

## Popular science summary of the PhD thesis

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Title of the PhD thesis	Metabolism, pace of life, and the dynamics of size-structured populations and communities. The case of fast-living squid.
PhD school/Department	DTU Aqua. Centre for Ocean Life

## Science summary

Global warming and fisheries exploitation are impacting marine ecosystems. Predicting future changes in marine ecosystems is one of the most urgent challenges in marine science. However, marine ecosystems are complex, and the classic species-based approach has difficulties predicting these global changes because species and species interactions change dramatically among ecosystems. The traitbased approach provides an efficient tool for understanding ecosystems. This theory ignores the membership of individuals to a species but rather assumes that traits interact together. To make global predictions of marine ecosystem processes such as commercial landings, we must understand what traits drive marine populations and ecosystems. The variability in growth traits, how fast individual grow, are known and well described; However, global models based on traits often do not consider variation in growth traits. In my Ph.D. thesis I investigate how life history traits of growth drive the dynamic and the structure of high-trophic level marine populations and communities by using the example of the fast-living squids that grow 5 time faster than squid. I developed an ecosystem model that includes squids, that grow fast and fish that grow slowly. I show that squid presence strongly depends on pelagic secondary production and that ecosystem structures (trophic interactions and biomass) change in the presence of squid. I used this framework to understand the recent global increase in squid. I showed that squid increase is not attributed to a rise in temperature (as previously proposed) but rather due to the loss of top predators. The results also suggested that the recent increase of squids in ecosystems likely caused a global decline in ecosystem biomass. This thesis addresses several aspects of the impact of growth strategies in structuring populations and ecosystems using squid. This shows that better global prediction could be reached by incorporating several growth strategies. Additionally, this thesis gives the first proofof-concept of the ecological properties of squid based on their traits.