

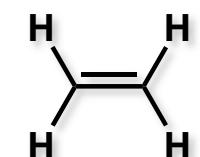
Symposium Honoring Professor Yoshito Kishi
August 23, 2025

Professor Kishi and Me



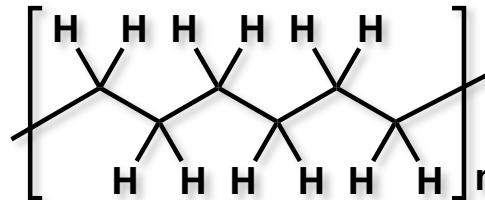
Tohru Fukuyama
Professor Emeritus
University of Tokyo

When I was a senior-high student:

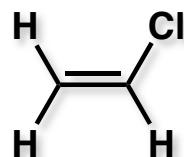


ethylene

catalyst

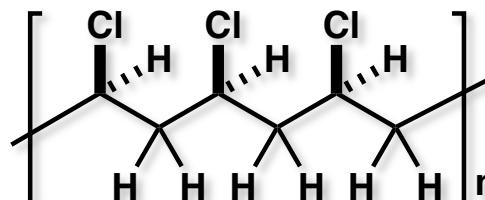


polyethylene

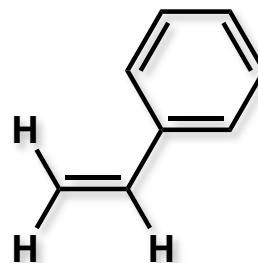


vinyl chloride

catalyst

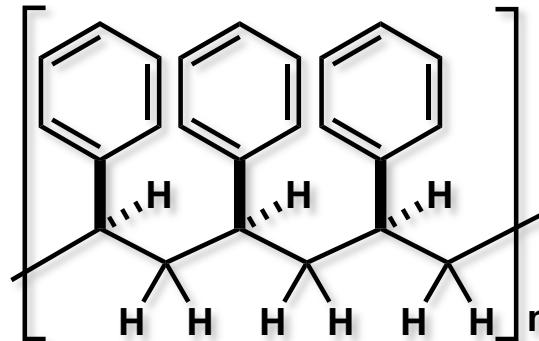


PVC



styrene

catalyst



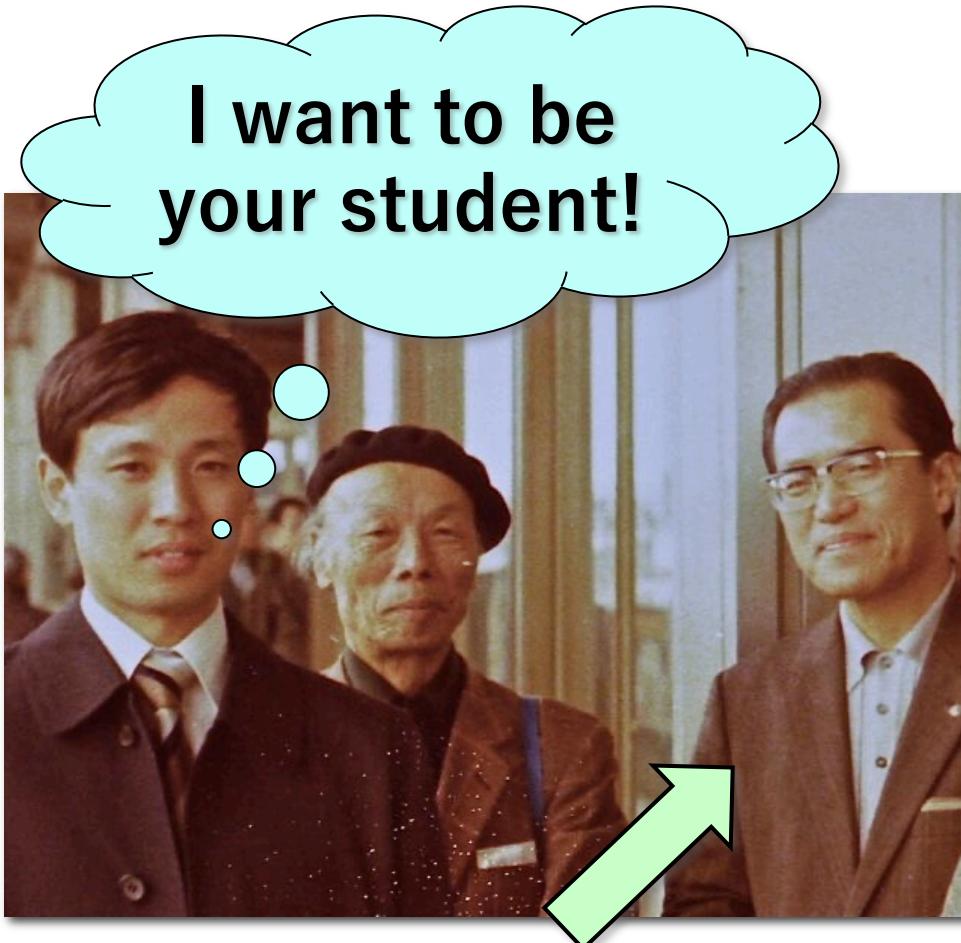
polystyrene

Polymer
Chemistry

?

1966

Learned the Pheromone Chemistry



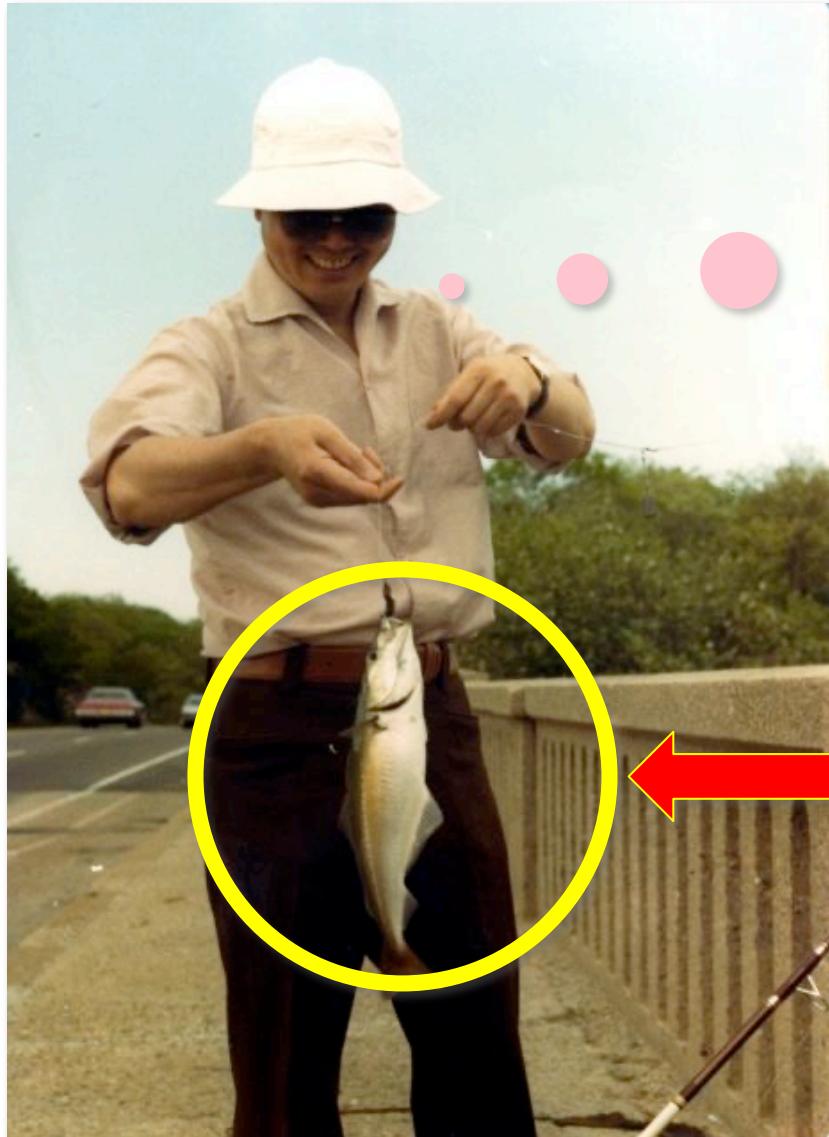
Prof. Katsura Munakata
Pesticide Chemistry
Nagoya University



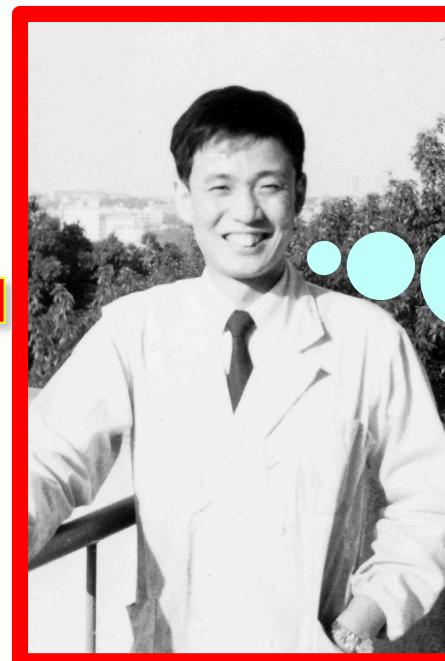
**Immediately decided
to go to
Nagoya University**

1966

Biggest Turning Point in My Life!



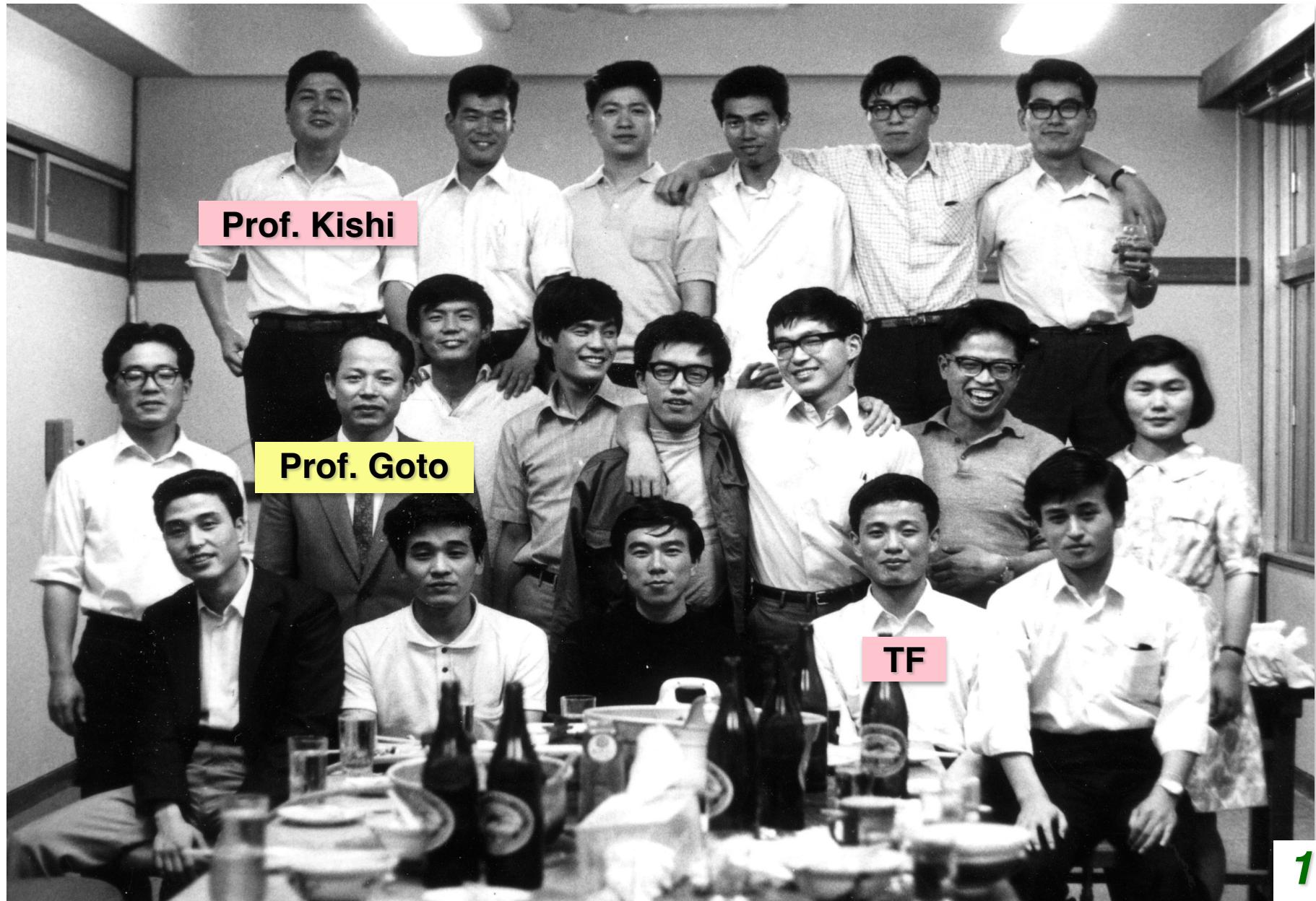
If you join my group, your future will be rosy...



I've never seen such an overconfident person!

1969

Welcome Party in 1970



What Dr. Kishi told me when I was an undergrad student:



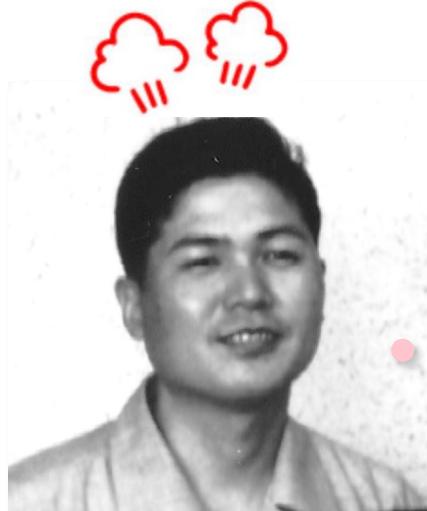
Don't call me,
“Kishi-sensei.”

OK, I will call you,
“Kishi-san.”



1970

What Dr. Kishi told me when I was an undergrad student:



Don't you ever ask me such an easy question!!

(In my heart)
I will never ask you
a question again!



1970

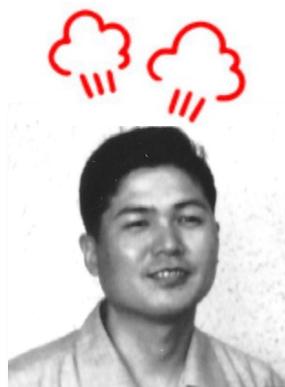
What Dr. Kishi told me when I was an undergrad student:



Why don't you do this reaction?



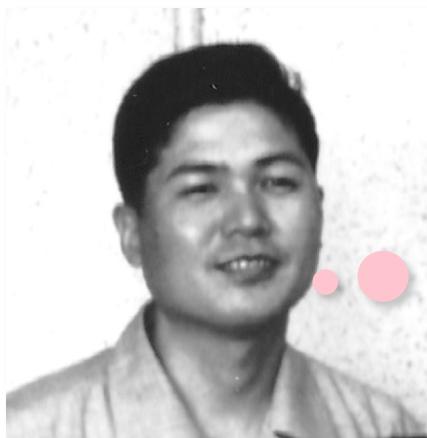
I know a similar reaction in literature, but it didn't give a good result.



How do you know the results without doing it by yourself?!

1970

What Dr. Kishi told me when I was an undergrad student:



It took 10 years before I became truly interested in organic chemistry.

(In my heart)

No wonder why I am not very much interested in it yet.



1970

Tamed Like a Chimpanzee?



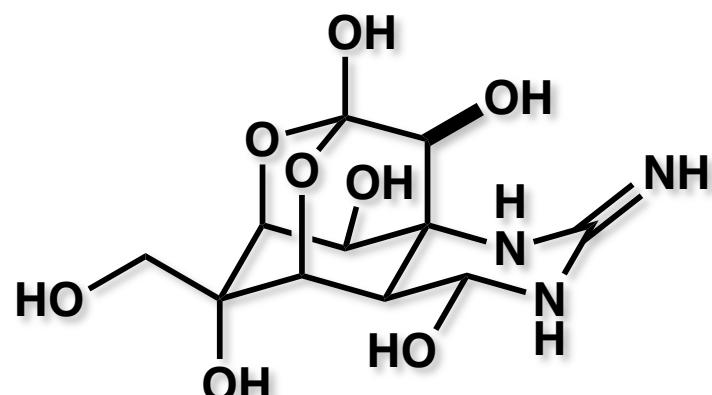
At lunch time, Dr. Kishi often gave me a banana.

I must
obey him...



1970

Joined the Tetrodotoxin Team

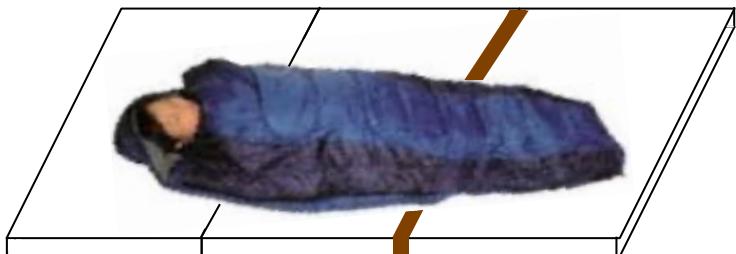


Tetrodotoxin

**Potent Neurotoxin
(Inhibitor of Na^+ Channel)**

1970

It took 70 minutes one way for commuting:



Slept on a floor of a storage room

- Slept in a sleeping bag on Mon, Wed, and Fri.
- After sleeping for 4-5 hours, washed my face and resumed experiments w/o eating breakfast.
- Worked until 22:10 on Tue, Thu, and Sat, to catch the last train at Nagoya Station.

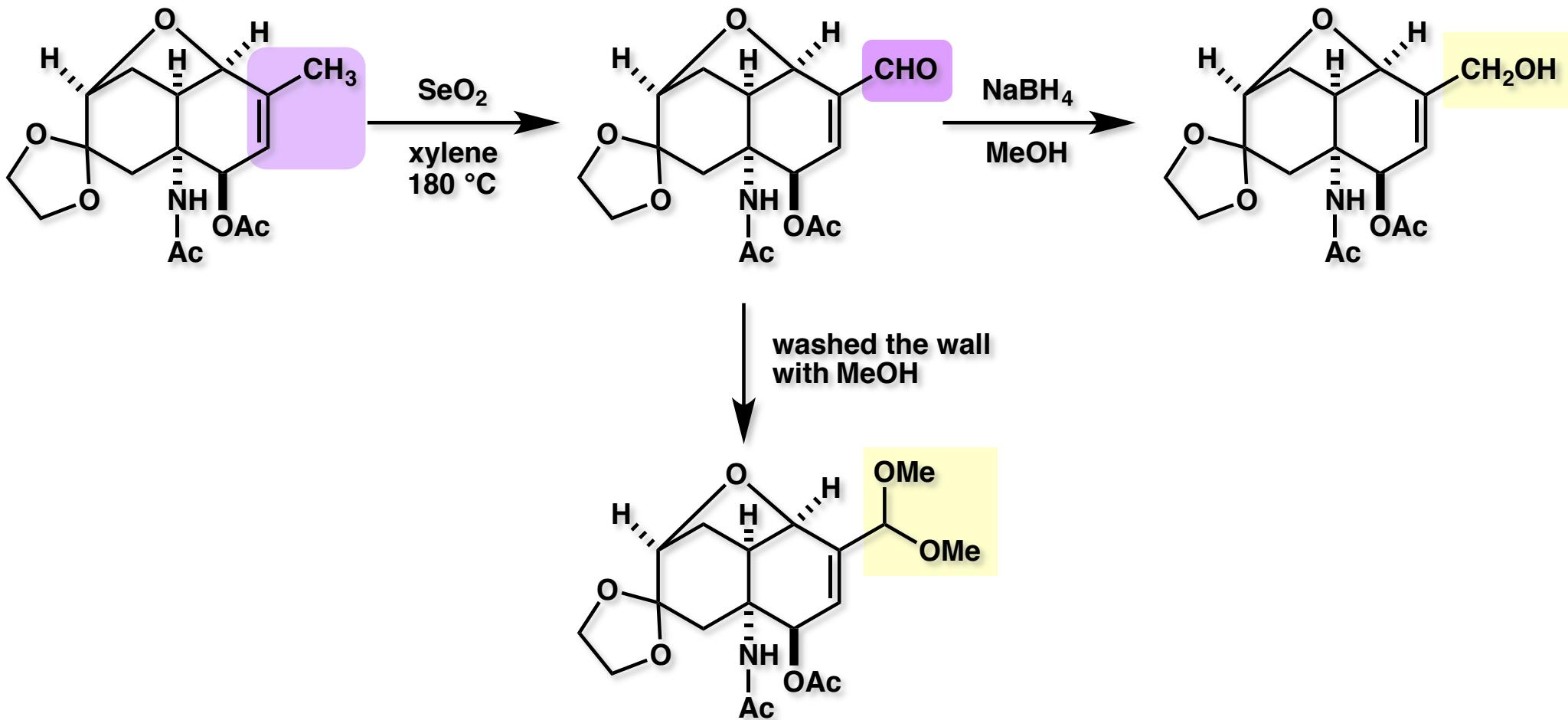
Dr. Kishi's Working Hours: 9 to 24

- Before going home, he asked me to do this and that.
- He never failed to say, “Don’t push yourself too hard.”
- How many times did I see **sunrise** by doing what he asked me to do?



1970-2

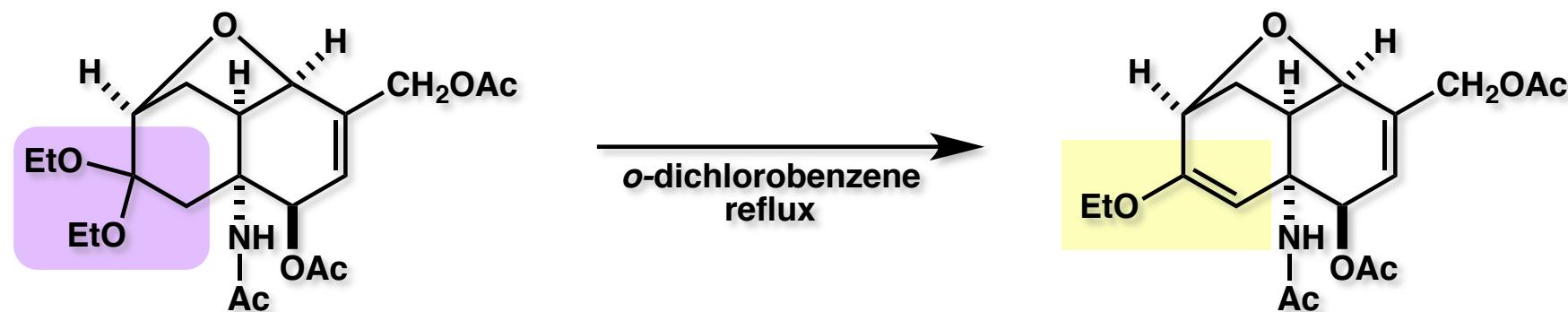
Failure during TTX Synthesis - 1



Reduction of the aldehyde did not proceed at all!

1971

Failure during TTX Synthesis - 2



Elimination of EtOH did not occur at all on large scale!

I passed the *o*-dichlorobenzene through an active alumina column to remove water.

1971

Another Story during TTX Synthesis

While I don't remember what reaction I did, I told Dr. Kishi that the reaction did not work.



He got angry and said, “The reaction should have worked!”



I was wondering why he got so angry.

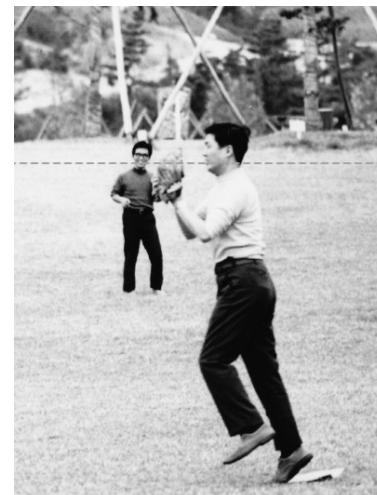
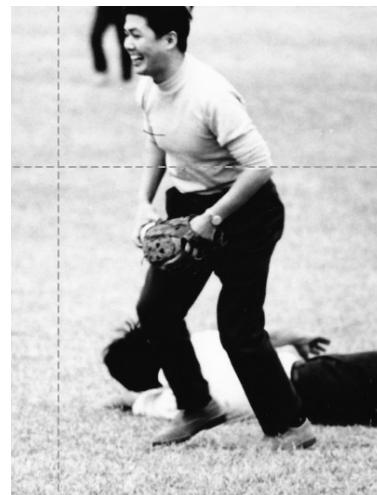
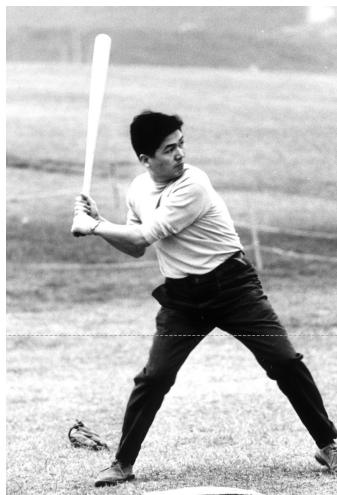


Years later, he told me that he did the experiment secretly on Sunday before asking me to do the same.

1971

Dr. Kishi and Softball

- Although he was a very good baseball player, he was too lazy to run and used a “DR (designated runner).”
- He used to say, “A poor baseball player does not make a good chemist.”



1971

**Although it was such a harsh life,
I never felt like I was forced to work.
I was filled with the excitement of
doing cutting-edge research.**



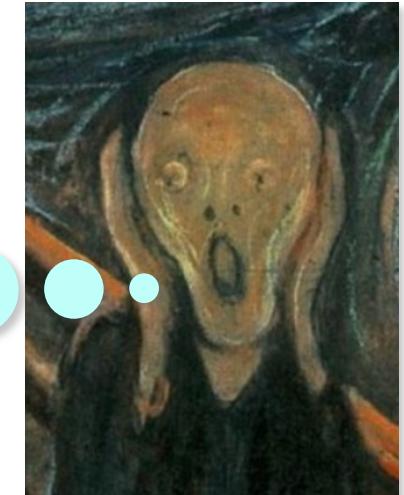
1972

Totally Unexpected News in 1972



Fukuyama-kun,
starting this summer I
will be a visiting
professor at Harvard
for a year. Would you
like to come with me?

This means "*I must*
go with him." I have
never left my home
in my life...



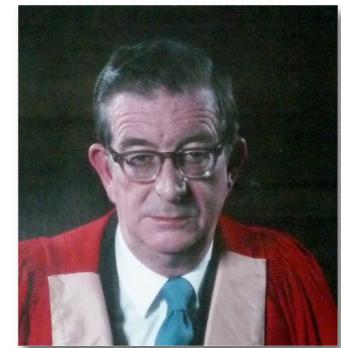
1972

My days were numbered: Plane crash...



@Nagoya Station

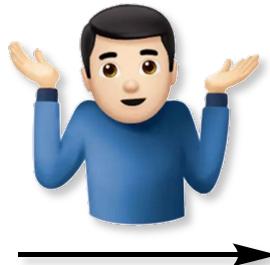
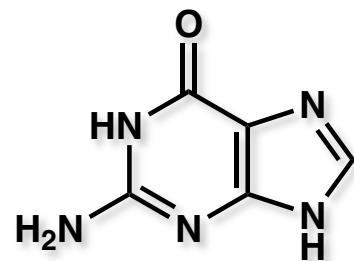
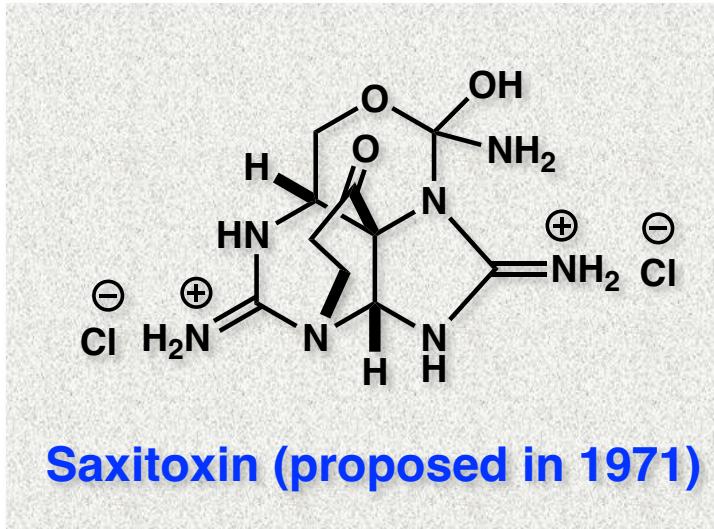
Years later Dr. Kishi told me that he took me to Harvard so that I could receive a Ph.D. degree from Prof. Woodward.



Prof. Woodward

1972

Dr. Kishi: Let's start total synthesis of saxitoxin!

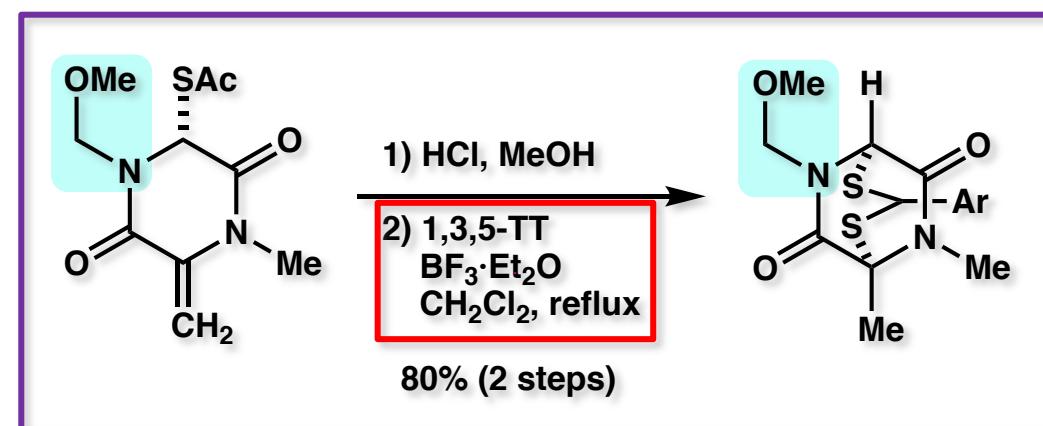
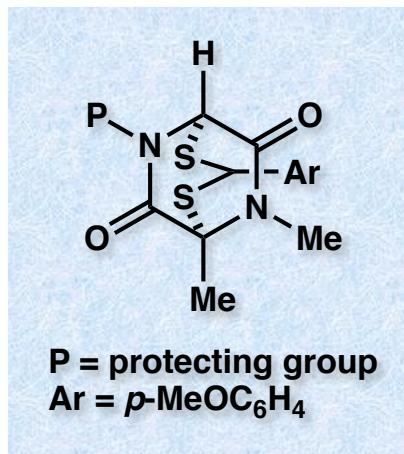
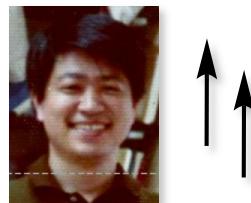
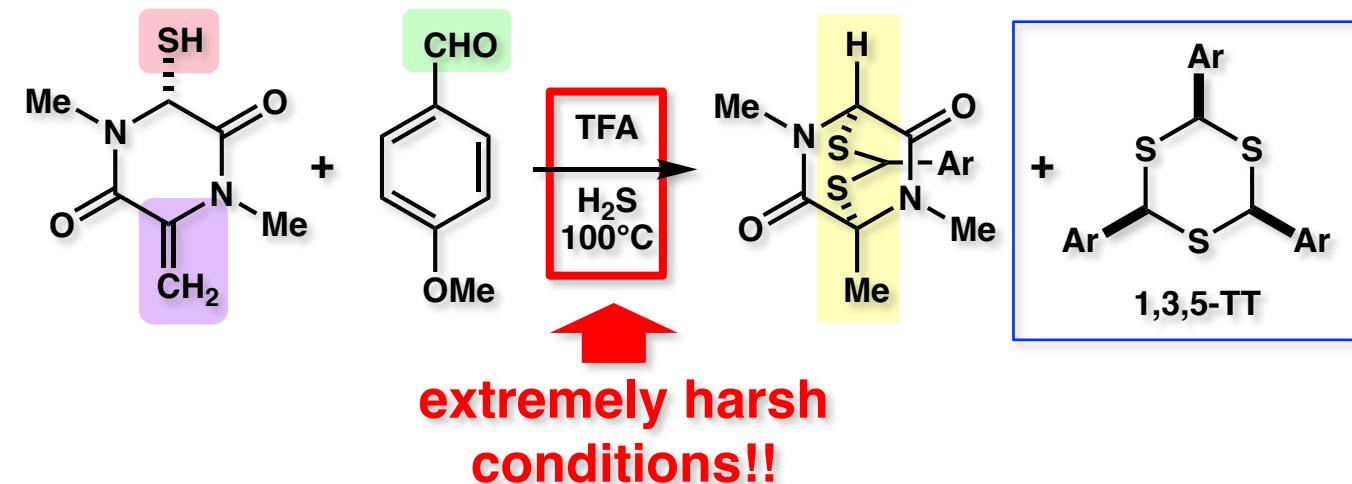


almost a rock
(0.1 mg/ml DMSO)

Dr. Kishi's Proposed Structure
(I don't remember...)

1972

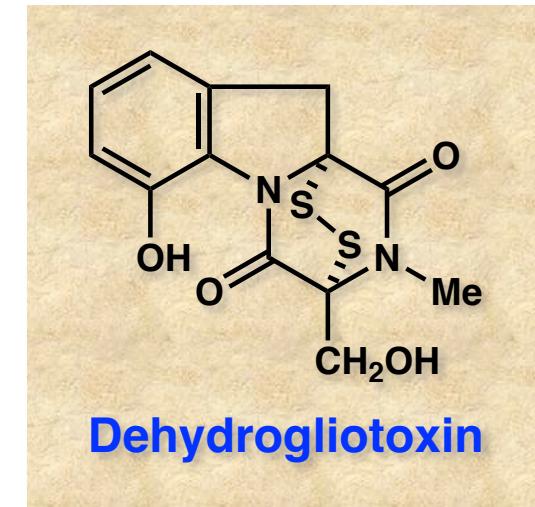
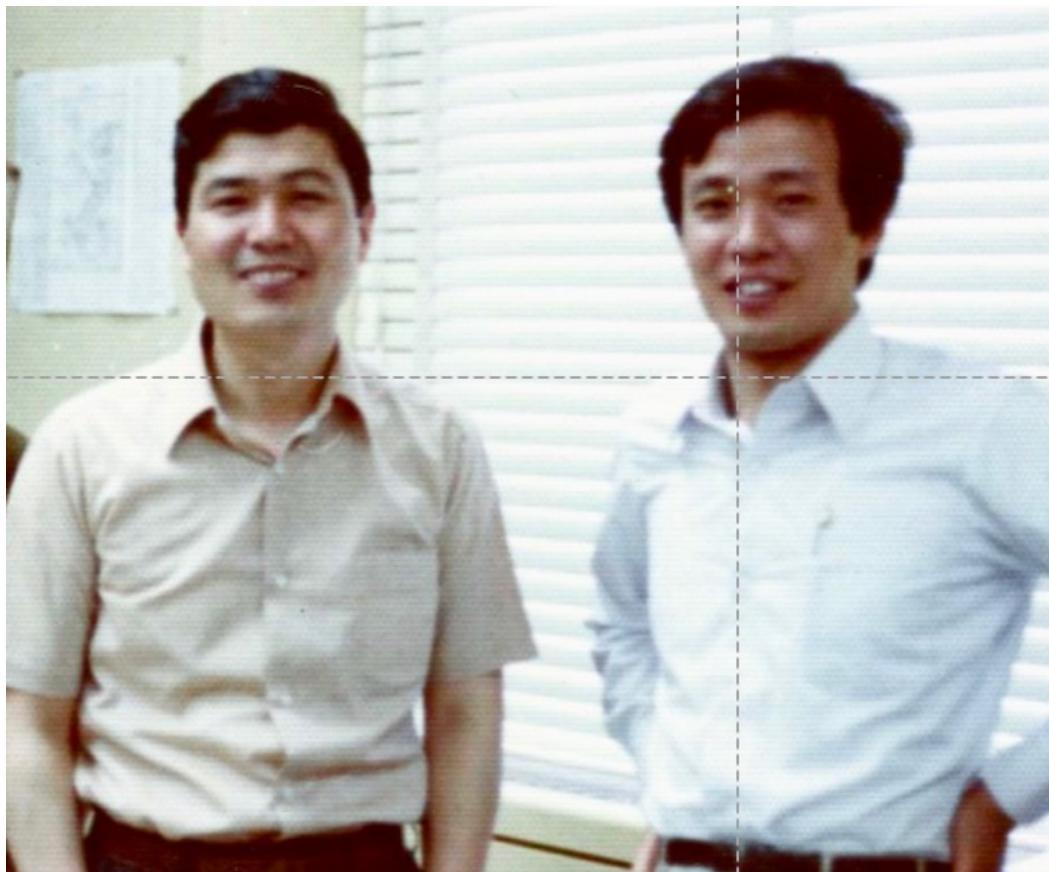
Escape from Hell: Nakatsuka-san joined



J. Am. Chem. Soc., 95, 6493 (1973)

1972

**Returned to Japan for one year
Dr. Kishi was to become a
professor at Harvard in 1974**

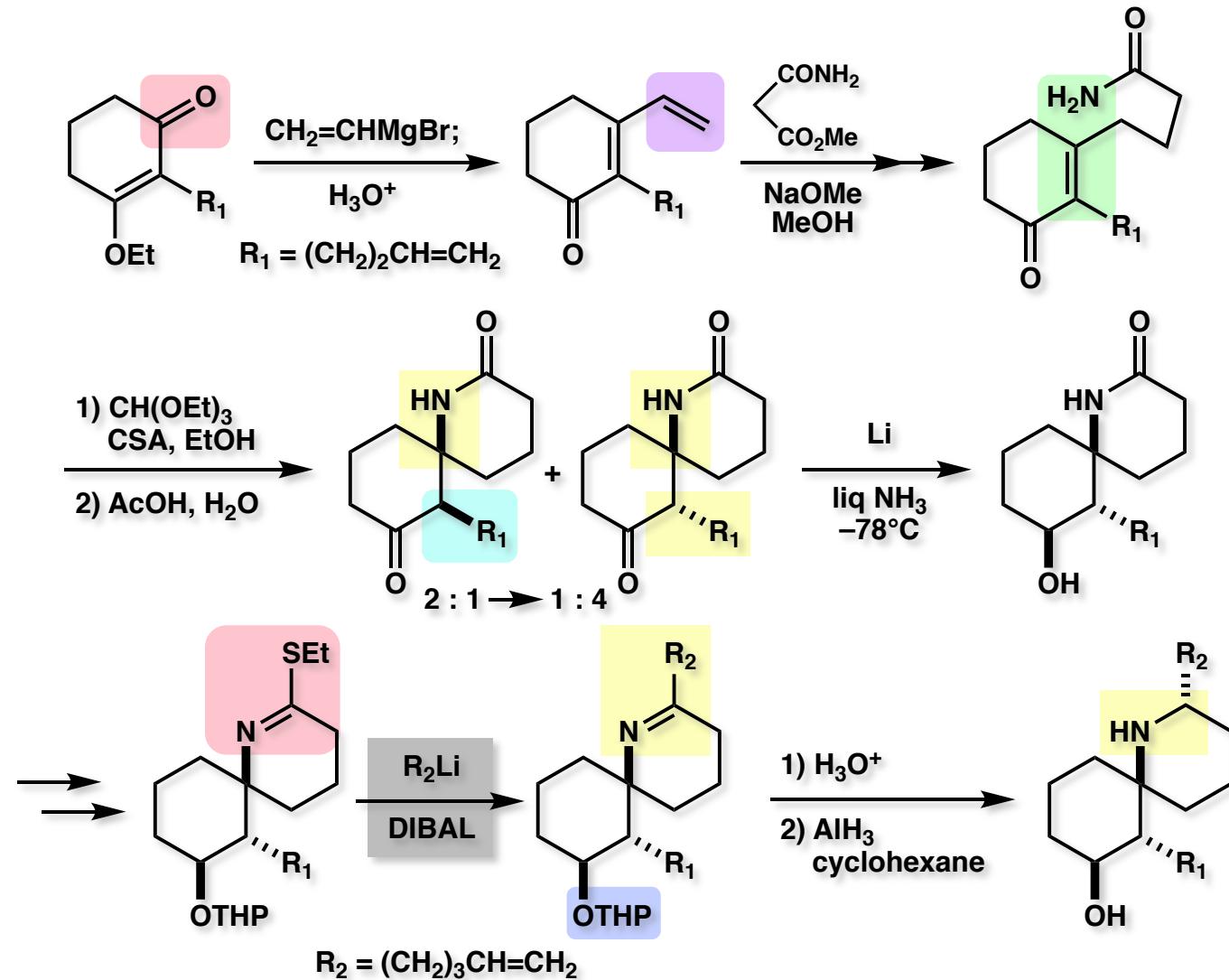
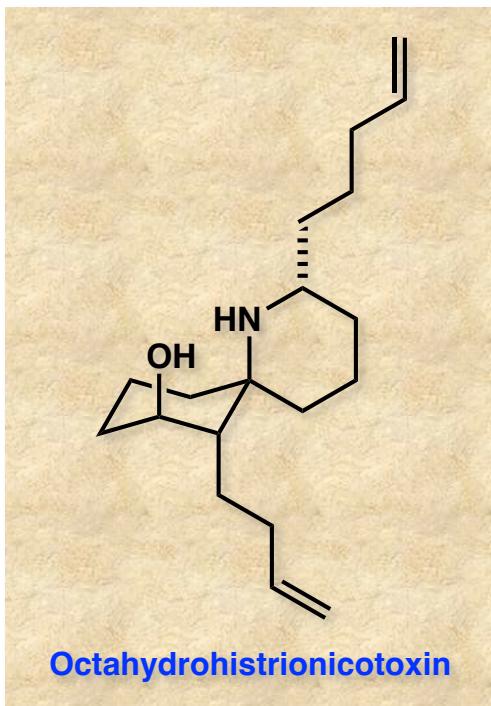


J. Am. Chem. Soc., **95**, 6492 (1973)

@Conant Lab

1973

Octahydrohistrionicotoxin



You can now start your Ph.D. work.

1. "A Stereoselective Decarboxylation of 1,6-Dimethyl-3-(3'-indolyl)-methyl-3-carboxy-2,5-piperazinedione," Y. Kishi, S. Nakatsuka, and **T. Fukuyama**, *Tetrahedron Lett.*, **12**, 4657 (1971).⁴
2. "New Epoxidation with *m*-Chloroperbenzoic Acid at Elevated Temperatures," Y. Kishi, M. Aratani, H. Tanino, **T. Fukuyama**, T. Goto, S. Inoue, S. Sugiura, and H. Kakoi, *J. Chem. Soc., Chem. Commun.*, 64 (1972).⁴
3. "Synthetic Studies on Tetrodotoxin and Related Compounds. III. A Stereospecific Synthesis of an Equivalent of Acetylated Tetrodamine," Y. Kishi, M. Aratani, **T. Fukuyama**, F. Nakatsubo, T. Goto, S. Inoue, H. Tanino, S. Sugiura, and H. Kakoi, *J. Am. Chem. Soc.*, **94**, 9217 (1972).⁴
4. "Synthetic Studies on Tetrodotoxin and Related Compounds. IV. Stereospecific Total Synthesis of *dl*-Tetrodotoxin," Y. Kishi, **T. Fukuyama**, M. Aratani, F. Nakatsubo, T. Goto, S. Inoue, H. Tanino, S. Sugiura, and H. Kakoi, *J. Am. Chem. Soc.*, **94**, 9219 (1972).⁴
5. "A New Method for the Synthesis of Epidithiodiketopiperazines," Y. Kishi, **T. Fukuyama**, and S. Nakatsuka, *J. Am. Chem. Soc.*, **95**, 6490 (1973).⁴
6. "A Total Synthesis of Dehydrogliotoxin," Y. Kishi, **T. Fukuyama**, and S. Nakatsuka, *J. Am. Chem. Soc.*, **95**, 6492 (1973).⁴
7. "A Total Synthesis of *dl*-Sporidesmin A," Y. Kishi, S. Nakatsuka, **T. Fukuyama**, and M. Havel, *J. Am. Chem. Soc.*, **95**, 6493 (1973).⁴
8. "A Total Synthesis of *dl*-Sporidesmin B," S. Nakatsuka, **T. Fukuyama**, and Y. Kishi, *Tetrahedron Lett.*, **15**, 1549 (1974).⁴
9. "X-Ray Structure Determination of 3,6-*p*-Anisylidenedithio-3-ethyl-*N,N'*-dimethylpiperazine-2,5-dione," K. Sasaki, **T. Fukuyama**, S. Nakatsuka, and Y. Kishi, *J. Chem. Soc., Chem. Commun.*, 542 (1975).⁴
10. "Synthetic Studies on Histrionicotoxins. I. A Stereocontrolled Synthesis of *dl*-Perhydrohistrionicotoxin," M. Aratani, L. V. Dunkerton, **T. Fukuyama**, Y. Kishi, H. Kakoi, S. Sugiura, and S. Inoue, *J. Org. Chem.*, **40**, 2009 (1975).⁴
11. "Synthetic Studies on Histrionicotoxins. II. A Practical Synthetic Route to *dl*-Octahydrohistrionicotoxin," **T. Fukuyama**, L. V. Dunkerton, M. Aratani, and Y. Kishi, *J. Org. Chem.*, **40**, 2011 (1975).⁴
12. "A New Synthesis of Epidithiopiperazinedione," **T. Fukuyama**, S. Nakatsuka, and Y. Kishi, *Tetrahedron Lett.*, **17**, 3393 (1976).⁴

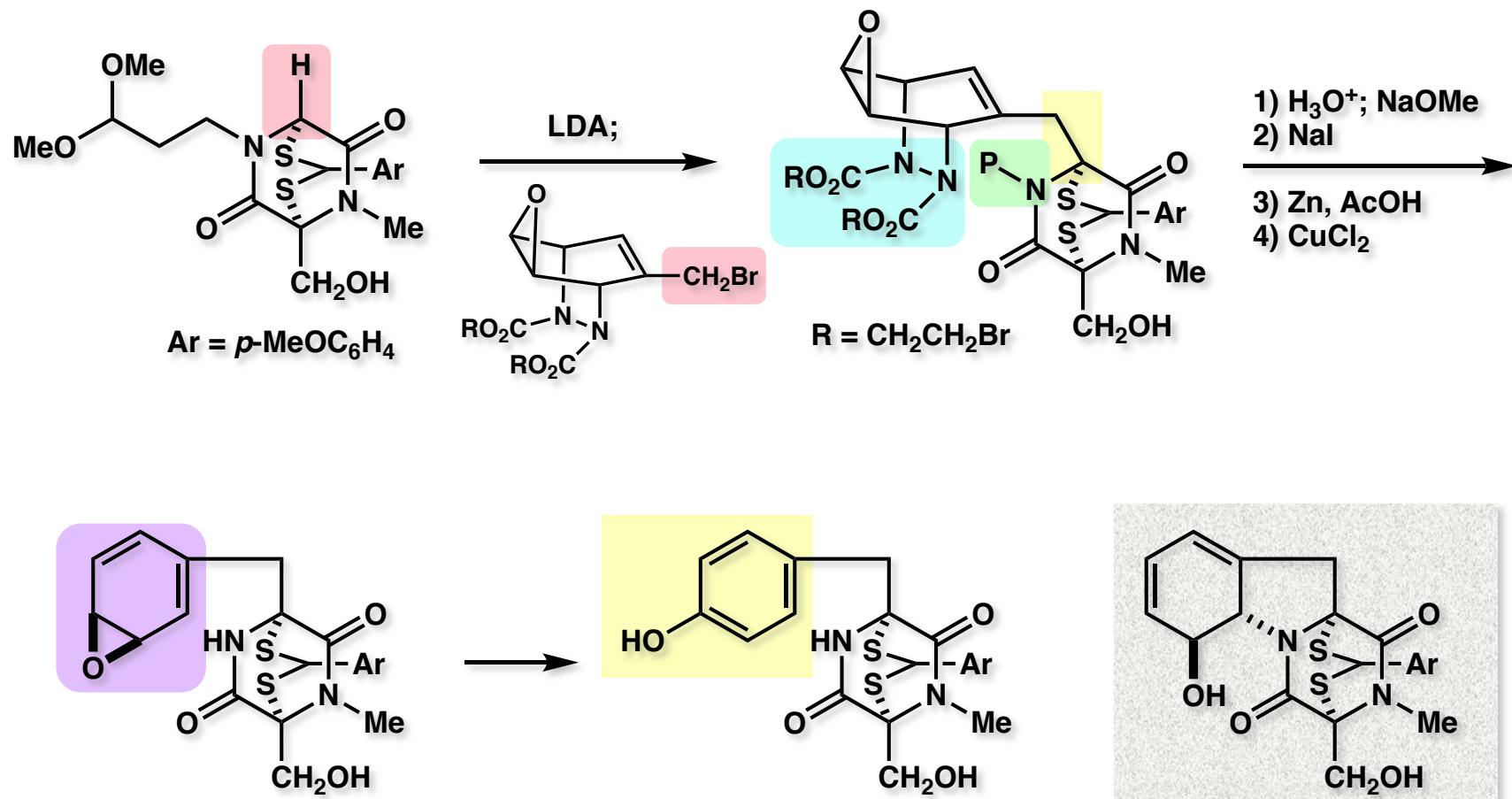


Since you'll be
our first Ph.D.,
you must
complete the
total synthesis of
gliotoxin.

1975

Synthetic Studies on Gliotoxin

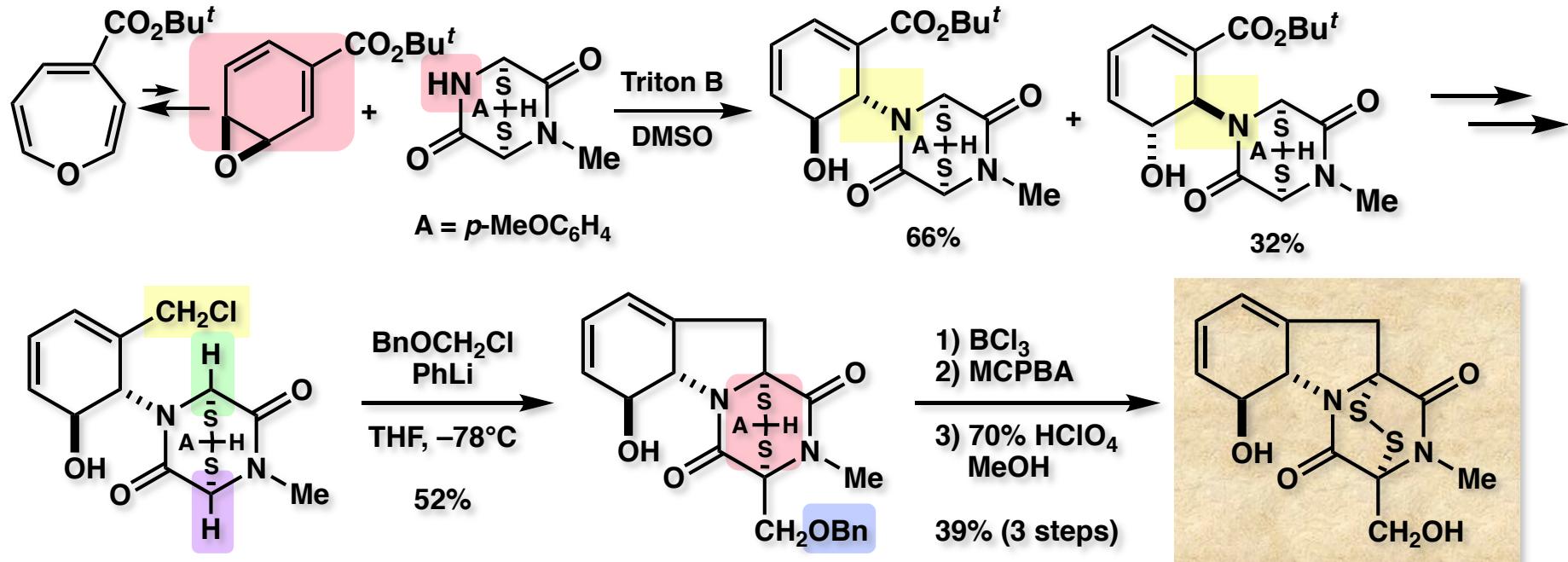
- First One Year -



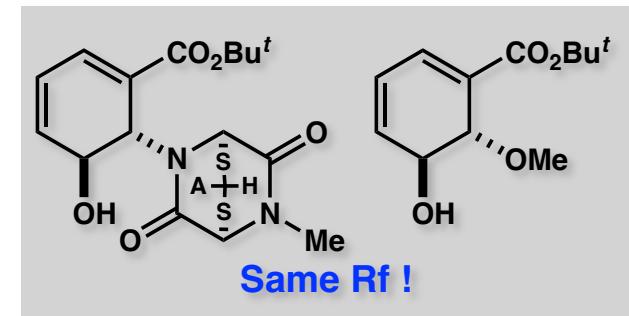
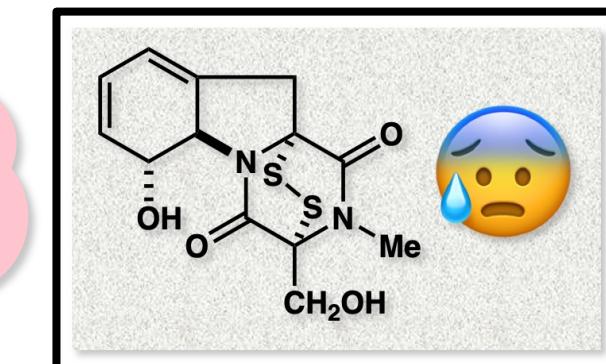
1975-6

Synthetic Studies on Gliotoxin

- Last Six Months -



Did you
scrutinize
the reaction
mixture??



J. Am. Chem. Soc., 98, 6723 (1976)

1976

Two-Hour Ph.D. Oral Exam



Prof. Kishi



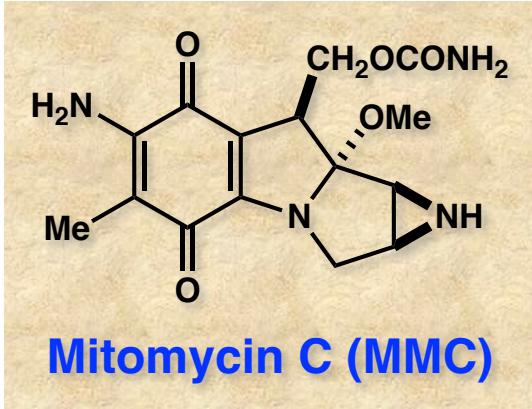
Prof. Woodward



Prof. Corey

January 20, 1977

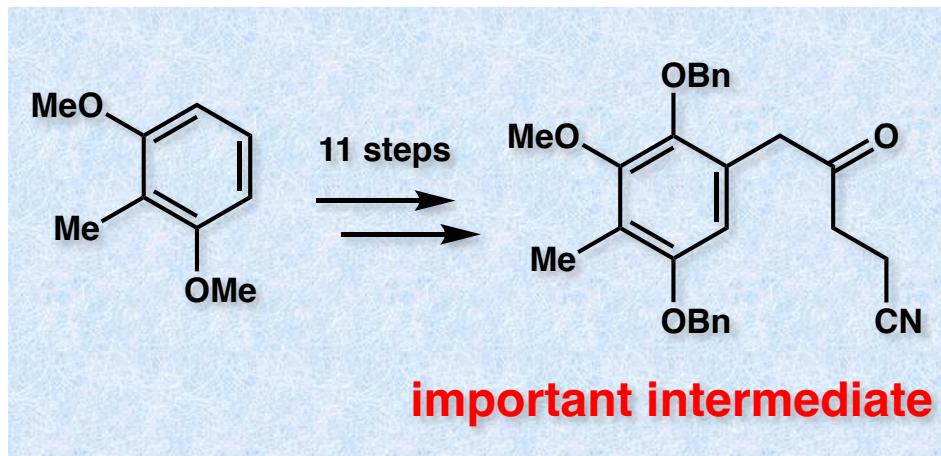
One day after the Ph.D. oral...



Dr. Kishi: The total synthesis of MMC is not progressing well, so I want you to finish it. Just fill this bottle with the important intermediate and then return to Japan for your wedding. (Three postdocs were working very hard on it.)



YK: 20% Empty
TF: 80% Full



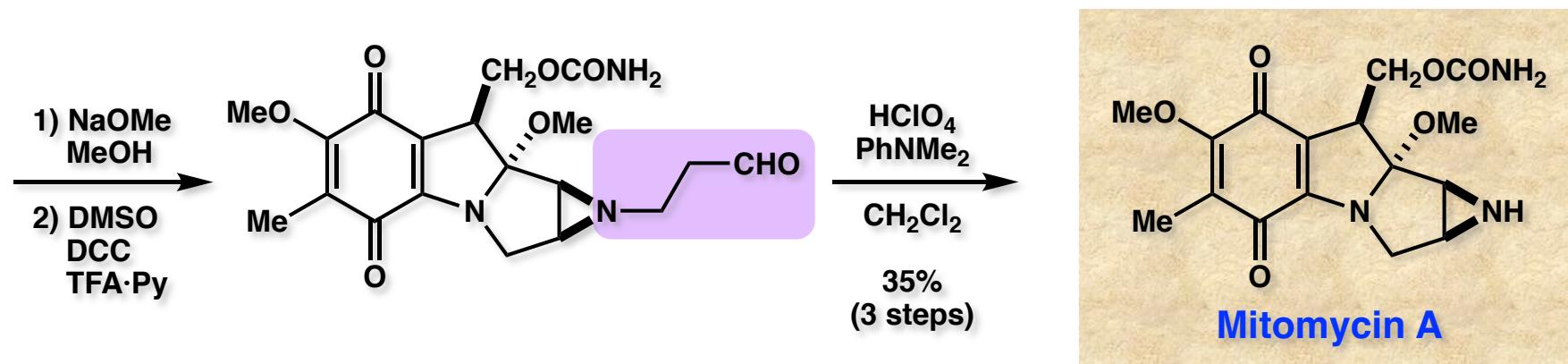
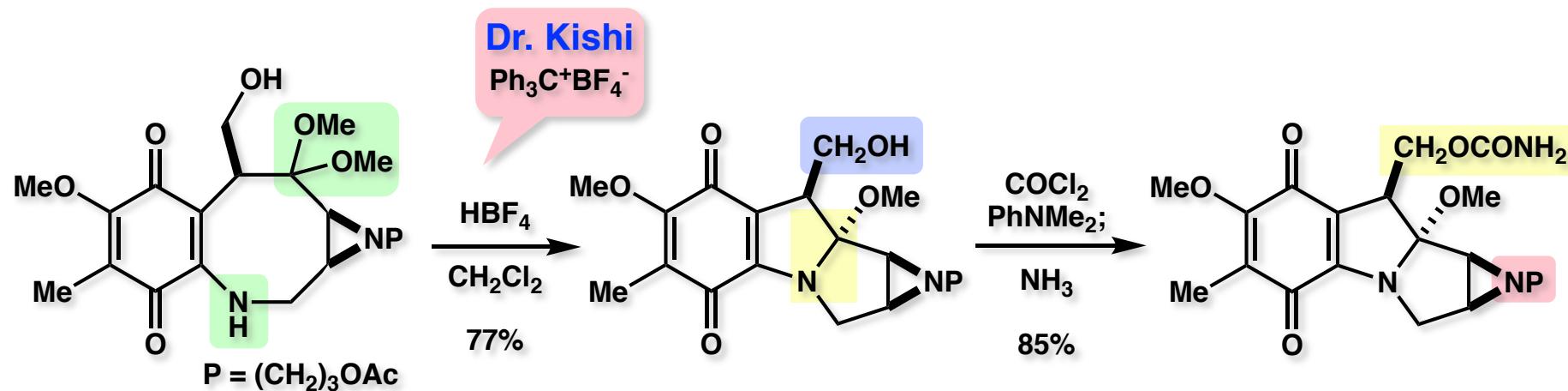
I worked like hell for three weeks without sleeping too much...



Yuri

1977

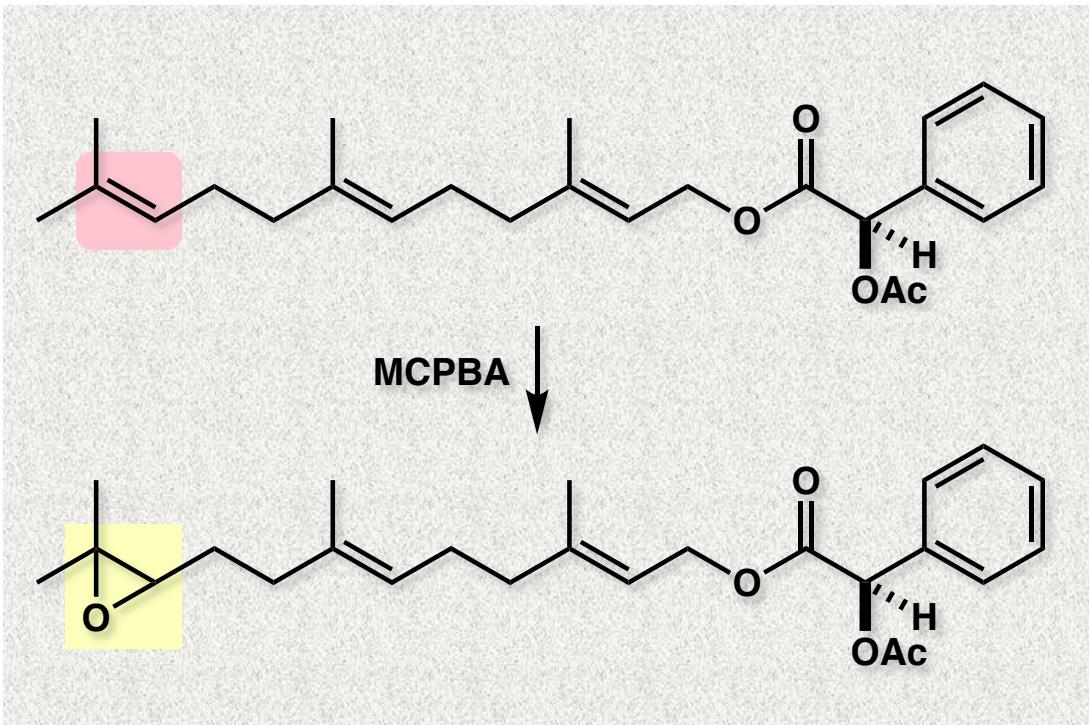
The Last Stage of MMC Synthesis



J. Am. Chem. Soc., **99**, 8115 (1977)
Tetrahedron Lett., **18**, 4295 (1977)

1977

YK: I want you to work on a secret project.



TF

Almost no asymmetric induction!
I would like to give up on this project.

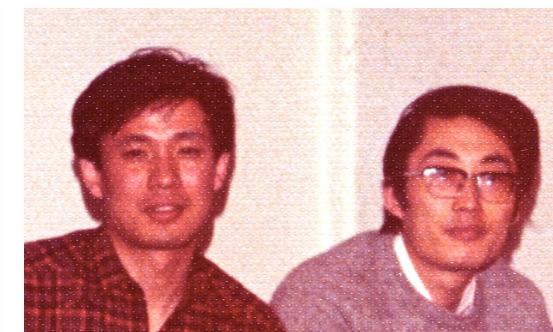
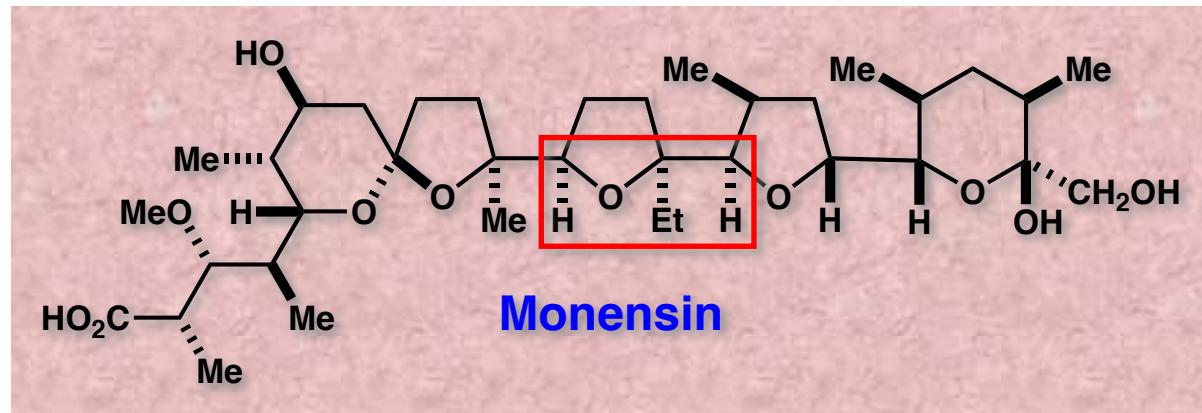
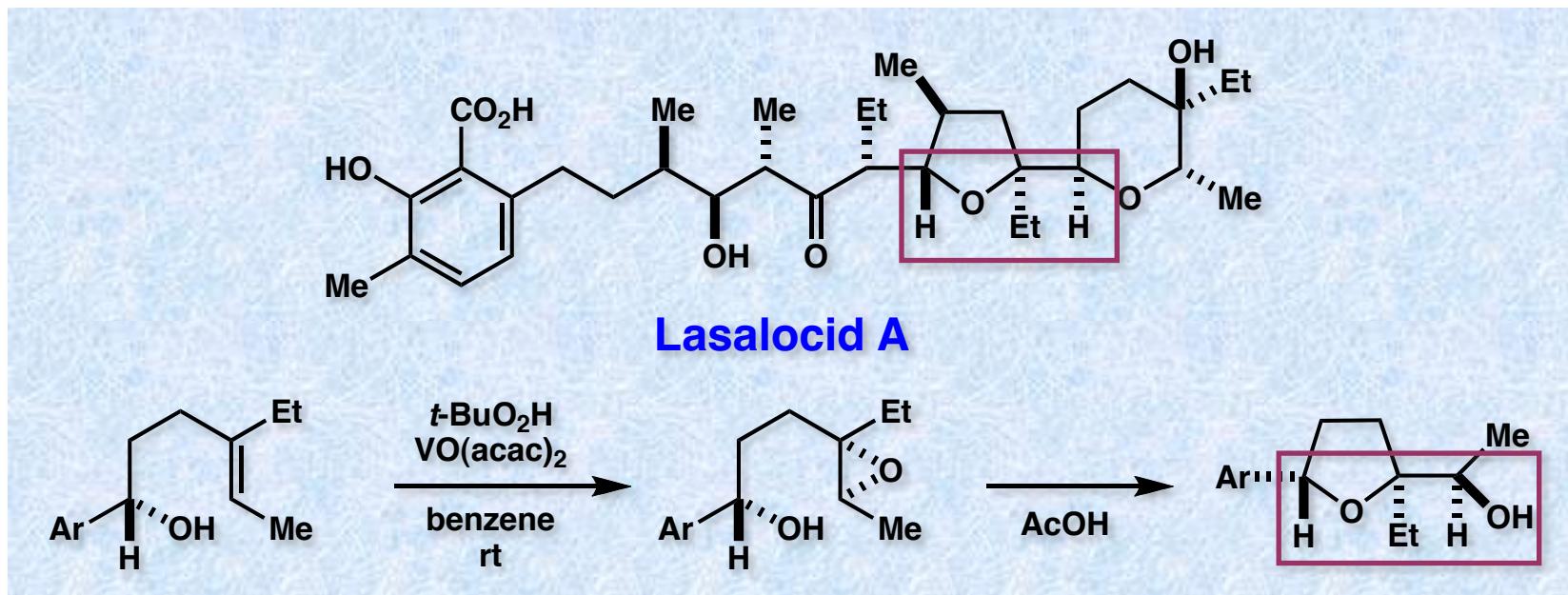


YK

If you don't like it so much, let's try the total synthesis of monensin after solving the following problem.

1977

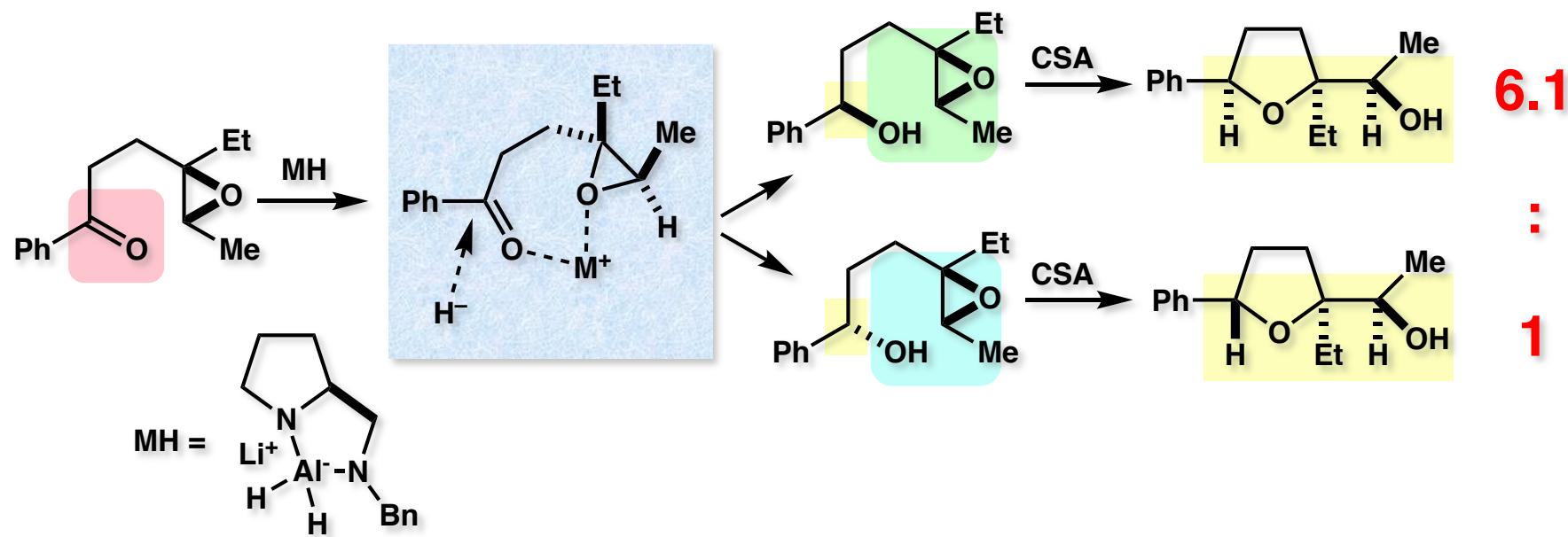
Total Synthesis of Monensin



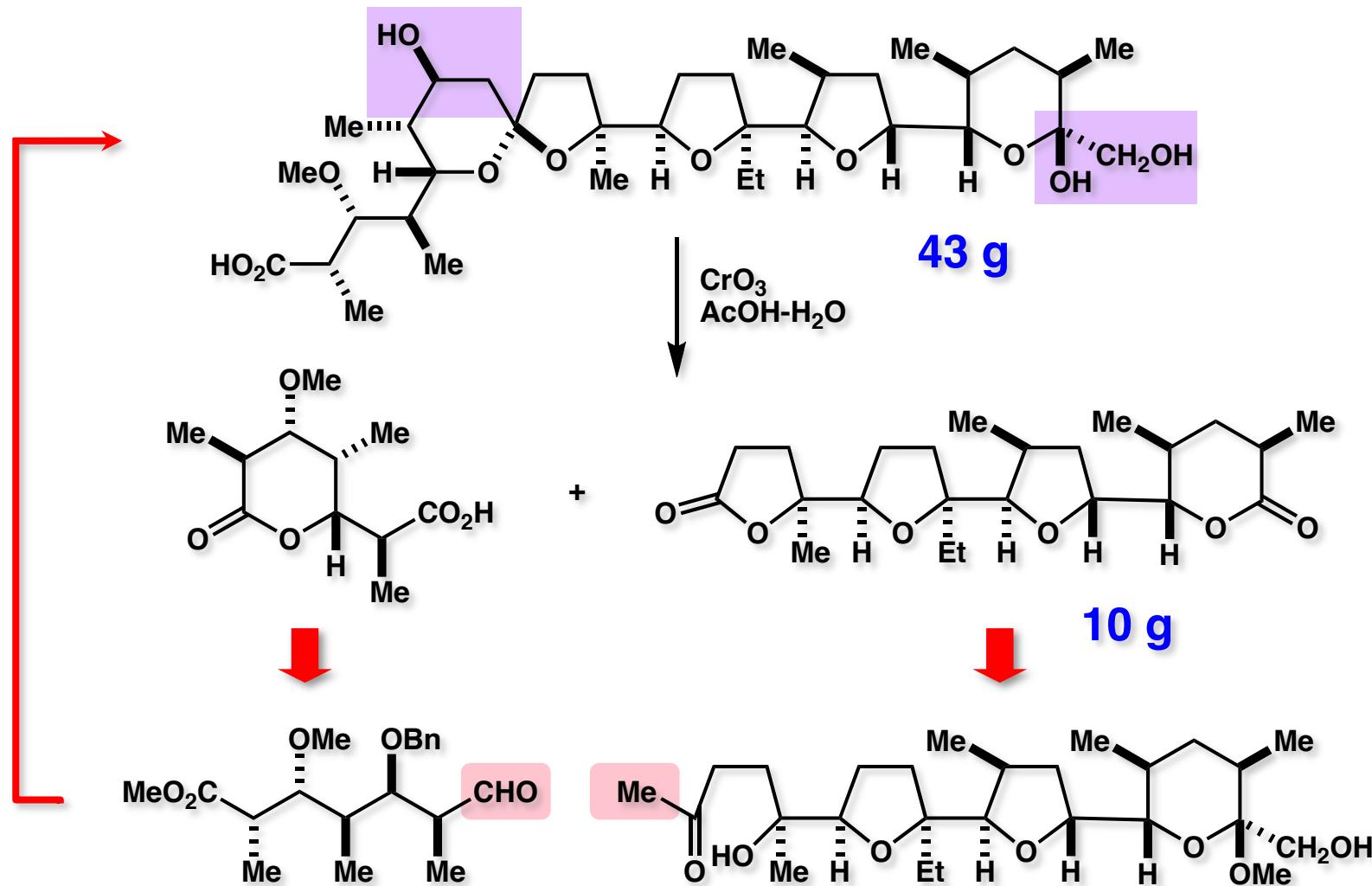
Dr. Nakata

1977-8

Solved the Problem in a Week

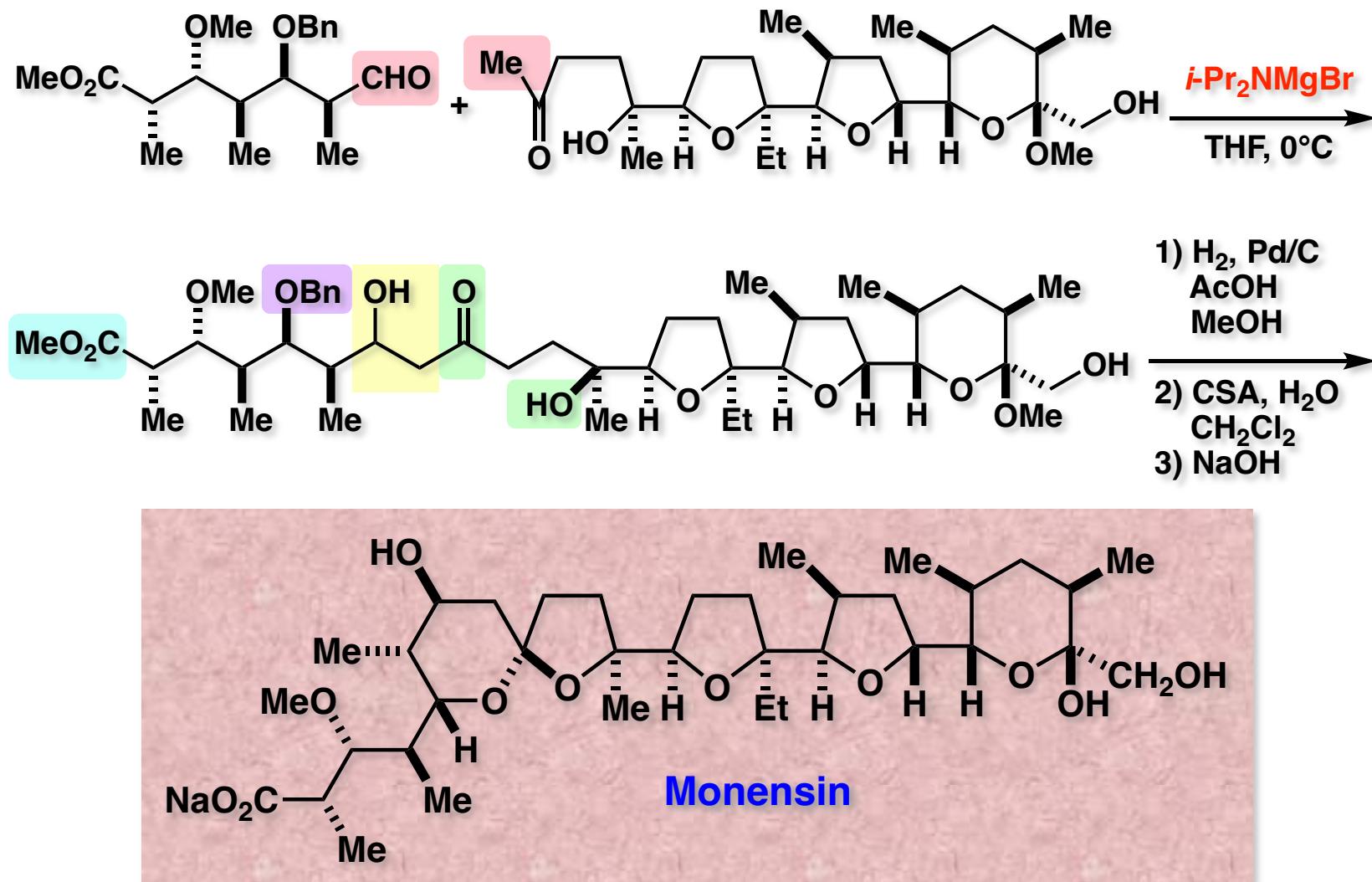


Reconstruction of Monensin



1978

Reconstruction of Monensin



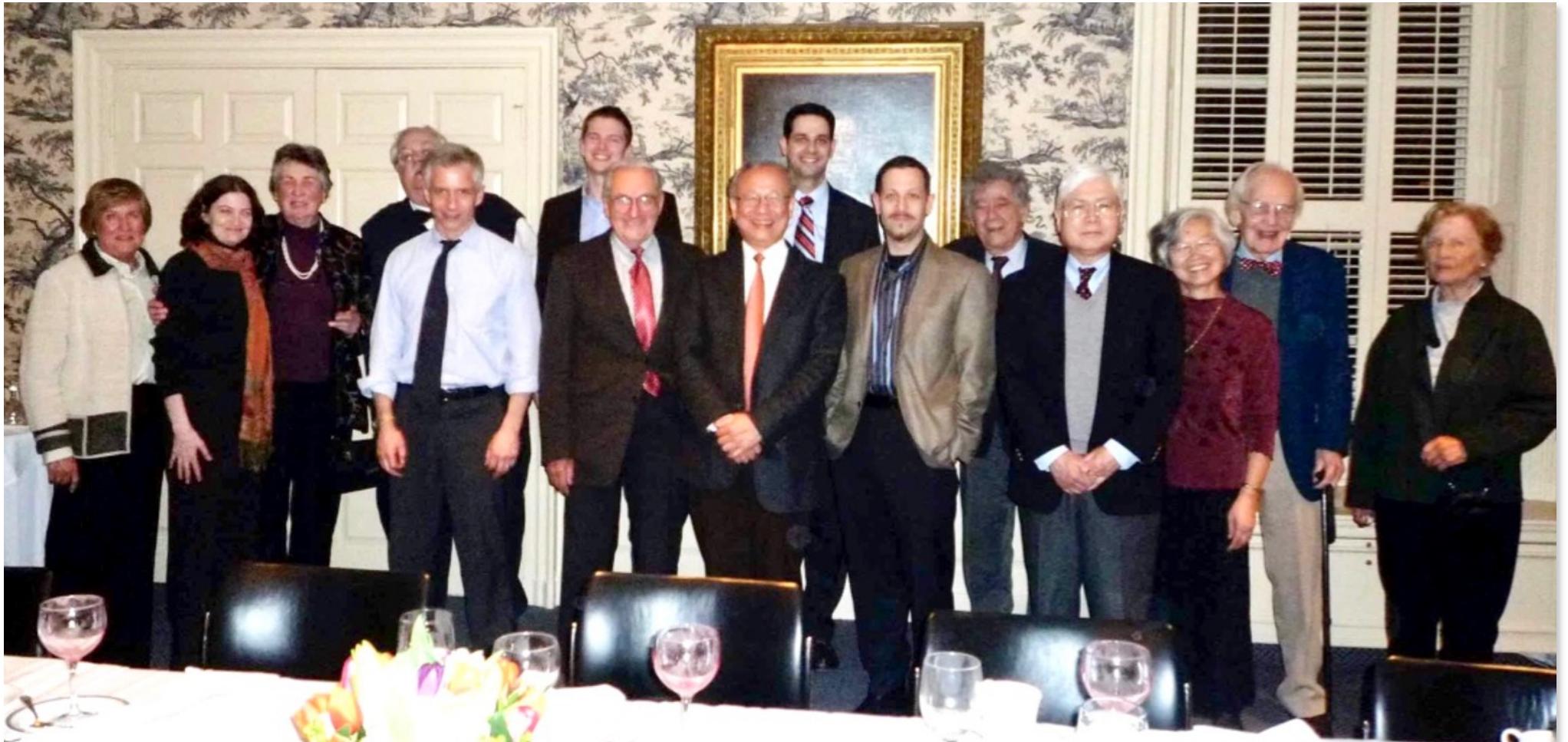
J. Am. Chem. Soc., 101, 262 (1979)

1978

Goodbye to Harvard – July, 1978



Dr. Kishi never praised me until April, 2009.³⁷



Max Tishler Prize Lecture Dinner

Second and the Last Comments by Dr. Kishi

38

福山君：

二の3月に東京大学を文部省より
申請された。是る。「含窒素天然物の全合成
研究」に乞附され、慶應大を研究業績は、
「はるかに」一言に付きます。持算され、是
福山君の全合成は「合成大経済・合成
反応の発達」と「全合成」が見事に融合
して、是る。何處か、ハシリ基を用いて
アミド化反応、重合反応、酵素の説明
があつた。P=10%の累積的P=10%化は、所
をもつて同時に、多くのイニシエータの活性
率の全合成が不思議の反応を示す
事だ。私は、君の合成は「EC..テナ
音極大・翁道を認める」と思
ます。

是れ（藝術性）を感じます。何より何より
Aを絶大 マイアミVCの全合成はまだ

この傑作です。
東京大学退官後、名古屋大学に
研究室を移さうと理所に思ます。
名古屋大学の福山君の研究人生の
出来事で、多くの見出と豊富な
地図などがあり、福山君を
賞めつつ、今後も研究の放棄は進
むまいことを期待します。

2013. 1. 30

福山
君

貴君の「含窒素天然物の全合成

研究」に乞附され、慶應大を研究業績は、
「はるかに」一言に付きます。

**The vast amount of research achievements
encompassed in your "Research on the Total
Synthesis of Nitrogen-Containing Natural Products"
can only be described as "amazing."**

私は、君の合成は「EC..テナ

音極大・翁道を認める」と思
ます。

是れ（藝術性）を感じます。

**I see an extraordinary imagination, creativity, and
artistic beauty in your work.**

Without Dr. Kishi, there is no Fukuyama

I am truly grateful to Dr. Kishi for guiding me into the wonderful world of organic chemistry.



