

{rokbox title=|Maximum likelihood (ML) tree for Vilesida based on COI sequences, reconstructed using RAXML under the generalized time-reversible Gamma (GTRGAMMA) model :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-vilesida-new-order-diaz-2025-thumb-et-al.jpeg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-vilesida-new-order-diaz-2025-et-al.jpeg{/rokbox}

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[Vilesida, a new order of demosponges revealed by molecular phylogeny and abundant 24-isopropylcholesterols \(24-ipc sterols\)](#)

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Abstract: We propose the creation of Vilesida ord. nov. (Porifera: Demospongiae), initially discovered thanks to molecular markers. Species from this new order share monactinal and diactinal megascleres arranged in a confused halichondrioid fashion and are currently scattered in the orders Suberitida, Bubarida, and Axinellida. All species analysed share a chemical synapomorphy not found in any other eukaryotic group: C30 sterols with an isopropyl group in the sidechain at C-24 as their major membrane sterols. These are precursors of the sterane 24-isopropylcholestane, abundant in some Neoproterozoic oils/rocks and hypothesized to be an early sponge biomarker. We propose: (i) the resurrection of *Viles*; (ii) its establishment as the type genus of Vilesidae fam. nov., the only family present in the new order; (iii) the reallocation of

ca *Petromi* and

Axinyssa

to the new order; and (iv) the creation of

Murus

gen. nov. in Vilesidae fam. nov. The type species of Murus, *Murus hirondellei* comb. nov., was previously placed in

Phakellia

(order Bubarida). In addition, we describe two new species from the Northeast Atlantic and the Mediterranean:

Murus

profunda sp. nov. and

Murus sinenotis

sp. nov.

Keywords: *Axynissa*, chemotaxonomy, cryptic species, integrative taxonomy, *Petromica*, Porifera, new taxa, sponge biomarkers, sponge lipids, Viles