

{rokbox title=|Examples of individuals collected during the surveys :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-distribution-micronektonic-crustacean-bay-biscay-pena-et-al-2023-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-distribution-micronektonic-crustacean-bay-biscay-pena-et-al-2023.jpg{/rokbox}

**Marian Peña**, María Moyà, **Aina Carbonell**, Rafael González-Quirós, 2023. [Vertical distribution and acoustic characteristics of deep water micronektonic crustacean in the Bay of Biscay.](#)

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**Abstract:** Vertical distribution of meso- and bathypelagic crustacean are scarcely known. The logistics involved in their studies hinder an adequate assessment of their role in the deep ecosystems. As a result, the literature on zooplankton scattering models is mainly focused on epipelagic organisms, particularly krill species. This study analyses data of the plankton community classified by family from the surface down to 2000 m taken in the Bay of Biscay, but focusses on the meso- and bathypelagic zone. Photographic data was employed to obtain a micronektonic crustacean shape catalogue. The Distorted Wave Born Approximation (DWBA) model was employed to estimate target strength. Pasiphaeidae, Euphausiidae and Acanthephyridae were mainly distributed above 500 m depth, while Benthescymidae, Sergestidae and Mysidae were concentrated in the lower mesopelagic to upper bathypelagic area. The most abundant species were Euphausiidae and Benthescymidae with up to 30 and 40 individuals per cubic meter respectively. Standard length ranged from 8 to 85 mm and was significantly related with height but not with depth. The Pasiphaeidae family presented the largest individuals followed by Acanthephyridae and Sergestidae while Euphausiidae, Benthescymidae, and Mysidae were shorter. An smooth fluid-like response was estimated for shorter organisms, while individuals of 60 mm or higher present TS oscillations from around 60 kHz. Pasiphaeidae present an almost 10 dB higher TS than Sergestidae, Acanthephyridae and Benthescymidae while Mysidae followed by Euphausiidae produce the lower TS. Simple models of TS values at broadside versus the logarithm of standard length (SL) that can be employed as an approximation of their scattering are provided for four common frequencies ( $TS = 58.5 \cdot \log_{10}(SL) - 188.7$ ,  $TS = 57.03 \cdot \log_{10}(SL) - 174.1$ ,  $TS = 22.48 \cdot \log_{10}(SL) - 157.14$ ,  $TS = 17.55 \cdot \log_{10}(SL) - 135$  and  $TS = 10.53 \cdot \log_{10}(SL) - 109$  at 18, 38, 70, 120 and 200 kHz respectively). Changes in body density and sound speed contrast may increase by 10 or 2 dB the resulting TS respectively but are constant in phase, while orientation can decrease the TS by up to 20 dB at the higher frequencies and alter the spectra to an almost flat trend. This study provides further insight into the vertical distribution and physical characteristics of the micronektonic crustacean families inhabiting the Bay of Biscay down to 2000 m depth. It also

estimates their echo from a real-shape catalogue that can be employed to infer knowledge from acoustic recordings, particularly of the lower mesopelagic and the bathypelagic zones.

Keywords: Shrimp, Abundance, Families, DWBA, Target strength, Mesopelagic, Bathypelagic, Season