Published in final edited form as:

Microbes Infect. 2015 July ; 17(7): 469–470. doi:10.1016/j.micinf.2015.05.002.

A new frontier: oral microbes without borders

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We are in the midst of an era of rapidly developing technologies and inventive tools for studying human biology. At the same time, oral microbes are now acknowledged as major contributors not only to oral health, but overall health and chronic inflammatory and inflammatory disease. This recent acknowledgement has attracted the attention of a broad spectrum of scientists interested in microbial ecology, innate immunity, cell biology of infection, and systemic disease.

During the past decade, studies on oral microbiology and immunology have garnered a wealth of information on the molecular and cellular basis of infection and inflammation. Furthermore, the composition of the oral microbiome and interactions of the host with the microbiome and poly-microbial species are being characterized at an unprecedented degree of precision. The components of the oral microbial communities are endowed with unique properties and functions that contribute to our understanding of the vastly complex human-microbe interactions and their resulting maladies.

This special issue of *Microbes and Infection* is devoted to the topic of “oral pathogens and microbiome in health and disease”, and contains six review articles that illustrate the behaviour of oral microbes on a molecular, cellular and systemic level, both as individual players and as members of larger microbial communities. The article by Atanasova and Yilmaz highlights the role of oral opportunistic microbes, especially the periodontal pathogens *Porphyromonas gingivalis* and *Fusobacterium nucleatum*, as new putative cofactors in the pathogenesis of a number of chronic illnesses spanning a broad range of diseases from orodigestive cancers, rheumatoid arthritis, diabetes, and kidney and heart disease to neurodegenerative conditions [1]. Nobbs and Jenkinson describe the oral cavity as containing one of the most complex microbial communities characterized so far. They illustrate how co-evolution of the oral ecosystem and host results in bacterial-fungal, bacterial-viral, and microbial-host networks that are associated with health or disease and may provide novel insights into the mechanisms of host immune responses [2]. Kreth et al. examine riboregulatory RNAs and their significance for virulence and microbial persistence

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in the oral cavity [3]. Duran-Pinedo and Frias-Lopez discuss current paradigms of the functional role of the oral microbiome and its components in dysbiosis of oral microbial ecology and its consequence for oral and non-oral diseases [4]. Aruni et al. provide recent information and views regarding the newly recognized, fastidious oral pathogen, *Filifactor alocis*, and the multiple mechanisms used by the microorganism to survive in human oral tissues [5]. Finally, Jakubovics and Burgess describe the critical role played by extracellular DNA in the structure and function of biofilms of the oral cavity [6].

We are experiencing an emergence of new microbial diseases worldwide and obtaining a better understanding of old ones. Research on oral microbiology and host pathogenesis have accelerated lately and have led to the discovery of many novel and key features of microbiology and immunology in general. Emerging evidence that oral health has a large impact on systemic disease makes the oral microbes even more relevant for diagnosis and treatment of human health. As pointed out by Lunsford et al. in their guest editorial [7], it is likely that continuing studies of oral microbes and the oral microbiome, in particular, will help us to formulate new paradigms (or shift existing paradigms) of oral pathogenesis and improve our understanding of chronic human diseases and general health from multiple perspectives.

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