Tetrahedron Letters total syntheses in the 1990s

History of Tetrahedron Letters:
- Launched in March 1959, the first ‘sister journal’ to Tetrahedron;
- A weekly international journal;
- 1990s: ~2300 papers/year;
- Current Editor-in-Chief: Dr. Zhen Yang (Peking University).

Macroyclic lactams via photolactamization: Gerhard Quinkert, TL, 1992, 33, 1977

Interconversion of aldehyde, nitrile and amide:
Saad S. Elmorshy, TL, 1995, 36, 2639.

Macrocyclic lactams via photolactamization: Gerhard Quinkert, TL, 1992, 33, 1977


For the history of this reaction, see: Samir Z. Zard, Chem. Commun., 2002, 1565.


For synthesis of Me₃SnCHB₂, see: Stephen G. Pyne, TL, 1995, 36, 763.

Carbonyl transposition of 1-tetralone: A. I. Meyers, TL, 1996, 37, 3243. For recent advances, see:
2) Bill Morandi, JACS, 2023, 145, 19496.
For total synthesis of Aspirochlorine by the same group with same strategy, see: JACS, 1993, 115, 536.


Sulfur rearrangement approach to aspirochlorine: Samuel J. Danishefsky, ACIE, 2000, 39, 3866.


For its preparation, see: TL, 1993, 34, 6259.

roles of Cr(CO)3 group:
1) activating group
2) stereodirecting group


Tetrahedron Letters total syntheses in the 1990s

(--)-Retigeranic acid, Paul A. Wender, TL, 1990, 31, 2517.

Challenges:
1) trans-hydridane subunit
2) triquinane subunit

Total syntheses: 6
First: Corey, JACS, 1985, 107, 4339.
Latest: Wang, JACS, 2023, 145, 13549.

See: JOC 1964, 29, 1855. HCONH2 hv acetone CONH2 72% (1:2)

arenne-olefin
cycloaddition


Cetirizine hydrochloride

stereospecific exo attack of the cation
For details, see: JOC, 1981, 46, 78.

Synthesis of [5.5.5.5]-fenestrane: Paul A. Wender, TL, 1996, 37, 7687.

radical cyclization cascade

For review on fenestrane, see: ACIE, 2013, 52, 12786.
**Tetrahedron Letters total syntheses in the 1990s**

For a prior racemic synthesis, see: Barry M. Trost, *ACIE*, 1990, 29, 520

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**Breynolide:** Steven D. Burke, *TL*, 1999, 40, 9.

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### Selected strategies for bicyclo[3.2.1]octane moiety:

- **Carboxylative cyclization:** See: E. J. Corey, *JACS*, 1980, 102, 1742.
- **See: John E. McMurry, *JACS*, 1979, 101, 1330**

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**Cycloaddition approach to breynolide:** Stephen F. Martin, *TL*, 1993, 34, 4281.
Tetrahedron Letters total syntheses in the 1990s

For review on total synthesis of the pseudoprotosin aglycones, see: Michael S. Sherburn, Nat. Prod. Rep. 2015, 32, 865.

1) LiAlH₄, THF
2) Na, NH₃, EtOH
3) + BuOK, DMSO
4) PPh₃, NBS, 86%

1) PCC, 98%
2) Me₃ST', KH, 99%
3) BF₃•OEt₂, then DIBAL-H, 69%

LDA
- 78 °C to rt


Schöllkopf oxazole synthesis

For anyne in total synthesis, see: Chem. Soc. Rev., 2018, 47, 8030.

Tetrahedron Letters total syntheses in the 1990s

For a prior synthesis of Modephene by Paquette, see: JACS, 1981, 103, 722;
also covered in GM: Rodriguez (JACS review 1981).


Vulgarolide

for a full paper, see:
Leo A. Paquette,
JACS, 1996, 118, 5620.

Concurrent introduction of four FGs

For prior synthesis of epoxycyclotyne by Stuart L. Schreiber, see: JACS, 1994, 116, 5505.
Also covered in GM: Burns (JACS review 1994)


Lubiminol


9 steps to chloroisoclimide
C-H radical chlorination
succinimide introduction

C-H oxidation


1) LDA, Mel, 90% (1:1 dr)
2) LDA, A, 100%
3) NaH
4) MOMBr
5) TsNHGNH2
6) NaH

Shapiro reaction

SO2Cl2

(-)-Verrucarol

(from D-glucose)

1) H2O4
2) PCC

EDCI, DMAP, B then tBuSH, O2

84% (1:1)

decarboxylative oxygenation

For its preparation, see: Tetrahedron: Asymmetry 1994, 5, 2217

1) KHMDS, 82% (5:4)
2) TBSOTf, 75%
3) 4 M KOH, 81%

no reaction for α-isomer

from β-isomer

skeletal rearrangement

1) m-CPBA, 91%
2) Zn, 81%

(-)-Verrucarol

intramolecular allylic cyclization


1) NaBH4
2) 1.5 M HCl

from A: 16-epi-vinoxine, 30%
from B: Vinoxine, 20%


140 °C
72%

intramolecular allylic cyclization

**Claisen rearrangement**

**DMTSCI:**

Thexydimethylsilyl chloride (bp 55–56 °C/1.3 kPa) and the corresponding triflate have been recommended as cheaper substitutes for tert-butyldimethylsilyl chloride and tert-butyldimethylsilyl triflate. Thexydimethylsilyl ethers are formed at comparable rates and they are at least 2–3 times more stable than TBS ethers to acid and base hydrolysis but they introduce unwelcome clutter to NMR spectra. Thexydimethylsilyl ethers are usually prepared by reaction of the substrate with thexydimethylsilyl chloride in pyridine or in DMF in the presence of imidazole.

"Protecting Groups, by Philip J. Kocienski, 3rd edition, P227"