

# RESOURCE COMPETITION AND PREDATION AS FORCES OF NATURAL SELECTION

## Summary

Leaving aside autotrophic plants, algae and cyanobacteria, we discuss the relative significance of food limitation and predation as two major forces driving natural selection, both extremely selective and both density-dependent, each responsible for one of the two components of individual fitness: successful survival until first reproduction, and maximum growth and reproduction. First, we argue that other biotic factors such as parasitism and mutualism are perhaps less general and not as important in driving individual selection. Second, we argue that the importance of abiotic factors can be only in their ability to moderate the effects of resource competition and predation, since they are neither selective nor clearly density-dependent. Third, we discuss the general prey-predator models to show that the power of selection by both resource competition and predation is density-dependent. Fourth, we discuss different features of food limitation as the force

of selection in aquatic and terrestrial habitats, also in relation to body size. Fifth, we compare the role of predators-hunters and predator-harvesters, and look into the relative proportions of these two categories offshore and onshore. We also compare the prey of different sizes in regards to the number and variability of predators that exploit it. Sixth, using models of functional response, we examine the dependence of prey individual risk on density of its population. We conclude that it is reduced at high density level due to risk dilution and predator's confusion, as well as below the density level that is equal to the number of prey being able to find a refuge, or to the critical prey density level at which a given prey becomes included into the predator's diet. Seven, we conclude that predation is a stronger and more efficient force of individual selection than competition, assuring that the prey wins the arm race with its predator.