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**SPRINGER
NATURE**

The human gut is home to trillions of microorganisms, which modulate health and disease. This Insight brings together leaders in the field of microbiota–host interactions to provide an overview of basic biological processes and important advances in the development of clinical applications.

Jeff Gordon and colleagues present a microbial perspective of human developmental biology. They describe how the microbiota affects prenatal and postnatal growth and explain how an understanding of such communities could help to prevent and treat diseases. To this end, they call for the establishment of ‘human microbial observatories’ to examine the development of the microbiota in birth cohorts with diverse lifestyles and patterns of disease.

Justin Sonnenburg and Fredrik Bäckhed analyse how the microbiota and diet interact to influence metabolism. They review mechanisms used by the microbiota to modulate the effects of diet on the host’s metabolic status, as well as the potential for therapeutic intervention.

Eran Elinav and colleagues discuss crosstalk between the microbiota and the innate immune system, focusing on bacterial components and host response pathways, mutually beneficial effects of such communication and diseases that arise when this interaction is disturbed.

Kenya Honda and Dan Littman summarize our understanding of how specific microbes determine aspects of adaptive immunity and the part that they play in the induction of both immune tolerance and conditions such as allergy and intestinal inflammation.

Andreas Bäumler and Vanessa Sperandio examine interactions between the gut microbiota and pathogenic bacteria, including how pathogenic species exploit microbiota-derived sources of carbon and nitrogen as nutrients and regulatory signals for growth and virulence.

And Rob Knight and colleagues consider the advent of microbiome-wide association studies, which have been enabled by advances in DNA sequencing, metabolomics, proteomics and computation. They provide a road map for realizing the promise of microbiome-based precision diagnostics and therapies.

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Christina Tobin Kährström, Nonia Pariente & Ursula Weiss
Senior Editors

CONTENTS

PERSPECTIVE

48 **A microbial perspective of human developmental biology**

Mark R. Charbonneau, Laura V. Blanton, Daniel B. DiGiulio, David A. Relman, Carlito B. Lebrilla, David A. Mills & Jeffrey I. Gordon

REVIEWS

56 **Diet–microbiota interactions as moderators of human metabolism**

Justin L. Sonnenburg & Fredrik Bäckhed

65 **The microbiome and innate immunity**

Christoph A. Thaiss, Niv Zmora, Maayan Levy & Eran Elinav

75 **The microbiota in adaptive immune homeostasis and disease**

Kenya Honda & Dan R. Littman

85 **Interactions between the microbiota and pathogenic bacteria in the gut**

Andreas J. Bäumler & Vanessa Sperandio

94 **Microbiome-wide association studies link dynamic microbial consortia to disease**

Jack A. Gilbert, Robert A. Quinn, Justine Debelius, Zhenjiang Z. Xu, James Morton, Neha Garg, Janet K. Jansson, Pieter C. Dorrestein & Rob Knight