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New strategy for discovering biologically active small molecules

The term antibiotic was coined by Selman Waksman to describe any compound produced by a microorganism that is antagonistic to the growth of other microorganisms in high dilution. Forty-three years after the structure determination of penicillin, the structure of liposidomycin B, an inhibitor of bacterial peptidoglycan synthesis, was uncovered in 1988. The structure explains the function of the antibiotic and was used as a motif for a science fiction film, *Godzilla vs. Biollante* in 1989. A derivative having liposidomycin core-structure, CAPZEN-45 has been recognized as a drug candidate for extremely drug resistant (XRD) *Mycobacterium tuberculosis*. In Japan, antibiotics and other microbial products has been explored as enzyme inhibitors, antiviral and anticancer agents. The *Journal of Antibiotics*, a flag journal for biologically active small molecules from microorganisms, has many articles on such microbial products as well as antibiotics. In addition, we have clarified the structures and functions of many biologically active small molecules such as tautomycin, tautomycetin, reveromycin, ascamycin, epiderstatin, epogymnolactam, and so on. Recently, we have uncovered a growth mechanism of

previously uncultured *Leucobacter* sp. by novel growth factors released by *Sphingopyxis* sp. strain ASN212. In this seminar, I will discuss the discovery of growth factors for Actinobacteria for the understanding the complex microbial communities as a network system, and for a general strategy for discovering biologically active small molecules using coproporphyrin in lieu of siderophore.

Speaker Biography

Makoto Ubukata has earned his PhD from Hokkaido University, the first modern educational institution in Japan and started his career as a Synthetic Chemist in 1980. After Postdoctoral fellowships at Indiana University and RIKEN, he became a Scientist at RIKEN in 1984. In RIKEN, he had spread his wings into the biological area probing for deeper understanding in Chemistry and Biology using biologically active small molecules. After 11 years working as a Scientist and Senior Scientist, he was appointed as a Full Professor of Biotechnology Research Center, Toyama Prefectural University. In 2003, he has moved his laboratory to Research Faculty of Agriculture, Hokkaido University. He is the recipient of JSBBA Award for Young Scientist (1989), Sumiki-Umezawa Memorial Award (1995), Japan Prize of Agricultural Science (2017), and Yomiuri Award of Agricultural Science (2017). He has been Professor Emeritus since 2015 and JSBBA Fellow since 2016. His current research interest includes the study on the structure and function of biologically active small molecule, which might help people.

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