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Born in 1955 in Augsburg, Germany

Studied Biology at the Ludwig-Maximilians-Universität München and at University College Swansea, UK

PROJECT

The Individual as Metaorganism: Novel Perspectives for Biology, Medicine and the Humanities

From protists to humans, all animals and plants are inhabited by microbial organisms. There is an increasing appreciation that these resident microbes influence the fitness of their hosts, ultimately forming a metaorganism consisting of a uni- or multicellular host and a community of associated microorganisms.

The objective of my research is to address key gaps in our current understanding of metaorganisms (synonym: holobionts) and to analyse and formulate new directions in explaining microbiota-host associations. My project will synthesize previous work on the evolution of immune systems and on host-microbe interactions over the past ten years and ask questions like: Are there unexplored developmental interactions between microbiota and host? Can a holobiont employ strategies unavailable to any one species alone? What does it mean to think of humans as part of a metaorganism - composed of human as well as of trillions of non-human cells? My goal is hence to integrate the different aspects of animal, plant and medical host-microbe research and to investigate how philosophy and anthropology can shape and change the way we look into the complexity of metaorganisms.

I do hope to engage colleagues from both the natural sciences and the humanities and also the public in the excitement of understanding how organismal complexity comes into being.

Recommended Reading

Rees, T., T. C. G. Bosch, and A. E. Douglas (2018). "How the microbiome challenges our concept of self." PLOS Biology 16, 2: e2005358.

Bosch, T. C. G. and D. Miller (2016). The holobiont imperative: perspectives from early emerging animals. New York: Springer.

Bosch, T. C. G. (2014). "Rethinking the role of immunity: lessons from Hydra." Trends in Immunology 35, 10: 495-502.

COLLOQUIUM, 11.09.2018

The Holobiont Imperative: Towards an Holistic Understanding of Complex Life Processes

In the last decade, biology has made revolutionary advances from century-old debates about the relative importance of non-pathogenic bacteria. Today we know that individuals are not solitary, homogenous entities but consist of complex communities of many species that likely evolved during a billion years of coexistence. Holobionts (hosts and their microbes) and hologenomes (all genomes of the holobiont) are multipartite entities that result from ecological, evolutionary and genetic processes. I propose, therefore, that the health of animals, including humans, is fundamental multi-organismal; and that any disturbance within the complex community of host and microbial cells has drastic consequences for the wellbeing of the individual member of this association. This new-found awareness of the dependency of phenotypes on other species and environmental conditions presents additional layers of complexity for the life sciences including medicine and evolutionary theory; and raises many questions that are being addressed by new research programs.

PUBLICATIONS FROM THE FELLOW LIBRARY

Bosch, Thomas C. G. (Washington, DC,2024)

The potential importance of the built-environment microbiome and its impact on human health

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1887992081

Bosch, Thomas C. G. (Berlin,2022)

Die Unentbehrlichen - Mikroben, des Körpers verborgene Helfer : warum sind so viele Menschen krank? : Antworten aus der Mikrobiomforschung

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1789998980

Sachbuch

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1789998980

Bosch, Thomas C. G. (Amsterdam [u.a.],2020)

Boundary maintenance in the ancestral metazoan Hydra depends on histone acetylation

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1749101882

Bosch, Thomas C. G. (Washington, DC,2020)

Microbial species coexistence depends on the host environment

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1748081977

Bosch, Thomas C. G. (Lausanne,2020)

Exploring the niche concept in a simple metaorganism

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1733203737

Bosch, Thomas C. G. (mbio,2020)

Microbial species coexistence depends on the host environment

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1733202358

Bosch, Thomas C. G. (Cold Spring Harbor,2019)

Microbial traits and the realized niche in a simple metaorganism

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1690378093

Bosch, Thomas C. G. (München,2019)

Komplexe Lebensgemeinschaften mit Bakterien : das Prinzip Metaorganismus

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Bosch, Thomas C. G. (Cold Spring Habor,2019)

Fitness effects of host-bacterial interactions - the microbial perspective

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1690373067

Bosch, Thomas C. G. (S.l.,2019)

The effect of symbiosis on symbiont fitness – interactions within a simple metaorganism

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1670527735