

BP 25: Posters - Systems Biology

Time: Monday 17:30–19:30

Location: Poster C

BP 25.1 Mon 17:30 Poster C

Evolutionary accessibility of fitness landscapes with multiple alleles — ●MARCIN ZAGÓRSKI^{1,2}, ZDZISŁAW BURDA³, and BARTEK WACŁAW⁴ — ¹IST Austria, Klosterneuburg, Austria — ²Institute of Physics UJ, Kraków, Poland — ³AGH, Kraków, Poland — ⁴University of Edinburgh, Scotland

The question of accessibility of global fitness maximum has a long history. On the one hand, increasing size of fitness landscape results in higher number of local fitness peaks that act as evolutionary dead-ends making global peak inaccessible. On the other hand, with increasing dimensionality of fitness landscape local peaks become saddle points

keeping the global peak accessible. For the fitness landscape with two alleles (genes being ON or OFF) the former picture dominates. However, it is unclear how considering multiple alleles will affect the accessibility. To address this issue, we performed exhaustive enumeration of all accessible pathways for fitness landscapes with up to 16 alleles and 2^{28} genotypes. We also run Moran type simulation of population evolution to independently verify our conclusions. The resulting estimates of asymptotic accessibility give 12%, 50%, 69%, 81% for fitness landscapes with 2, 4, 8 and 16 alleles respectively. Interestingly, this increase in accessibility is connected with higher evolutionary access time, causing evolutionary adaptation to take longer on fitness landscapes with multiple alleles.