

Absorption of organic carbon into copepods changes with phytoplankton concentration and species composition

Ida Wendt and Peter Thor

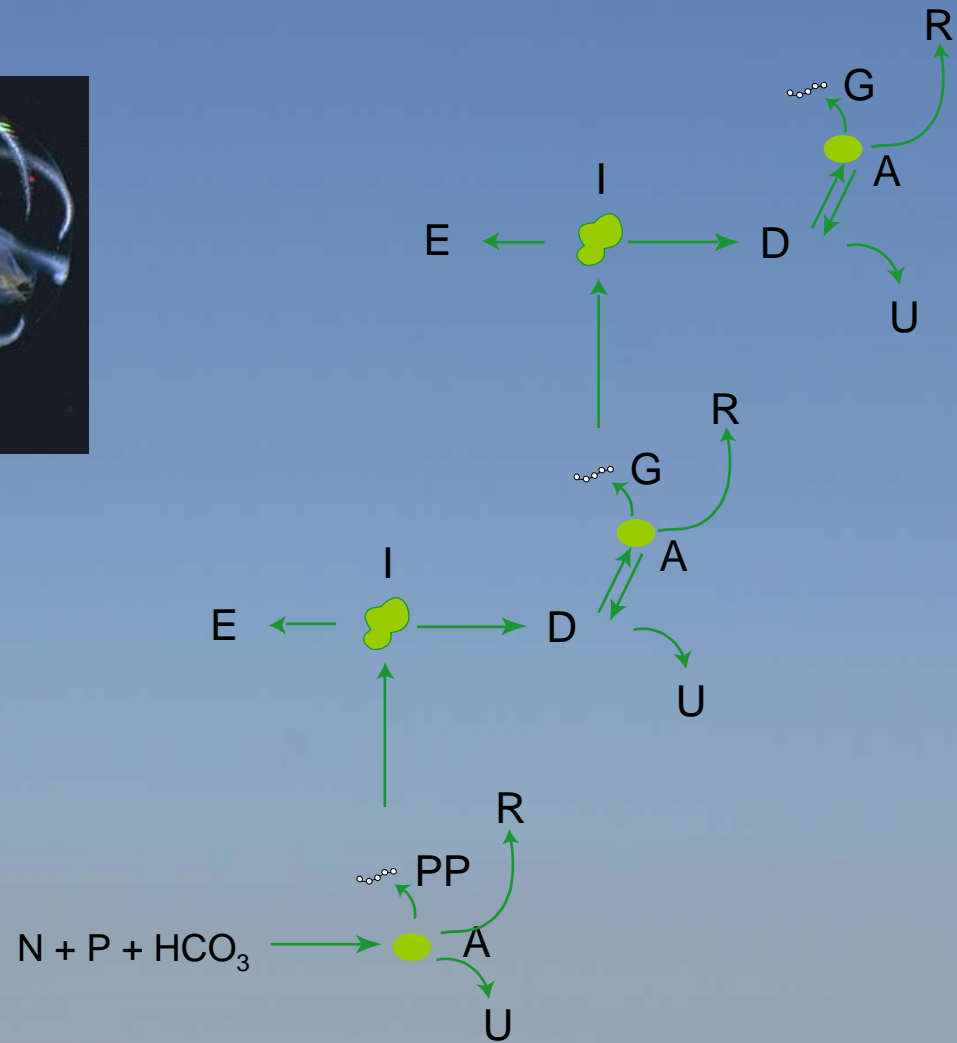
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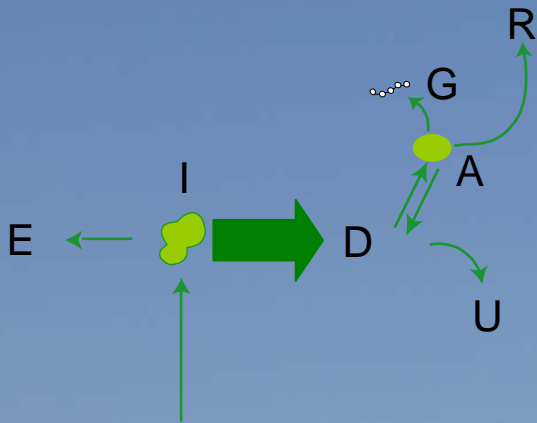


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- *Carbon absorption in copepods is important to pelagic carbon flux*
 - *controls production of faecal material*
 - *controls growth rate*
- *nevertheless, data on direct measurements of AE are scarce*
- *modellers tend to use constant AEs or AEs as functions of IR*







Since, in terms of carbon:

$$d = g + r + u \quad (1)$$

and

$$\text{GGE} = \frac{g}{i} \quad (2)$$

where d is the rate of carbon absorption in the gut, g is growth rate, r is respiration rate, u is excretion rate, and i is ingestion rate, it follows that:

$$g = d - (r + u) \quad (3)$$

and

$$\text{GGE} = \frac{d - (r + u)}{i} \quad (4)$$

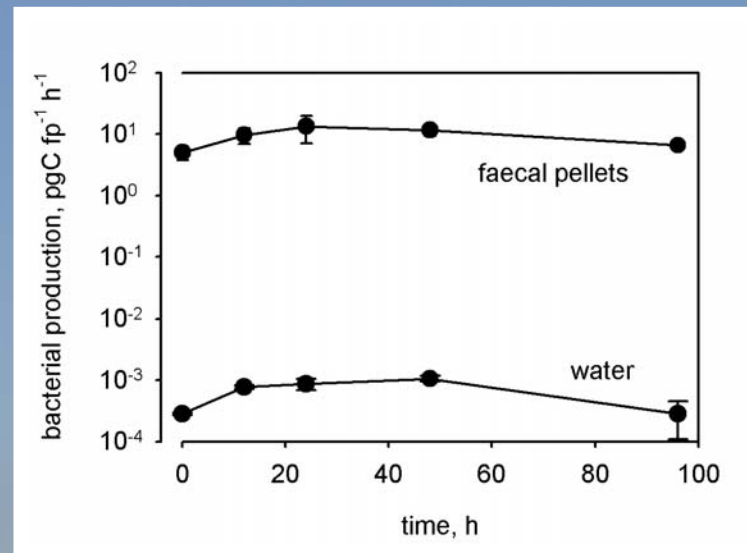
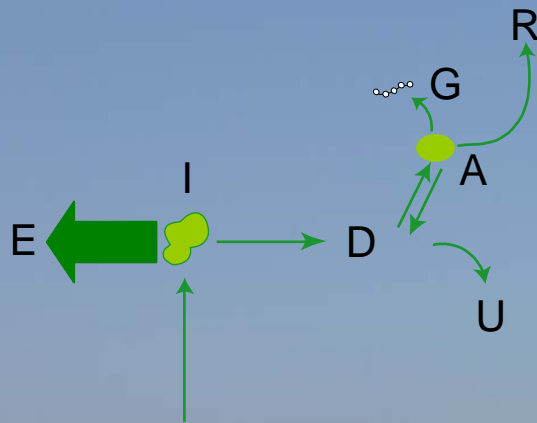
From Thor et al 2007

- Growth depends on d , r , and u
- Respiration is strongly coupled to growth (Thor et al. 2002)
- Excretion of carbon is very low (Miller & Glibert 1998)
- Growth is therefore controlled primarily by d



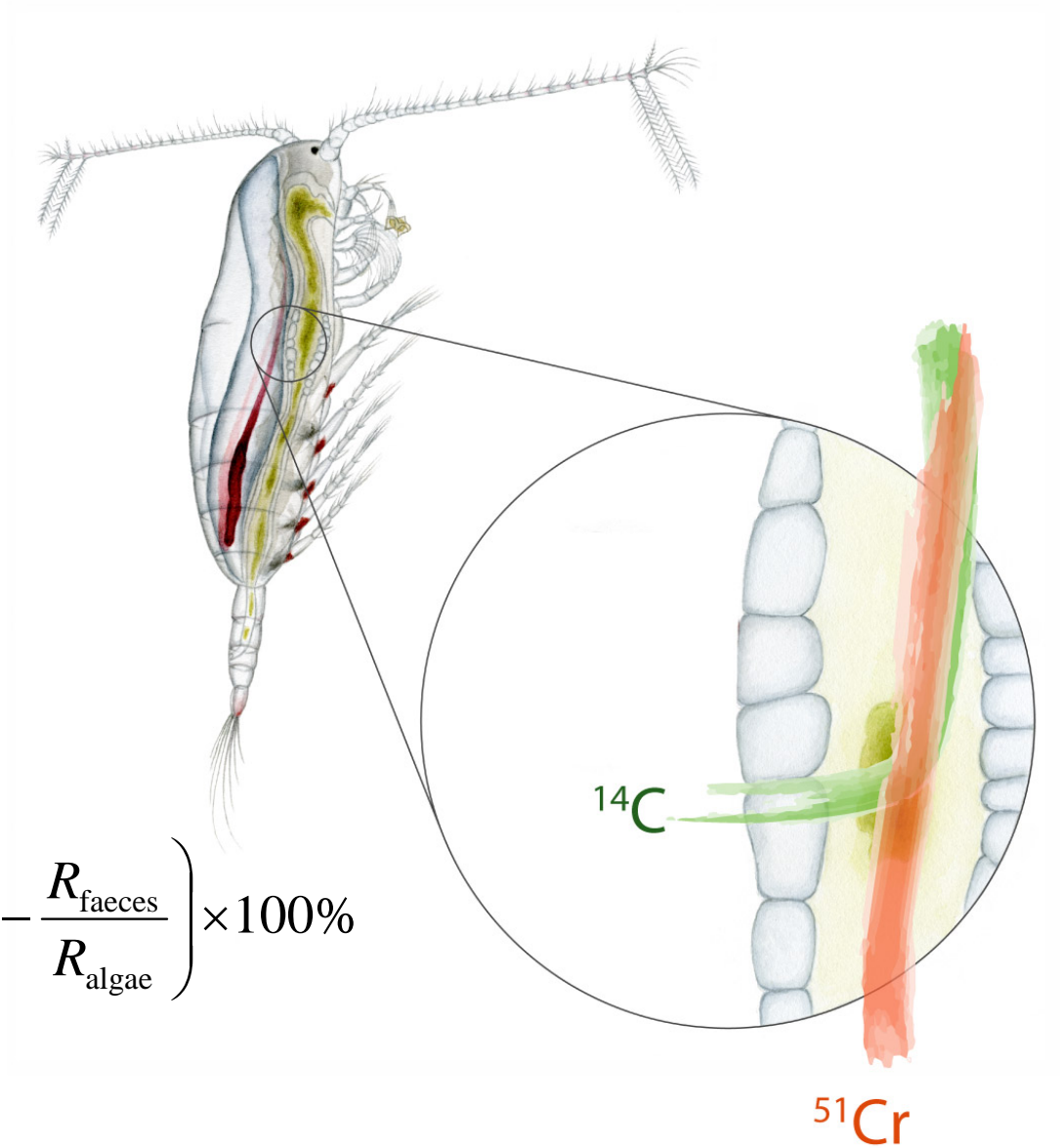
Faecal material from 2 mm-copepods do not leave the mixed zone
and do not contribute significantly to vertical carbon flux

On the other hand, copepod faecal pellets constitute microbial hot spots in the mixed zone



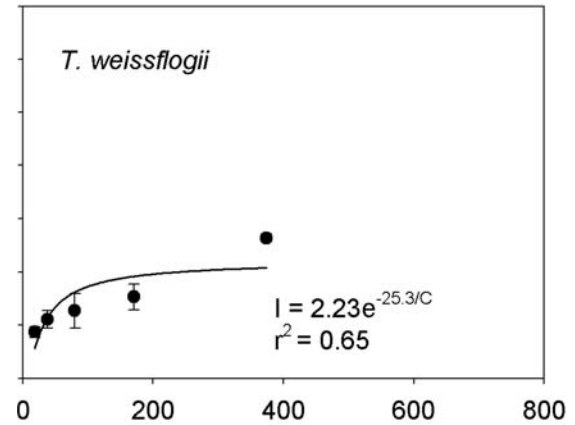
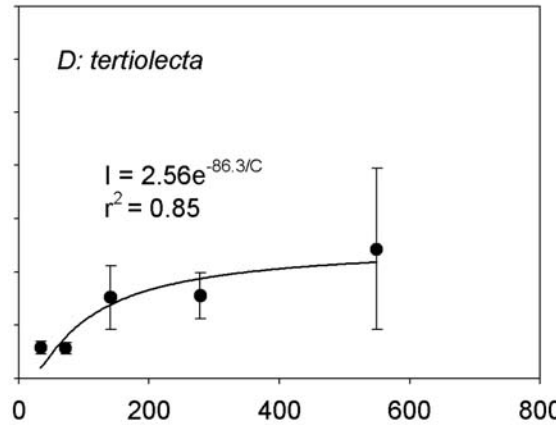
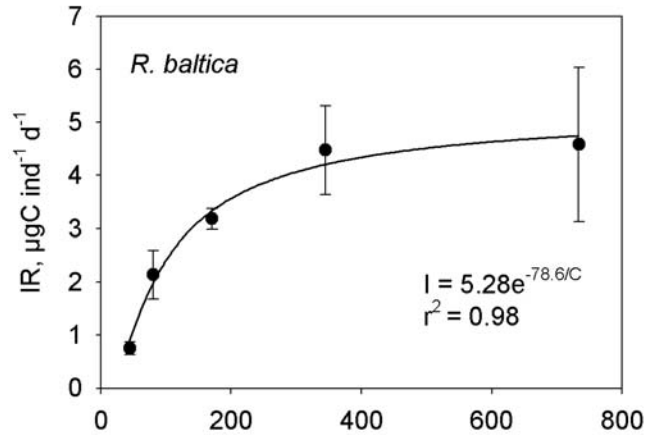
Thor et al. 2003





$$AE = \left(1 - \frac{R_{\text{faeces}}}{R_{\text{algae}}} \right) \times 100\%$$

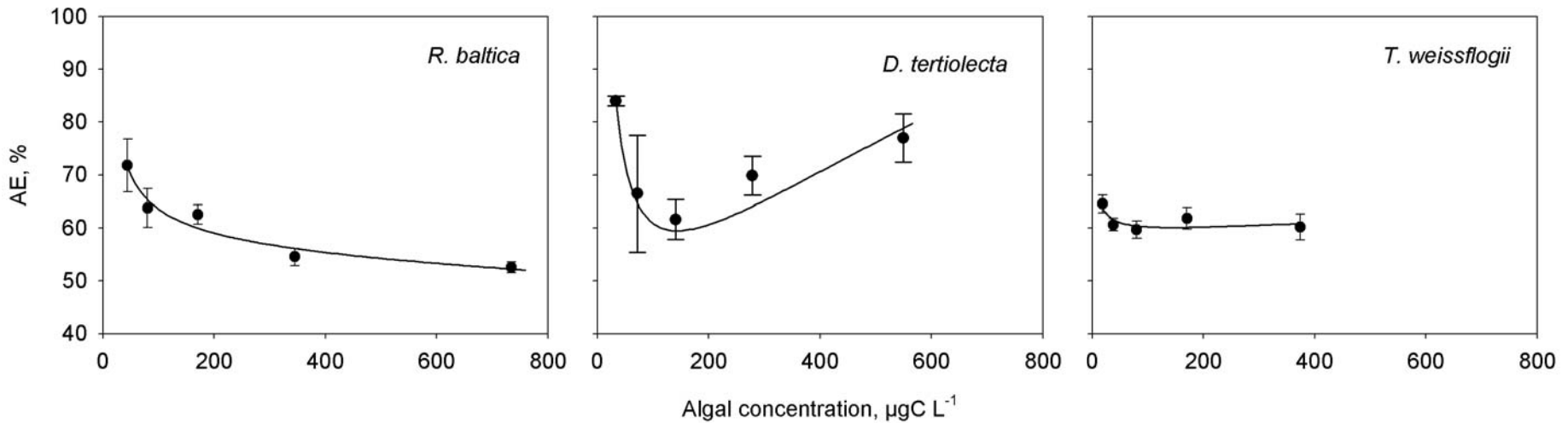
Drawing: Maj Persson



Algal concentration, $\mu\text{gC L}^{-1}$

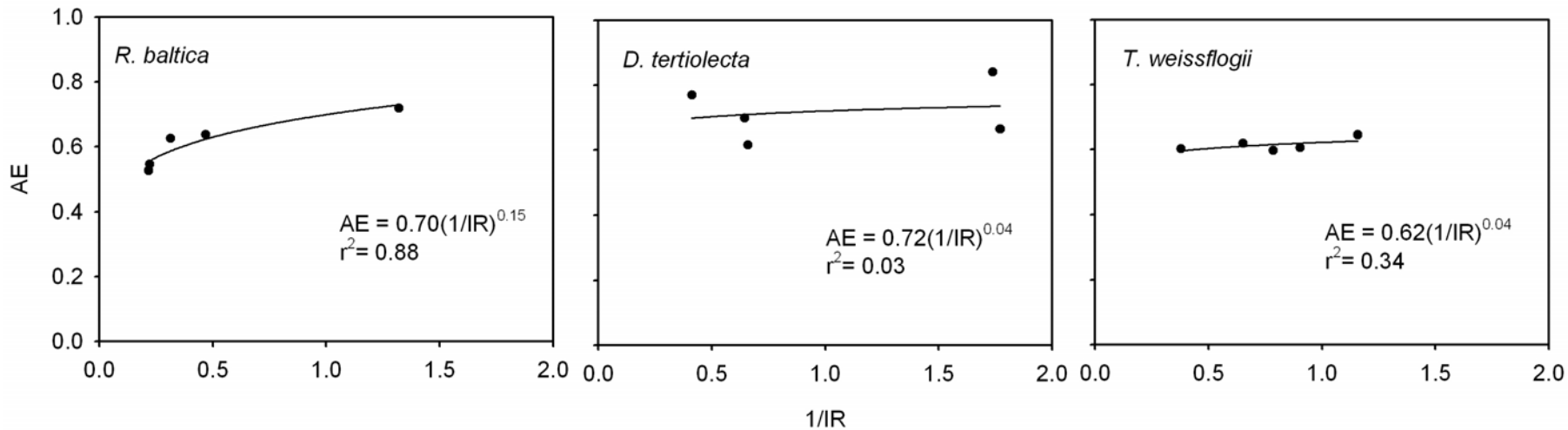


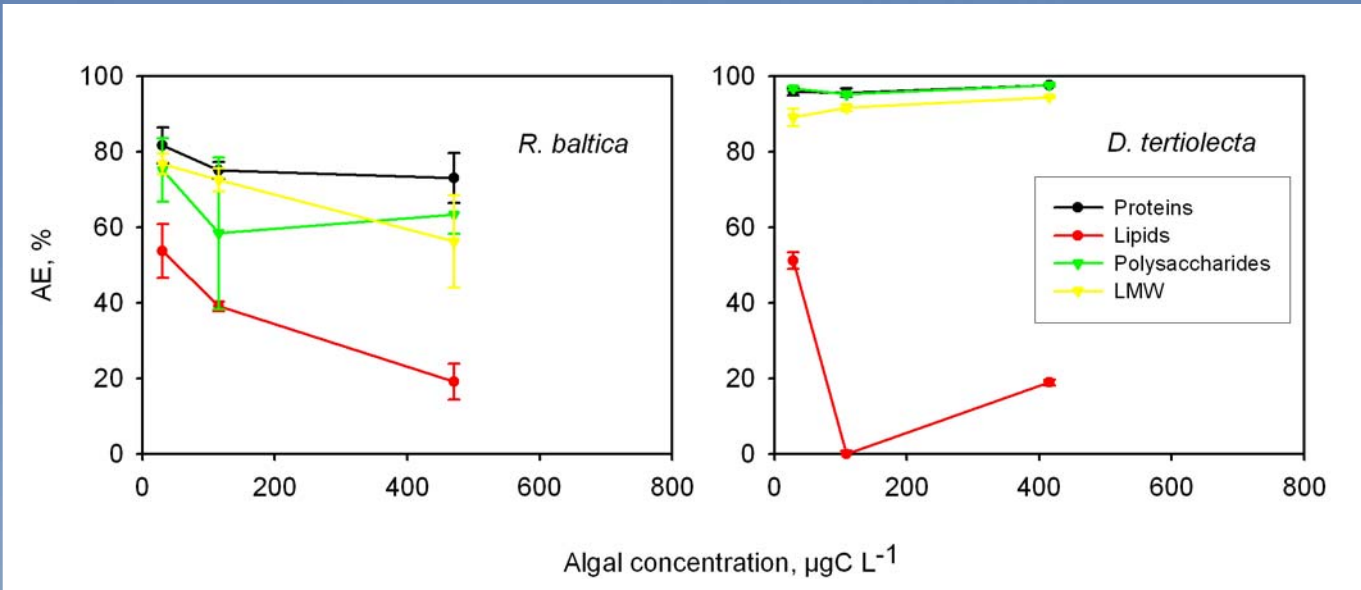
$$AE = k + m \frac{\ln C}{C} + n C^{0.5} \ln C$$

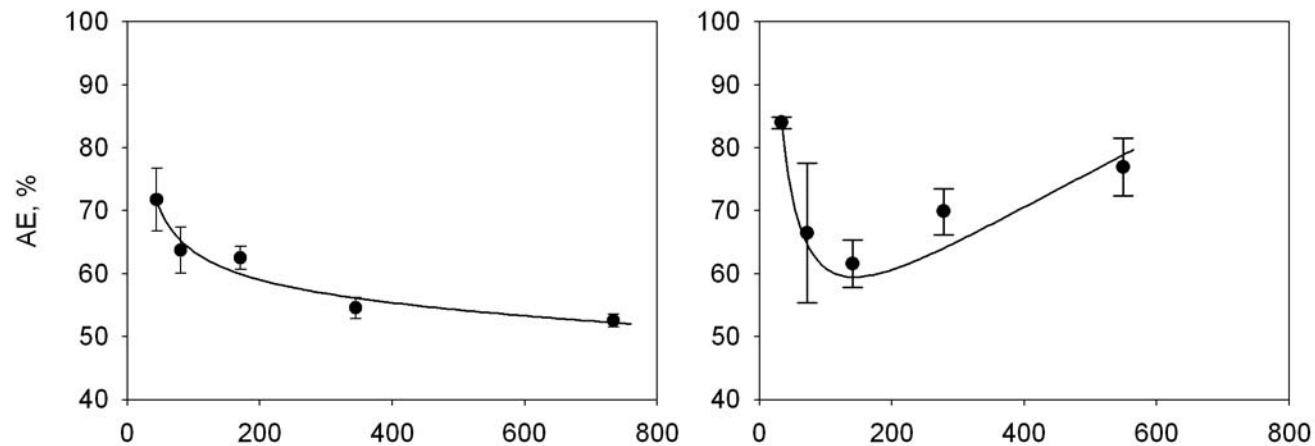
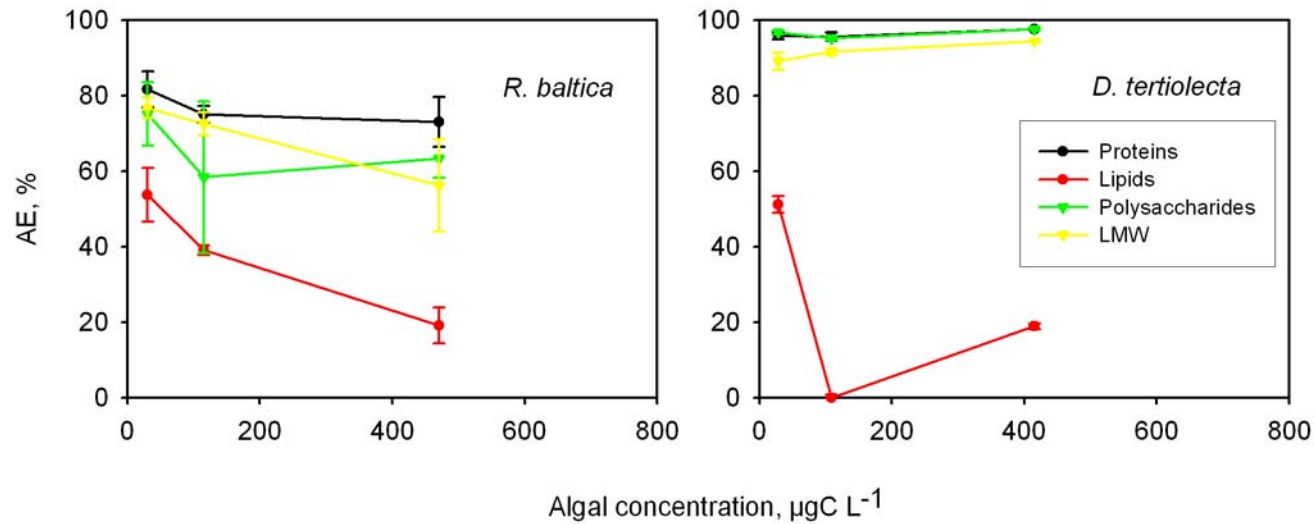


<i>Variation due to diet</i>	52.6- 84.0 %
<i>Variation due to conc.</i>	55.3- 73.4 %









Aksnes and Wassman 1993

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Conclusions:

- AE varies tremendously with prey density and type
- AE is not constant or a function of IR or GPT
- Take AE into account when modelling copepod mediated carbon flux
- Overall carbon AE seems correlated to lipid AE
- Future work: Microzooplankton prey

