



# Synergy between systematics, biogeography and biodiversity: an honorary volume celebrating the achievements of professor Zoltán S. Varga

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We are delighted to introduce a special issue of *Biologia Futura*, dedicated to celebrating the lifetime achievements in research, biodiversity conservation, and mentoring of professor Zoltán S. Varga. A native of Debrecen born in 1939, he significantly contributed to these fields as a lecturer, later as a professor, and eventually as the head of the department at Kossuth University (now Debrecen University). Prof. Varga established a broad network of scientists, museologists, taxonomists, and conservationists. He held distinguished positions as a visiting professor in Germany and Budapest, delivering numerous guest lectures in Hungary and abroad. His academic and conservation contributions were acknowledged through various prestigious awards, including the esteemed Széchenyi Award.

Prof. Varga is one of the most remarkable scientists in recent biodiversity research in Hungary; during his lifetime work spanning more than six decades, he contributed to biological science in zoology, biogeography, botany and conservation research and raised an extensive network of students, many of them are now leading researchers in their field. This special issue of *Biologia Futura* stands as a tribute to the exemplary contributions and mentoring legacy of Zoltán Varga in the realm of biodiversity research. As a revered mentor and influential figure in the scientific community, he

leaves an indelible mark, nurturing and guiding numerous biologist researchers throughout his illustrious career. Notably, this collection is a testament to his enduring impact, featuring contributions from his close colleagues and, most notably, his former students.

Zoltán's scientific output of approximately 450 publications covered exceptionally broad areas that can be grouped into four major research fields. From his extensive scientific output a consistent theme that stands out is his deep involvement and contribution to the field of entomology, specifically focussed on the taxonomic and zoogeographical study of Lepidoptera, most importantly the Noctuidae family. In systematics, he described 250 new Lepidoptera (butterflies and moths) species, including 28 new genera that culminated in a 9-volume monograph series on Eurasian moths Noctuoidea. His research consistently delves into the geographical distribution, taxonomy, morphological variations, and population studies of butterfly and moth species, with a strong emphasis on conservation applications. He is also a foremost expert in Palearctic biogeography, with decades of research on the high mountain fauna of Eurasia based on a series of expeditions he led to alpine areas of the Balkan and Central Asia. Notably, he utilized cutting-edge analytical approaches relevant to the respective research eras; initially employed morphology and morphometry in the study of butterflies, moths, dragonflies, and orthopterans, before transitioning to genetic methodologies such as allozymes, microsatellites, and DNA sequencing. All this research formed the basis of a better understanding of classification, description, and differentiation of various insect species with a special interest in the Noctuidae family.

Throughout his research, Zoltán consistently focuses on the geographical distribution of various insect groups unravelling patterns of species distribution, migration, and the impact of geography and environmental factors on the diversity and composition of these insect populations. A notable aspect is the broad geographic scope

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of his interest, ranging from Hungarian regions to vast landscapes like the Balkan Peninsula and the arid mountain ranges of Middle and Central Asia, including areas like Hindukush, Pamir, Tian Shan (Fig. 1), and Altai. This comprehensive exploration contributes significantly to his profound understanding of Eurasia's biogeography, consequently establishing him as a globally recognized and significant figure in zoogeography. His research often involved describing new species, subspecies, or genera, especially from the Noctuidae family, establishing him as one of the world's foremost experts in this taxonomic group.

Beyond science and conservation, Prof. Varga is an outstanding teacher, supervisor and mentor. His undergraduate classes on phylogeography and evolution spurred his students to build up a career in these research fields — including three of us, the Guest Editors. In a world that is increasingly dominated by compartmentalization of natural sciences, he has remained an integrative and innovative thinker. He likes the big picture and stimulates his students to think in a synergetic way to explore seemingly unrelated facts, patterns and processes across the board. All in all, the latter — that could be justly called Zoltán's *Ars Poetica*— left its trademark signs on his students' way of thinking and thus contributed a non-incremental way to the research approach of young scientists in Hungary and beyond. He is an inspirational speaker who shares his lexical knowledge of natural history of animals and plants widely with his audience usually without the need of a microphone. Finally, he is an accomplished artist who often illustrates his talks, seminars and publications with his own aquarelles of beautiful plants, butterflies and birds.

This special issue of *Biologia Futura* stands as a tribute to the exemplary contributions and mentoring legacy of Prof. Varga in the realm of biodiversity research. As a revered mentor and influential figure in the scientific community, he leaves an indelible mark, nurturing and guiding numerous biologist researchers throughout his illustrious career. Notably, this collection is a testament to his enduring impact, featuring contributions from his close colleagues and his former students. These contributions represent a continuum of Zoltán Varga's influence, showcasing the work of emerging scientists established professors who stand as testaments to his guidance. Each paper within this curated collection celebrates his unparalleled influence in shaping Hungarian biodiversity research while honouring his profound role in nurturing the scientific minds of tomorrow. Here's Zoltán Varga — a mentor, a scholar, and an inspiration. Much like a venerable oak tree in Hungarian biodiversity research, fostering and nurturing the growth of numerous students (Fig. 2).

This special issue contains 12 specific papers written by his colleagues and friends. All studies are connected to his work and represent the width and breath of his lifetime research agenda. The first group of papers focus on systematics and ecology of lepidopterans (Junker et al. 2023; Ronkay and Ronkay 2023; Pecsenye et al. 2024; Szanyi et al. 2024a). The second group of papers deals with an insect group also close to him, orthopterans (Nagy A et al. 2024, Rácz et al. 2024b). As Zoltán Varga is a leading authority in biogeography, no wonder he inspired some of his students this way (Nagy J et al. 2023; Sólymos 2023). Another group of papers are related to conservation biology (Barta 2024; Csorba et al. 2024; Meglécz 2024), where the Zoltán Varga's

**Fig. 1** Prof Zoltán S. Varga on field work in the Zhetysu Alatau Mts. (Tian Shan range) in 2018 above the settlement Tekeli (Kazakhstan) (Photo credit: Gábor Sramkó)







**Fig. 2** A symbolic oak tree illustrating some of the former and current students of Prof Zoltán S. Varga. (Credit: Attila Lévai & István A. Rác)

influence is pivotal in Hungary. Finally, a paper dealing with evolutionary biology (Székely 2023) unite all his students, as we all immersed into this topic following his footsteps.

The value of more than six decades of dedicated scientific work is reflected but also in the number of students raised (Fig. 2). Since Linnaeus, this has been an important guide for our eminent biological researchers: raising "apostles" is at least as important as writing top scientific publications. With this conclusion, we all wish Prof. Zoltán S. Varga continued success and many more scientifically productive year ahead.

**Declarations**

**Conflict of interest** The authors declare no competing interest.

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