

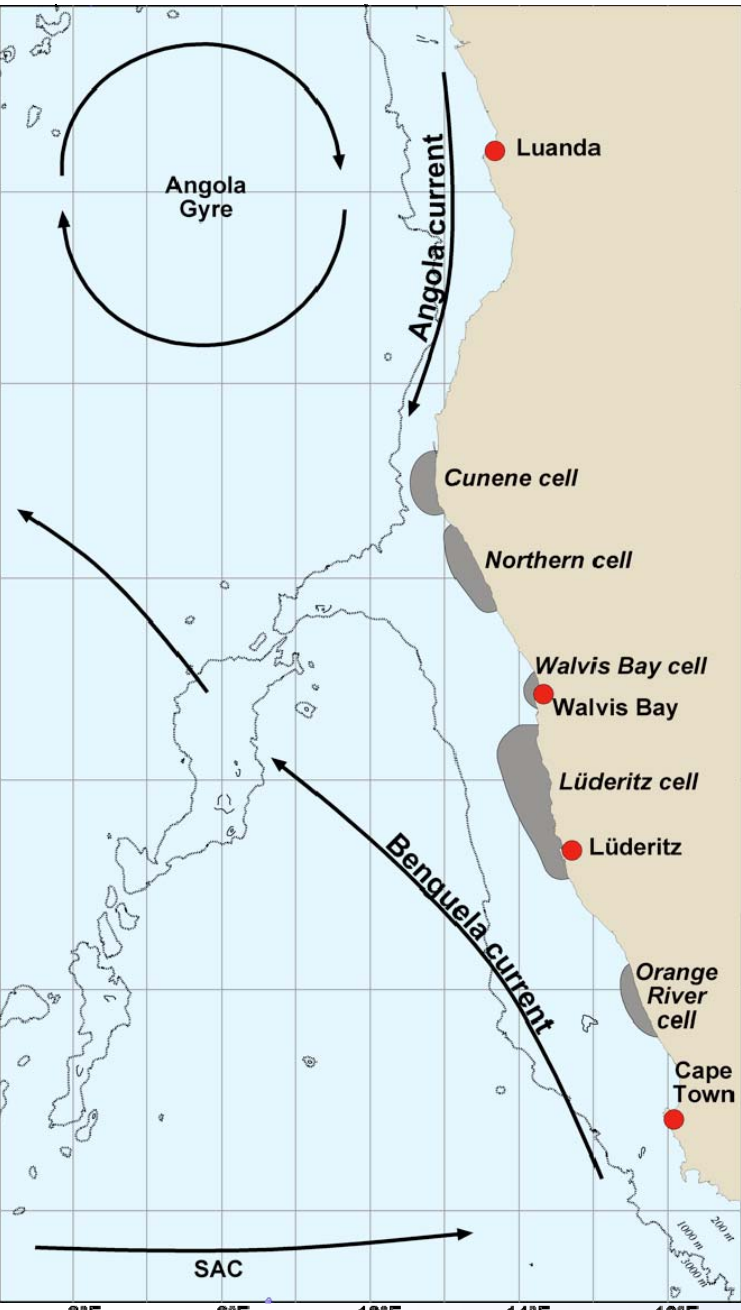


Food-Web Structure and Trophic Interactions in the Northern Benguela Upwelling System

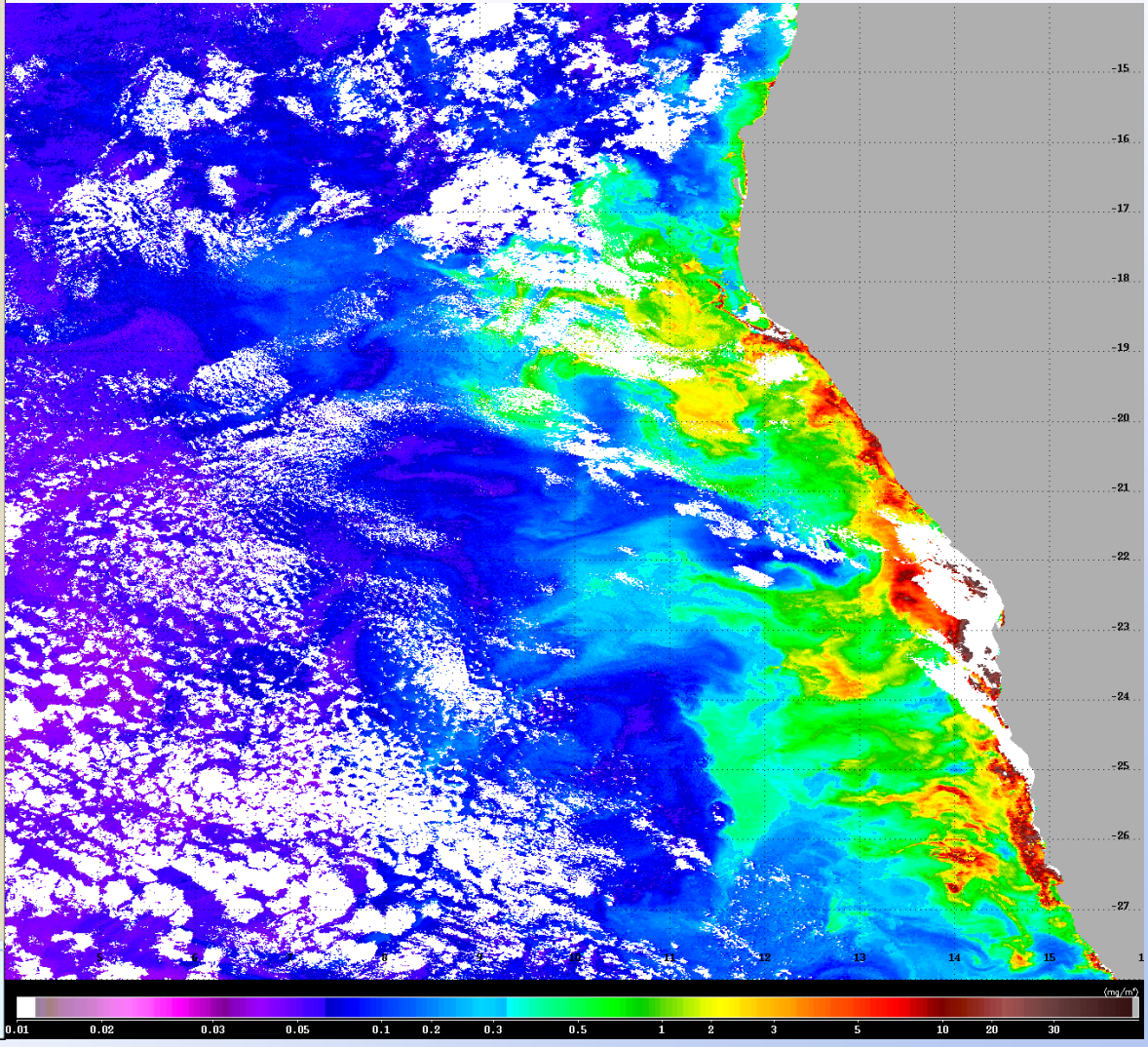


**Holger Auel, Anna Schukat,
Wilhelm Hagen, Maya Bode**
University of Bremen
and the whole **GENUS** Team

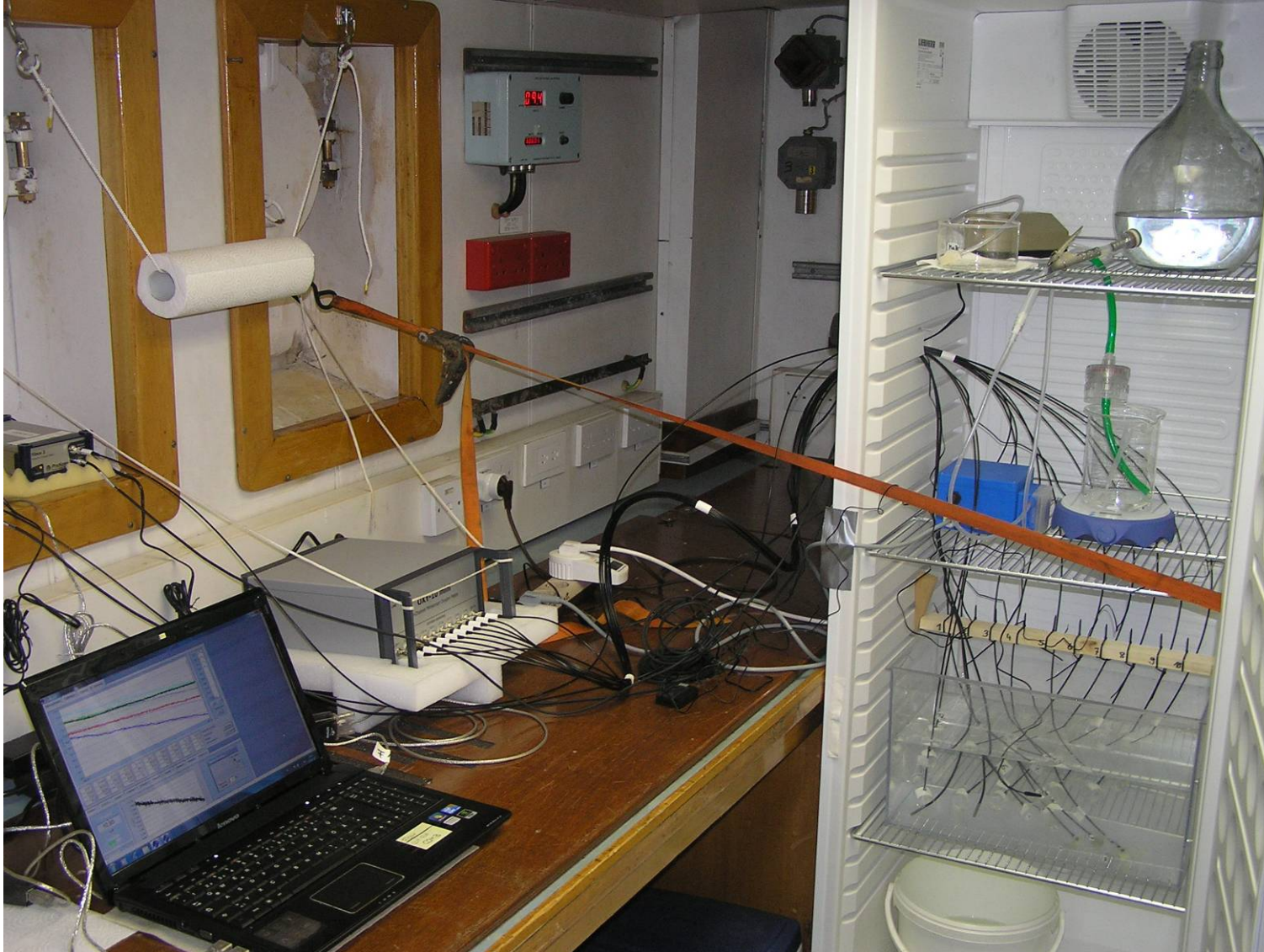




**Chl a concentration
20-24 March 2008**

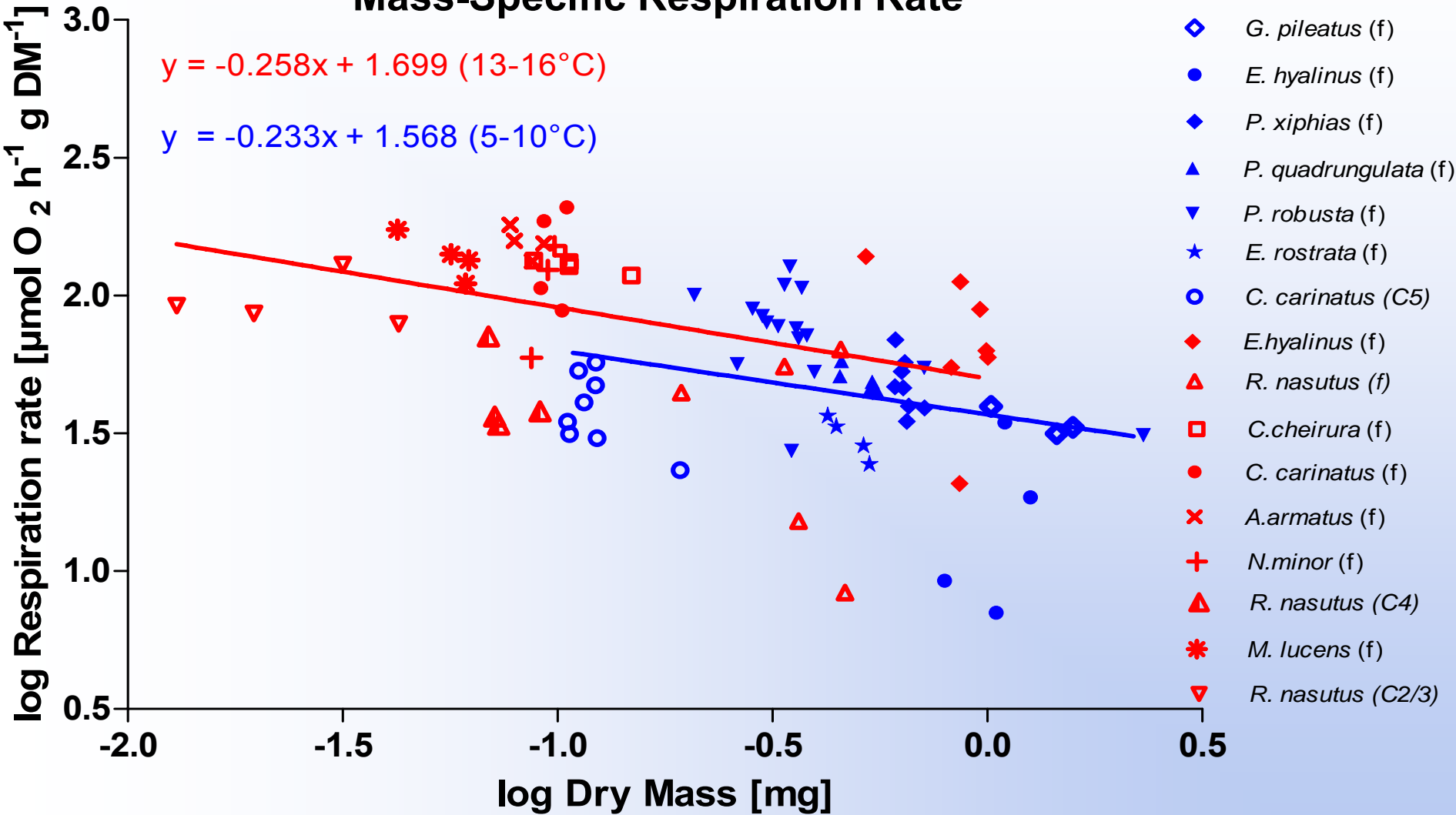


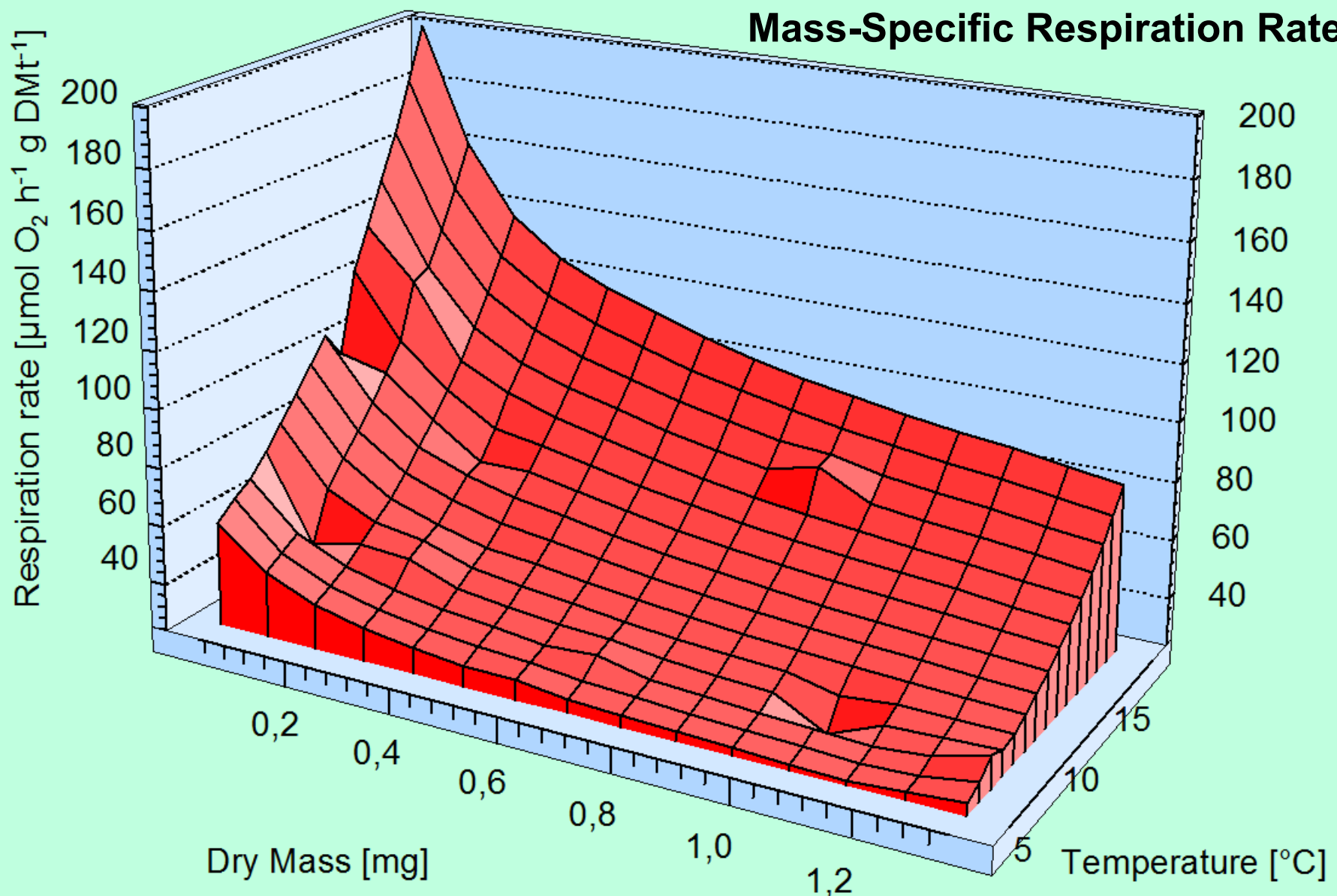
- **To develop a standardised experimental method to determine metabolic activity and energy demand of different zooplankton taxa**
- **To quantify the respiration and energy demand of key zooplankton taxa**
- **To parameterise zooplankton respiration and consumption based on proxies that are easier to measure**
- **To establish the dietary spectra and trophic levels of different zooplankton taxa by means of trophic biomarkers**
- **To incorporate these empirical data into a foodweb model using the Ecopath with Ecosim software package**
- **To assess and quantify the ecological roles of dominant zooplankton taxa (i.e. copepods, decapods, krill & fish larvae) for the pelagic foodweb and carbon cycle**

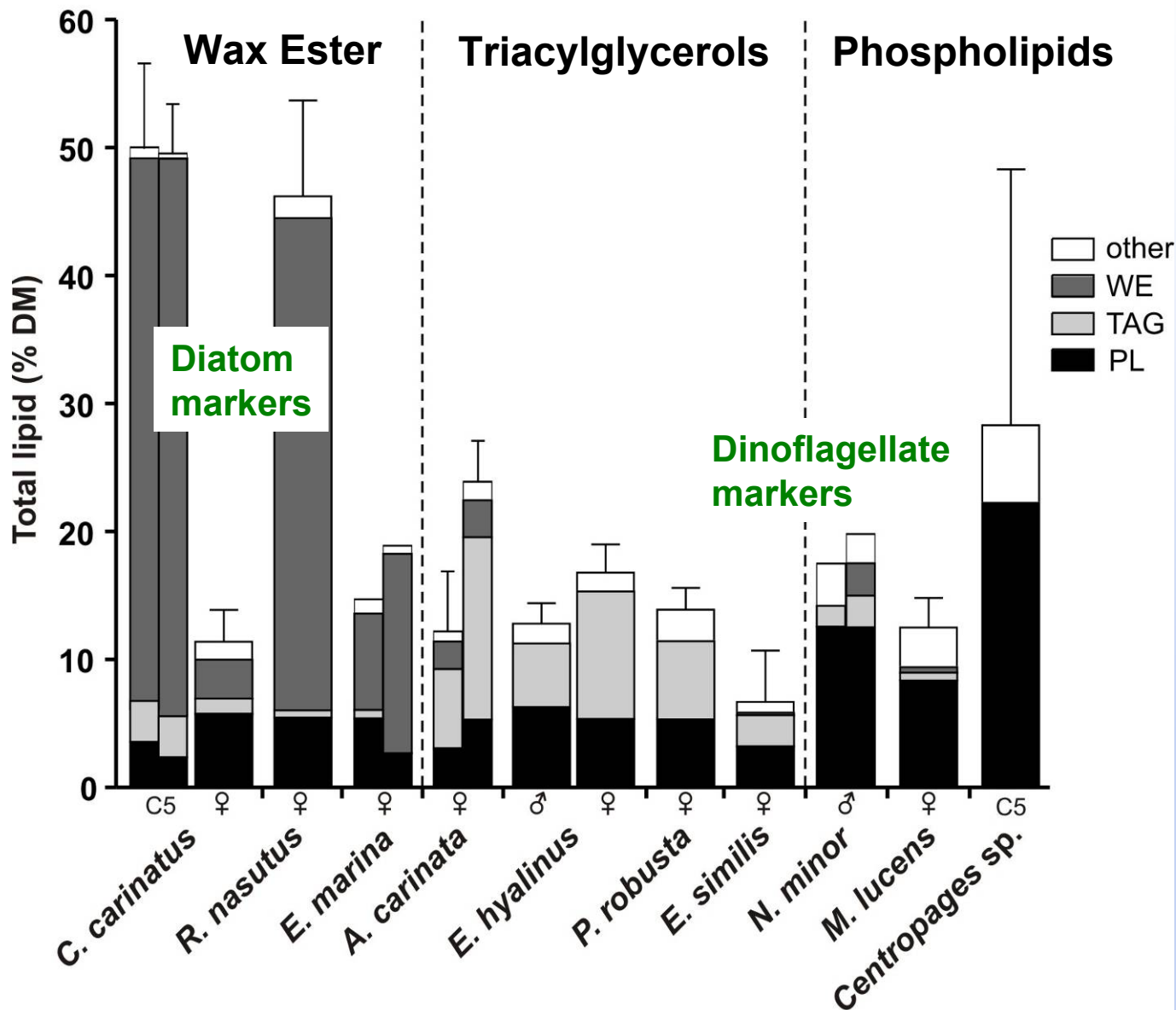


Experimental setup for respiration measurements on board by optode respirometry

Mass-Specific Respiration Rate







Different lipid storage strategies:

WE: long-term storage, often related to diapause

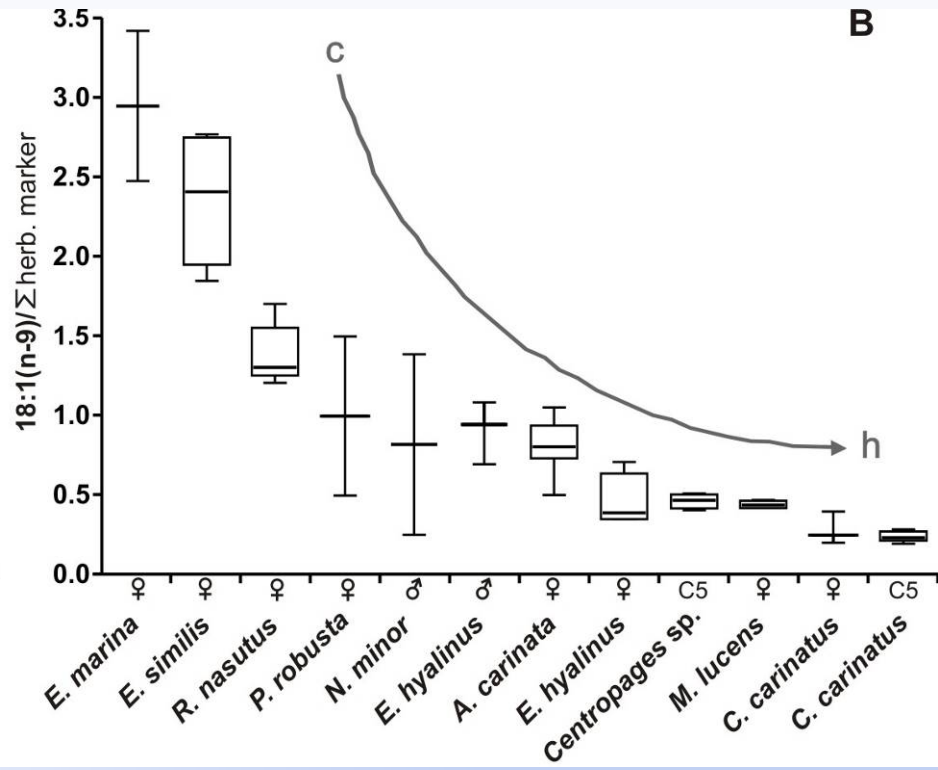
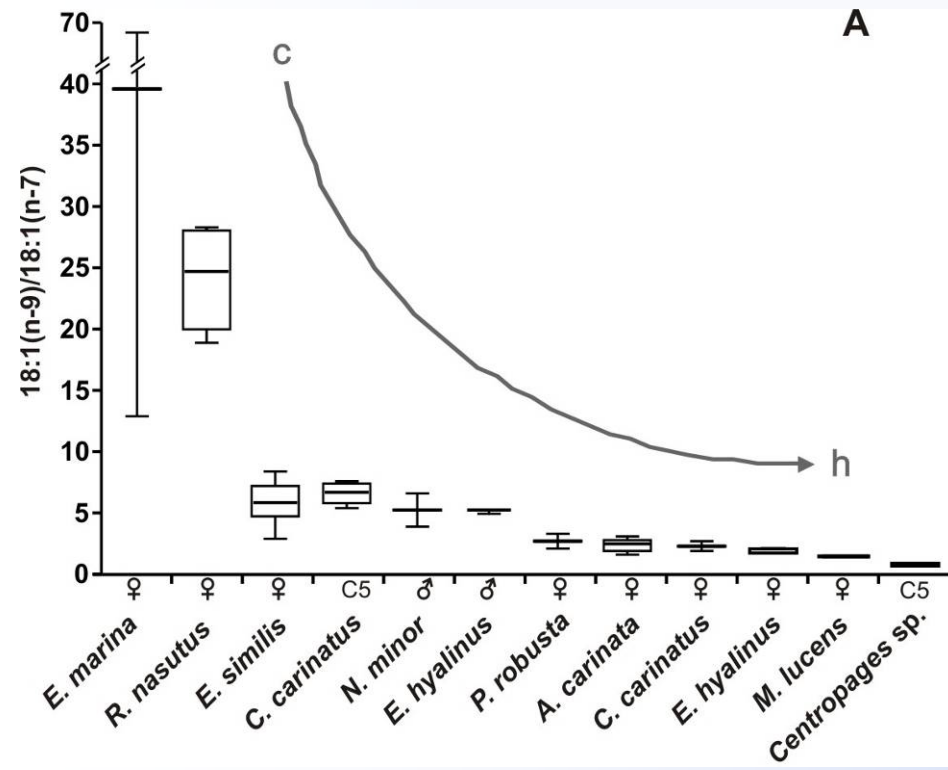
TAG: short-term storage, easier accumulation and catabolism

PL: mainly structural components of biomembranes, but also short-term storage

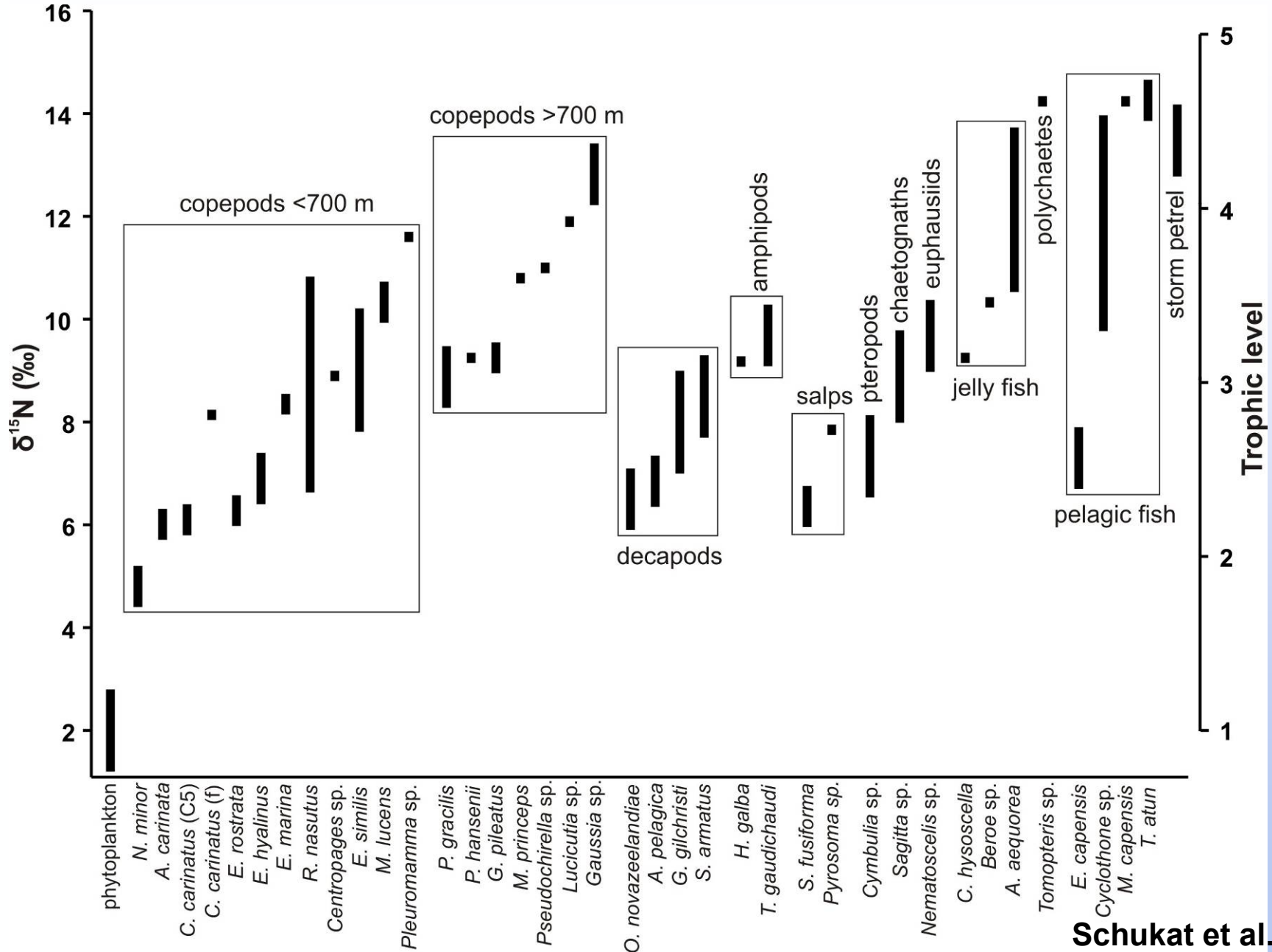
Species-specific & ontogenetic differences

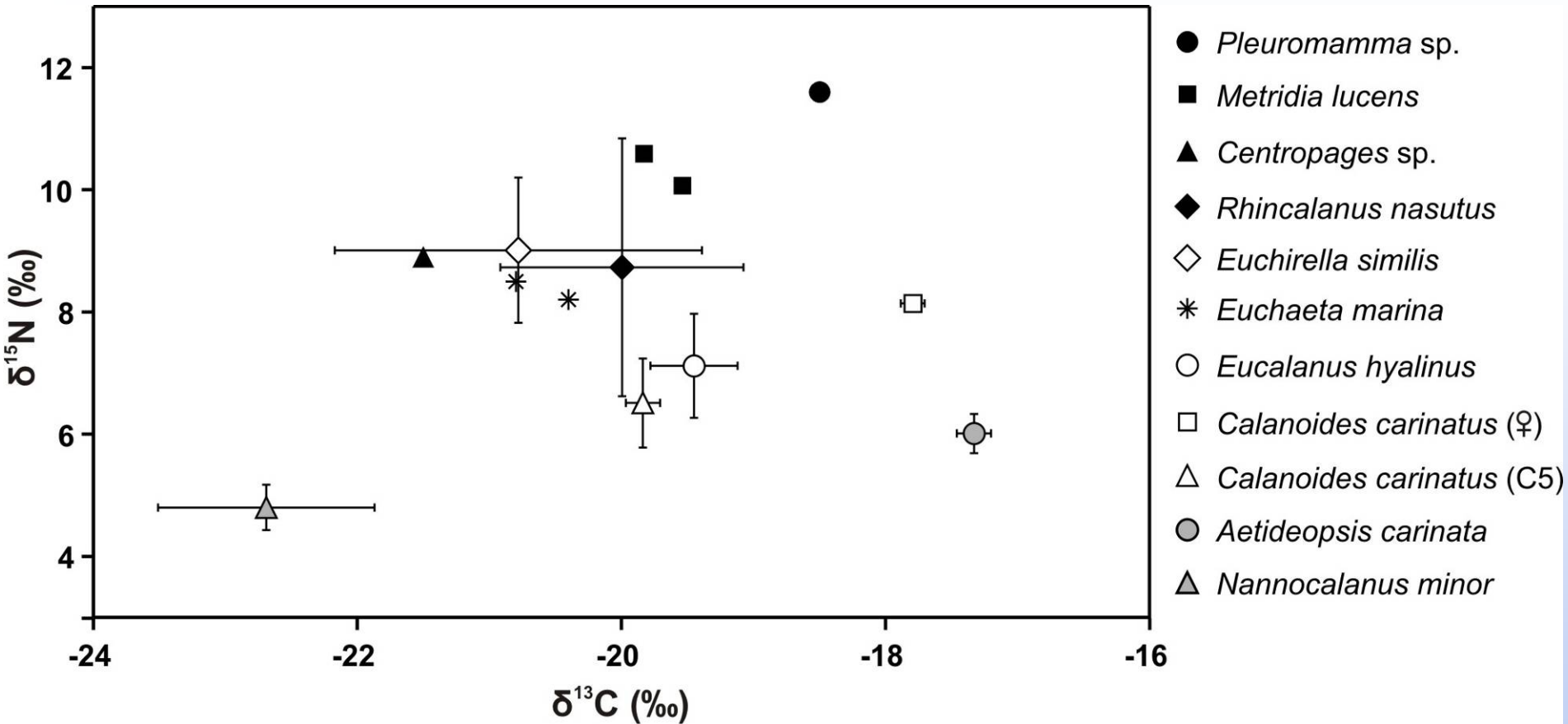
18:1(n-9)/18:1(n-7)

18:1(n-9)/Σ herb. markers



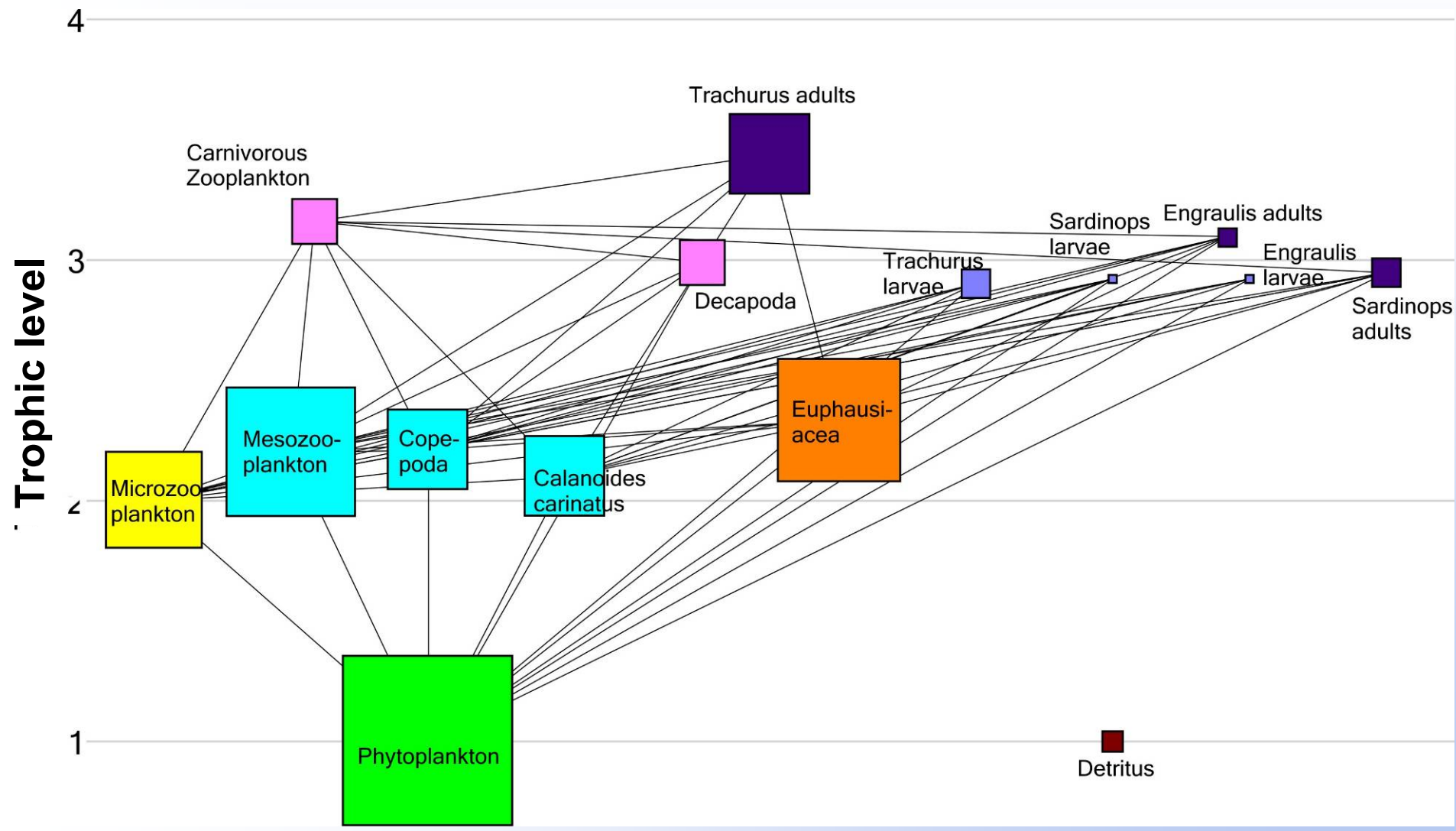
**Sequence of species from carnivory to herbivory:
Most copepods are NOT (strictly) herbivorous.**

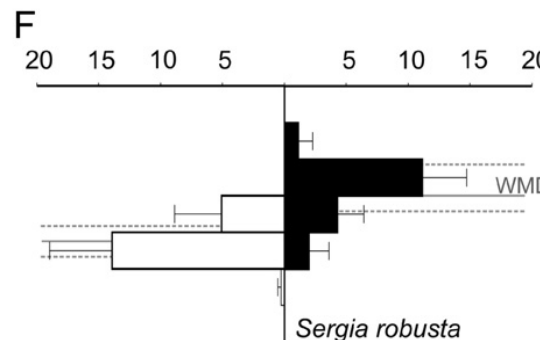
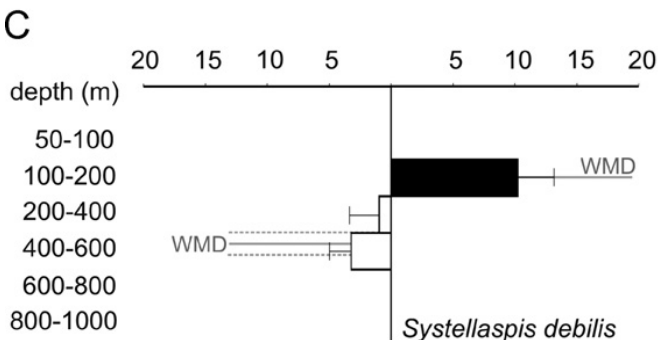
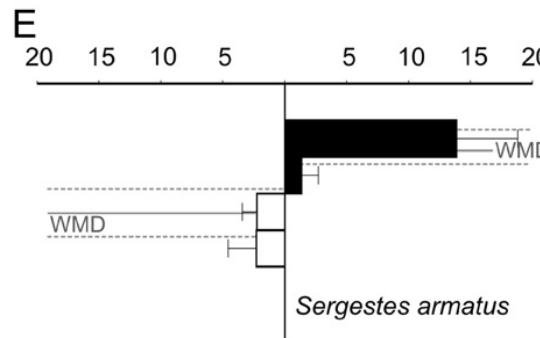
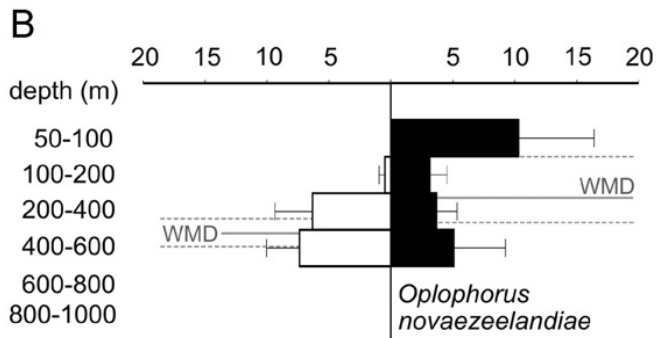
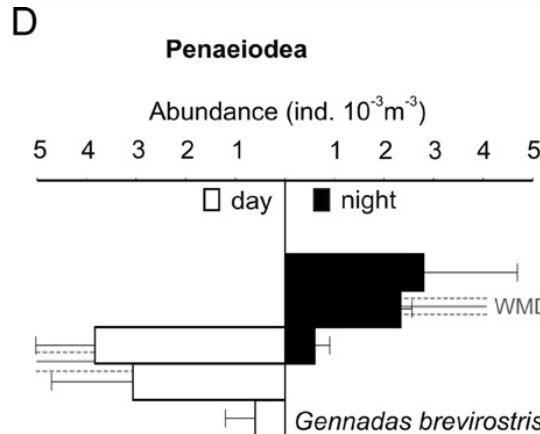
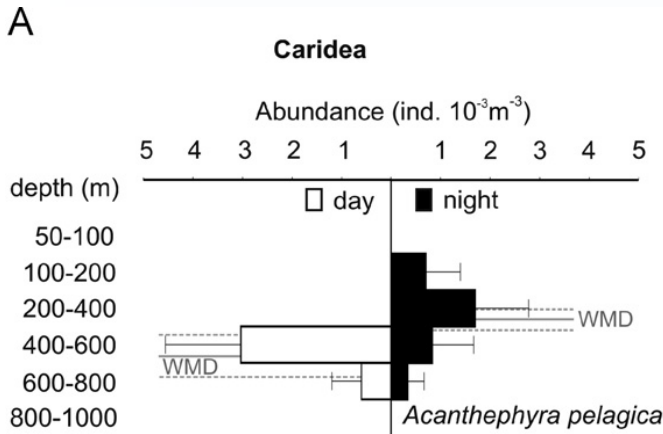




Wide range of $\delta^{15}\text{N}$ ratios from 5 to 12, i.e. spanning over at least 2 trophic levels.

ECOPATH with ECOSIM model with high taxonomic resolution at lower trophic levels





Pelagic decapods:

**7 to >20 mg C m⁻² d⁻¹
highest towards the north**

**Pronounced diel vertical
migrations > Contribution to
vertical carbon flux &
export to the deep sea.**

Calanoid copepods:

**78 mg C m⁻² d⁻¹ on the shelf
21 mg C m⁻² d⁻¹ oceanic**

**Locally, *Calanoides carinatus*
may remove up to 90% of
diatom biomass per day.**

- **Optode respirometry is the ideal method to measure respiration rates of zooplankton organisms.**
- **Zooplankton respiration rates can be parameterised based on temperature, body mass and activity level.**
- **Trophic interactions within zooplankton and particularly the trophic roles of calanoid copepods are more complex than just linking primary production to higher trophic levels.**
- **Building a realistic data set of dietary spectra (predator-prey matrix) is the true challenge when creating an EwE model. Trophic biomarkers are useful, but yet not sufficient.**
- **There are indications that parts of the foodweb are top-down controlled.**
- **For more details, see posters by Schukat et al. and Hagen et al. during the poster session**

