Telecourse DEB 2011

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I've first hear of the Dynamic Energy Budget (DEB) when I start to work at CIIMAR. The responsible for the project talk a little bit about it and explain me that the DEB is a well-conceived theory where the process of substrate uptake and use by organisms is explained. So my first objective in this work was to try to obtain information to complement the parameters needed to apply DEB regarding the species *Crangon crangon*.

DEB uses the individual for the metabolic organization because at this organizational level it is easy to make energy and mass balances. According to DEB biomass is sectioned into one or more reserves and one or more structures. Reserves and structure have the main difference between them in their dynamics. Reserves are important for very reasons, mainly to smooth out fluctuations in resource availability and to explain the chemical composition of the individual. Reserves also explain the three energy fluxes - assimilation, dissipation and growth - that couldn't be explained by any other way. Reserves are used to fuel all metabolic needs of the individual.

For the last year I've been working with the brown shrimp *Crangon crangon* (L.), a highly abundant epibenthic crustacean along European shallow waters from Norway to Morocco and throughout the Mediterranean and Black Seas (Campos J. & Van Der Veer, H. 2008).

My work is related to the physiological performance of *C. crangon* along the European Coast, and the first step for this study was to set an experiment under controlled conditions, where the shrimps were maintained under starvation for several weeks. One of the purposes is to investigate how this species uses their reserves, trying to set parameters for the DEB model. Mainly we want to study how proteins, lipids and carbohydrates are used by the individual under long periods of starvation and to confirm if proteins are indeed the main reserve compound of this crustacean, as is been suggested by Comoglio L. et al (2004), or if these species uses glycogen as a first and proteins as a last resource (Cuzon G. & Ceccaldi H., 1973).

In DEB we see that when an individual eats the ingested food can be assimilated or released again to the environment. The food assimilated is transformed in reserves and then is available to be used in the different metabolic processes. These reserves can be used for two different purposes, somatic maintenance plus growth and maturity maintenance plus maturation (juveniles) or reproduction (adults). Also we know that the feeding rate of an individual depends on the food availability, body size and temperature.

Based on this, we set the 3 experimental aquaria at a constant salinity and temperature, 29±1 and 20±1ºC, respectively, and used 50 individuals, all females, with a total length ranging between 26mm - 28mm.

For approximately 1 month and a half shrimps were kept in starvation and once a week 6 individuals were sacrificed. These individuals will allows us to see how much time do the shrimps take to mobilize their reserves and what is the first compound to be used (proteins, lipids or carbohydrates).

With this set of experiences it was also performed another one with a different purpose. Is this one we tried to determine the oxygen consumption of the individuals along the starvation period.

Preliminary results suggest that caloric content decreases with starvation time as would be expected. We expect that under starvation, proteins are the first to be mobilized to pay for maintenance costs. After lipids and carbohydrates follow. This implies that oxygen consumption will reflect the use of different compounds for maintenance purposes. In the end, we expect that we will be able to estimate both the energy reserves and the energy maintenance costs for *C. crangon*.

References

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