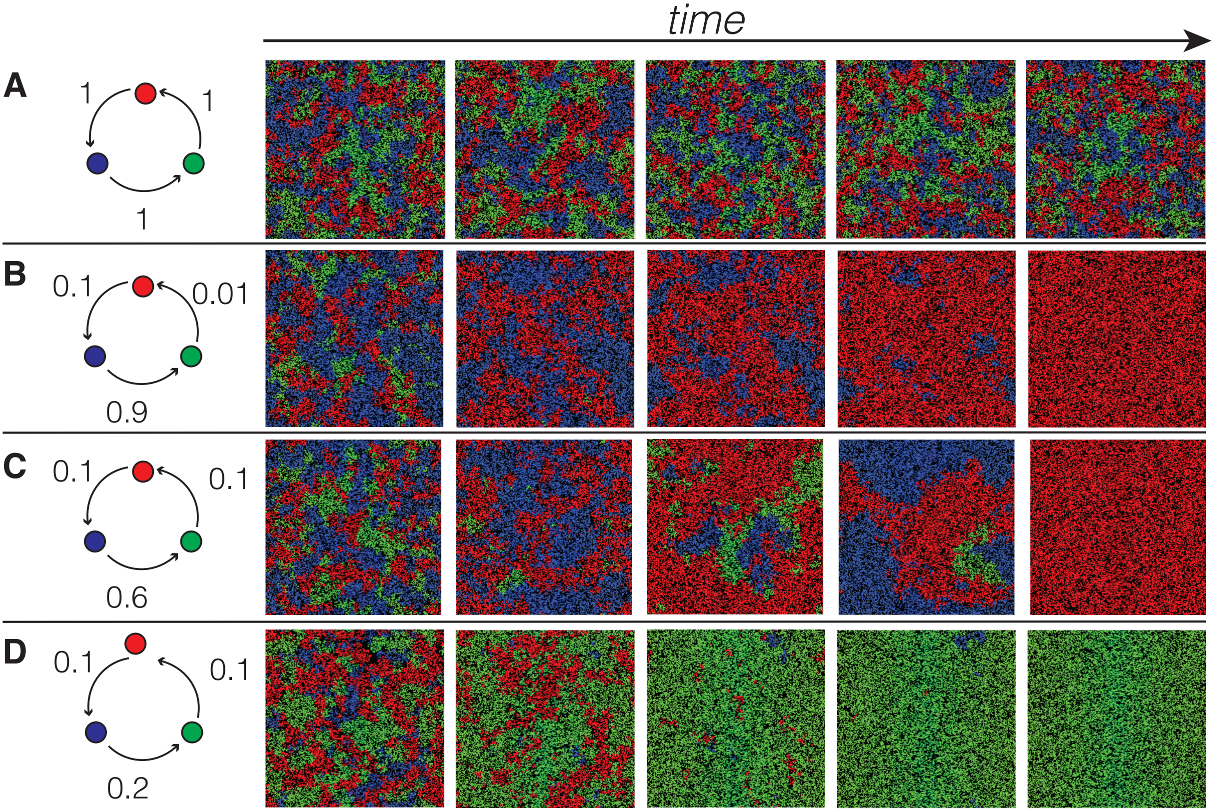

Three contact processes representing each species spread on the lattice with birth rates $\beta_{R,P,S} = 1$ and die with rates $m_{R,P,S}$. The three species play a rock-paper-scissor game upon encounters. The simulation proceeds iteratively as follows: pick a random (focal) site (x) and pick a random neighbor (y) out of the four neighbors of the focal site. If both the focal site and the neighbor are vacant, nothing happens; if the focal site is vacant and the neighbor is occupied, the respective neighbor replicates into the focal site with probability one. Thus, $\varnothing_x + R_y \rightarrow R_x + R_y$, $\varnothing_x + P_y \rightarrow P_x + P_y$, and $\varnothing_x + S_y \rightarrow S_x + S_y$. In case the focal site is occupied, it has a probability of dying equal to m_R, m_P, or m_S when occupied by R, P, or S, respectively. Thus, $R_x \xrightarrow{m_R} \varnothing_x$, $P_x \xrightarrow{m_P} \varnothing_x$, and $S_x \xrightarrow{m_S} \varnothing_x$. If the particle does not die, it interacts with a random neighbor following a cyclical competitive hierarchy defined by the rock-paper-scissor game: Rock takes over Scissor with probability σ_R: $S_x + R_y \xrightarrow{\sigma_R} R_x + R_y$, Paper takes over Rock with probability σ_P: $R_x + P_y \xrightarrow{\sigma_P} P_x + P_y$, and Scissor takes over Paper with probability σ_S: $P_x + S_y \xrightarrow{\sigma_S} S_x + S_y$.
(**A**) In a fully symmetric scenario, where the replacement rates of the three pairs ($\sigma_R = \sigma_P = \sigma_S = 1$) and the individual mortality rates ($m_R = m_P = m_S = 0.4$) are equal, the three strains coexist for long times in a dynamic equilibrium. (**B,C**) Equal mortality rates ($m_R = m_P = m_S = 0.4$) combined with asymmetric interaction rates permit the survival of only one species. In (B) the interaction rates span three orders of magnitude ($\sigma_R = 0.1$, $\sigma_P = 0.01$, $\sigma_S = 0.9$) and thus are strongly asymmetric leading to a quick eradication of P (green) and eventual dominance of R (red). In (C) the interaction rates are only moderately different ($\sigma_P = \sigma_R = 0.1$ and $\sigma_S = 0.6$) and still only a single species prevails. (**D**) When one species has a slightly increased mortality rate ($m_R = m_P = 0.4$, $m_S = 0.44$) and the interaction rates are close to symmetric ($\sigma_P = \sigma_R = 0.1$ and $\sigma_S = 0.2$) also eventually only one species dominates.