Tribute to Professor Albert I. Meyers

Dr. Albert I. Meyers, Professor Emeritus at Colorado State University at Fort Collins, was born November 22, 1932 in New York City, N.Y. He received the B.S. and Ph.D. in Chemistry from New York University in 1954 and 1957 and was a special NlH Fellow at Harvard from 1965-66. He was employed with Cities Service Oil in Princeton before taking a position as Assistant Professor at Louisiana State University in 1958. He rose to the rank of Professor 1964 and moved on to Wayne State University as Professor of Chemistry 1970-72. From 1972 to the present Dr. Meyers has held the title of Professor, University Distinguished Professor, John Stille Professor, and Professor Emeritus at Colorado State University.

The work of Professor of Albert I. Meyers has greatly influenced the course of modern synthetic organic chemistry. He has been a leader in use of heterocyclic compounds for synthesis, in stimulating the development of asymmetric synthesis of carbon-carbon bond forming reactions, in the use of directed metallation for synthesis and in the total synthesis of natural products.

Early in his career, Professor Meyers discovered that dihydro-1,3-oxazines could be elaborated by metallation and then reduced and hydrolized to aldehydes. This aldehyde synthesis was one of the early uses of organolithium bases of heterocyclic compounds and stimulated a great deal of further work. Professor Meyers' ability to utilize hetereocyclic compounds is based on his insight that heterocyclic ring contains latent functionality which can be released after critical synthetic reactions have been carried out. This theme, which was elaborated in his monograph “Hetereocyclics in Organic Synthesis” has been very influential in the field.

In 1974 Professor Meyers fired a "shot heard around the world" when he first described that a chiral enolate derived from a chiral oxazoline undergoes alkylation with high diastereoselectivity. Subsequent hydrolysis of the heterocyclic ring gave substituted alkanoic acids with enantiomeric ratios which were dramatically higher than previously had been observed for carbon-carbon bond alkylations. This stimulating result set the stage for major steps forward in asymmetric alkylations. His work was quickly recognized by the organic community as a breakthrough result and many variations have followed. Meyers' subsequent development of oxazolines and imines to control the diastereoselectivity and his rationalizations in terms of well defined transition states underlay the development of this

field. Meyers' use of hydroxylated chiral imines to generate imines, amines and related compounds for lithiation and substitution raised enantiomeric ratios to greater than 95:5 and were the first truly useful asymmetric synthetic reactions. Meyers' further work showed that chiral amino alcohols, which were readily available from amino acids, could be used to prepare many useful heterocyclic chiral auxiliaries. Again this theme has been developed in many laboratories. It may be safely stated that work of Professor Albert Meyers was primarily responsible for the renaissance in carbon-carbon bond asymmetric synthesis that followed his work in the 1970's.

It is also unforgettable that Professor Meyers challenged the total synthesis of antitumor ansamacrolide, maytansinoids and succeeded in it. In his paper on the total synthesis of (–)-maysine published in1983, fourteen names were found as co-authors. The work was a really frontier of the following and a number of endeavors toward total synthesis of macrocyclic lactones.

In the 1980's Professor Meyers developed the use of chiral and achiral formamidines to form anions adjacent to the nitrogen by lithiation. His work on the asymmetric alkylation of these compounds proved most effective for alkaloid synthesis. The course of these reactions were investigated by labelling and computational work. In 1984, Professor Meyers' work established that chiral bicyclic lactams prepared from gamma keto alkanoic acids are widely useful templates for asymmetric synthesis. A particularly notable feature of this work was the preparation of quaternary asymmetric centers using this heterocyclic structure. The bicyclic lactams have been further developed in the Meyers' group and remain a key component of his synthetic approaches for asymmetric carbon-carbon bond formations.

The use of oxazolines as activating groups for metallation was initiated by Meyers. This work derived from his use of the oxazoline as a masked carboxyl group and derived from his earlier work which showed that Grignard reagents could be formed in the presence of this heterocyclic ring. After the appropriate chemistry was completed, the carboxyl group was released. The use of a chiral oxazoline for aromatic alkylations and to produce biphenyls in asymmetric couplings was a further important significant development from the Meyers' group. His demonstration that the oxazolines could promote nucleophilic addition to aromatic rings also was stimulating for carbocyclic and asymmetric synthesis. Arising out of this work is the postulate of the complex induced proximity effect which Meyers and Beak (Illinois) introduced to rationalize a large number of novel reactions

through metal coordination which delivered the organometallic in a proximity for an unexpected reaction.

Professor Meyers has applied his skill in asymmetric methodology to the synthesis of many classes of natural products and has reported over 35 asymmetric total syntheses. While total syntheses of isoquinoline, indole, quinoline aikaloids were his focus, he and his coworkers have synthesized a number of other natural products in highly enantioenriched forms with known absolute configurations. In fact his work led to clarification of previous misassignments in the literature. A recent, interesting innovation is the synthesis of trichodiene, a compound which has two adjacent chiral quaternary centers and was a significant synthetic challenge.

Professor Albert Meyers has published over 500 articles, 7 reviews and a monograph. He has presented approximately 50 Honorary Lectures and has consulted for five major pharmaceutical companies. He is world reknown for his work in asymmetric synthesis and as his over 280 postdocs and PhD students can attest, he is a stimulating research director. He was selected in 2002 by ISI as one of the highest cited authors over the past twenty years.

His work has been recognized by awards which include the Andrew G. Clark Award for Excellence in Research; the Alexander von Humboldt Senior Scientist Award, 1984-1985; the ACS Award for Creative Work in Synthetic Organic Chemistry, 1985; the Arthur C. Cope Scholar Award from the American Chemical Society, 1986; the John Draper Distinguished Alumni Award, New York University, 1990; and was named the Colorado State Foundation Research of the Year, 1996. He received the Yamada Prize, Japan in 1996 and the International Society of Heterocyclic Chemistry Award in 1997. He was honored as a Japanese Science Foundation Fellow in 1979, a Fellow of the American Academy of Arts and Sciences in 1989, and elected to the National Academy of Sciences in 1994.

Other honors and services in chemistry include "Man of the Year-Louisiana Jaycees" in 1967 and election to the Executive Committee of the American Chemical Society in 1974-76. Professor Meyers has served on the editorial boards of leading chemistry journals. Among these are J. Org. Chem., 1974-79 and 1990-95; International Journal of Heterocyclic Chemistry, 1964-79; Organic Procedures, 1968-78; Heterocycles, 1974-present; J. Am. Chem. Soc., 1987-90; Tetrahedron/Tetrahedron Letters, 1990-present; J.

Chem. Soc., Perkin Trans. 1, 1990-95; and J. Chem. Soc., Chem. Commun., 1997-present. He was Associate Editor of J. Am. Chem. Soc., 1980-85; Guest Editor, Tetrahedron Symposium in Print, 1984; and Editor-in-Chief, Organic Syntheses, 1990-91. He has served as Chairman of the ACS Organic Symposium, 1975; Chairman, American Chemical Society, Executive Committee, Organic Division, 1980-81; Chairman of the Gordon Conference on Heterocycles, 1973 and on Stereochemistry, 1982; on the Board of Editors, Organic Syntheses, 1985-92; and NIH Study Section, Med. Chem., 1974-77, 1985-89.

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