

Preface

Secretions and emissions in biological systems play important signaling roles within the organism but also in its communication with the surrounding environment. This relatively recent knowledge is in stark contrast with the view of secretions that is available in most text books in different biological science disciplines. Not too long ago, secretions and emissions were considered biological waste products that were simply discharged out of plants through a chemical gradient with no function to the environment whatsoever. The realization of this void of information was the driving force behind the compilation of this volume. This volume brings together state-of-the-art information about the role of secretions and emissions in different organs and organisms ranging from flowers and roots of plants to human organs.

The plant chapters will relate information regarding the biochemistry of flower volatiles and root exudates, and their role in attracting pollinators and interacting with soil microbial communities, respectively. Furthermore, these chapters will illustrate information about the fine molecular and biochemical machinery that is involved in the biosynthesis and secretion of these compounds; which suggests that the organism actively coordinates the release of these chemical signals. The release of compounds by roots is further highlighted by the most economically important root–microbe association in agriculture. The rhizobium–legume root association forms an organ called the nodule that can fix the nitrogen from the air and entirely eliminates the need of nitrogen fertilization in legume plants such as soybean. Proteoid roots release proteases for improving nitrogen and phosphorus availability for their mineral nutrition. Roots of plants not only release compounds, but also entire cells and the detailed mechanisms and functions of this phenomenon will be highlighted. Plants emit fine bouquets of smell not only through their flowers but through several organs; the biosynthesis and function of volatile organic compounds (VOCs) in plants are also covered in this volume. Moreover, in order to manipulate their animal pollinators, plants provide them with nutritive exudates.

Microbial chapters will explain the biochemistry and ecology of quorum sensing and how microbial communities aggregate in different environments through the

continuous release and sensing of compounds that regulate the “quorum” in the community. A related chapter will touch upon highly coadapted association between plants and soil microbes that can aid in bioenergy applications by degrading lignocellulosic materials.

Other chapters will explain the biology of secretions by algae and humans, among other organisms. All in all, this volume will be a welcome addition to the literature as no other book covers aspects related to biological secretion in such a holistic and integrative manner.

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Jorge Vivanco
František Baluška

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Vivanco, J.M.; Baluška, F. (Eds.)

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