CURRICULUM VITAE

Ramesh Kunde Ph. D.
Post-Doctoral Fellow
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EDUCATION AND RESEARCH EXPERIENCE

Sep, 2018- Present **Associate Scientist** in GVK Biosciences Private Limited, Hyderabad, India.

2016-2018 **Postdoctoral Fellow** – The Hebrew University of Jerusalem, Israel, in the group of **Prof. Shlomo Yitzchaik** and **Dr. Mattan Hurevich;** Project: **Synthesis of Chondroitin Sulfate Disaccharide and Tetrasaccharide** and **Synthesis of Oligoarabinofuranoside using Photoremovable Protecting Groups**.

2014-2016 **Research Scientist** in AISIN COSMOS R&D CO Pvt. Ltd, Hyderabad.

2008-2014 **Doctoral Research -** CSIR-Indian Institute of Chemical Technology, Hyderabad, India, under the supervision of **Dr. P. Radha Krishna**.

Thesis entitled **"Ring-Closing metathesis approach towards the total synthesis of Xylogiblactone B and (4*S*,10*R*)-4,10-Dihydroxydodec-2-en-1,4-olide; Acid catalyzed lactonization approach towards the total synthesis of Etharvendiol, Polyporolide and 1-(5-Oxotetrahydrofuran-2-yl)ethyl 2-phenylacetate"**

2004-2006 **M. Sc.** in Organic Chemistry, Osmania University, Hyderabad, India.

2001-2004 **B. Sc.** in Chemistry, Kakatiya University, Warangal, India.

RESEARCH ACCOMPLISHMENTS

From Doctoral and Post doctoral research

- First total synthesis of anti malarial α-pyrone Lippialactone and its C9-epimer was achieved by cross-metathesis protocol
- First diastereoselective *O/N*-arylative *Passerine-Smiles* and *Ugi-Smiles* reactions using chiral aldehydes

- First total synthesis of polyol γ-butyrolactone: Xylogiblactone B *via* Yamaguchi esterification and ring-closing metathesis from D (+)-mannitol
- Studies towards the total synthesis of (+)-etharvendiol
- First total synthesis polyol γ-butyrolactone: Polyporolide *via* acid catalyzed intramolecular lactonization
- Total synthesis of (4*S*,10*R*)-4,10-dihydroxydodec-2-en-1,4-olide via RCM protocol.
- Total synthesis of (4*S*,10*S*)-4,10-dihydroxydodec-2-en-1,4-olide via CBS reduction and acid catalyzed intramolecular lactonization
- First total synthesis of γ-butyrolactone: 1-(5-oxotetrahydrofuran-2-yl)ethyl 2-phenylacetate *via* acid catalyzed intramolecular lactonization and Yamaguchi esterification
- Total synthesis of 3*β*,4*α*-dihydroxy-1-(3-phenylpropanoyl)-piperidine-2-one
- Total synthesis of Crassalactone A by Chiron approach
- Synthetic efforts towards the total synthesis of Almuheptolide A and Almuheptolide B
- Total synthesis of (*S*)-N-((1*R*,2*S*)-1-hydroxy-1-phenylpropan-2-yl)-5-oxopyrrolidine-2-carboxamide
- Synthesis of Chondroitin sulfate disaccharide and tetrasaccharide
- Synthesis of Oligoarabinofuranoside using Photoremovable Protecting Groups
- Total synthesis of 1-*O*-β-D-glucopyranosyl-1,4-dihydroxy-2-((*E*) 2-oxo-3-butenyl)benzene and 1-*O*-*β*-d-glucopyranosyl-1,4-dihydroxy-2-(3′ ,3′ -dimethyl-allyl)benzene

CONFERENCES/SYMPOSIUMS PARTICIPATED

- Participated in International Symposium on "Chemistry and Chemical Biology in Natural Products" at IICT, Hyderabad, india-2012
- Participated in International Symposium on "Nature Inspired Initiatives in Chemical Trends" at IICT, Hyderabad, india-2014

From Masters Degree

- Passed Masters Degree in 2006
- Qualified National Talent Test conducted by Council of Scientific and Industrial Research for the Junior Research Fellowship 2007 India

EXPERTISE

- Expertise in design and execute multi-step synthesis of bioactive target molecules by innovative strategies
- Good skills in asymmetric synthesis
- Development of novel synthetic methodologies as tools in multi step organic synthesis
- Profound efficiently in handling of hygroscopic air sensitive reagents and reactions
- Excellent team worker, skilled in synthesis of mg-kg scale
- Endured in purification of products in minor amounts
- Interpretation of the structure of the organic compounds using ^{1}H NMR, ^{13}C NMR, IR and MASS Spectroscopic data
- Highly conversant with the experimental techniques such as MPLC, Preparative MPLC, LC-MS, thin layer chromatography and column chromatography
- Able to identify experimental problems and resolve them independently
- Capable of both collaborative and independent research
- Strong knowledge in chemistry software- ISIS Draw, Chem Draw, NMR software (Bruker and Mestrec) and ACD Labs
- Possession of good communication and management skills
- Ability to write articles and manuscripts to scientific research journals

RESEARCH INTERESTS

Design and development of new synthetic methodologies and their applications to synthesis of architecturally complex natural products or model compounds having pharmacological importance. Asymmetric synthesis, Peptide synthesis, asymmetric catalysis, transition metal catalysis and organic materials.

PUBLICATIONS

1. Total synthesis of proposed structure of Xylogiblactone B by Chiron approach. Palakodety Radha Krishna, **Ramesh Kunde**, Rajesh Nomula. *Tetrahedron Lett.* **2014**, *55*, 5244-5246.
2. Studies towards the total synthesis of (+)-Etharvendiol.

Ramesh Kunde and Palakodety Radha Krishna. *Tetrahedron Lett.* **2015**, *56*, 1344-1347.

3. Total synthesis of proposed structure of Polyporolide *via* acid catalyzed lactonization. **Ramesh Kunde**, and Palakodety Radha Krishna. *Tetrahedron Lett.* **2015**, *56*, 3928-3932.
4. First total synthesis of Lippialcactone and its C9 epimer. Palakodety Radha Krishna, Rajesh Nomula, **Ramesh Kunde**. *Synthesis* **2014**, *46*, 0307-0312.
5. First diastereoselective *Passerine-Smiles* and *Ugi-Smiles* reactions using chiral aldehydes. Palakodety Radha Krishna, Gandrath Dayaker, D. Venkata Ramana, **Ramesh Kunde.** *Helv. Chim. Acta* **2014**, *97*, 1076-1087.
6. Total synthesis of (4*S*,10*R*)-4,10-dihydroxydodec-2-en-1,4-olide *via* RCM protocol. **Ramesh Kunde**, Palakodety Radha Krishna (*Manuscript under preparation*)
7. Total synthesis of (4*S*,10*S*)-4,10-dihydroxydodec-2-en-1,4-olide *via* CBS reduction and acid catalyzed intramolecular lactonization. G. Manikanta**,** **Ramesh Kunde**, Palakodety Radha Krishna (*Manuscript under preparation*)
8. First total synthesis of γ-butyrolactone: 1-(5-oxotetrahydrofuran-2-yl)ethyl 2-phenylacetate *via* acid catalyzed intramolecular lactonization. **Ramesh Kunde**, Palakodety Radha Krishna (*Manuscript under preparation*)
9. Total synthesis of 3*β*,4*α*-dihydroxy-1-(3-phenylpropanoyl)-piperidine-2-one. G. Manikanta, **Ramesh Kunde**, Palakodety Radha Krishna (*Manuscript under preparation*)
10. Synthesis of (*S*)-N-((1*R*,2*S*)-1-hydroxy-1-phenylpropan-2-yl)-5-oxopyrrolidine-2-carboxamide. **Ramesh Kunde** (*Manuscript under preparation*)
11. Total synthesis of 1-*O*-β-D-glucopyranosyl-1,4-dihydroxy-2-((*E*) 2-oxo-3-butenyl)benzene and 1-*O*-*β*-d-glucopyranosyl-1,4-dihydroxy-2-(3′ ,3′ -dimethyl-allyl)benzene. **Ramesh Kunde** (*Manuscript under preparation*)

Personal details:

Sex : Male

Date of Birth : June 16, 1982

Marital status : Married

Nationality : Indian

PROFESSIONAL REFERENCES

1. **Dr. P. Radha Krishna**

   Principal Scientist

   OBC division

   Indian Institute of Chemical Technology

   Hyderabad, India

   Phone: +91-40-2719315

   Email: *prkgenius@iict.res.in*

2. **Dr. P. Yella Reddy**

   Director, R&D

   Aisin Cosmos R&D Co. Ltd.

   Sapala Organics Pvt. Ltd.

   Tarnaka, Hyderabad, India

   Phone: +91-40-27191815

   Email: *paidir@netscape.net*

3. **Dr. Mattan Hurevich**

   Institute of Chemistry

   Department of Organic Chemistry

   The Hebrew University of Jerusalem

   mobile: +972-522868777

   Email: *mattan.hurevich@mail.huji.ac.il*

4. **Prof. Shlomo Yitzchaik**

   Professor of Chemistry

   Institute of Chemistry

   The Hebrew University of Jerusalem

   Phone: +972-6-6565978

   Email: *shlomo.yitzchaik@huji.mail.ic.il*

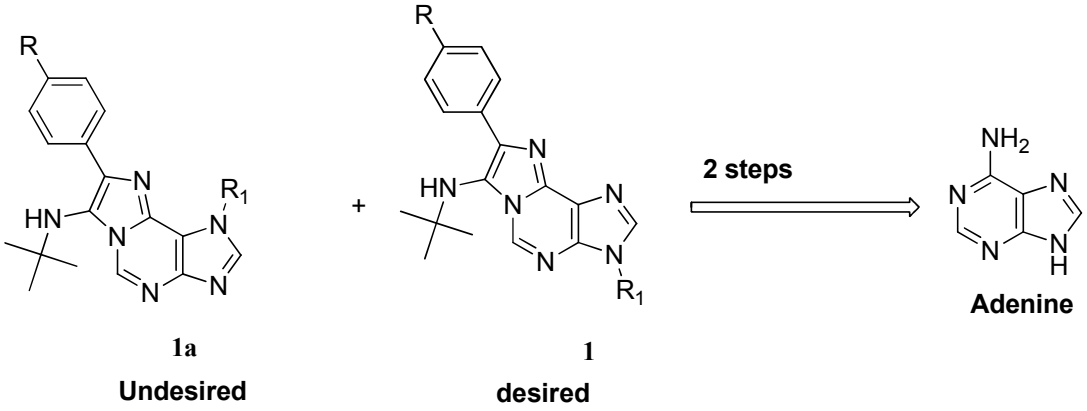
Ramesh Kunde

Research experience at GVK Bio PVT ltd Hyderabad

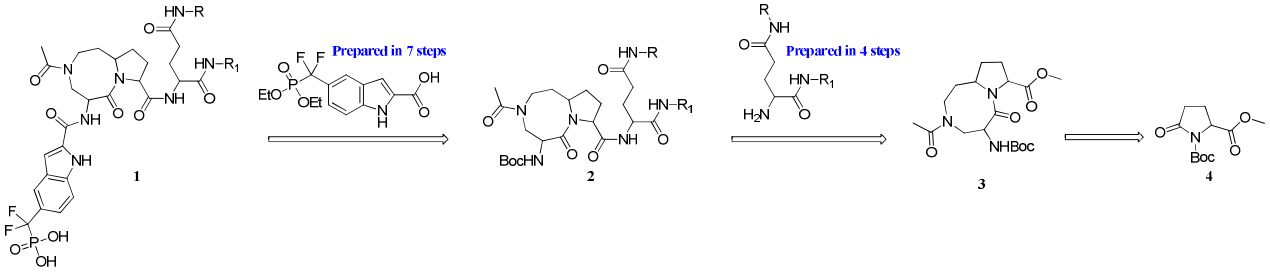
(Sep, 2018-Present)

Here below mentioned some synthesized Molecules:

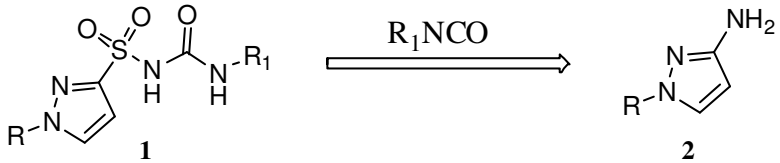
Retrosynthetic analysis of N-(tert-butyl)-substituted phenyl--imidazo[2,1-i]purin-7-amine

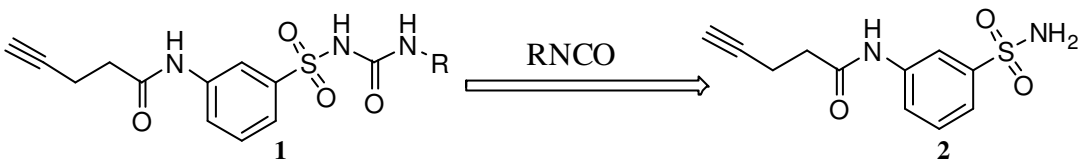


Retrosynthetic analysis of Phospho peptide

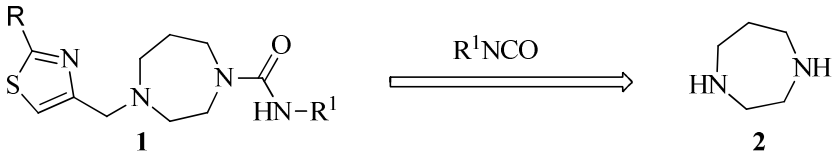


Retrosynthetic analysis of N-carbamoyl-pyrazole-3-sulfonamide and N-carbamoyl benzenesulfonamide derivatives

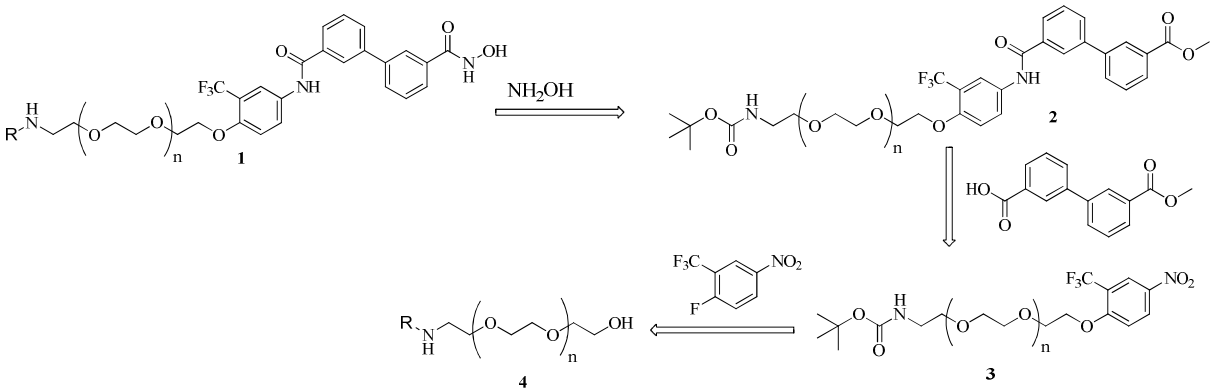




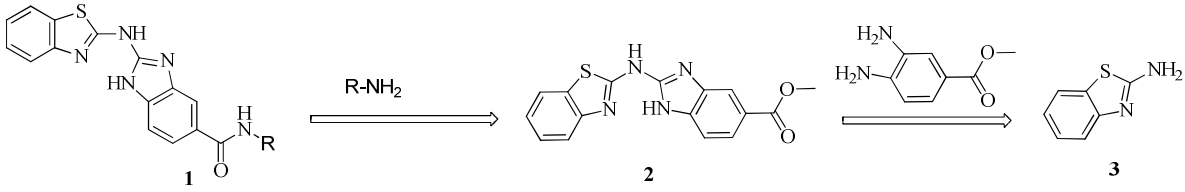
Retrosynthetic analysis of substituted thiazol -1,4-diazepane-1-carboxamide derivative



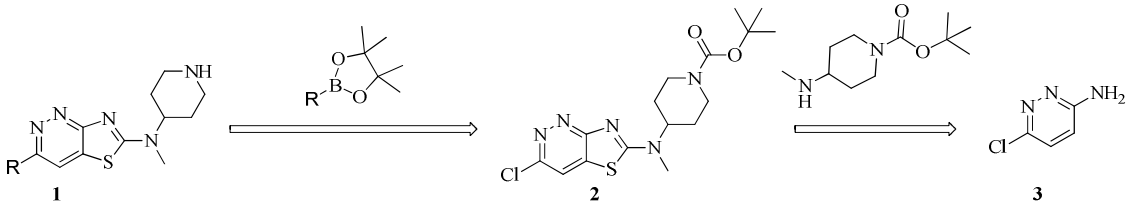
Retrosynthetic analysis of hydroxycarbamoyl-[1,1'-biphenyl]-3-ylcarboxamido)-2-(trifluoromethyl)phenoxy) ethoxy)ethoxy)ethyl)carbamate



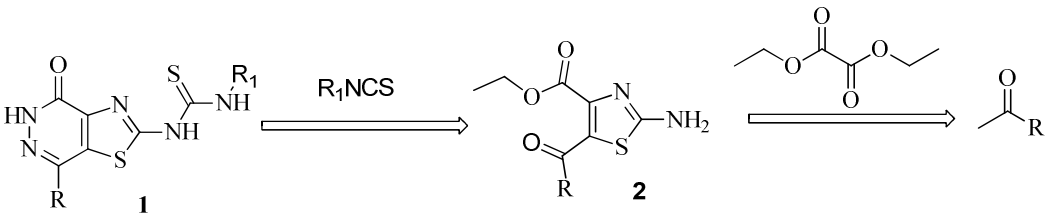
Retrosynthetic analysis of Benzothiazol-amino-indazol-benzo imidazole-5-carboxamide



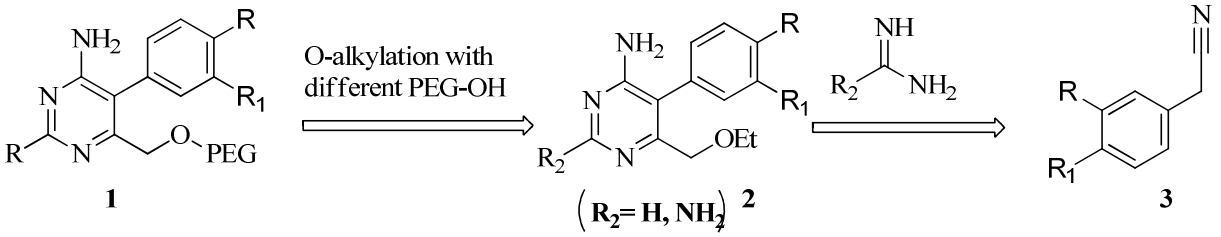
Retrosynthetic analysis of Piperidin-amino thiazolo-pyridazin-pyrazol derivative



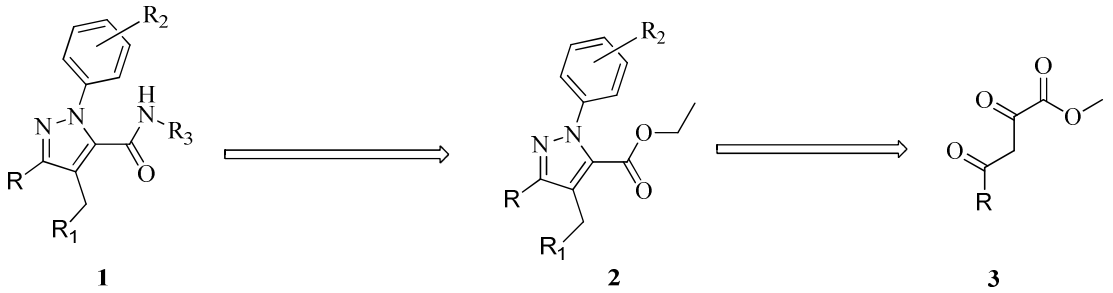
Retrosynthetic analysis of Dihydrothiazolo-pyridazin-thiourea desivative



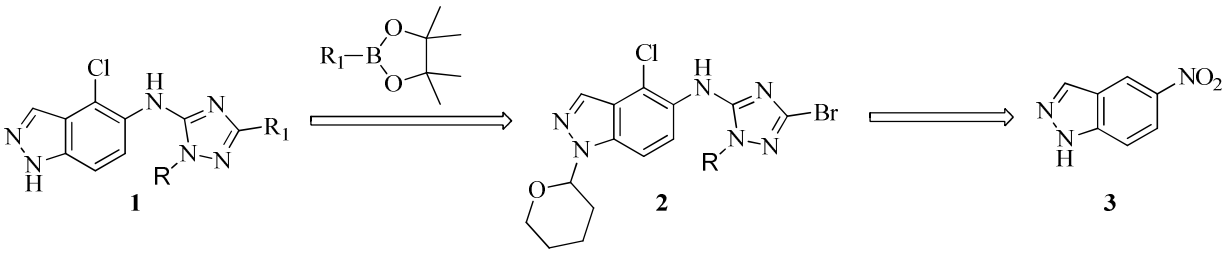
Retrosynthetic analysis of pyrimidine-2,4-diamine and pyrimidin-4-amine derivatives



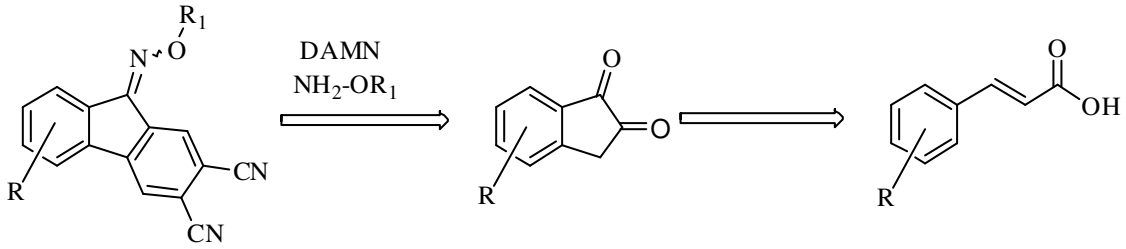
Retrosynthetic analysis of 4-benzyl-3-butyl-1-(2,5-dichlorophenyl)-1H-pyrazole-5-carboxamide derivatives



Retrosynthetic analysis of triazol-5-yl-1H-indazol-5-amine derivatives



Retrosynthetic analysis of hydroxyimino-9H-fluorene-2,3-dicarbonitrile

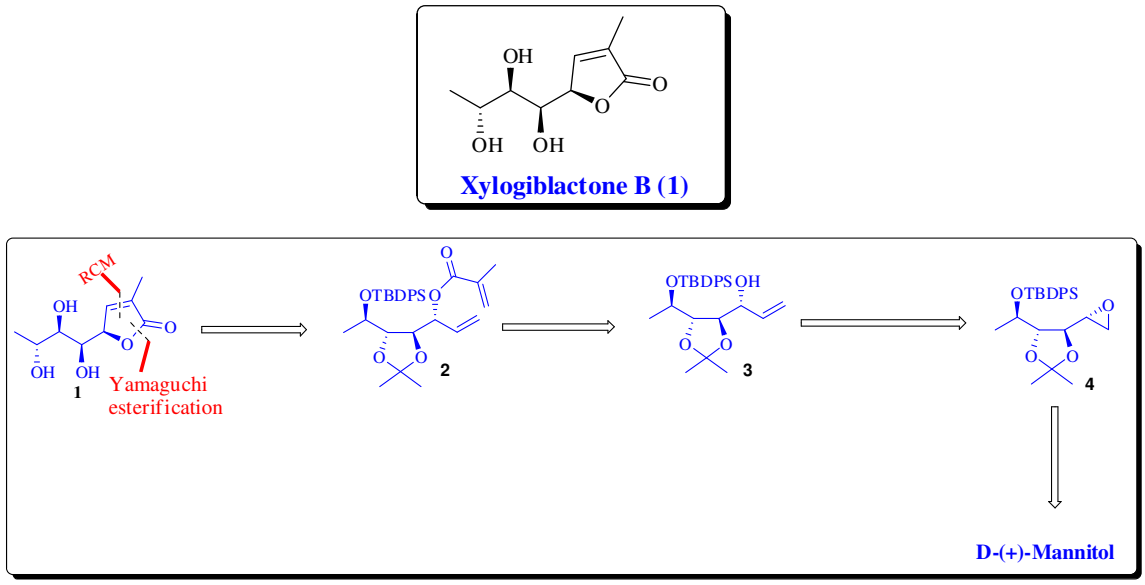


DOCTORAL RESEARCH

Total synthesis of Xylogiblactone B by chiron approach

(*Tetrahedron letters* **2014**, *55*, 5244-5246)

Butenolides, which are structural units in many natural products, are important intermediates in organic synthesis. Butenolide containning compounds are considered as potential insecticides, bactericides, fungicides, antibiotics, anticancer agents, anti-inflammatories, allergy inhibitors, antipsoriasis agents, cyclo-oxygenase inhibitors, phospholipase A2 inhibitors, *etc*. Considerable effort has been devoted to the chemical synthesis of these interesting compounds in the past decades. The fungi of Xylariaceae family have long been used in the Chinese medicine and particularly the ethyl acetate extracts of the fermented broths of *X. gibbisporous* YMJ863 showing high antifungal activity. Recently from the family of *Xylotumulus gibbisporus* YMJ863 polyketide γ-lactone named xylogiblactone B (**1**) was isolated by Lee, T. H. *et. al.* in 2014. The effect of xylogiblactone B on the inhibition of NO (nitric oxide) production in lipopolysaccharide-activated murine macrophages was evaluated.

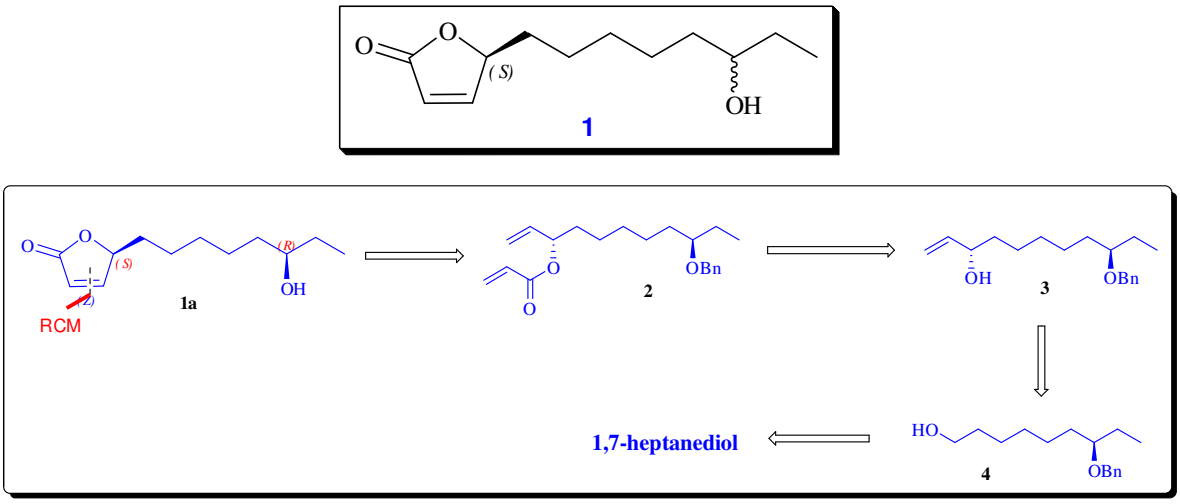


The retrosynthetic strategy of Xylogiblactone (**1**) in above scheme reveals that it could be synthesized by the RCM of the corresponding diene ester (**2**) which in turn could be accessed by the coupling of allylic alcohol (**3**) with commercially available 2-methacrylic acid under Yamaguchi conditions. Thus compound (**3**) could be accessed from the regioselective epoxide ring-opening reaction of the corresponding epoxide (**4**), which would be prepared from the natural chiral template D-(+)-mannitol.

Total Synthesis of (4*S*,10*R*)-4,10-dihydroxydodec-2-en-1,4-olide *via* ring-closing metathesis protocol

(*Manuscript under preparation*)

(4*S*,10*R*)-4,10-dihydroxydodec-2-en-1,4-olide (**1**) isolated from the actinomycete *Streptomyces sp*. reported by wang *et. al*. in 2014. Compound (**1**) showed the most potent antifungal activities against *Alternaria alternata* and *Curvularia lunata with MIC* values of 32 and 16 µg/ml.

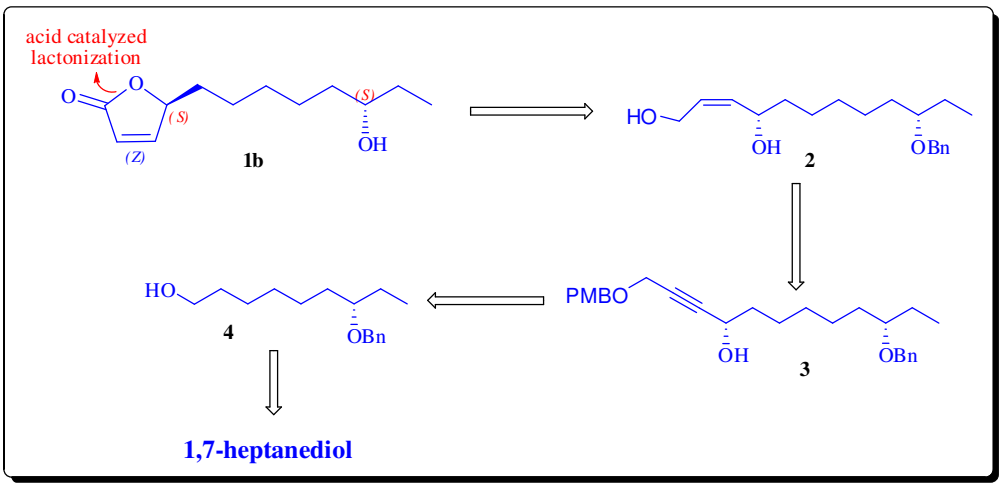


The envisaged retrosynthetic strategy of (**1a**) was delineated in above Scheme. Construction of butenolide (**1a**) moiety *via* ring-closing metathesis protocol from bisolefinic ester (**2**)**,** which in turn was accessed upon acryloylation of allylic alcohol (**3**)**.** Allylic alcohol (**3**) was obtained from the *O*-benzyl protected primary alcohol (**4**)**.** Compound (**4**) accessed from 1,7-heptanediol involved simple chemical manipulations like vinylation and Sharpless kinetic resolution.

Total Synthesis of (4*S*,10*S*)-4,10-dihydroxydodec-2-en-1,4-olide *via* acid catalyzed lactonization

(*Manuscript under preparation*)

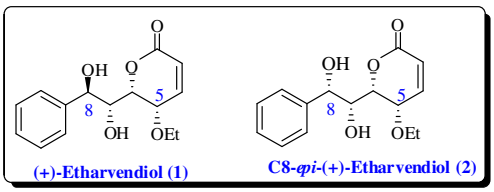
The envisaged retrosynthetic strategy of (**1b**) was delineated in below Scheme. Construction of butenolide (**1b**) moiety *via* acid catalyzed lactonization approach from *Cis*-butene diol derivative (**2**)**,** which in turn was accessed from (**3**)**.** compound (**3**) was could be obtained from the *O*-benzyl protected primary alcohol (**4**)**.** Compound (**4**) accessed from 1,7-heptanediol involved simple chemical manipulations like vinylation and sharpless kinetic resolution.



Total synthesis of (+)-Etharvendiol and its C8-epimer

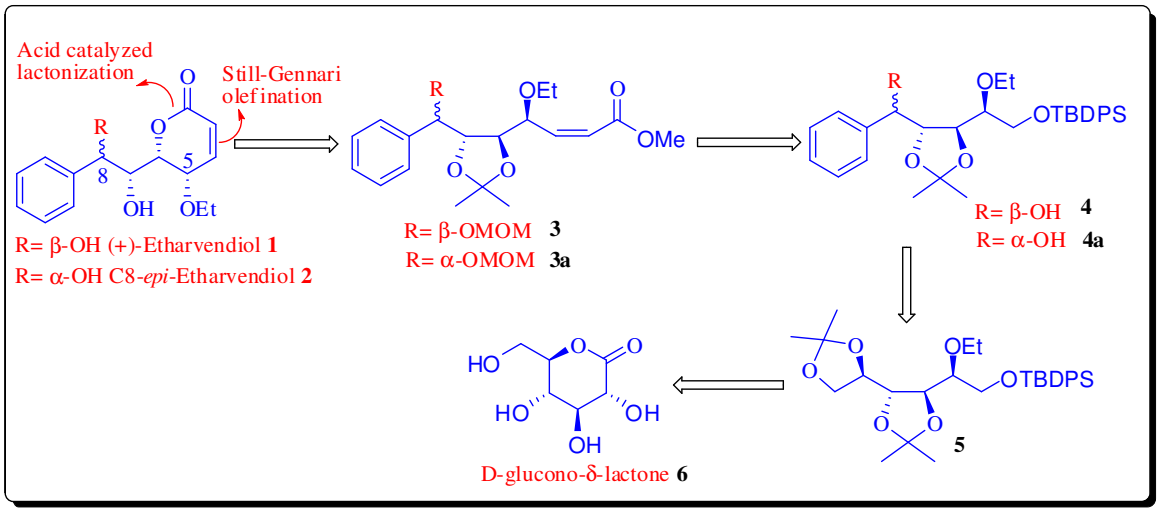
(*Tetrahedron letters* **2015**, *56*, 1344-1347)

Trees of genus *Goniothalamus* of the plant family Annonaceae have for a long time aroused considerable interest as a source of potent biologically active styryllactones from a pharmacological point of view. Many styryl-lactones isolated from *Goniothalamus* species of natural products have been used as a traditional medicine in Asia to treat rheumatism, edema, as an abortifacient, as a mosquito repellent and most interestingly in folk medicine for treatment of different diseases. Their unique and intriguing structures coupled with diverse and useful characteristics as well as their broad spectrum of activity have made them inviting synthetic targets. The novel styryl-lactone (+)-etharvendiol was isolated from the methanolic extract of *goniothalumus arvensis* stem bark. (+)-etharvendiol (**1**) was determined from ^{1}H NMR, ^{13}C NMR, IR and mass spectral analysis.



The retrosynthetic analysis of (**1**) and (**2**) dipicted in below scheme. Herein we report the synthetic efforts towards the total synthesis of (+)-etharvendiol (**1**) by a convergent synthetic pathway involving acid catalyzed one pot acetonide deprotection and lactonization of (**3**), which could in turn obtained from (**4**) involving Still-Gennari olefination. Alongside, a C8-epimer (**2**) was also synthesized by the same path way from its isomeric analogs. Diastereomers (**4**) and (**4a**) were synthesized from (**5**) involving removal of the 1,2-acetonide group and *in situ* oxidative cleavage of the resulting glycol to yield the corresponding aldehyde and on further reaction with PhMgBr. The

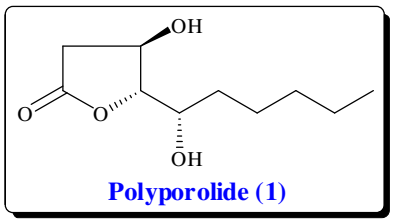
diacetonide compound (**5**) that could in turn be realized from D-glucono-δ-lactone by employing few simple chemical manipulations.



Total synthesis of Polyporolide *via* acid catalyzed lactonization

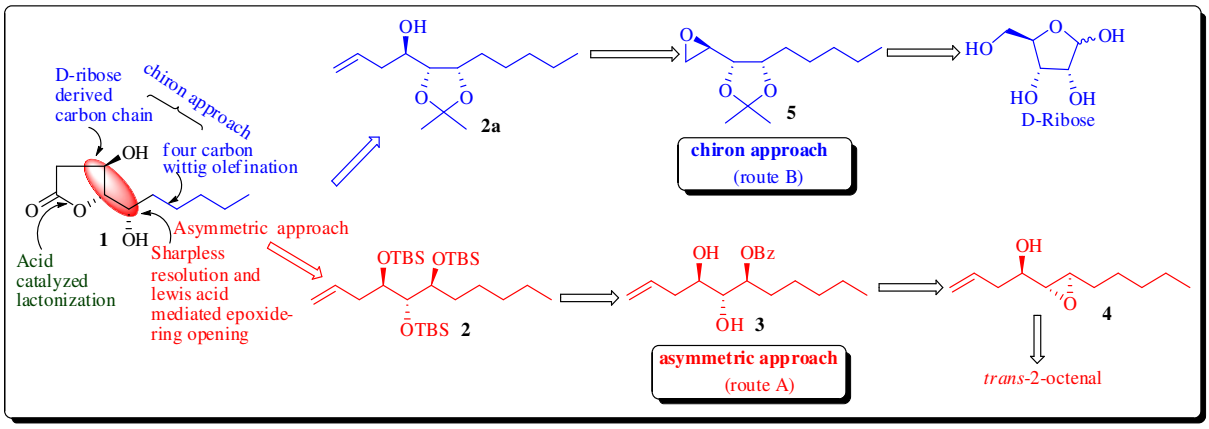
(*Tetrahedron letters* **2015**, *56*, 3928-3932)

The chemistry of γ-butyrolactones has attracted considerable attention mainly because many molecules that belong to this class revealed diverse and significant biological activity. Synthetic methods continue to be developed for the construction of γ-lactone structural unit from readily available starting materials. A acetogenin, Polyporolide (**1**), was isolated from the mycelial solid cultures of a *Polyporus* strain SC0652. polyporolide (**1**) exhibited toxicity to brine shrimp (A. salina) with LC_{50} of 424.5 μg mL^{-1}.



The retrosynthetic analysis of Polyporolide (**1**) is illustrated in below (route A, asymmetric approach). We planned to generate the γ-lactone functionality in the final step of our synthesis by the oxidation of the terminal olefinic bond followed by acid-catalyzed one pot deprotective-intramolecular lactonization of (**2**). Thus, in order to access compound (**2**), a Titanium (IV) mediated regioselective ring- Opening reaction of (**4**), which was identified as crucial intermediate, afforded monobenzoate diol (**3**). Compound (**3**) on exhaustive silylation would give (**2**), which on acid catalyzed deprotective-lactonization can result in target compound (**1**). Epoxy

alcohol (**4**) could be conceived from commercially available trans-2-octenal. Thus, all the stereogenic carbons were garnered through the Sharpless kinetic resolution of the corresponding allylic alcohol that was realised through Barbier allylation of *trans*-2-octenal.

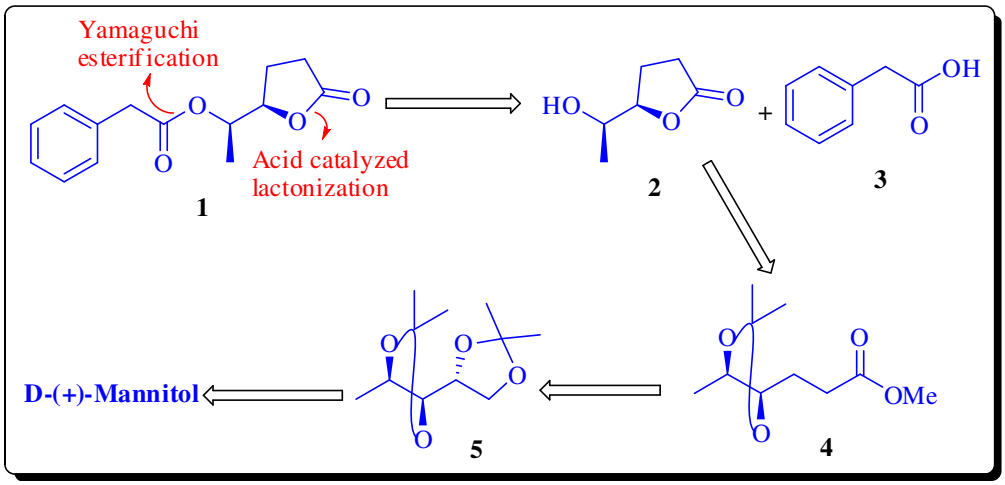


Alternatively, Chiron approach (route B) banked on regioselective epoxide ring-opening reaction of (**5**), identified as precursor to compound (**2a**) which in turn could lead us target compound (**1**) on acid catalyzed deprotective-lactonization reaction set. Epoxide (**5**) could be accessed from D-ribose through a 4C-Wittig homologation on the lactol, hydrogenation of the ensuing olefin and few more conventional transformations on C5 site. Homoallyl alchol (**2a**) could be obtained from epoxide **5** on ring-opening reaction with Grignard reaction.

First total synthesis of γ-butyrolactone: 1-(5-oxotetrahydrofuran-2-yl)ethyl 2-phenylacetate *via* acid catalyzed lactonization

(Manuscript under preparation)

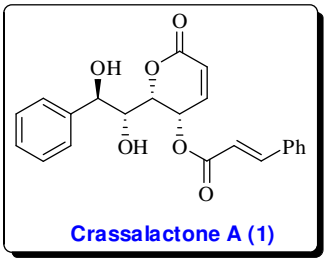
γ-Butyrolactones form an important class of compounds which appear as substructures in many natural products, and they have been also employed as key intermediates for the synthesis of a wide range of bioactive compounds. In fact, many natural products have γ-butyrolactone skeleton, and γ-butyrolactones have been used to prepare pharmacologically active compounds. 1-(5-oxotetrahydrofuran-2-yl)ethyl 2-phenylacetate (**1**) isolated from the fungus *Nigrospora sphaerica.*



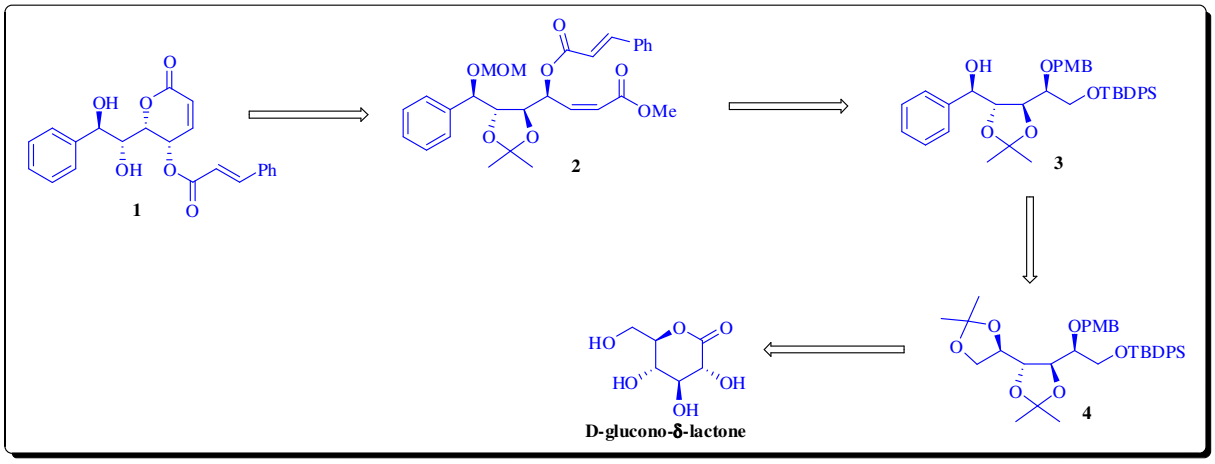
The retrosynthetic analysis of (**1**) dipicted in above scheme. Synthesis of (**1**) *via* Yamaguchi esterification of hydroxyl γ-butyrolactone with commercial source phenyl aceticacid (**3**). Construction of γ-butyrolactone (**2**) by one pot acetonide deprotection followed by lactonization of (**4**). 1,2-acetonide deprotection and wittig olefination of (**5**), which was easily accessed from D-(+)-mannitol.

Total synthesis of Crassalactone A by Chiron approach

(+)-crassalactone A (**1**) was isolated from the ethyl acetate extract of the leaves and twigs of Polyalthia crassa. It shows cytotoxic activity against a panel of mammalian cancer cell lines. The structure was determined on the basis of spectroscopic methods.

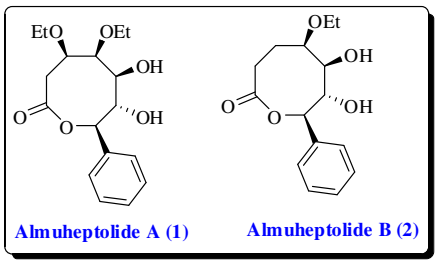


The retrosynthetic analysis of compound **1** showed in below scheme. It was envisioned that (+)-crassalactone A (**1**) could be synthesized from **2** by acid catalyzed one pot deprotection and lactonization, functional group transformations, elaboration, and lactonization. While in turn **3** could be originated from **4** involving removal of the 1,2-acetonide group and *in situ* oxidative cleavage of the resulting glycol to yield the corresponding aldehyde and on further reaction with PhMgBr. The diacetonide derivative **4** could be derived from the commercially available D-glucono-δ-lactone.

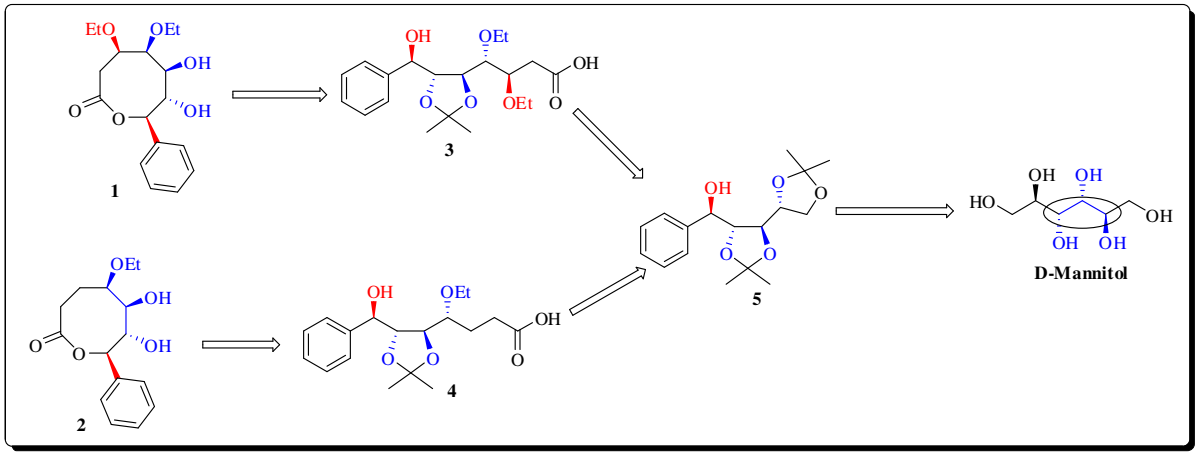


Synthetic efforts towards the total synthesis of Almuheptolide A and Almuheptolide B

The new heptolides (+)-almuheptolides-A (**1**) and -B (**2**) were isolated from *G. Arvensis*. (+)-Almuheptolide-A (**1**) and its diacetate were initially found to be inhibitors of the integrated mitochondrial electron-transport chain, measured as aerobic NADH oxidation, with similar potency, Almuheptolide-A (**1**) showed an IC_{50} of 4.4 ± 0.2 µM, whereas its diacetate gave an IC_{50} of 3.9 ± 0.2 µM. Taking into account that most of the respiratory chain inhibitors with potential biomedical interest act within this order of magnitude on mammalian submitochondrial particles, both compounds were effective inhibitors of the whole respiratory chain. However, the NADH oxidase activity involves all three energy-conserving enzymatic complexes of the respiratory chain, and thus the inhibitory action of the compounds might be affecting one or more of these electron-transfer chain components.



The retrosynthetic analysis of (**1**) and (**2**) dipicted in below Scheme. Herein we report the synthetic efforts towards the total synthesis of Almuheptolide A(**1**) and Almuheptolide B (**2**) by a convergent synthetic pathway from (**5**) involving acetonide protection of D-mannitol, oxidative cleavage of 1,2-diol to yield the corresponding aldehyde and on further reaction with PhMgBr.



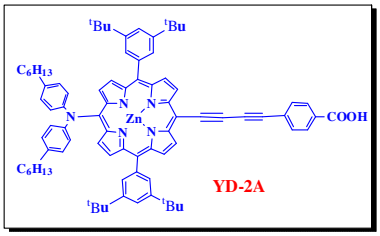
Research experience at Aisin Cosmos R&D Co. Ltd, Japan.

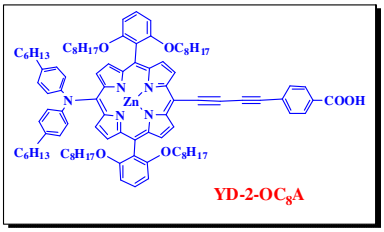
(2014-2016)

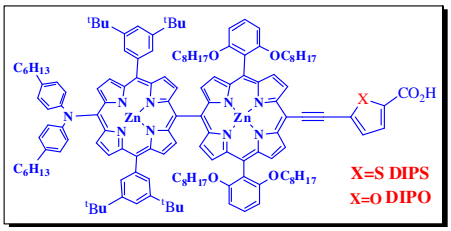
Synthesis of Organic Dyes used in Dye Sensidised Solar cells (DSSCs), Hole Transport Materials (HTMs) and Pyrrolo Dipyridine Derivatives

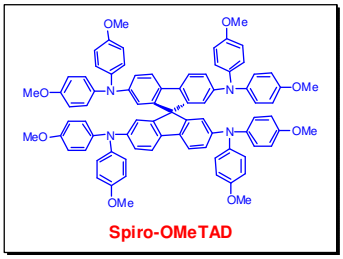
DSSCs and HTMs are currently the most efficient third-generation solar technology available. Other thin-film technologies are typically between 5% and 13%, and traditional low-cost commercial silicon panels operate between 14% and 17%. This makes DSSCs and HTMs attractive as a replacement for existing technologies in "low density" applications like rooftop solar collectors, where the mechanical robustness and light weight of the glass-less collector is a major advantage. They may not be as attractive for large-scale deployments where higher-cost higher-efficiency cells are more viable, but even small increases in the DSSC and HTMs conversion efficiency might make them suitable for some of these roles as well.

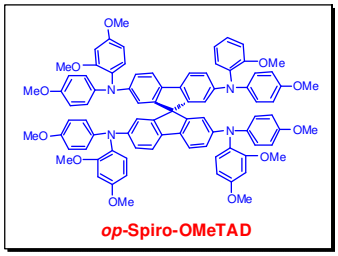
Some synthesized DSSCs and HTMs

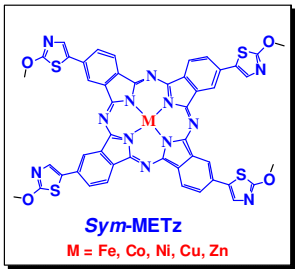


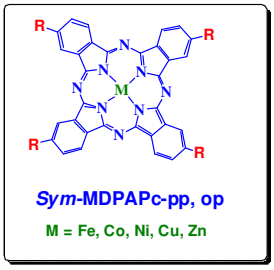


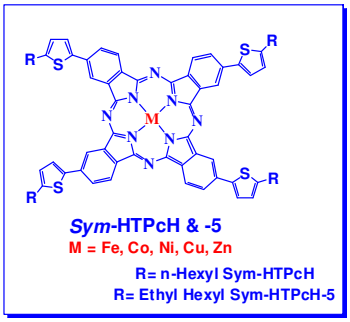


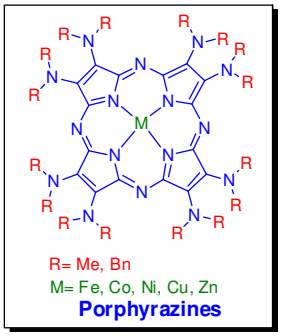


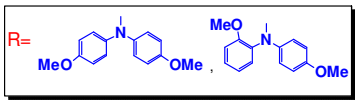




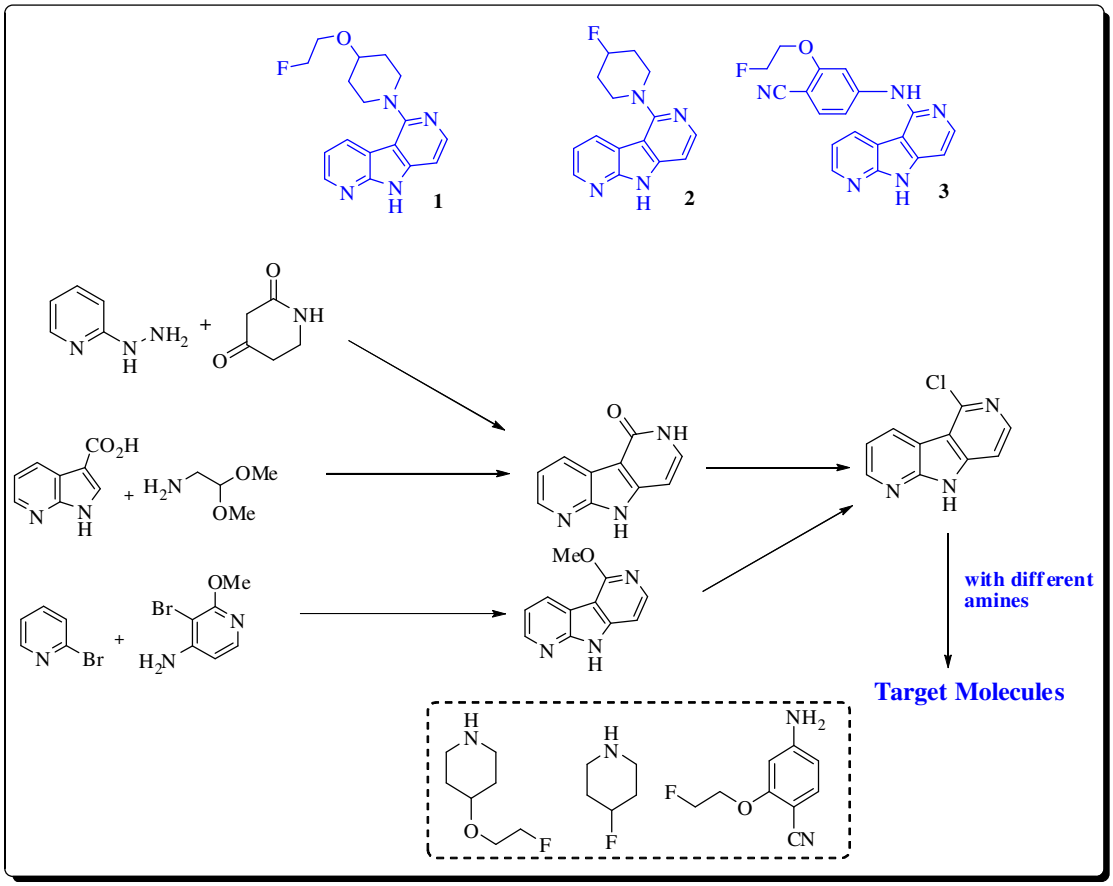


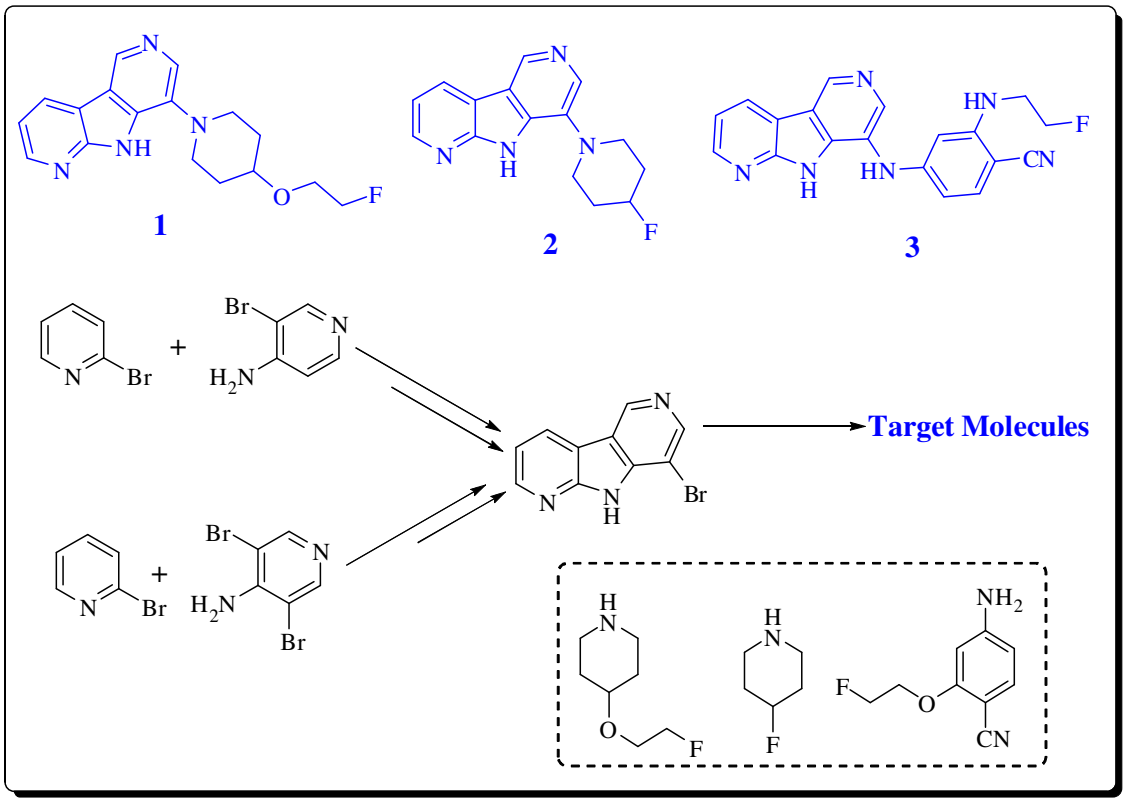






Synthesis of Pyrrolo Dipyridine Derivatives (AcImmune Project)



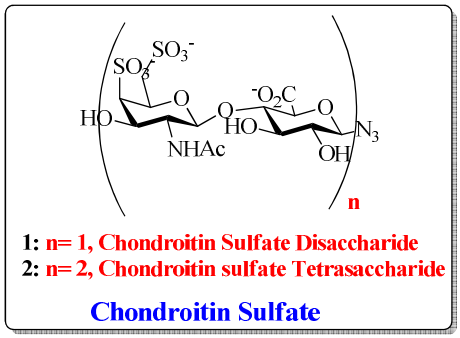


Post-Doctoral Research

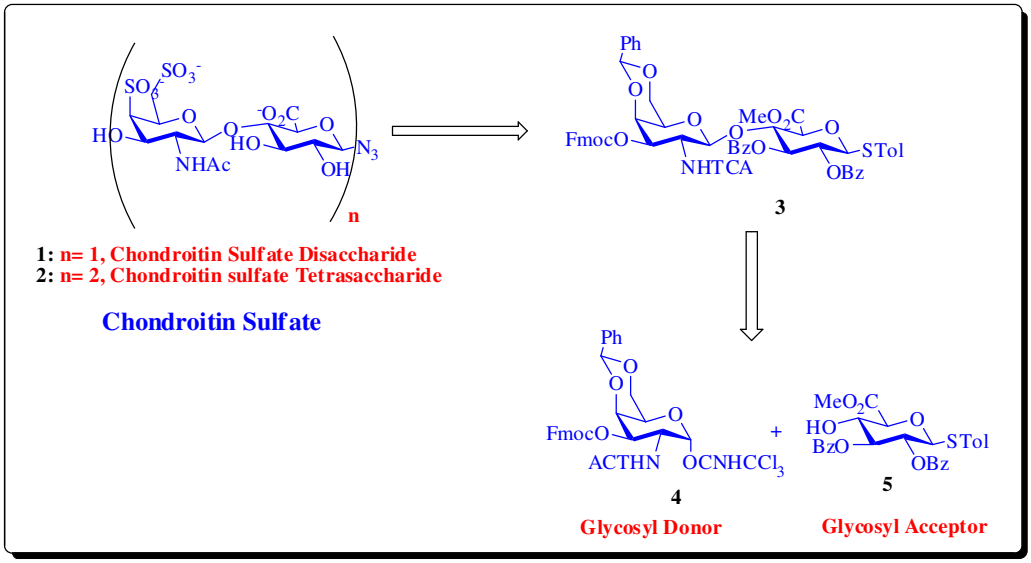
(July, 2016-Present)

Synthesis of Chondroitin Sulfate Disaccharide and Tetrasaccharide

Glycosaminoglycans (GAGs) are heterogeneous polysaccharides comprising of repeating glucuronic acid and amino sugar disaccharide units. These macromolecules can be covalently attached to core proteins to form proteoglycan side chains, or located in the extracellular matrix and intracellular secretory granules. GAGs have gained interest as potential therapeutic agents in cancer treatment, with studies showing their involvement in various pathobiological cancer stages and interactions with various effective molecules such as growth factors and cytokines. Over expression of chondroitin sulfate (CS) has been identified in various cancer phenotypes such as prostate, testicular, gastric, pancreatic and breast cancer.



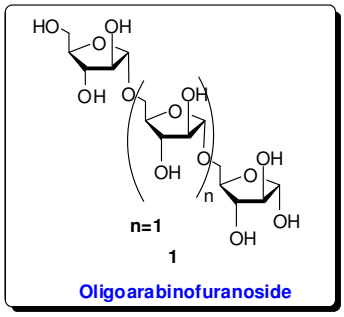
We envisioned a convergent strategy to access various CS molecules from a single disaccharide building block **3**. The Sulfated 4- and 6-hydroxyls of D-Galactosamine were masked with a benzylidene acetal. In particular, deprotection of benzylidine acetal or regioselective opening of the acetal ring was anticipated to permit selective deprotection of either or both the 4- and 6-hydroxyls and circumvent the need for hydrogenolysis. The orthogonal *O*-Fmoc group was installed at the C-3 position on the non reducing end of **4** to facilitate chain elongation. To achieve stereoselective formation of *β*-glycosidic linkages, we exploited well-precedented *N*-trichloroacetyl and benzoyl participating groups. Finally, the anomeric hydroxyl of **3** was masked with a thiotolyl group, which could be converted to activated glycosyl donors and offers a convenient means to conjugate CS to small molecules.

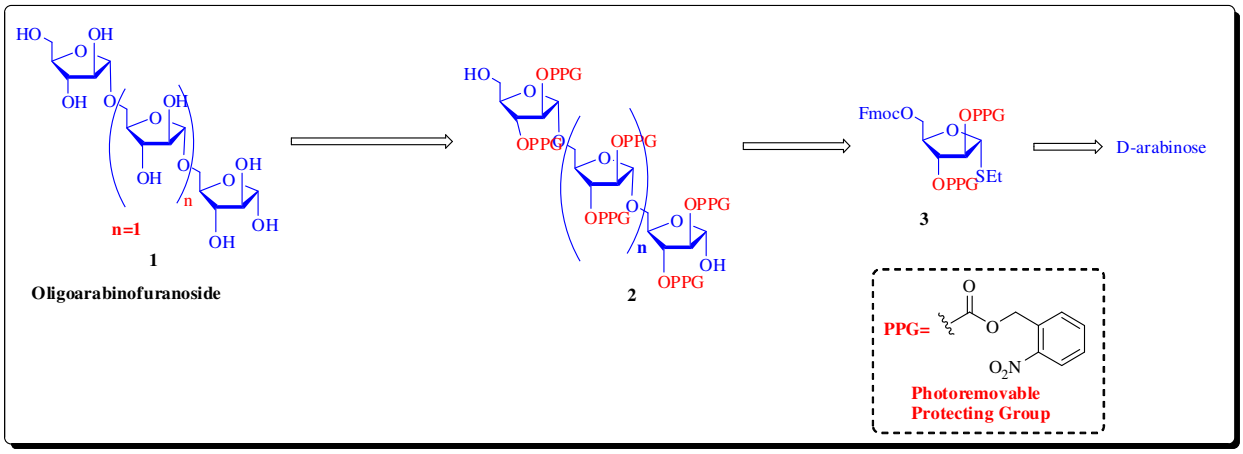


Synthesis of Oligoarabinofunosides using Photoremovable protecting Groups (PPGs)

Carbohydrates exist in all living systems and play key roles in biological recognition processes. Protection and deprotection of hydroxyl groups are indispensable for the chemical synthesis of carbohydrate. Recently, the use of photolabile protecting groups has been considerably increased in synthetic as well as biological chemistry because of their easy removal upon light irradiation and their orthogonality compared to classical protecting groups. Photolabile protecting groups have been successfully used in the photolithographic synthesis of DNA chips and peptide arrays for genomics and proteomics. PPGs were occasionally used in glycan synthesis as an attractive way of providing orthogonal protection to one or two hydroxyls. These groups have many advantages over the permanent protecting groups regularly used in glycan synthesis because the photodeprotection is reagent free, not hazardous, and is performed under mild reaction

conditions, hence, in many cases might provide viable addition. This prompted us to explore the use of PPGs to protect multiple hydroxyls on the arabinofuranoside in order to evaluate their use for global deprotection.

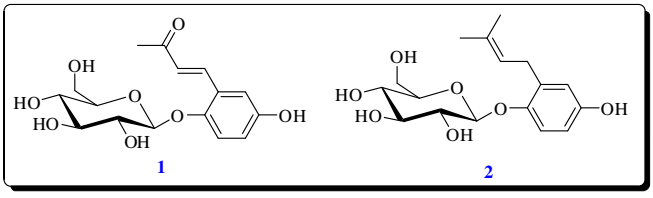




The retrosyntheric analysis of oligofuranoside (**1**) could be obtained from (**2**) *via* deprotection of photolabile protecting groups using irradiation of light. PPGs protected oligoarabinofuranoside synthesized by glycosylation of compound (**3**) with compound (**4**). Compound (**3**) and (**4**) could be obtained from commercial source D-arabinose.

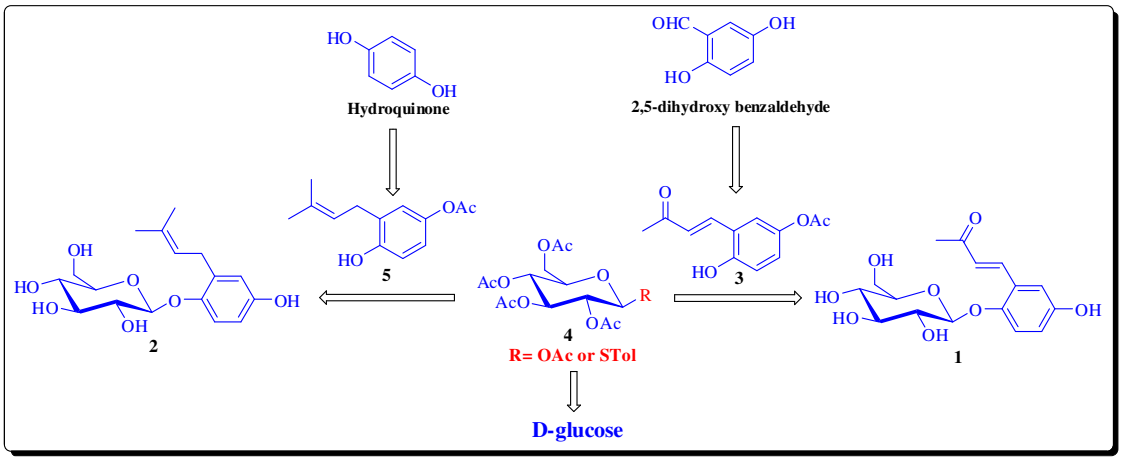
Total synthesis of 1-*O*-*β*-D-glucopyranosyl-1, 4-dihydroxy-2-((*E*) 2-oxo-3-butenyl)benzene (1) and 1-*O*-*β*-d-glucopyranosyl-1,4-dihydroxy-2-(3′ ,3′ -dimethyl-allyl)benzene (2)

(*Manuscript under preparation*)



The 2-alkylhydroquinone glucoside, 1-*O*-*β*-D-glucopyranosyl-1,4-dihydroxy-2-((*E*) 2-oxo-3-butenyl)benzene (**1**) and 1-*O*-*β*-d-glucopyranosyl-1,4-dihydroxy-2-(3′ ,3′ -dimethyl-allyl)benzene (**2**) were isolated from the aerial parts of *Phagnalon saxatile* (L.) Cass. (Asteraceae).

The structure of compound (**1**) and (**2**) identified based on spectroscopic methods. The cytotoxic activity of compound (**1**) and (**2**) were evaluated against fibro sarcoma (HT1080), human lung cancer (A549) and breast cancer (MCF7) cell lines.

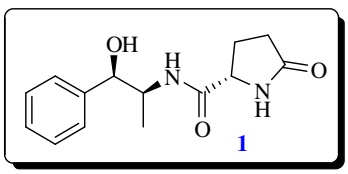


The retrosynthetic strategy of compound (**1**) and (**2**) in above scheme. The construction of 1,2-*trans* glycoside bond presented in compound (**1**) and (**2**) by the glycosylation of compound (**4**) with the substituted phenols (**3**) and (**4**) in the presence of Lewis acid. Compound (**4**) could be obtained from commercial source D-glucose. Phenolic compound (**4**) achieved from 2, 5-dihydroxybenzaldehyde and compound (**5**) could be obtained from hydroquinone.

Total synthesis of (*S*)-N-((1*R*,2*S*)-1-hydroxy-1-phenylpropan-2-yl)-5-oxopyrrolidine-2-carboxamide

(*Manuscript under preparation*)

Ephedra sinica Stapf. (Ephedraceae) is one of the original plants of *Ephedrae Herba* that was recorded in the Chinese Pharmacopoeia as "Ma Huang." *E. sinica* has been widely used to treat rheums, asthma, and cough with dyspnea, inter alia, in traditional Chinese medicine (TCM) for thousands of years. It has been reported that *E. Sinica* contains amphetamine-type alkaloids and flavonoids as the most important and accepted constituents in pharmaceutics and chemotaxonomy. Recently Phenylpropanoid, (*S*)-N-((1*R*,2*S*)-1-hydroxy-1-phenylpropan-2-yl)-5-oxopyrrolidine-2-carboxamide (**1**) was isolated from the stems of *Ephedra sinica*. The structure of compound (**1**) elucidated by in-depth examination of spectroscopic data and absolute configuration also corroborated through CD procedure.



The envisaged retrosynthetic strategy of (**1**) was delineated in below Scheme. Compound (**1**) could be synthesized by the amide coupling between amino alcohol (**2**) and L-Pyroglutamic acid (**3**). Amino alcohol could be obtained from phenylgrignard addition of *N*-Boc protected amino aldehyde (**4**). Compound (**4**) synthesized from commercial source L-alanine.