Summary of the DEB theory

This course is a big opportunity to learn new concepts and understand the meaning of DEB theory. Dynamic energy budget theory is a "theory for the process of uptake and use of substrates by organisms". What looks very interesting is that a primary motivation leads to an important theory which treats the change of energy fluxes during the life cycle of an organism. DEB Theory introduced basic concepts as homeostasis, metabolism, biomass which is partitioned into 2 compartments: reserve and structure. The fact that reserve does not mean "set apart for late use" was a new notion for me. This theory shows difference between demand and supply systems and makes some assumptions for the standard model to make it the simplest one to use. The second chapter introduces the different energy fluxes in the standard DEB theory. In the transformation of food into faeces, a part is passed to the assimilation. These reserves are partitioned later by "kappa rule" into 2 parts for somatic maintenance, maturity, reproduction and growth. The third chapter is more technical, we learned how to quantify entropy, energy and mass, how to classify compounds into mineral and organic class and how to differentiate between substrates and products with Macro-chemical reaction equations. DEB theory defines reshuffling, fractionation, enzyme mediated transformations and metabolism. Those concepts seem to be complicated but in the context of this theory we can easily assimilate them, especially when some examples are specified. Our final chapter was an extension of the DEB standard model which removes the assumption of isomorphy: Univariate DEB model. In this model we studied the changing of feeding conditions. First we saw how starvation (Start of starvation, mild starvation and prolonged starvation) affects the growth, then shrinking and turnover of structure as a way of paying the somatic maintenance cost, finally how some species adapt their somatic and manage their reserves for immigration, dormancy and emergency reproduction. We also learned the changing of shapes, by defining isomorph, V0-morph and V1-morph. In the last section, DEB theory specifies the Mass aspects of Univariate model: the three basic fluxes, difference between fluxes and state and Mass investment in neonates. Knowing the concept of respiration quotient, nitrogen balance, water balance was so beneficial for me.