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CORRELATION AMONG VITAL RATES: A CHALLENGE TO EVOLUTIONARY DEMOGRAPHERS?

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One of the central life-history theories addresses the question of variation in the fitness components, where increased variation in some vital rates can decrease the stochastic population growth rate. Thus, there should be strong selection to reduce variation on those vital rates that most influence fitness. The intuitive nature of this hypothesis and the ability to test it with demographic data for the first time by Pfister (1998) have made this one of the most influential scientific articles in stochastic demography. Despite of its contribution, Pfister's publication did not cause the expected increase of papers addressing the issue, and the few papers that did address the issue obtained contradictory results, where just part of these results were concordant with Pfister's. The assumption emerged in Pfister's analysis that vital rate pairs have Individual Independent distribution (IID) is biased, however, few authors worried to confirm this assumption. Here our aim was to explore whether the correlation among vital rates is a challenge to evolutionary demography and to what extent does such correlation actually occur. To answer this question, we generated same matrices used by Pfister (1998) to check correlations among vital rate pairs using Pearson correlation. We analyze matrices of 17 populations of eight species from different taxa and compare 10054 vital rate pairs (survival and fecundity included). Our results showed that correlations were generally weak and centered near zero with just 12.18% of significant correlations, not different from the frequency expected by a random distribution. This result shows that between-rate correlations are not frequent enough to violate the IID assumption. Moreover, we were able to reproduce similar significant correlations among pairs of vital rates with pseudo-random simulations and this result suggest that more investigation is urgently needed in order to understand the role of real and spurious correlations in life-history evolution.

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