

Preface

In Honor of Professor Satoshi Omura on the Occasion of His 70th Birthday

It is a great pleasure and honor for me to contribute a preface for this special issue of Heterocycles. Professor Satoshi Omura's enormous contributions have made a great impact on natural product and bioorganic chemistry ranging from fundamental and applied sciences to practical industries and even to human welfare.

Professor Omura was born in Yamanashi Prefecture, central region of Japan, on July 12, 1935. After the graduation from Yamanashi University (1958), he received M.S. (1963) and Ph. D (1970) degrees in Chemistry from Tokyo University of Science. He also received a Ph. D degree in Pharmaceutical Sciences (1968) from the University of Tokyo. He became a visiting professor at Department of Chemistry, Wesleyan University, Connecticut in 1971 and then a professor at School of Pharmacy, Kitasato University in 1975. Since 1990, he has served as the President of the Kitasato Institute, originally founded by the historically world-famous microbiologist, Shibasaburo Kitasato in 1914. Omura has also been a professor at Kitasato Institute for Life Sciences, Kitasato University from 2001.

Since early days as a young scientist, Omura has devoted studying on bioorganic chemistry focusing on the isolation of substances from microbial world with extremely remarkable bioactivities. He created novel methods of isolating and culturing microorganisms with co-workers and through the establishment of unique screening systems, they could identify more than 150 types and 340 novel bioactive compounds.

Amazingly, of those compounds discovered and/or developed by Omura's group, nanaomycin (1974), avermectin (1979), rokitamycin (1981) and tilmicosin(1989) have been practically used worldwide as human medicines, drugs for animals and/or agrochemicals. The most striking example is the case of avermectin. Isolation of avermectin from *Streptomyces avermectinius (avermitilis)* and collaboration with Merck group brought about the discoveries of a novel practical medicine, ivermectin, as an anthelmintic for animals first

(1981) and later against severe human diseases caused by the nematodes, for example, onchocerciasis (1981). In the latter case, WHO program (started in 1988) has succeeded in saving vast numbers of people in epidemic areas in Africa from blindness and recurrent infection until now. Applications to other parasitic diseases are now on-going worldwide.

A number of natural products with unique and remarkable bioactivities isolated by Omura's group have also been employed as a standard biochemical tool for studies on biological functions and they have markedly contributed to the development of biochemistry and molecular biology. Some of those are cerulenin (1967; inhibits fatty acid biosynthesis), staurosporin (1977; inhibits protein kinase), herbimycin (1979; inhibits HSP90), setamycin (bafilomycin B, 1981; inhibits V-type ATPase), triacsin (1986; inhibits acyl-CoA synthetase) and lactacystin (1991; inhibits proteasome). For example, the impact of his research on these fields must be estimated that more than 2500 original articles citing staurosporin had been published during five years between 1994 and 1998.

Omura's contribution to these areas of science is too much to illustrate the details, so the major achievements are listed as follows.

- 1) Establishment of the effective screening systems for microbial products
- 2) Discovery of microbial products
 - a) as medicines including the case of avermectin
 - b) as biochemical tools including the case of staurosporin
- 3) Studies on macrolide antibiotics
- 4) Structure determination and syntheses of natural products
- 5) Biosynthetic studies and gene analyses of microbial metabolites
- 6) Hybrid biosynthesis by gene manipulation

During more than four-decade career, Omura has published about 900 scientific papers and edited six important books in this field. Through these accomplishments, he received countless awards and honors including the Japan Academy Prize (1990), the Charles Thom Award of Society for Microbiology, USA (1991), the Chevalier de L'Ordre National du Merit, France (1992), the Fujihara Award, Japan (1995), the Robert Koch Gold Medal, Germany (1997), Earnest Guenther Award, ACS (2005), etc, etc. Since 2001, he has been a member of the National Academy of Sciences, USA and of the Japan Academy, and also holds memberships of Academies of other many major countries.

Omura is surely one of the most outstanding researchers and leaders in this area and no wonder to continue his devotion to bioorganic chemistry from now on too.

With my best wishes to Professor Omura for his 70th birthday.

A handwritten signature in black ink, appearing to read 'Takeshi Kitahara', with a large, sweeping flourish at the end.

Takeshi Kitahara

Professor Emeritus, the University of Tokyo

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