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Nutrient Provision and Demand in a New Landscape: Relevance for Conservation Biology from Ecosystem Composition and Ionomics

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Abstract

Ionomics and ecological stoichiometry are used to provide conservation biology with the essential ecological and evolutionary relevance, enabling for the solution of unresolved issues. The use of ecological stoichiometry and ionomics allows for the consideration that changes in the nutritional supply of the environment alter an individual's ecophysiology, behaviour, health, and fitness, affecting their ecological interactions and population functioning. Better conservation and restoration tactics may be encouraged using the knowledge that is gained.

Keywords: Ecology; Conservation biology; Environment

Introduction

A fundamental obstacle to biological conservation is the growing strain that anthropogenic activities are placing on organisms and habitats. Because of numerous local and global disturbances, conservation biologists must gather information from multiple sources and view the creatures they are studying as parts of the entire Earth system. Ecosystems and populations are threatened by a variety of dangers as a result of continued anthropogenic pressure, including species extinction, habitat loss and change, environmental overexploitation, biodiversity loss, and the spread of invasive species [1, 2].

Methods

Individuals, populations, and communities are affected by geosciences: theoretical foundation

Every living thing on Earth is a part of the biogeochemical cycle, in which atoms travel from one sink to another in an unending cycle; each organism might be compared to a small gear in this wheel. One of the most remarkable aspects of life on Earth is that all living things, from bacteria to whales, are made of atoms that contain the same roughly 25 chemical elements but in different proportions. This is due to the biogeochemical origin of life and the most fundamental natural laws that govern how each living thing functions [3, 4].

Because 25 chemical elements cycle constantly in food webs, all the diversity of life and all interactions between lifeforms that we are able to understand have their mechanical beginning in these cycles. We emphasise two key concepts in our application of a biogeochemical approach to organismal ecology and conservation biology: (1) ionomics, which recognises that an organism's chemical makeup influences its functionality and fitness (Frausto da Silva and Williams, 2001; Kaspari, 2021; Fernández-Martnez, 2022); and (2) stoichiometry, which holds that the production of a molecule is only possible when the chemical reaction leading to its production is stoichi To produce fully functional cells, tissues, organs, and organisms, all chemical reactions must be stoichiometrically balanced (Sterner) [5].

We describe the chemical balance of the entire metabolism and entire body-building process of developing organisms when concentrating on organismal ionomics and stoichiometry. So, we agree that a fully functional body of any organism cannot be built using random chemical element amounts. Significantly, there are linkages between this organism's genes, the proportions of its constituent parts, and its total chemical makeup [6, 7].

Encouraging bird visitors

Through interacting with plants, pollinators contribute to ecosystem health and human well-being. Despite the fact that insect pollinators are crucial for agriculture and ecology, our understanding of their biology and role in ecosystems is inadequate. Crucially, we don't fully comprehend how pollinators are impacted by nutritional constraints by the nutritional quality and diversity of food sources. Furthermore, we know very little about how nutrients cycle through the environment-soil-plant-pollen/nectar-pollinator pathway and how that affects the fitness and health of organisms in ecosystems [8, 9].

Discussion

It is necessary to alter how CO2-driven plant fertilisation is viewed. We must comprehend the mechanisms and processes causing CO2-driven nutrient dilution in order to advocate for such a change, provide local stakeholders, national or subnational governmental organisations, and policymakers with science-based results, as well as to raise awareness among citizens and consumers. We stress that ionomics and ecological stoichiometry can be used as tools to clarify these mechanisms and support other strategies.

Conclusion

The principles and patterns underlying organismal ecology cannot be better understood and conservation efforts cannot be carried out by focusing just on physiological, behavioural, and life cycle events. Organisms must be viewed as entities that are firmly rooted in and reliant on biogeochemistry when researching and discussing these occurrences. Ionomics and ecological stoichiometry enable connections between organisms, their life history strategies, evolution, and interactions with biotic (like plants-pollinators) and abiotic

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(like CO2) factors occurring in the environments inhabited by these organisms. These questions are generated regarding the origin and function of physiological phenomena. To handle upcoming and current world changes responsibly, one must be aware of how biogeochemical processes may shape biodiversity [10].

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Declaration of competing interest

There are no disclosed conflicts of interest for the writers.

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