Abstract

The ability of a genotype to produce different phenotypic variations under different environmental conditions is called phenotypic plasticity, which in living organisms can manifest as changes in body symmetry. Geometric symmetry is an ideal but unattainable state in nature. If an organism existed in a world without any biotic and abiotic stressors, perhaps we could expect it to be perfectly symmetric. However, the living world is more complex than that and all organisms are constantly affected by countless environmental stressors. That is why we generally observe organisms more or less asymmetric.

Green algae of the genus *Desmodesmus* are well known for their high degree of phenotypic plasticity. These organisms generally form coenobia, i.e. pseudocolonies of individuals originating from the same parent coenobium. Shape changes of this alga have been studied in the past, but mainly as a difference between unicellular and multicellular stage, or spiny or spineless morphotype. What has not received as much attention is the asymmetry of its coenobia. In my thesis, I described how the asymmetry of *Desmodesmus communis* changed under different conditions that occur during a planktonic life. For this I used the highly developed methods of landmark-based geometric morphometrics. It has been discovered that coenobia living in constitutively mixed and semi-mixed environments arise with an increased level of asymmetry. Coenobia living in stationary environments with increased sinking pressure then exhibited significantly lower rates of asymmetry. This asymmetry was most pronounced in the area of the spines that *Desmodesmus communis* bears on its four corners. Furthermore, my analyses showed the highest asymmetry with regards to the transversal axis. Horisontal and vertical asymmetry didn't result in such high proportions in any of the strains studied. The most determinant source of shape variation was identified as the difference between coenobia within the strain. Differences between segments of asymmetry within a single coenobium were significantly lower. Finally, in *Desmodesmus communis*, small young individuals were found to exhibit significantly higher levels of asymmetry than large and old individuals. A relationship between planktonic life history and phenotypic plasticity in the form of asymmetry was successfully demonstrated. My thesis yielded discoveries that contribute to further understanding of the ecology and complex evolution of these coenobial organisms.