



Dr Ehrlich is Professor of Microbiology and Immunology, and Otolaryngology-Head and Neck Surgery at Drexel University College of Medicine (DUCOM) in Philadelphia, PA, USA. He also directs both the Center for Genomic Sciences (CGS) and the Center for Advanced Microbial Processing (CAMP) within the Institute for Molecular Medicine and Infectious Disease, and the Core Genomics Facility within the Clinical and Translational Research Institute. He is the Founder of CGS, now in its 19th year at its 3rd host institute and CAMP. CGS scientists utilize a broad array of comparative genomic techniques and bioinformatic tools, many developed in-house, to identify and characterize both virulence genes within pathogens, and susceptibility genes to pathogens within their hosts. Dr Ehrlich is also one of the founders of the field of Clinical Molecular Diagnostics (MDx), having been involved in the original application of PCR for the detection of human retroviruses in 1985, and is widely recognized as an authority in the field. Subsequently he founded the MDx Division at the University of Pittsburgh Medical Center where he directed one of the first CAP and CLIA certified MDx labs in the USA. He used his experiences from this endeavour to author and edit the first text book/lab manual for infectious disease (ID) MDx. In addition, together with a team of like-minded pioneers in the MDx field he was one of the founders of the Association for Molecular Pathology (AMP) and served as the first co-chair of the ID section. Beginning in 2006 he has served as an advisor and consultant for the development of the Ibis universal biosensor, a next generation MDx platform, which provides pan-domain coverage and species-level identification for bacteria and fungi in a single assay using a combination of PCR, mass spectroscopy, and advanced algorithms.

Dr Ehrlich refers to himself as a synthetic scientist, in contradistinction to an analytical scientist, and parleys ideas and technologies across multiple academic and clinical silos. This unusual approach to science and technology has enabled him to make substantial contributions in multiple academic, clinical, and technical arenas. These advances include: theoretical modelling of infectious disease processes; developing animal models of infectious disease; combining biofilm-based understandings of bacterial growth with chronic bacterial pathogenesis; bioengineering of intelligent medical implants to prevent infections; creating comparative and computational genomic tools; being an early adopter of next-generation DNA sequencing technologies and analyses to test theoretical models of bacterial evolution; performing human disease gene mapping and cloning studies; comparing clinical and molecular parameter of the human retroviruses HTLV-I and HIV-1; developing and implementing molecular diagnostics for understanding the role of bacterial pathogens in “sterile” conditions in otolaryngology, orthopaedics, surgery, urology, gynaecology, and the central nervous system.

Dr Ehrlich counts among his most important contributions to science the re-writing of much of our understanding of chronic bacterial pathogenesis. This began with his promulgation of the biofilm paradigm to explain many facets of chronic mucosal microbial infections, an area of interest for nearly a quarter of a century. This work began with his explorations into chronic middle-ear disease in children which he has since repeatedly generalized such that it is now widely accepted that the vast majority of all chronic bacterial infections are biofilm-associated. He also advanced the Distributed Genome Hypothesis to explain the enormous clinical variability among strains of a bacterial species, which together with the biofilm paradigm form the bases for his rubric of Bacterial Plurality. More recently he has developed the concept of bacterial population-level virulence factors and has used statistical genetics for the first time within the field of bacterial genomics to identify distributed genes that are associated with virulence. This computational methodology provides a non-biased, top-down approach to

prioritize the annotation of hypothetical genes. Coincident with the recent relocation of his research enterprise to Drexel University College of Medicine he founded and developed CAMP. CAMP functions as a collaborative multi-discipline, multi-institutional facility for the development of meta-omics, a combination of genomics, expressomics, proteomics and metabolomics, which serve as a translational tools for the biofermentive production of useful natural product compounds that are too expensive or too difficult to make using synthetic chemical approaches. Thus, the mission of CAMP is to exploit a suite of technological advances, many developed within the CGS, which permit the identification, cloning, heterologous expression, and biochemical verification of commercially important biosynthetic and biodegradative pathways from what Dr Ehrlich refers to as the “Genomic Dark Matter” , i.e. the 99% of microbial species that are unculturable.

Dr Ehrlich’s latest paradigm-changing hypothesis developed with his collaborator, Judith Miklossy, is that both osteoarthritis and Alzheimer’s disease (AD) result from a combination of chronic bacterial biofilm infections of the joints and brain (primarily originating from the periodontium) and in the case of AD the brain’s anti-microbial and inflammatory responses to these infections. To accomplish this goal he has assembled a multi-national team of academic and industrial partners and is conducting blinded, large-scale, deep-sequencing analyses of affected and control patient populations.

Dr Ehrlich’s contributions to science have been widely recognized: he has published nearly 300 original scientific papers, reviews, and chapters; has an h-factor of 55 with greater than 13,000 citations of his published works; and six of his papers (all of which he PI’d or Co-PI’d) have been cited by the prestigious faculty of 1000’s post-publication peer review. He has received approximately \$50 million in research funding throughout his career, including his original NIH R01 grant which is currently in years 20-25. In addition, Dr Ehrlich has given over 200 invited talks around the world including some two dozen named and keynote lectures; he has received multiple honorary, visiting, and adjunct professorships in the States, Asia and Europe; and he has organized more than a dozen research symposia in multiple divergent fields of endeavour.

Dr Ehrlich feels strongly about scientific citizenship, including mentoring and participating in the fair and critical review of manuscripts and proposals, and thus takes a particularly keen interest in developing the next generation of medical scientists, as well as training physicians and surgeons in research. In this regard he has mentored dozens of graduate students, postdocs, residents, fellows, and junior faculty across many different specialties. He has participated as a reviewer on nearly 100 grant review panels, and reviews for more than 50 scientific journals. He has also established, in his father’s name, the Professor Robert E Ehrlich scholarship in mathematics at Alfred University, his undergraduate *alma mater*.