CURRICULUM VITAE

CHITTURI BHUJANGA RAO

Organic Chemistry Division,
Indian Institute of Chemical Technology,
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Objective:

- To pursue a postdoctoral research career in the area of synthetic organic chemistry, Medicinal Chemistry and Bio-Organic Chemistry and to seek a position where my skills can be fully utilized to gain new experiences and knowledge.

Educational Qualification:

2006-2012: Ph.D in Synthetic Organic Ohemistry under the supervision of **Dr. Y. Venkateswarlu**, Chief Scientist, ***Indian Institute of Chemical Technology***, Hyderabad, India.

2002-2004: M.Sc in Organic Chemistry (first division) ***Andhra University***, Visakhapatnam, A. P, India.

Research Experience and Highlights:

- Experienced in developing new methodologies and synthesis of complex biologically active molecules.
- Experienced in preparation and handling of air and moisture sensitive reagents/reactions.
- Isolation and structural elucidation of complex organic compounds by spectroscopic techniques.
- Experienced in structural elucidation of new compounds by using 1D, 2D & Mass spectroscopic techniques.
- Experienced in purification techniques such as flash column chromatography, MPLC and HPLC.
- I am familiar with deadline management, work priority, and professional reporting.
- Conversant with commonly used computer software. MS-OFFICE, (Word, Excel & Power Point), CHEM OFFICE (Chemdraw, 3D), ISIS Draw, ACD-LABS, ACS CA on CD, DNP and Beilstien Cross fire.

- Ability to write scientific reports, and manuscript for publication.
- Expertise in writing novel scientific projects in organic chemistry.
- I have guided post graduate students of chemistry and pharmacy in completing their dissertation wor

Projects Handled

- Synthesized 4,5-disubstituted Pyrazinone Derivatives By Suzuki Coupling Sponsored by Glaxo Smith Kine (UK) (GSK-IICT-16), 12 Target molecules have been prepared in 3 grams Each.
- Isolation of bioactive secondary metabolites from marine organisms collected from Indian Ocean sponsored by Department of Ocean Development (DOD), New Delhi, India.
- Isolation of bioactive secondary metabolites from marine organisms collected from Indian Ocean sponsored by Department of Science and technology (DST), New DelhGov. India.

Teaching Experience:

2004-2006: Worked as a junior lecturer in Sarada Junior College, Narsaraopet, A.p., India

Research Interest:

- Development of new and greener synthetic methodologies
- Synthesis of bioactive complex molecules in novel schematic procedures
- Isolation of bio-active natural products
- Discovery and structural elucidation of potent bio-active molecules

Awards and Fellowships:

- Research Fellowship (2006-2012) awarded by CSIR (Council of Scientific and Industrial Research), New Delhi, Govt. of India.
- Qualified for Shyama Prasad Mukherjee (SPM-Exam) Fellowship Test 2006 conducted by CSIR (Council of Scientific and Industrial Research), New Delhi, Govt. of India.
- Qualified CSIR-UGC-NET National Eligibility Test for Lectureship (2004) conducted by CSIR (Council of Scientific and Industrial Research), New Delhi, Govt. of India.

Symposia Attended:

- Poster presentation in "**Organic Synthesis and Human Well Being: Emerging Opportunities and Challenges (OSHWB)**", 4th Aug, 2010, at Indian Institute of Chemical Technology, Hyderabad, India.
- Participated in "**MEDCHEM Congress-2011**", 25th Feb, at Indian Institute of Chemical Technology, Hyderabad, India.
- Poster presentation in **"Chemistry and Chemical Biology of Natural Products (CCBNP-2012)"** 2nd August, at Indian Institute of Chemical Technology, Hyderabad, India.

List of Publications:

1. "Protective opening of epoxide using pivaloyl halides under catalyst-free conditions" **Chitturi Bhujanga Rao**, Dasireddi Chandra Rao, Mallem Venkateswara and Yenamandra Venkateswarlu. ***Green Chem.,*** **2011**, 13, 2704–2707.

2. "Retro-Claisen Condensation with Fe(III) as Catalyst under Solvent-Free Conditions" **Chitturi Bhujanga Rao**, Dasireddi Chandra Rao, Dokuburra Chanti Babu, and Yenamandra Venkateswarlu., ***Eur. J. Org. Chem.*** **2010**, 2855–2859.

3. "An Efficient Protocol for Alcohol Protection under Solvent- and Catalyst-Free Conditions." **Ch. Bhujanga Rao**, B. Chinnababu, and Y. Venkateswarlu., ***J. Org. Chem.*** **2009**, 74, 8856–8858.

4. "Towards synthesis of Carbasugars (+)-Gabosine C, (+)-COTC, (+)-Pericosine B and (+)-Pericosine C", D. Chanti Babu, **Ch. Bhujanga Rao**, K. Venkatesham J. Jon Paul Selvam, Y. Venkateswarlu., ***Carbohydrate Research,*** **2014**, 388 130–137.

5. "Total synthesis of the aromatase inhibitor dihydroisocoumarin via protective opening of Lactones". D. Chanti Babu, **Chitturi Bhujanga Rao**, D. Ramesh, S. Raghavendra Swamy, Yenamandra Venkateswarlu., ***Tetrahedron Letters.*** **2012**, 55, 3633-3636.

6. "Total Synthesis of (-)-Cleistenolide" Dokuburra Chanti Babu, Kankati Ashalatha, **Chitturi Bhujanga Rao**, Jon Paul Selvam Jondoss, and Yenamandra Venkateswarlu., ***Helvetica Chemica Acta***. **2011**, 94, 2215-2220.

7. "Stereoselective Total Synthesis of Cladospolide A". Karuturi Rajesh, Vangaru Suresh, Jondoss Jon Paul Selvam, **Chitturi Bhujanga Rao**, Yenamandra Venkateswarlu ***Synthesis***. **2010**, 8, 1381–1385.

8. "Stereoselective Total Synthesis of Xestodecalactone C" Karuturi Rajesh, Vangaru Suresh, Jondoss Jon Paul Selvam, **Chitturi Bhujanga Rao**, and Yenamandra Venkateswarlu., ***Helvetica Chemica Acta***. **2009**, 92, 1866-1872.

9. "Silica supported perchloric acid: A mild and highly efficient heterogeneous catalyst for the synthesis of poly-substituted quinolines *via* Friedl¨ander hetero-annulation" M. Narasimhulu, T. Srikanth Reddy, K. Chinni Mahesh, P. Prabhakar, **Ch. Bhujanga Rao**, Y. Venkateswarlu., ***J. Mol. Cat***. **2007**, 266, 114–117l.

Personal Biodata:

Nationality	:	Indian
Gender	:	Male
Marital Status	:	Married
Languages known	:	Telugu, Hindi and English.

References:

Dr. U. V Mallavadhani Senior Principal Scientist Natural Products Laboratory Indian Institute of Chemical Technology, Hyderabad Andhra Pradesh India-500 007 E-mail: **mallavadhani@iict.res.in**	**Dr. B. China Raju** Senior Scientist Natural Products Laboratory Indian Institute of Chemical Technology, Hyderabad, Andhra Pradesh India-500 007 E-mail: **chinaraju@iict.res.in**	**Dr. M. S. R. Murthy** Senior Principal Scientist Discovery Laboratory Indian Institute of Chemical Technology, Hyderabad, Andhra Pradesh India-500 007 E-mail: **msrmurty@iict.res.in**

DOCTORAL WORK and RESEARCH SUMMARY

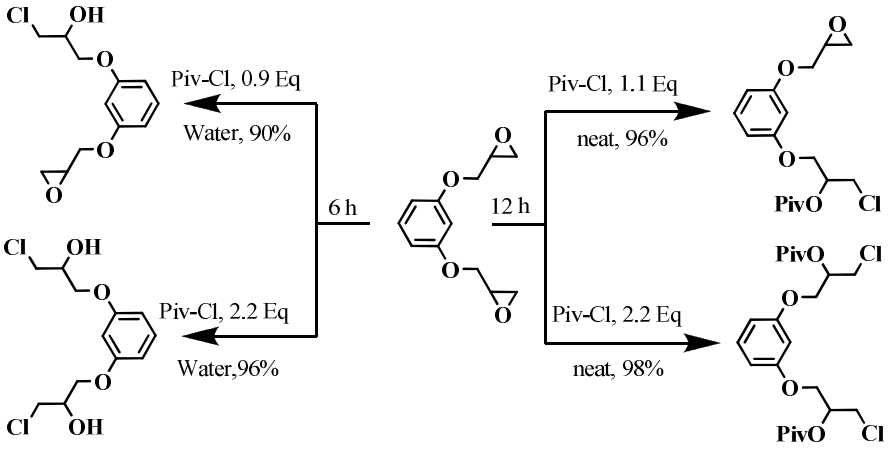
CHITTURI BHUJANGA RAO

Indian Institute of Chemical Technology, Hyderabad, India.

1. Protective opening of epoxide using pivaloyl halides under catalyst-free conditions

***Green Chem.*, 2011, 13, 2704–2707.**

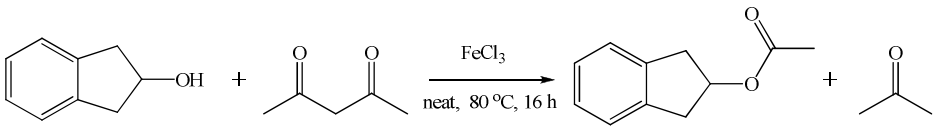
An efficient and environmentally benign protocol for protective opening of epoxide (POE) with pivaloyl halides in solvent-free conditions and in aqueous media under catalyst-free conditions has been developed. The green reaction conditions, simplework-up procedures, high yields and broad scope of the reaction illustrate the good synthetic utility of thismethod.The key advantages of the reaction are regioselectivity and reconvertability of products into their prior epoxides in the presence of mild reaction conditions.



Scheme 1: POE reaction in different conditions witout using any catalyst.

2. Retro-Claisen Condensation with Fe(III) as Catalyst under Solvent-Free Conditions

***Eur. J. Org. Chem.* 2010, 2855–2859.**



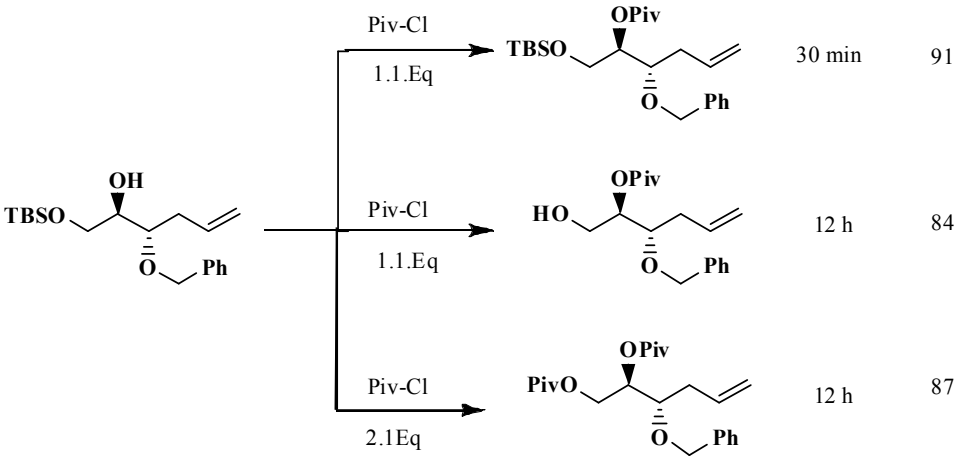
Scheme 2: Fe(III) catalized Retro-Claisen Condensation of 1,3-diketones.

An iron (III) salt catalyzed retro-Claisen condensation between an alcohol and a 1,3-diketone was investigated. The mechanism involves the formation of a metal-induced sixmembered cyclic transition state and cleavage of the Csp^2–Csp^3 bond. Regioselective esterification and one-pot conversion of silyl ethers into esters with good yields was observed. Simple reaction conditions, high yields, and broad scope of the reaction illustrate the good synthetic utility of this method.

3. An Efficient Protocol for Alcohol Protection Under Solvent and Catalyst-Free Conditions

J. Org. Chem. *2009, 74, 8856–8858.*

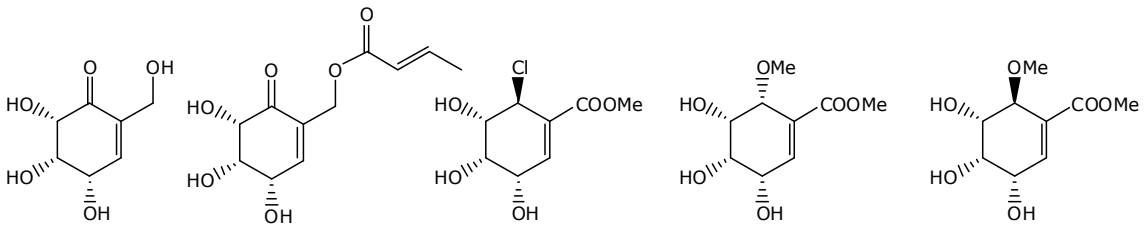
Asimple and highly efficient protocol for pivaloylation of alcohols without using a catalyst under solvent-free conditions has been developed. The key advantages of the reaction are short reaction time, high yields, simple workup, and no need for further purification. Selectivity was observed between primary alcohols vs. secondary alcohols and aliphatic alcohols vs. aromatic alcohols. The accentuated and relevant phenomenon of this method that we observed is in one-pot conversion of TBS protection into Piv protection of the hydroxyl group.



Scheme 3: Protection of alcohols under solvent free and catalyst free conditions.

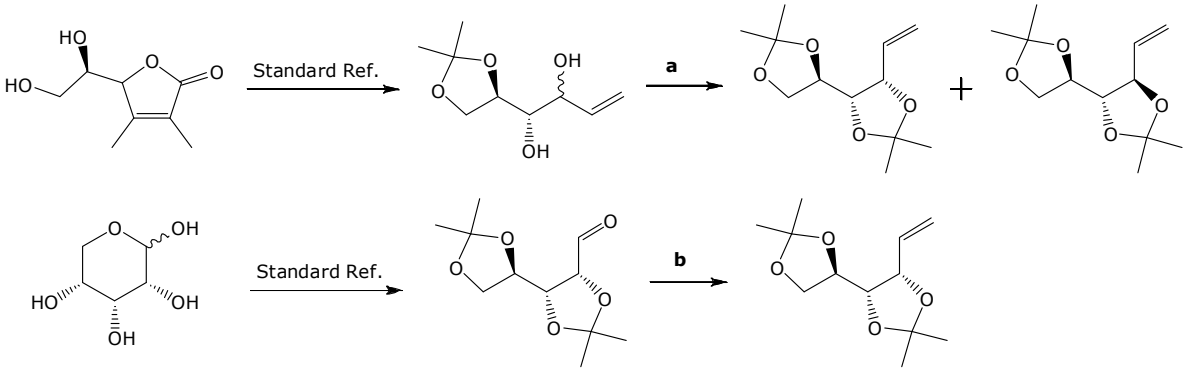
4. Towards synthesis of Carbasugars (+)-Gabosine C, (+)-COTC, (+)-Pericosine B and (+)-Pericosine C

***Carbohydrate Research*, 2014, 388, 130–137.**

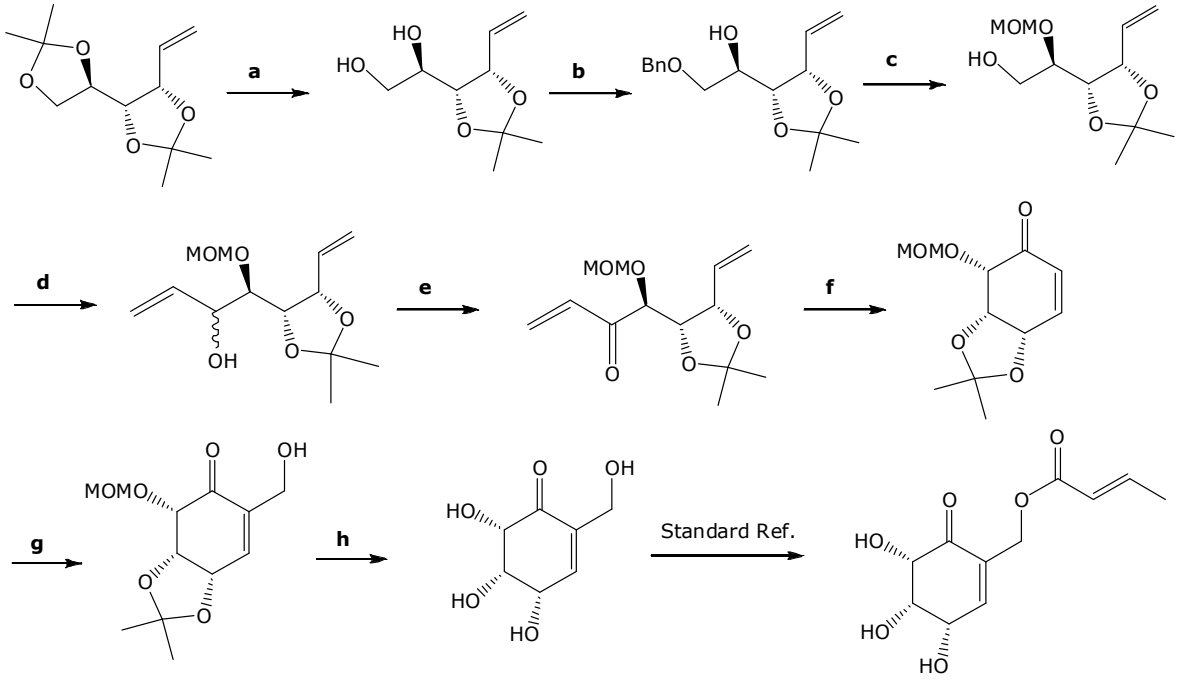


(+) Gabosin C (1) **(+) COTC (2)** **(+) Pericosine A (3)** **(+) Pericosine B (4)** **(+) Pericosine C (5)**

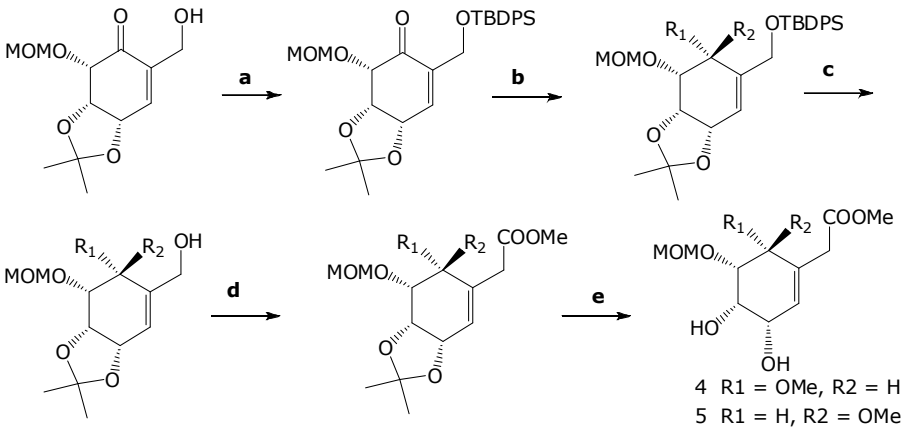
Asymmetric total synthesis of (+)-gabosine C, (+)-pericosine B and (+)-pericosine C has been reported from readily available D-(-)-isoascorbic acid and D-ribose involving Grubbs ring closing metathesis, Morita-Baylis-Hillman (MBH) reaction, and Luche reduction.



Scheme 4: (a) (i) TBAF, THF, rt, 8 h (ii) 2,2 DMP, TsOH, DCM, 12 h, 2 steps 85%; (b) tBuOK, PPh_3PCH_3 +Br-, THF, -10 °C, 4 h, 75%.



Scheme 5: (a) PPTs, methanol, 0 °C, 6 h, 70%; (b) pyridine, benzoyl chloride, DCM, 7 h, 92%; (c) DIPEA, MOM-Cl, DCM, 12 h (ii) K_2CO_3, methanol, 0 °C, 3 h, two steps 83%; (d) (i) $(COCl)_2$, DMSO, triethyl amine, -78 °C, 1 h (ii) vinyl Magnisium bromide, THF, 3 h, 0 °C, two steps 84%; (e) IBX, DMSO, 3 h, 0 °C, 91%; (f) Hoyeda Grubbs catalyst (5 mol%), DCM, reflux, 8 h, 60% (g) aqeous formaldehyde (37-40%), DMAP, -10 °C, 3 days, 38 % (h) TFA, methanol 0 °C, 4 h, 70 %.

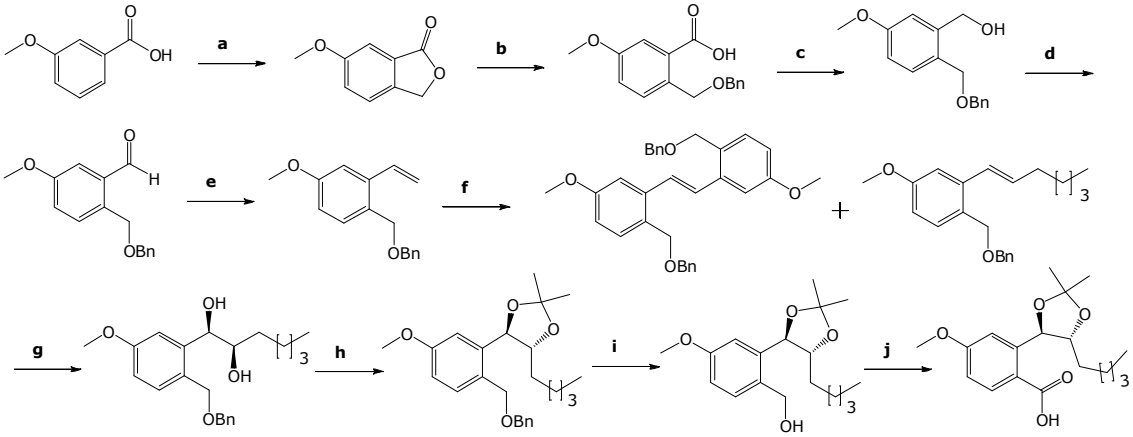


Scheme 6: (a) TBDPS-Cl, imidazole , DCM, - 78 °C, 18 h, 89%; (b) NaBH4, MeOH, 0 °C, 1 h, 92%; (c) (i) NaH, MeI, THF, rt, 6 h; (ii) HF-water, THF, 0 °C, 8 h; (d) (i) TEMPO, $PhI(OAc)_2$, MeCN: Water (2:1), 3 h; (ii) MeI, K_2CO_3, Me_2CO, rt, 3 h; e) TFA, MeOH, rt, 3 h; (f) $CeCl_3 \cdot 7H_2O$, $NaBH_4$, MeOH, -78 °C, 1 h, 88%.

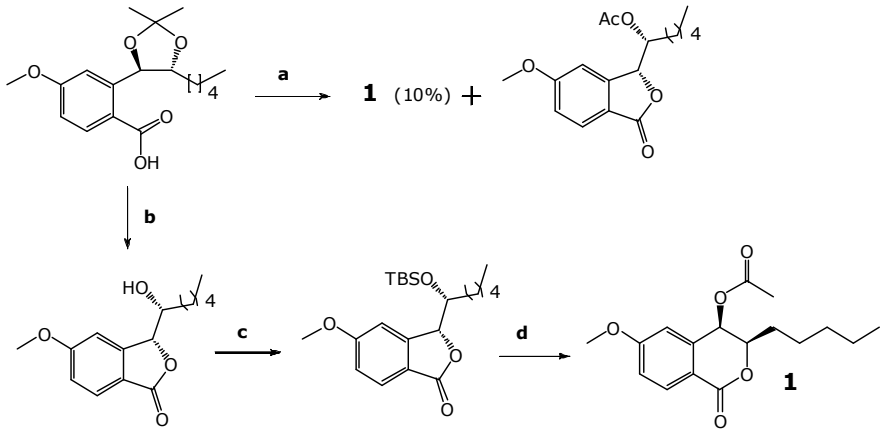
5. Total synthesis of the aromatase inhibitor dihydroisocoumarin via protective opening of lactones

***Tetrahedron Letters*, 2012, 53, 3633–3636**

Asymmetric total synthesis of a dihydroisocoumarin, (3*R*,4*R*)-(−)-6-methoxy-1-oxo-3-pentyl-3,4-dihydro- 1H-isochromen-4-yl acetate (**1**) starting from commercially available m-anisic acid is described. Herein, we depict the use of protective opening of lactones and construction of d lactone. The synthesis involves Wittig, Grubbs cross metathesis, and Sharpless dihydroxylation reactions.



Scheme 7: (a) CH_2O, Glacial acetic acid, 11 N HCl, reflux, 1 h, 75%; (b) (i) MeOH, K_2CO_3, reflux 3 h; (ii) NaH, BnBr, 4 h, over two steps 84%; (c) LAH, THF 1 h, 90%; (d) $(COCl)_2$, DMSO, TEA, -78 °C, 1 h, 95%; (e) t-BuOK, PPh_3PCH_3Br, THF, -10 °C, 4 h, 80%; (f) Grubbs 2nd generation catalyst (10 mol %), DCM, reflux, 12 h, 80%; (g) AD-mix-β, $CH_3SO_3NH_2$, t-butanol/H_2O (1:1), 0 °C, 24 h, 95%; (h) 2,2 DMP, PTSA, DCM, rt, 5 h, 95%; (i) Raney-Nickel, H2, ethanol, rt, 48 h, 95%; (j) NaClO2, NaH2PO4, t-Butanol/H2O (7:3), rt, 8 h, 94%.

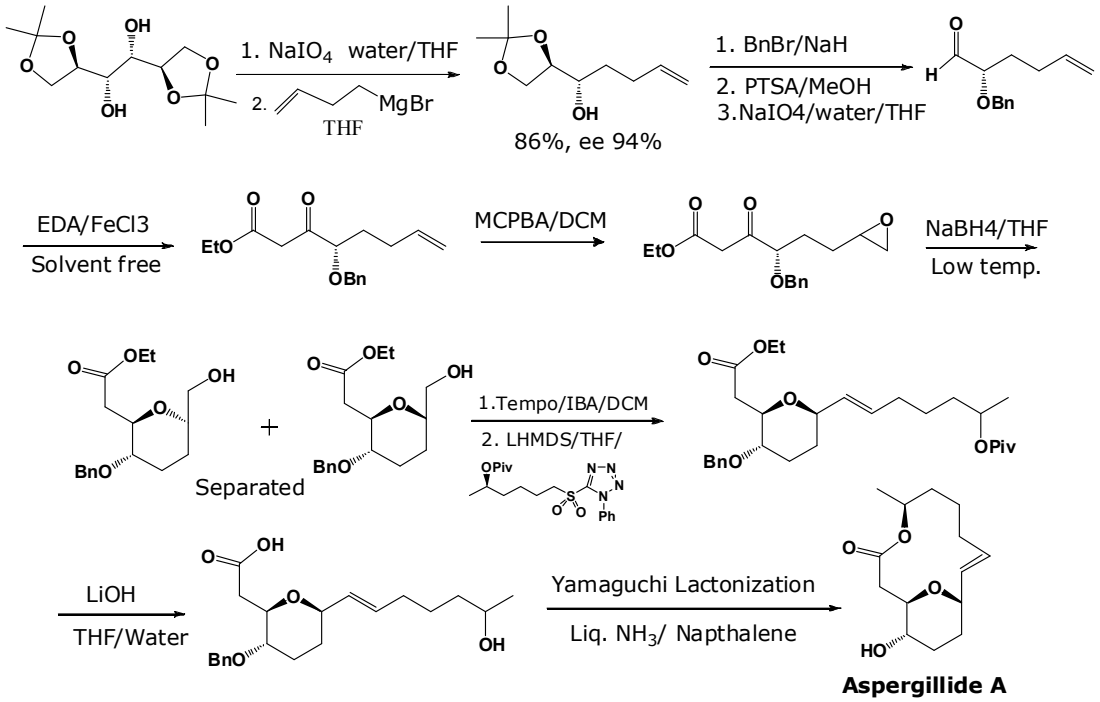


Scheme 8: (a) FeCl3, acetyl acetone (**retro-claisen condensation, *scheme 2***), toluene, reflux, 24 h, 65%; (b) HCl, methanol, rt, 93%; (c) TBSCl, imidizole, rt, 3 h, 93%; (d) (i) K_2CO_3, MeOH, reflux 3 h; (ii) THF/acetyl chloride 8 h; (iii) HCl, methanol, rt, overall yield 70%.

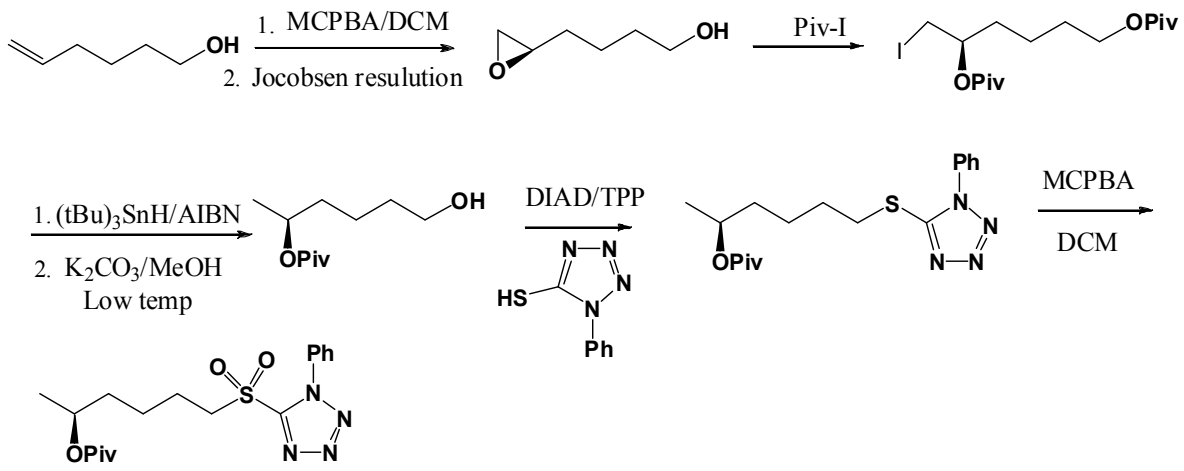
7. A Novel approache for Asymetric total synthesis of aspergillide A

(Manuscript under preparation)

Asymmetric total synthesis of aspergillide A from commercially available D-mannitol diacetonide is described. We have developed and used four new methodes and procedures in this course of total synthesis of Aspergillide A. The synthesis also involves jacobsen kinetic resolution, Julia Olefination and Yamaguchi lactonization reactions.



Scheme 9: Schematic procedure for asummetric synthesis of aspergillide A

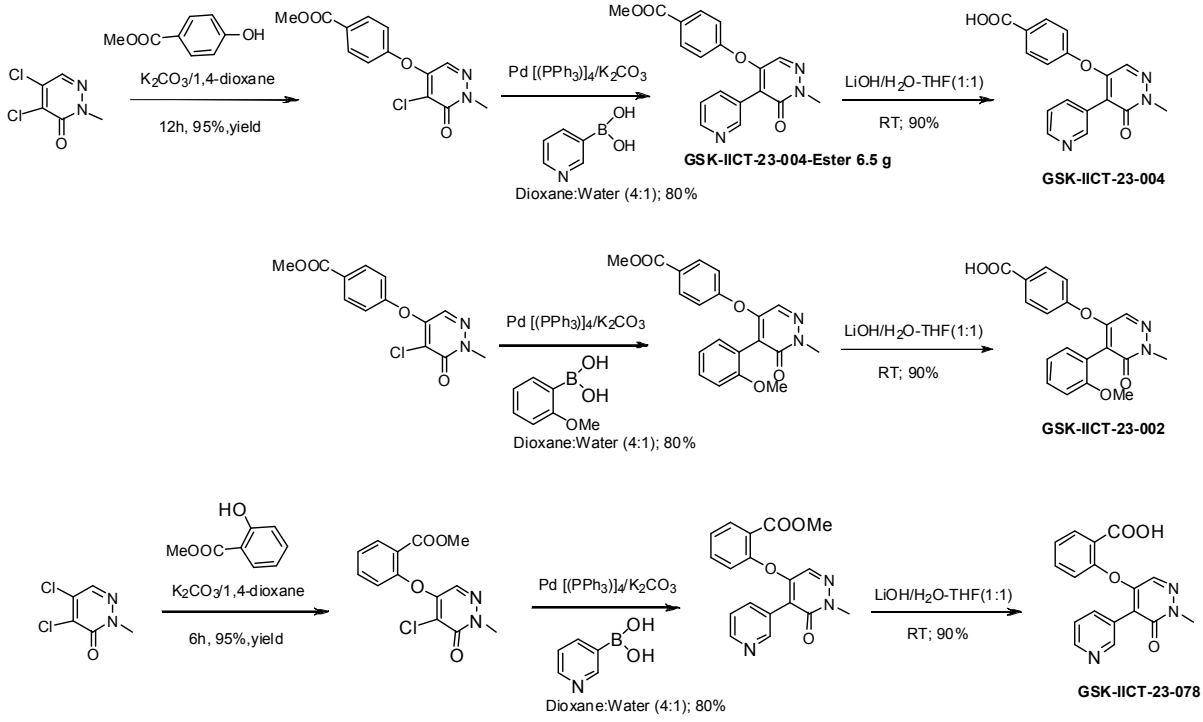


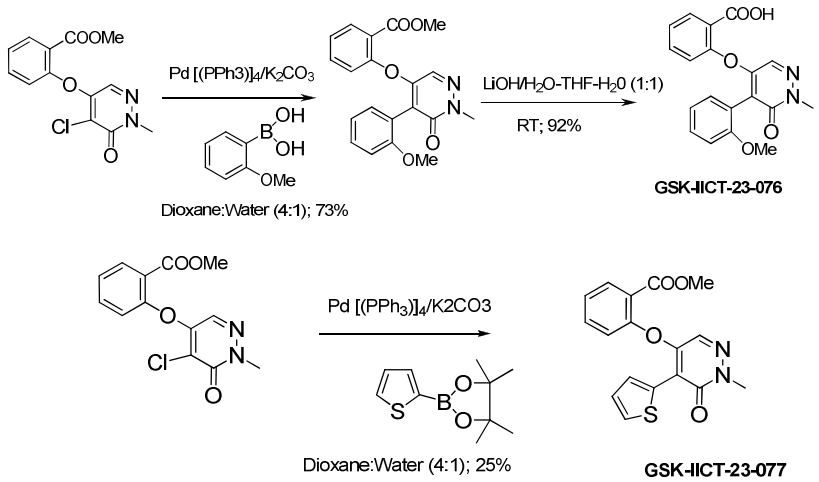
Scheme 10: Schematic procedure for synthesis of Julia Olifenation intermediate which wasu used in total sythesis aspergillide A.

Completed Industrial Projects

Procedures for Synthesis of Pyridazinones

I have successfully completed an industrial project from IICT-GSK-23, Synthesis of Pyridazinones. I successfully prepared 10 compounds in time out of 12 given to me.



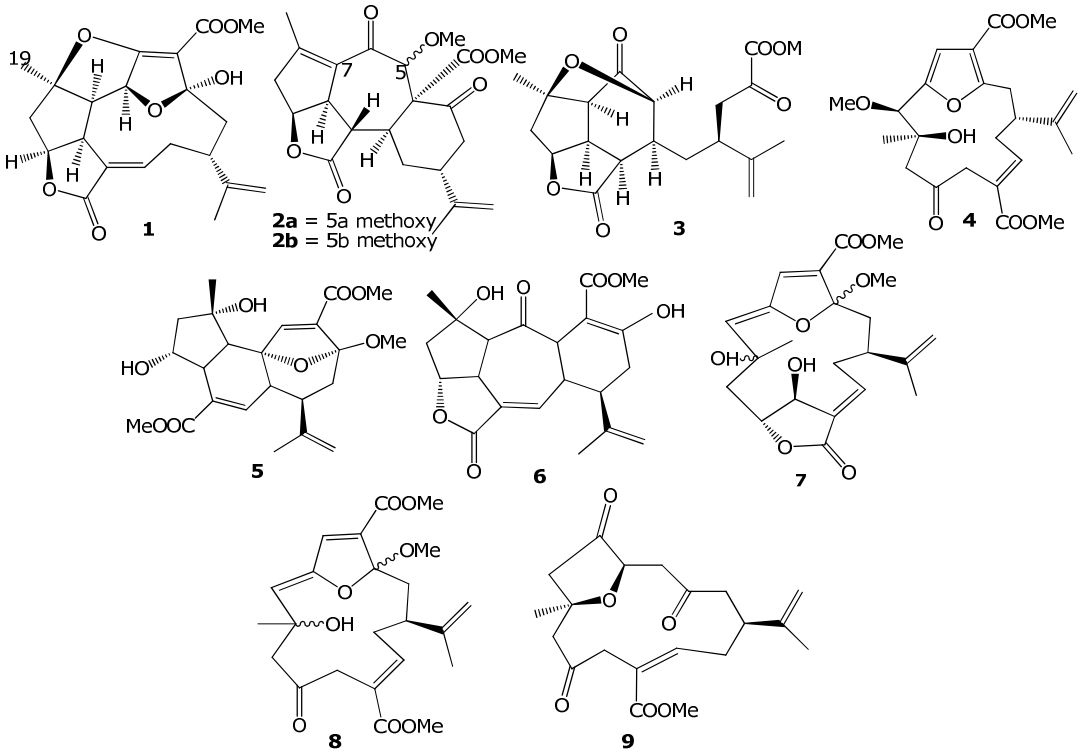


Scheme 11: GSK-IICT-23 Project: Synthesis of Pyridazinones

Completed DBT and DST Projects

➢ Isolation of secondary metabolites from the soft coral *Sinularia inelegans*

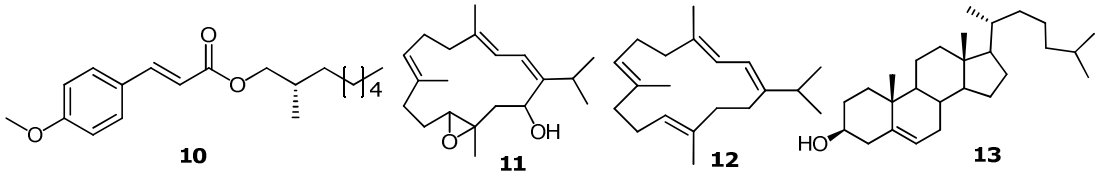
The soft coral *Sinularia inelegans* is chocolate brown in colour with glossy spots, grows to reasonable biomass under sea water. It occurs widely in south Indian sea coast. The soft coral *Sinularia inelegans* was collected from Mandapam coast (N 9° 18'; E 79° 08') in the Gulf of Mannar during April 2011 at a depth of 20 feet by skin diving and was preserved in excess methanol until workup.



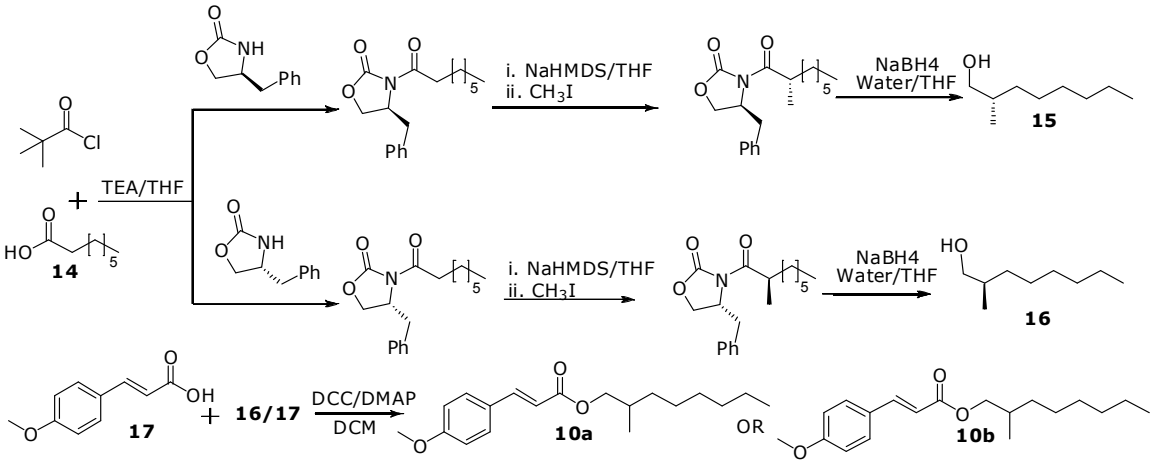
A total of ten compounds were isolated from the soft coral *Sinularia inelegans,* and among them, five compounds are new and the rest are known diterpenoids. All compounds showed good cytotoxic activity against four kinds of cancer cell lines.

- **Isolation of secondary metabolites from the soft coral *Sarcophyton ehrenbergi***

The soft coral *Sarcophyton ehrenbergi* is in light yellow colour with glossy spots grows to a reasonable biomass on rocky substratum. It occurs widely in south Indian sea coast. In the present study the soft coral *Sarcophyton ehrenbergi* was collected from Mandapam coast (N 9° 18'; E 79° 08') in the Gulf of Mannar during November 2011 at a depth of 20 feet by skin diving and was preserved in excess methanol until workup.



We have isolated four compounds from the mentioned spices, among them, compound (10) is a new compound (P-Methoxy cinnamic acid ester) and rest of are known compounds (11-13).



Scheme 12: Synthesis of two enantiomers (10a & 10b) of new compound 10

The structure and stereo center of compound **10** was confirmed by its total synthesis by using Evans chiral auxiliaries as starting synthones (scheme 12). As the compound **10** has only one stereo-center, there are two possible stereo isomers **10a** and **10b**, hence we prepared both the isomers and compared optical rotation with the naturally obtained compound (**10**).