**Natural selection does not affect the structural evolution of proteins**

Proteins diverge during biological evolution. At the level of sequences, different aminoacids evolve at different rates, which is a clear evidence of natural selection and its selective pressure. We recently found that the rate of evolution of a site depends on the mutational stress of the active conformation, which is proportional to its degree of packing. However, at the level of structure, even though there are preliminary studies of structural divergence profiles, the role of natural selection has not been elucidated yet. Here, we deeply study the effect of natural selection on the structural divergence of a wide set of families of proteins. We compared experimental data with equivalent simulated data generated by modeling each single mutation as a perturbation of the oscillators coupled to the corresponding site. We generated 2 sets of simulated mutants; one without accounting for natural selection, what was accomplished by solely mutating random sites, and the other one selecting each random mutation according to its fixation probability, which is related to the degree of packing of the site. The profiles we analyzed were both in Cartesian coordinates and projected on the normal modes of proteins. We found that the agreement between experimental and simulated profiles is high either considering or not natural selection in the simulation. Moreover, there are no clear differences between simulated profiles. These results suggest there is no evidence of natural selection on the evolution of the structure and go against the common belief that natural selection governs molecular evolution.