Modelling the metabolism of European flat oyster larvae

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Ostrea edulis is a native oyster species that inhabits the European coastlines. Its common name, the European flat oyster, refers to the smooth and flat shell appearance of its shell. Flat oysters have been recognised as valuable ecosystem engineers, that can create rich and diverse ecosystems. However, over- exploration, non-indigenous diseases and pollution have led to the decline of flat oyster stocks to near extinction in the Belgian part of the North Sea. In response, European countries have initiated large scale restoration projects, aiming to reintroduce O. edulis and the ecosystem it sustains. To support the oyster reef restoration efforts, it is necessary to be able to understand, quantify and model individual characteristics of the flat oyster.

In 1993, Koojiman first published the Dynamic Energy Budget theory (DEB), which quantifies energy and mass fluxes through an individual organism. The DEB model allows for the simulation of growth, reproduction, ageing and condition, based on external factors, such as food availability and temperature. Additional improvements to the model have been developed to adapt the standard DEB model to species with a more complex life cycle (several larval stages, metamorphosis, settlement, et cetera). Further improvements now allow the DEB model to be used as an individual based model (IBM-DEB). What's more, when inter-species interactions play, DEB can even be extended to ecosystems.

In this study, the DEB model will be parameterised for flat oyster larvae, taking into account the environmental characteristics of the Belgian North Sea. This will create an in-depth understanding of the larval metabolism and support connectivity studies of oyster populations.
The results of the DEB model for flat oyster larvae will contribute to European oyster restoration projects, while also helping to reach the aim put forward in the Maritime Strategy: reaching an improved ecological status in the Belgian part of the North Sea.

Reference
Kooijman, S.A.L.M. (2010). Dynamic Energy Budget theory for metabolic organisation. Cambridge University Press.

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