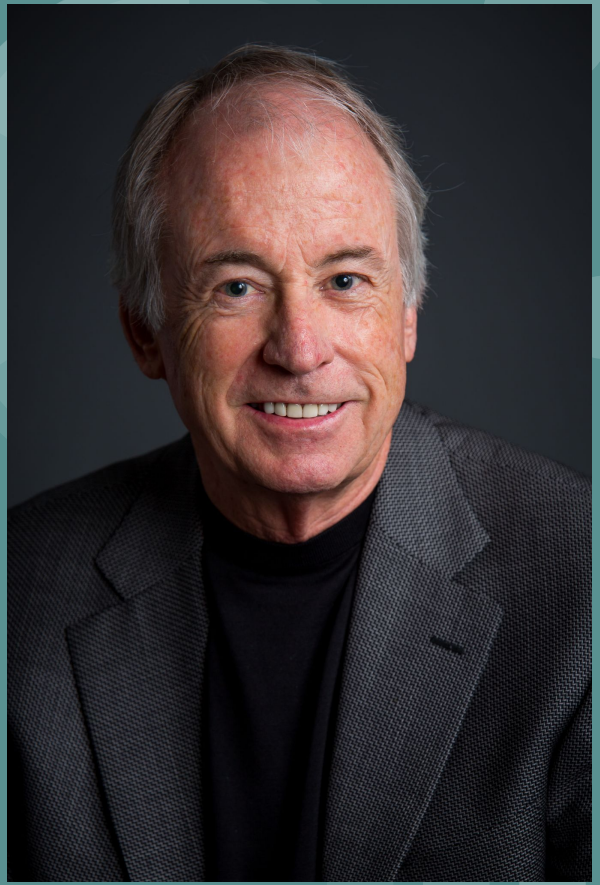
Stephen F. Martin



Vivian Nguyen
BRG Spotlight Presentation
Presented June 29, 2021

MARTIN, STEPHEN F - Chemistry - CNS Directory. https://cm.utexas.edu/component/cobalt/item/12-chemistry/132-martin-stephen-f?Itemid=1251 (accessed Jun 29, 2021).

Biography and Education

- **1968:** B.S. Chemistry from University of New Mexico
- **1972:** Ph.D. from Princeton University
  - Worked under Professor Edward C. Taylor
- **1972-1973:** Alexander von Humboldt Postdoc at University of Munich
  - Worked under Professor Rudolf Gompper
- **1973-1974:** NIH Postdoc at MIT
  - Worked under Professor George Büchi
- Native of New Mexico
- Likes music, traveling, fly fishing, skiing, photography, and wine.

https://sites.cns.utexas.edu/smartin/biocv (accessed Jun 29, 2021).

Career and Recognitions

- University of Texas, Austin:
  - Assistant Professor (1974-80)
  - Associate Professor (1980-86)
  - Full Professor (1986-)
  - Currently holds the M. June and J. Virgil Waggoner Regents Chair in Chemistry (since 2000)
- Regional editor of Tetrahedron and Chairman of the Executive Board of Editors of Tetrahedron Publications
- Published over 315 papers
- Co-author of textbook *Experimental Organic Chemistry: A Miniscale and Microscale Approach*

Awards:

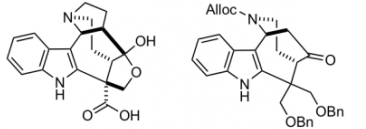
- 1980-1985: National Institutes of Health Research Career Development Award
- 1996: Arthur C. Cope Scholar Award
- 2017: Ernest Guenther Award in the Chemistry of Natural Products (ACS)

and many more

https://sites.cns.utexas.edu/smartin/biocv (accessed Jun 29, 2021).

Research Interests

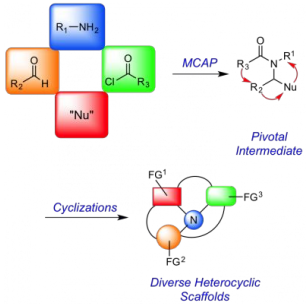
1. **Synthesis of alkaloids**



Actinophyllic acid Key intermediate to divert

- Rapidly induces cancer cell death

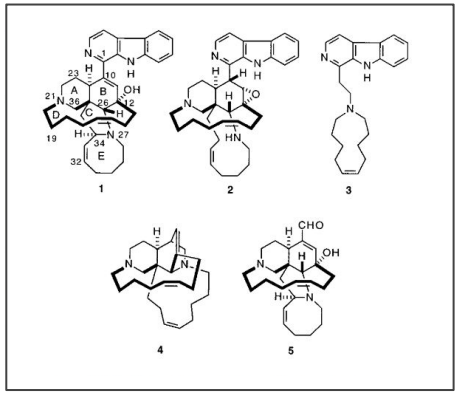
2. **Multicomponent assembly process (MCAP)**

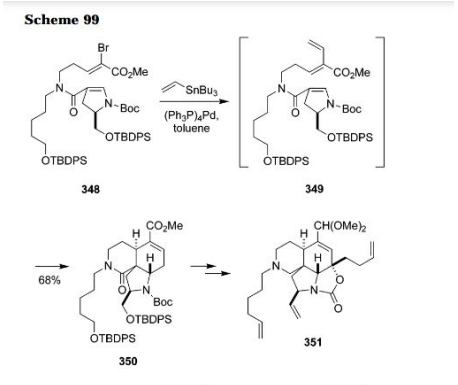


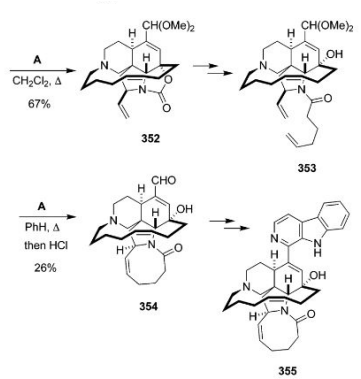
3. **Synthesis of novel peptidomimetics**
4. **Molecular Recognition in Protein-Ligand Interactions**

https://sites.cns.utexas.edu/smartin/biocv (accessed Jun 29, 2021).

Enantioselective Total Syntheses of Manzamine A and Related Alkaloids (also reviewed in **Synthesis of Oxygen- and Nitrogen-Containing Heterocycles by Ring-Closing Metathesis**)



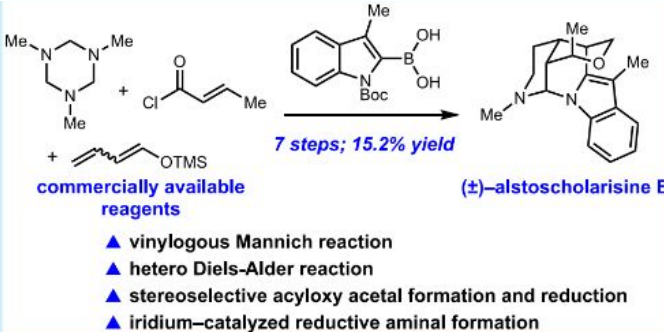




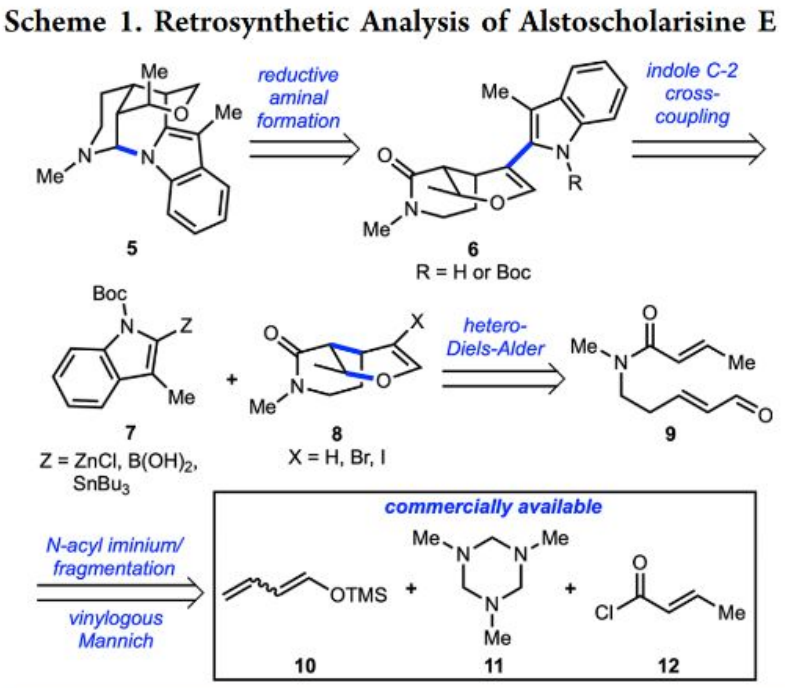
- Manzamine A (1, 355) is an indole alkaloid with biological activity (anti-tumor, anti-malarial)
- Tricyclic ABC ring core assembled by a domino Stille/Diels-Alder reaction (yielding 349)
- Used a vinylogous N-acyl urea as the dienophile in the Diels-Alder reaction
- Shows wide scope of ring-closing metathesis (RCM) reactions. RCM used here for formation of both the fused eight-membered ring and the bridged 13-membered ring.

1.) John M. Humphrey, Yusheng Liao, Amjad Ali, Tobias Rein, Yue-Ling Wong, Hui-Ju Chen, Anne K. Courtney, and Stephen F. Martin
Journal of the American Chemical Society 2002 *124* (29), 8584-8592
DOI: 10.1021/ja0202964
2.) Alexander Deiters and Stephen F. Martin
Chemical Reviews 2004 *104* (5), 2199-2238
DOI: 10.1021/cr0200872

Stereoselective Total Synthesis of (±)-Alstoscholarisine E

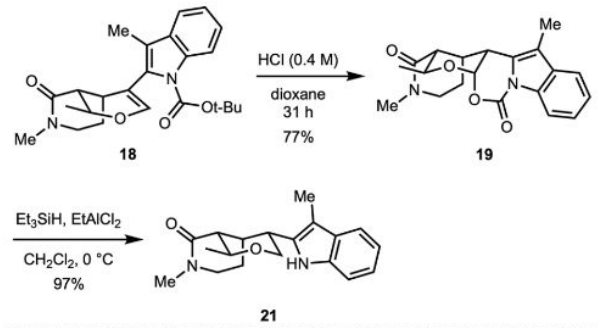


- Only seven steps
- Uses Mannich and Diels-Alder to get cis-oxahydroisoquinolone core (seen in many indole alkaloids)



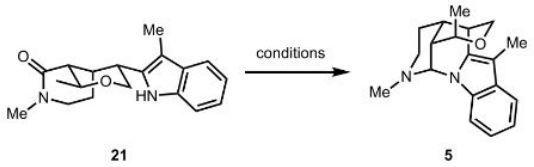
Michael D. Wood, Daniel W. Klosowski, and Stephen F. Martin
Organic Letters 2020 22 (3), 786-790
DOI: 10.1021/acs.orglett.9b04093

Scheme 3. Stereoselective Reduction of Enol Ether Moiety



- Diastereoselective reduction of the vinyl ether (18) via stereoselective acid-catalyzed cyclization (product 19) and Lewis acid hydride reduction (product 21)

Table 1. Completion of the Synthesis of (±)-Alstoscholarisine E via Reductive Cyclic Aminal Formation

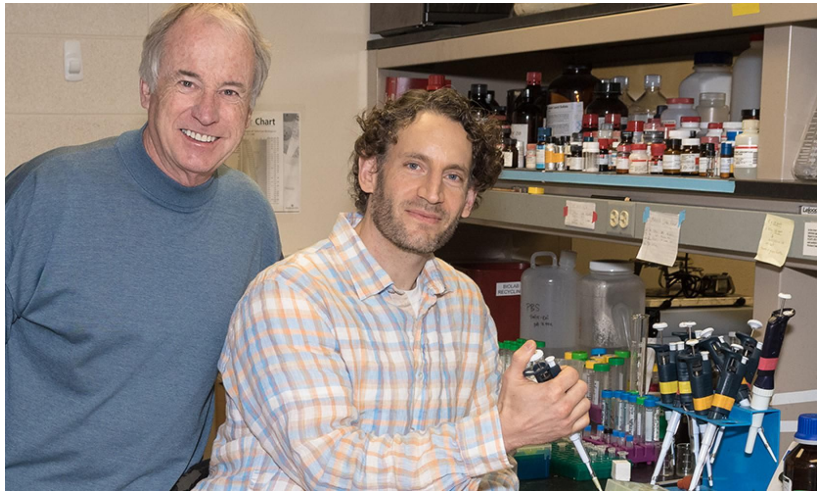


entry	conditions	yield (%)
1	DIBAL-H, CH_2Cl_2, −78 °C	trace[a]
2	Cp_2ZrHCl, THF, 70 °C	trace[a]
3	Bu_3SnH, Tf_2O, MeCN, −40 °C to rt	trace[a]
4	Ph_2SiH_2, $Ti(Oi\text{-}Pr)_4$, THF, 50 °C	trace[a]
5	TMDS, $Ti(Oi\text{-}Pr)_4$, PhMe, 50 °C	56[b]
6	TMDS, $IrCl(CO)(PPh_3)_2$, PhMe, rt	56[c]
7	TMDS, $IrCl(CO)(PPh_3)_2$, CH_2Cl_2, rt	77[b]

- New mild procedure to form cyclic aminals
- Intermediate captured by a nitrogen nucleophile to generate an aminal
- Conditions in entry 7

Current News

UT scientists look to curb opioid epidemic with pain reliever discovery (2017)



- Non - addictive
- Helps with traumatic brain injuries
- Known as UKH-1114
- Shown results in mice
- Patent already filed
- Further testing for safety and addiction will most likely take 5-10 years

Goard, A. UT scientists look to curb opioid epidemic with pain reliever discovery. https://www.kxan.com/news/ut-scientists-look-to-curb-opioid-epidemic-with-pain-reliever-discovery/ (accessed Jun 29, 2021).