

Dr. Michael J. Krische

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Blakemore Research Group
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WHAT STARTS HERE CHANGES THE WORLD

THE UNIVERSITY OF TEXAS AT AUSTIN

- was born in 1966 in California
- His dad, Joseph Krische, a German who immigrated to the USA in 1952 (7-year after WWII)
- B.S. degree in chemistry from UCLA (1989, Dr Henry Rapoport)
- Ph.D. degree at Stanford university (1996, Dr Barry Trost)
- NIH Post-Doctoral Fellow at Louis Pasteur university
- Faculty at the University of Texas at Austin (1990)
- Full professor (2004)
- Robert A. Welch Chair in Science (2007)



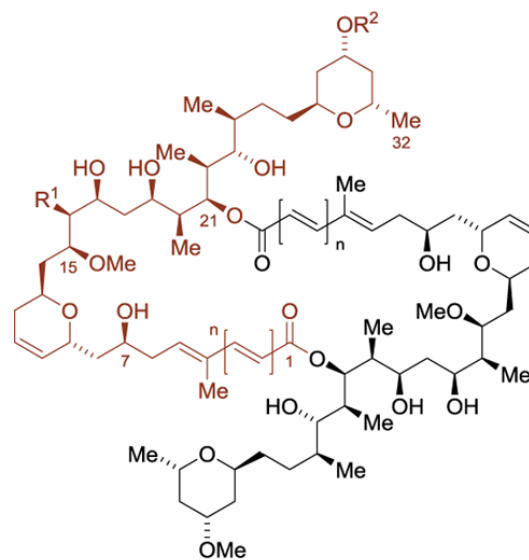
Research

- H₂-MEDIATED C-C COUPLING
- NATURAL PRODUCT SYNTHESIS



Swinholide A

cytotoxic in the
ng/mL
44-membered
macrodiolide ring



Swinholide A
R¹ = R² = Me, n = 1

Swinholide B
R¹ = H, R² = Me, n = 1

Swinholide C
R¹ = Me, R² = H, n = 1

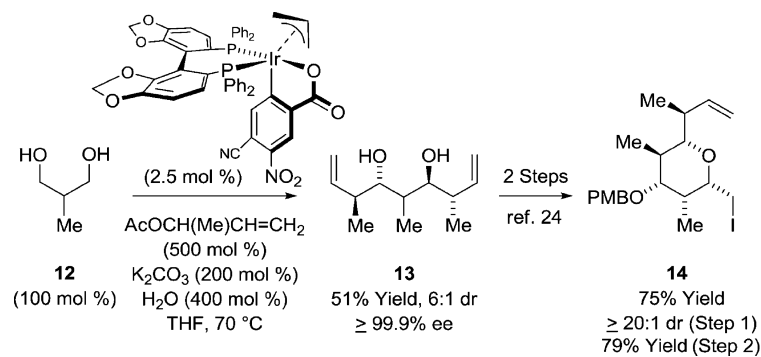
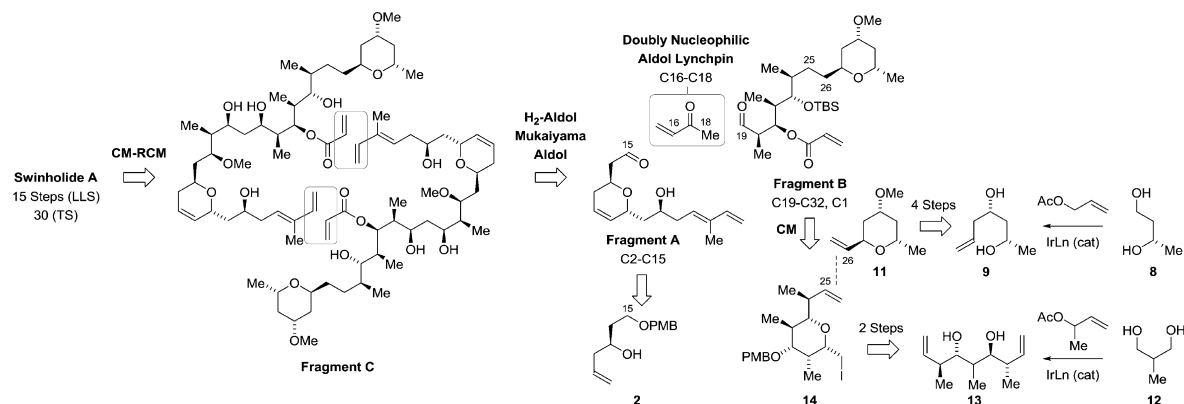
Misakinolide A
(**Bistheonellide A**)
R¹ = R² = Me, n = 0

Swinholide A Total Syntheses	LLS (TS)	Skeletal Assembly	Redox Reactions	Protection- Deprotection	Other Reactions
Paterson (ref. 13)	27 (50)	10 (37%)	5 (19%)	10 (37%)	2 (7%)
Nicolaou (ref. 14)	35 (59)	9 (26%)	7 (20%)	13 (37%)	6 (17%)
Krische (<i>This Work</i>)	15 (30)	9 (60%)	3 (20%)	2 (13%)	1 (7%)

LLS: longest linear sequence
TS: total steps

- Retrosynthetic Analysis of Swinholide A via C–C Bond-Forming Hydrogenation and Transfer Hydrogenation

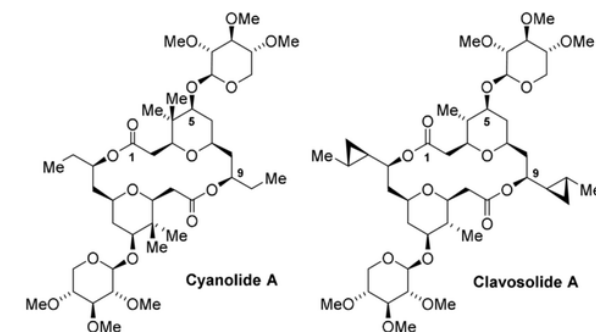
- Synthesis of Iodo Ether 14 via Diastereo- and Enantioselective Double anti-Crotylation of Diol 12



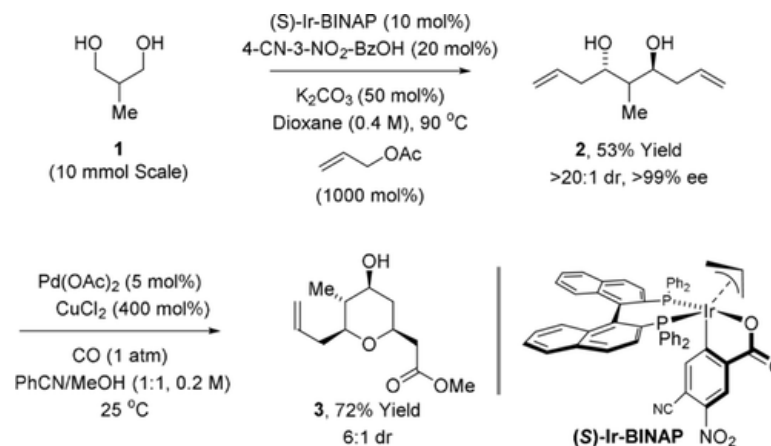
Clavosolide A

absence of protecting groups or chiral auxiliaries

Cabrera, J. M., & Krische, M. J. (2019). Total Synthesis of Clavosolide A via Asymmetric Alcohol-Mediated Carbonyl Allylation: Beyond Protecting Groups or Chiral Auxiliaries in Polyketide Construction. *Angew Chem Int Ed Engl*, 58(31), 10718-10722. doi:10.1002/anie.201906259



Total or Formal Syntheses	LLS (TS)	Total or Formal Syntheses	LLS (TS)
Hong, 2010 (ref. 9a)	14 (21)	Lee, 2006 (ref. 10a)	26 (31)
Reddy, 2011 (ref. 9b)	17 (21)	Smith, 2006 (ref. 10b)	19 (28)
She, 2011 (ref. 9c)	15 (18)	Willis, 2006 (ref. 10c)	16 (20)
Pabbaraja, 2011 (ref. 9d)	17 (21)	Chakraborty, 2008 (ref. 10d)	34 (36)
Rychnovsky, 2011 (ref. 9e)	12 (19)	Jennings, 2009 (ref. 10e)	21 (23)
Jennings, 2011 (ref. 9f)	15 (19)	Floreancing, 2012 (ref. 10f)	14 (21)
Krische, 2013 (ref. 9g)	7 (9)	Hong, 2015 (ref. 10g)	16 (25)
Bates, 2014 (ref. 9h)	13 (18)	Breit, 2015 (ref. 10h)	11 (16)
Zhou, 2019 (ref. 9i)	19 (22)	Aggarwal, 2016 (ref. 10i)	14 (24)

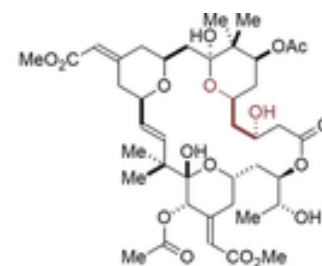
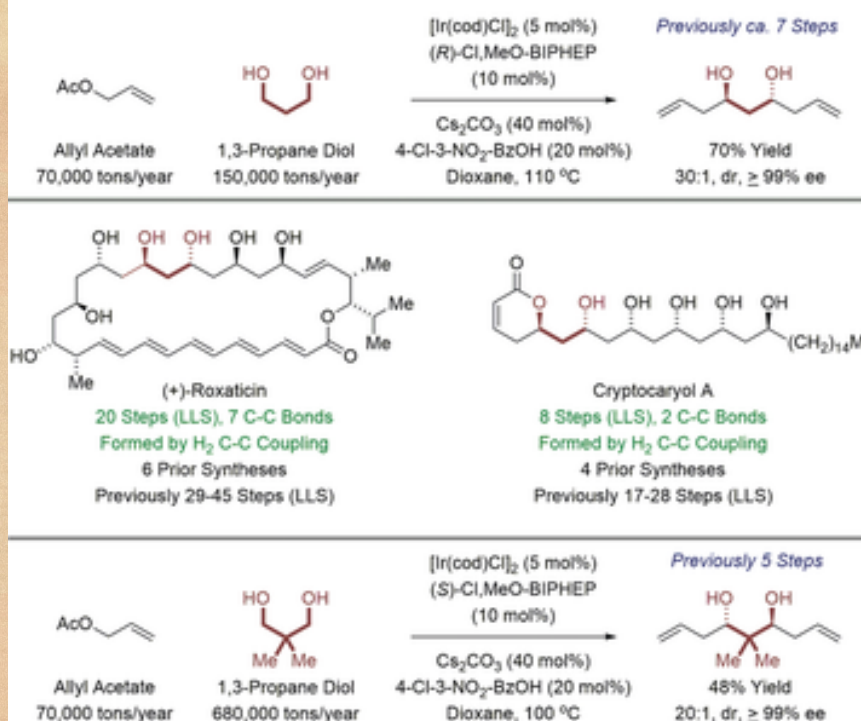


Don't sacrifice something expensive to modify something cheap!

- carbonyl addition methodology for complex molecule synthesis
- Using π -unsaturated pronucleophiles
- Bypassing the use of premetalated reagents and the attendant issues of safety, selectivity, and waste posed by their use

Stereo- and site-selective (protecting group-free) C–C bond formations

- Doerksen, R. S., Meyer, C. C., & Krische, M. J. (2019). Feedstock Reagents in Metal-Catalyzed Carbonyl Reductive Coupling: Minimizing Preactivation for Efficiency in Target-Oriented Synthesis. *Angewandte Chemie International Edition*, 58(40), 14055-14064. doi:10.1002/anie.201905532



Bryostatin 7
20 Steps (LLS), 5 C-C Bonds Formed by H_2 C-C Coupling
6 Prior Syntheses
Previously 25-43 Steps (LLS)



CH328N Organic Chemistry II - Spring 2020

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Here are some famous chemists for you to read up on!

 Alexander Porfiryevich Borodin.pdf (36k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Amadeo Avogadro.pdf (45k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Antoine Lavoisier.pdf (123k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Charles-Adolphe Wurtz.pdf (111k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Derek Barton.pdf (62k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Edward Frankland.pdf (57k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Elias James Corey.pdf (44k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Emil Fischer.pdf (85k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	
 Erwin Schrödinger.pdf (24k)	Wandi Zhang, Aug 4, 2017, 2:16 PM	v.1	

https://sites.google.com/a/utexas.edu/ch328n_spring2020/home/famous-chemists

Awards

- ACS Award for Creative Work in Synthetic Organic Chemistry (2020)
- American Association for the Advancement of Science Fellow (2017)



Current Funding:

- National Institutes of Health (NIH-NIGMS)
- National Science Foundation
- Robert A. Welch Chair in Science
- UT Austin Center for Green Chemistry and Catalysis

