Journal of Molecular Evolution (2024) 92:1–2
https://doi.org/10.1007/s00239-024-10153-4

ANNOUNCEMENT

2023 Zuckerkandl Prize

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This year marks the fifth straight year that the reinstated Zuckerkandl Prize has been awarded. This is an award for the top paper published in the *Journal of Molecular Evolution* to appear in a print issue during the calendar year, as judged by a committee, in honor of Founding Editor Emile Zuckerkandl. The award committee consisted of Bui Quang Minh and Caroline Weisman this year.

The two finalist papers spanned the gamut of molecular evolution from a mechanistic modeling approach for the genotype–phenotype map to methodological considerations in experimental evolution, both with application for studies of microbial populations evolving under varying selective regimes. The runner up paper is "Phenotype Design Space Provides a Mechanistic Framework Relating Molecular Parameters to Phenotype Diversity Available for Selection" by Savageau (2023). Building upon previous work, the approach models combinations of biochemical kinetics with mutational expectations from population genetics to predict phenotypic evolution.

We are pleased to announce that the 2023 winner is "Case Studies in Microbial Fitness: Seemingly Subtle Changes Can Have Major Effects on Phenotypic Outcomes", by Worthan et al. (2023). The paper appears in a *Journal of Molecular Evolution* special issue on experimental evolution, an approach which, especially for microbes, allows us to watch an evolutionary process in real time. We can see mutations emerge, determine their functional effects, and observe how they move through populations. This is the dream for understanding molecular evolution, but is impossible in most other experimental systems. Interest in experimental evolution has thus increased rapidly, with publications increasing tenfold between 2001, when the inaugural Zuckerkandl prize was awarded to a paper in the field (Kashiwagi et al. 2001), and now.

Key to experimental evolution is the ability to faithfully determine what effect a mutation had when it emerged. But, for practical reasons, testing the effects of mutations is often done in an experimental setup slightly different than the one in which the evolution took place. For example, mutations that evolved in an Erlenmeyer flask may be tested in a smaller culture tube that fits standard devices for measuring cell density. It is assumed that the phenotype of interest is not affected by these apparently minor differences.

Worthan et al. (2023) report several cases in which this assumption is wrong, and seriously so, resulting in mutations switching from appearing of benefit to appearing neutral or even of harm. The implications for practice in experimental evolution, and on the interpretation of the current literature, are profound and clear. They offer concrete and causally tight explanations for these results, fueled by careful observation of the physical details of their experimental setup.

Their results have lessons beyond microbial laboratory evolution. Much work in evolution somehow incorporates the scientist's assumptions about which features of its environment are important to the organism. The paper reminds us that these assumptions may not always be well-aligned with reality. Another excellent paper in that issue (Kinsler et al. 2023) also reports high sensitivity of fitness measurements to subtle environmental differences, emphasizing these conclusions.

The *Journal of Molecular Evolution* is proud to congratulate the authors on this work and the award, which includes a US$250 cash prize to the first author. The journal is proud to have published these papers in 2023 and looks forward to more outstanding submissions in 2024.

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