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 \( R \): \( S_x + R_y \xrightarrow{\sigma_S} R_x + R_y \), Paper takes over Rock with probability \( P \): \( R_x + P_y \xrightarrow{\sigma_R} P_x + P_y \), and Scissor takes over Paper with probability \( S \): \( P_x + S_y \xrightarrow{\sigma_P} S_x + S_y \).

(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 \( (\sigma_R = 0.1 \text{ and } \sigma_S = 0.6) \) 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 \( (\sigma_R = 0.1 \text{ and } \sigma_S = 0.2) \) also eventually only one species dominates.