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Commentary

New Insights into Evolutionary Medicine: The Importance of Microevolution in Human Health and Illness

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Description

The coexistence of human health and wellbeing with viable ecosystems is the cornerstone of sustainable living on Earth. This association is underscored by the UN's Sustainable Development Goals, which pursue nature conservation as well as equality and sustainability among people, societies, and cities. However, our ability to reach these important goals is hindered by the degradation of living nature (ie, biodiversity founded on flora and fauna) and non-living nature (ie, geo-diversity founded on geology, geomorphology, topography, soils, and hydrology) that results from global change caused by human activities. Such degradation also poses severe threats to human health and wellbeing, which are highly dependent on nature.

Our knowledge of the benefits of nature for both physical and emotional health is accumulating steadily. The variety of living nature at genetic, species, and ecosystem levels is known as biodiversity. Biodiversity contributes to the quality of nature, as a more diverse biotic environment can provide a greater variety of ecosystem functions and services. Increasing scientific evidence shows that biodiversity contributes to human physical and mental health through various pathways and processes. However, biodiversity is an over-simplified view of nature, because by focusing only on biodiversity we neglect the diversity of the non-living components of the Earth's surface and subsurface, namely geo diversity. The importance of geo diversity for nature conservation and ecosystem service provision has been relatively neglected until recently. Geo diversity can contribute substantially to biodiversity and human health; however, the pathways and processes by which this occurs have not been sufficiently explored or empirically tested.

Given the pandemic of COVID-19, the need for field- and clinic-ready diagnostic kits is in high demand. Low-cost disposable devices for virus detections on the scale are critical to minimize infection spreading in a society. Many commercial testing kits based on antigen binding are available in the market (known as rapid antigen tests) while the challenges in rapid virus determination and quantification remain. Indeed, many lab-intensive protocols, such as virus extraction, lysis, antibody assay, and Polymerase Chain Reaction (PCR), are required to precisely measure the virus from human specimens, including nasopharyngeal swabs, blood withdrawals, urine, or feces, while the conventional antigen binding assay with limited detection sensitivity can only be useful for certain scenarios. In the "Microfluidic Detection of Viruses for Human Health" Special Topic in Bio-microfluidics, a series of emerging microfluidic strategies are introduced to offer potential new advanced diagnostic kits to detect the virus in a timelier manner. For example, microfluidic PCR technology was investigated to quantify the virus with a high sensitivity to indicate infectious disease progress. In addition, many novel chemical materials and microfluidic components are introduced here to extract the virus and related biomarkers to convert a lab-based bio-chemical analysis to a rapid point of care assay by using a low-cost integrative device.

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Conflict of Interest

There are no conflicts of interest.