

# Ecological Stoichiometry

THE BIOLOGY OF ELEMENTS FROM  
MOLECULES TO THE BIOSPHERE

ROBERT W. STERNER AND JAMES J. ELSEY

WITH A FOREWORD BY PETER VITOUSEK

# Ecological Stoichiometry The Biology Of Elements From Molecules To The Biosphere

**Yicheng Fang**



## **Ecological Stoichiometry The Biology Of Elements From Molecules To The Biosphere:**

**Ecological Stoichiometry** Robert W. Sterner, James J. Elser, 2002-11-17 Biochemistry energy flow      Ecological Stoichiometry Robert Warner Sterner, James J. Elser, Peter Vitousek, 2002-10-01 All life is chemical That fact underpins the developing field of ecological stoichiometry the study of the balance of chemical elements in ecological interactions This long awaited book brings this field into its own as a unifying force in ecology and evolution Synthesizing a wide range of knowledge Robert Sterner and Jim Elser show how an understanding of the biochemical deployment of elements in organisms from microbes to metazoa provides the key to making sense of both aquatic and terrestrial ecosystems After summarizing the chemistry of elements and their relative abundance in Earth s environment the authors proceed along a line of increasing complexity and scale from molecules to cells individuals populations communities and ecosystems The book examines fundamental chemical constraints on ecological phenomena such as competition herbivory symbiosis energy flow in food webs and organic matter sequestration In accessible prose and with clear mathematical models the authors show how ecological stoichiometry can illuminate diverse fields of study from metabolism to global change Set to be a classic in the field Ecological Stoichiometry is an indispensable resource for researchers instructors and students of ecology evolution physiology and biogeochemistry From the foreword by Peter Vitousek T his book represents a significant milestone in the history of ecology Love it or argue with it and I do both most ecologists will be influenced by the framework developed in this book There are points to question here and many more to test and if we are both lucky and good this questioning and testing will advance our field beyond the level achieved in this book I can t wait to get on with it      Ecological Stoichiometry Robert Warner Sterner, James J. Elser, 2002 Biochemistry energy flow      *Encyclopedia of Theoretical Ecology* Dr. Alan Hastings, Dr. Louis Gross, 2012-05-31 This major reference is an overview of the current state of theoretical ecology through a series of topical entries centered on both ecological and statistical themes Coverage ranges across scales from the physiological to populations landscapes and ecosystems Entries provide an introduction to broad fields such as Applied Ecology Behavioral Ecology Computational Ecology Ecosystem Ecology Epidemiology and Epidemic Modeling Population Ecology Spatial Ecology and Statistics in Ecology Others provide greater specificity and depth including discussions on the Allee effect ordinary differential equations and ecosystem services Descriptions of modern statistical and modeling approaches and how they contributed to advances in theoretical ecology are also included Succinct uncompromising and authoritative a must have for those interested in the use of theory in the ecological sciences      **Progress in Ecological Stoichiometry** Dedmer B. Van de Waal, James J. Elser, Adam C. Martiny, Robert W. Sterner, James B. Cotner, 2018 Ecological stoichiometry concerns the way that the elemental composition of organisms shapes their ecology It deals with the balance or imbalance of elemental ratios and how that affects organism growth nutrient cycling and the interactions with the biotic and abiotic worlds The elemental composition of organisms is a set of constraints through which all the Earth s biogeochemical cycles must pass All organisms

consume nutrients and acquire compounds from the environment proportional to their needs Organismal elemental needs are determined in turn by the energy required to live and grow the physical and chemical constraints of their environment and their requirements for relatively large polymeric biomolecules such as RNA DNA lipids and proteins as well as for structural needs including stems bones shells etc These materials together constitute most of the biomass of living organisms Although there may be little variability in elemental ratios of many of these biomolecules changing the proportions of different biomolecules can have important effects on organismal elemental composition Consequently the variation in elemental composition both within and across organisms can be tremendous which has important implications for Earth's biogeochemical cycles It has been over a decade since the publication of Sterner and Elser's book *Ecological Stoichiometry* 2002 In the intervening years hundreds of papers on stoichiometric topics ranging from evolution and regulation of nutrient content in organisms to the role of stoichiometry in populations communities ecosystems and global biogeochemical dynamics have been published Here we present a collection of contributions from the broad scientific community to highlight recent insights in the field of Ecological Stoichiometry

*Biological Inorganic Chemistry* Ivano Bertini, Harry B. Gray, Edward Stiefel, Joan Valentine, 2007-01-01 Organized and edited by Ivano Bertini Harry Gray Ed Stiefel and Joan Valentine with contributions from many other world leaders in the field this all new book is equally appropriate for graduate or senior undergraduate courses in bioinorganic chemistry The long awaited text for 21st century courses in biological inorganic chemistry is now available Organized and edited by Ivano Bertini Harry Gray Ed Stiefel and Joan Valentine with contributions from many other world leaders in the field this all new book is equally appropriate for graduate or senior undergraduate courses in bioinorganic chemistry The book has been extensively class tested at Princeton and UCLA and it includes tutorials in biology and biochemistry and in inorganic chemistry to aid students of varying backgrounds The main text is divided into two parts Part A *Overviews of Biological Inorganic Chemistry* sets forth the unifying principles of the field A full course in bioinorganic chemistry could be based entirely on this overview section which is a really a book within a book Part B *Metal Ion Containing Biological Systems* describes specific classes of systems in detail A special feature is the strong connection to the genomic revolution that has dramatically enhanced our ability to define the function of gene products in living organisms Throughout the book protein data bank codes are given for structures discussed in the text and students are encouraged to learn to use the PDB in their courses and research This exciting new book will be a must read for years to come for all students and researchers interested in the field of biological inorganic chemistry

**Global Ecology** Sven Erik Jørgensen, 2010-04-16 *Global Ecology* focuses on the perception of the biosphere or the ecosphere as a unified cooperative system with numerous synergistic effects which describe the distinctive properties of this sphere This book is subdivided into five parts dealing with diverse aspects in global ecology The first part of the book provides comprehensive description of the biosphere including its unique characteristics and evolution This part also describes various spheres in the biosphere such as

the hydrosphere noosphere and pedosphere as well as their composition The next part focuses on the global cycles including calcium carbon iron microbial nitrogen oxygen phosphorus sulfur and water cycles In addition global balances and flows are explained Presented in the third part are the results of the global cycles and flows as well as the patterns of the climatic factors and marine currents There is also a part discussing the climate interactions climatic changes and its effect on the living organisms The book concludes by covering the application of stoichiometry in the biosphere and in ecosystems The book offers a comprehensive view of global ecology and ecological stoichiometry which will aid in the processes of global ecology Provides an overview of the theory and application of global ecology International focus and range of ecosystems makes Global Ecology an indispensable resource to scientists Based on the bestselling Encyclopedia of Ecology Full color figures and tables support the text and aid in understanding *Bio* ,2004 **Advances in Plant-Soil Nitrogen**

**Management Strategies** Sumera Anwar,Shahbaz Khan,Fahad Shafiq,2024-02-19 *Official Meeting Program* Ecological Society of America. Meeting,2002 **Journal of Experimental Biology** ,2006 *Annual Review of Ecology, Evolution, and Systematics* ,2008 **The Bulletin** ,2004 *The American Naturalist* ,2009 Morphological, Physiological, and Biochemical Aspects of Growth Rate in Plants Virginia Matzek,2006 *The Dioxin Story, Episode II* Richard Allen Maltby,2005 **John T. and Paige S. Smith Undergraduate Science Research Symposium Proceedings** ,2008

**Ecology of Insects** Martin R. Speight,Mark D. Hunter,Allan D. Watt,2008-08-18 Fully revised and updated to include new topical study areas the second edition of the successful text the Ecology of Insects provides a balanced treatment of the theory and practice of pure and applied insect ecology Includes new topical areas of insect ecology and provides greater coverage of physiological genetic molecular and ecosystem aspects of insect ecology Concepts include the foundations of evolutionary ecology and population dynamics in ecosystem science as they are applied to topics such as climate change conservation and biodiversity epidemiology and pest management Fully updated and revised throughout this new edition refers to primary literature and real world examples To access the artwork from the book please visit <http://www.blackwellpublishing.com/speightinsects> *Science* John Michels (Journalist),2010 *Proceedings* ,2009

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