Mucous-mesh grazer in the Benguela and Humboldt Upwelling Systems

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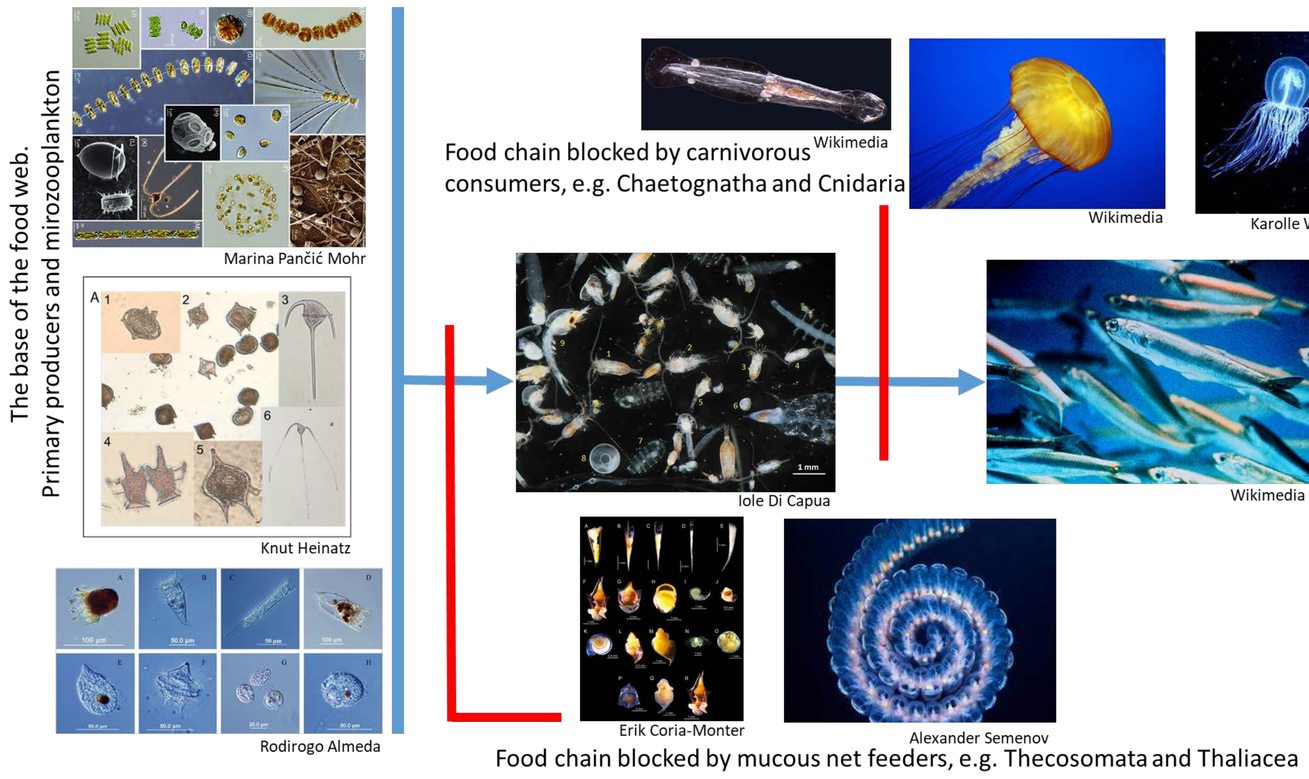
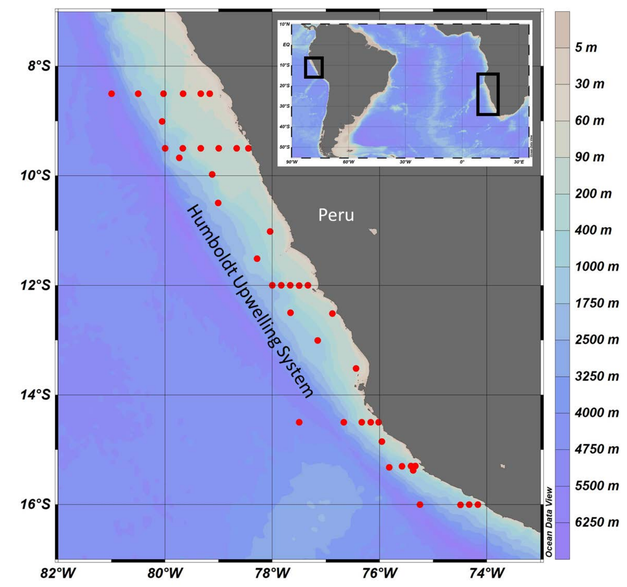
The GENUS (Geochemistry and Ecology of the Namibian Upwelling System), TRAFFIC (Trophic Transfer efficiency in the Benguela Current) and CUSCO (Coastal Upwelling System in a Changin<g Ocean) projects investigated processes that drive the trophic systems of the Benguela and Humboldt Upwelling Systems (BUS and HUS) and associated feedbacks to fisheries and climate.

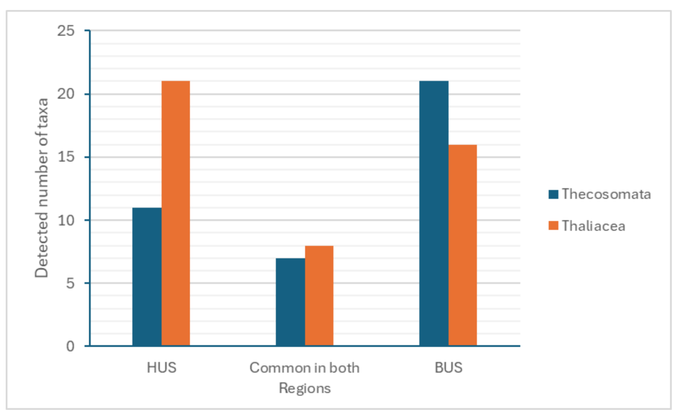
A simplified food chain can be blocked by blooms of carnivorous gelatinous organisms between zooplankton and fish, whereas blooms of mucous net feeders can block the pathway between the base of the food web (phyto- and microzooplankton) and meso- and microzooplankton.



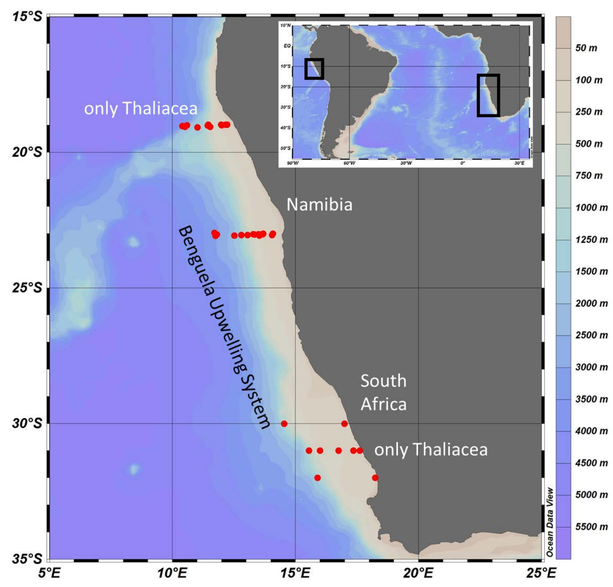
Limited information exists on mucous-mesh grazers such as Thecosomata (pteropods) and Thaliacea (salps and doliolids) due to methodological constraints in sampling, preservation, and identification, as well as a shortage of taxonomic expertise. Nevertheless, these organisms play crucial ecological roles. Thecosomata are significant grazers on microplankton, contributing substantially to both organic and inorganic particle fluxes. Meanwhile, Thaliacea exhibit rapid growth rates and occasionally form extensive blooms, during which they consume large quantities of phyto- and microzooplankton. Subsequently, they facilitate an increased carbon flux into deeper ocean layers through the sinking of their feces and the bodies of deceased or dying individuals.



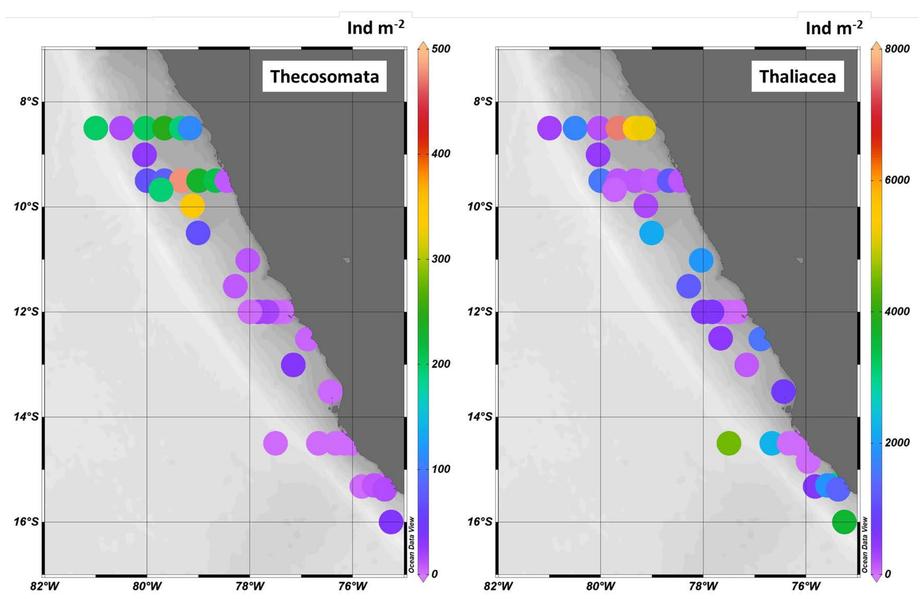
Sampled stations in the Humboldt Upwelling System.



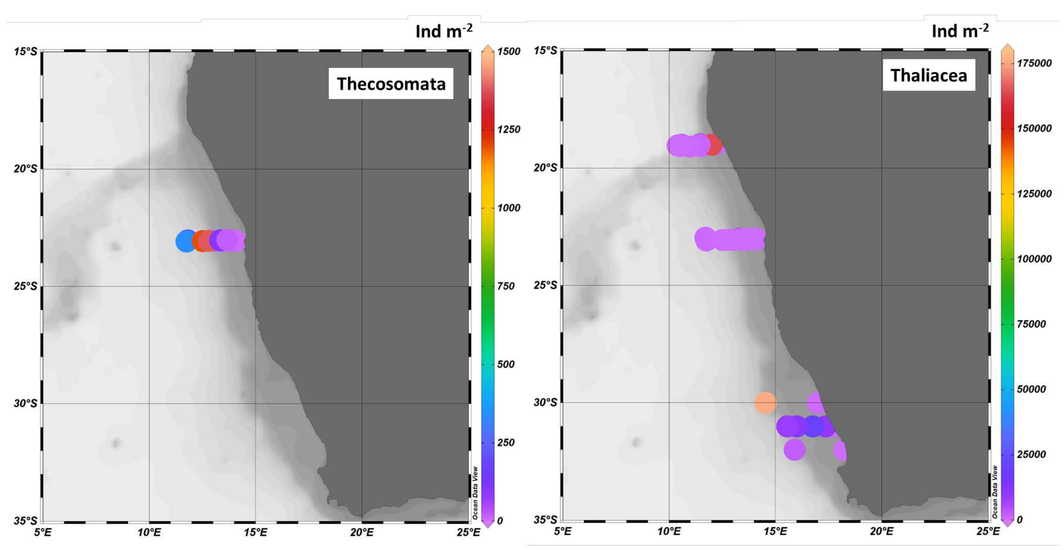
Number of Thecosomata and Thaliacea taxa in the Humbodt and Benguela Upwelling Systems and number of species common in both systems.



Sampled stations in the Benguela Upwelling System.

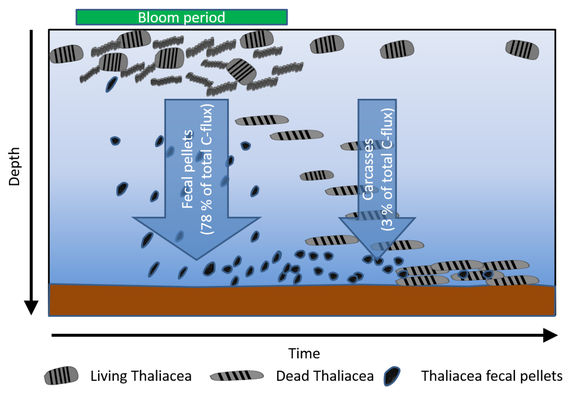


Thecosomata and Thaliacea abundance in the Humboldt Upwelling System.



Thecosomata and Thaliacea abundance in the Benguela Upwelling System.

Thecosomata were primarily observed in regions along the shelf edges, where particle concentrations were sufficiently high to supply ample food yet still low enough to avoid clogging of their mucous nets. In the Humboldt Upwelling System (HUS), their distribution was predominantly confined to the northern sector, in the Benguela Upwelling System (BUS), only one transect was analyzed. Thaliacea were found to be more prevalent across the entire surveyed areas. They occasionally formed blooms, particularly in the BUS, thereby exerting a significant influence on the carbon cycle.



A simplified flux scheme after a bloom of Thaliacea based on results by Martin et al. 2016.

Data used for this poster:

Auch D, Steinen V, Steckhan L, Koppelmann R, Yari S, Mohrholz V, Schukat A, Fernández-Méndez M, Richards Kittu L, Peck MA (2023) Oceanographic structuring of the mucous-mesh grazer community in the Humboldt Current off Peru. Mar Ecol Prog Ser 725:29-44.

Koppelmann R, Kullmann B, Lahajnar N, Martin B, Mohrholz V (2013) Onshore-offshore distribution of Thecosomata (Gastropoda) in the Benguela Current upwelling region off Namibia: species diversity and trophic position. Mar Biol Ass UK 93: 1625-1640.

Martin B, Koppelmann R, Kassatov P (2016) Ecological relevance of salps and doliolids in the northern Benguela Upwelling System. J Plank Res 39: 290-304.

Roth A (2023) Über das Vorkommen und die Ökologie der Thaliacea (Salpida & Doliolida) und hyperiiden Amphipoda der Gattung *Themisto* im südlichen Benguela Auftriebsgebiet. Bachelor thesis, University of Hamburg, 67 pp.

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