

EDITORIAL PERSPECTIVE

BRIDGING FRONTIERS: MOLECULAR INSIGHTS AND ECOLOGICAL ADAPTATIONS IN HEALTH AND BIODIVERSITY

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This issue showcases the unique breadth of interdisciplinary study which incorporates elements of both molecular biology and ecology and applications of these disciplines. This is represented by 18 studies that span geography and themes of research that illustrates the complex interactions among the genetic, environmental and organismic components of organismic responses to stressors and their resilience. In addition, this volume highlights the ability of scientific inquiry to identify mechanisms that can provide insights into diagnostics, conservation and therapeutics in order to address the growing list of global problems such as metabolic disorders, environmental stressors and loss of biodiversity. A number of the studies presented focus upon the investigation of metabolic and genetic adaptation. For example, in the paper by Dadashova et al. the investigation into MTHFR gene polymorphism in pediatric Burkitt lymphoma patients found that patients had higher levels of homocysteine than normal levels of vitamins in their blood and demonstrated that genotype based interventions may be used to reduce the toxic side effects of chemotherapy. The study by Huseynova investigating the modulation of pyruvate kinase in the brain when exposed to stressors including hypoxia and electromagnetic fields (EMF), have shown that there are structural and developmental vulnerabilities within the brain and that pyruvate kinase may serve as a marker for assessing neuronal injury. A further example is the review by Javan et al. on the acetylation and sirtuins. The paper describes the post-translational modifications that control metabolic flexibility with relevance to aging and neurodegenerative disease. Overall, the collective evidence from these studies emphasizes how molecular pathways are able to either respond or fail to respond to both internal and external pressures with the goal of establishing new frameworks for precision medicine. Health as influenced by the environment emerges as a common thread throughout many of the studies. The study by Abdinov & Zeynalova comparing the viability of *Paramecium caudatum* (a type of protozoan) in the saliva of obese versus non-obese individuals demonstrated that the oral microbiome of obese individuals was negatively impacted by obesity. Therefore, it proposed using the protozoans as noninvasive diagnostic tools for evaluating the presence of metabolic disorders. Exposure of rat embryos to electromagnetic fields during pregnancy altered the formula of leukocytes, producing lymphocytosis and neutropenia at different ages in the offspring of the paper by Guliyeva et al.

The representations of biodiversity and the results of the conservation efforts in this edition are vibrant by the work of Diansyah et al. Proteins related to fertility that are specific to breeds of native Indonesian bulls have been identified from their seminal plasma; this will allow for precise breeding in tropical livestock. Body size as it relates to nutrition is the most important metric for Komodo dragons on Komodo Island; this will help develop adaptive conservation methods. The paper on plants by Guvendiyev et al. that studies the morphological and biochemical profiles of *Medicago lupulina* and wild cherry plum in Azerbaijan have shown the genetic diversity and traits that are necessary to develop varieties that can adapt to changing environments and resist disease through breeding. In addition, the study of the ecological-anatomical profile of *Althaea officinalis* in both in situ and ex situ conditions has demonstrated phenotypic plasticity; while optimizing nitrogen levels in vitro for the micropropagation of Shirvan Shahi grapes has allowed for the development of more precise micropropagation protocols. Innovations in technology and analytical techniques have enhanced this edition by providing additional research opportunities. Applications of nanotechnology in medicine have the potential to produce revolutionary treatments for medical conditions (tissue engineering, targeted cancer therapies) although there are still challenges to overcome in terms of biocompatibility. Bioactive compounds in the rhizomes of *Gynostemma pentaphyllum* were identified using metabolomic screening and found to have potential cytotoxic effects. Diseases such as LHON, cancer and diabetes are associated with mitochondrial DNA mutations in genes such as ND1, ATP6 and tRNA^{Leu(UUR)}; therefore, mutations in these regions may be "hot spots" of disease. Genetic engineering plays a significant role in protecting crops, as evidenced by cotton lines that are resistant to *Verticillium* wilt due to chromosome substitution. Data on the diversity of harvestmen in the Caucasian Biosphere Reserve provide a baseline for ecological data, while molecular adaptations to desynchronization stress involved CRMP2, which modulates anxiety-like behaviors. These papers represent our journal's continued dedication to facilitating international collaboration and high-quality scientific inquiry.

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