

# Preface

When you go into a scientific library or look through the catalogues of scientific publishers, you will quickly find books from food scientists, food technologists, food chemists, food microbiologists, and food toxicologists. Agronomists, nutritionists, and physicians have written on food, and last but not least cooks. What I missed was a book on food written from the perspective of a biologist. When Susan Safren, the food science editor from Springer Science + Business Media, LLC, invited me to write a book, I decided that I would write this book on food biology.

What I had in mind was a survey on eating through space and time in a very fundamental way, but not in the format of a systematic textbook. The present book is more of an ordered collection of scientific essays.

*Contents.* In *Chapter 1*, I start with a prehistoric Venus to explore the relationship between sex and food. Then I use another lady—Europe—to investigate the strong links between food and culture. I then ask what is eating in a very basic but simple physicochemical sense. In *Chapters 2 and 3*, I embark on a biochemistry-oriented travel following the path of a food molecule through the central carbon pathway until it is decomposed into  $\text{CO}_2$  and  $\text{H}_2\text{O}$  and a lot of ATP. My account does not intend to teach biochemistry, but to use recent research articles from major scientific journals to look behind food biochemistry. In *Chapter 4*, we explore the evolution of eating systems over time starting with the primordial soup, going into the RNA world, and then into the fascinating eating world of cells. I follow here the historical time line and you should not be too surprised that most of these chapters is dedicated to the prokaryotic cells and its nutritional biochemistry. Don't blame me for a microbiological bias. For the larger part of the biological evolution on Earth, the living world was represented mostly, if not exclusively, by microbes. In *Chapter 5*, I give "higher" organisms their full rights. I selected animal-oriented research papers under an ecology perspective. The actors come first from the ocean, then its borders. To unite plants and animals and to put land-based biology on center stage, I choose herbivory as a read thread for the second part of this chapter.

In *Chapter 6*, we investigate food stories from a behavioral viewpoint, first with animals and then with humans, where our march through time reaches from

animals to early hominids into human history, even politics. If we would end here, we would miss a major point, namely that human eating stories cannot be seen in isolation. To dismantle again our anthropocentric view of the world, *Chapter 7* will show us as food for many predators. Microbes as the invisible rulers of the world make again their strong appearance on the scene. I end my chapter with an outlook on a few selected chapters from agronomy and the problems to feed a growing world population with the help of science and technology. It is also a story about pessimism and optimism in life.

*Scope.* I am deliberately speaking of eating systems because my definition of eating is very inclusive. It also covers gases ( $\text{CO}_2$ ,  $\text{O}_2$ ,  $\text{H}_2$ , and  $\text{CH}_4$  take central places in the arguments of this book), electrons, and protons. Prokaryotic systems, “eating” very strange compounds and using exotic energy sources, are prominently treated. You will see another aspect in this book on food: The arena where the story is unfolding is planet Earth. Several of the chapters stress the link between the biosphere and the atmosphere and touch questions of climate change.

*Writing Style and Readership.* The reader will find two types of chapters. One type tells a linear story in an easy essay style. These chapters should be accessible to any science student, perhaps even an educated layman or laywoman. The other type organizes a story around recent research articles in major scientific journals. Here you might get the impression of a somewhat heterogeneous patchwork when I try to integrate a couple of research papers into a story. As the level of arguments in research journals is frequently very complex, the second type of chapters is more difficult to read. I tried to work out the essence of the papers without simplifying them too much. These parts are better suited to advanced students.

When it comes to the technique of writing, I tried to animate the flow of arguments with historical remarks, anecdotes, or personal reflections, which are not conventional parts of a scientific textbook, but are essential for a scientific essay since they are necessary to provoke thought. To avoid false scientific claims for my personal opinions, these passages are printed in italics. As these passages often interrupt the flow of the main arguments, I have chosen frequent subheadings to structure a chapter.

*Reading Recommendation.* Some chapters on bioenergetics, photosynthesis, and bacterial metabolism in Chapters 2 and 3 require some background knowledge. If you need a recall of your biochemistry knowledge, you will find the required backup information with a mouse click on the virtual bookshelf of the National Center for Biotechnological Information. Please go to [www.ncbi.nih.gov/](http://www.ncbi.nih.gov/) and on the opening page you find on the first row of the header “Books.” Clicking on it, you can search numerous science books or you can choose a specific one. Personally I recommend *Biochemistry* by Berg or *Molecular Biology of the Cell* by Alberts when you need backups for the present book. If you need help for more classical subjects of biology, you will find a first orientation on the Internet with Wikipedia. Useful web sites are provided at the end of the book after the reference section. The second part of the book is

easier to follow and may in part even please a larger public. Even when I have written the book as a logical flow of arguments, I do not think that it must be read in a linear fashion. In fact I strongly encourage you to selective reading. I was also a selective author. Start with the chapter where the heading arouses your interest.

*Illustrations.* Most figures in this book go back to illustrations from landmark science publications from the late nineteenth century Germany. I used them for several reasons. One is esthetical—I like these old figures because they are so artful and I owe my thanks to the Brockhaus Verlag, who allowed me to present these figures from the “Brehm” and the “Kerner,” multivolume treatise of zoology and botany, respectively, and “Meyers Konversationslexikon” to an international readership. The “Brehm” illustrations were not only used by Charles Darwin in his book *The Descent of Man*, but became a standard in the educated German-speaking household. Where the Brehm fails in the world of the microbes, my colleagues from our microscopy group (M. L. Dillmann, M. Rouvet) helped me with modern pictures. Apart from this historical aspect, the old figures were also meant as a contrast to the quoted research papers, which were mostly published over the last few years to provide a topical review. However, this mania for actuality neglects the fact that science also relies on tradition of knowledge. We can lose insight when we are not looking back. The idea for illustrating the *Dramatis Personae*, the actors of the play of life, came from a reviewer (Ted Farmer, Uni Lausanne), who suggested that classical zoology and botany might not be that present in the modern generation of molecularly trained biologists. The figures are also meant as moments of relaxation and fun when reading through a sometimes demanding text. I hope that you will enjoy this survey of eating through space and time. Personally I learned a lot when writing this book.

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The Quest for Food

A Natural History of Eating

Brüssow, H.

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