Cover Letter

Dear Sir,

I am writing this application to express my keen interest to work as a Research scientist in your organization. First of all, I would like to introduce myself **Zilla Mahesh Kumar**, completed the doctoral studies in chemical sciences in Natural Product Chemistry Division of **Indian Institute of Integrative Medicine** in **Jammu,** the topic of my PhD thesis is *"**isolation, synthetic modification of natural products to develop lead molecules and Development of new synthetic methodologies for the preparation of biologically active molecules**".*

After completing my doctoral degree I was moved toTotal synthesis research group Dr S Raghavan senior principal scientist in Indian Institute of Chemical Technology CSIR Hyderabad INDIA. Previously worked as a postdoctoral research fellow in IIT Roorkee in the chemistry department. Previously worked as a postdoctoral research fellow in IISER BERHAMPUR total synthesis group of the chemistry department.

I have an ability to motivate myself and do innovative work both independently and collaboratively, learning new concepts in a short period of time. During my doctoral degree and postdoctoral research experience I have gained knowledge in isolation, characterization of natural products from all natural sources as well as in synthetic and structural modification of natural products, synthesis of medicinal active compounds, development of new synthetic methodologies for the preparation of biologically active molecules, in total synthesis, catalysis. And also have good knowledge in spectroscopic techniques for the characterization of natural products as well as synthetic products (Mass, IR, H^1nmr, C^{13}nmr, DEPT, HMBC, HSQC, COSY). As I have discussed above on my working skills I have published some of the good journals during my PhD degree which are discussed in the resume.

I was expertise in multistep synthesis, catalytic reactions, catalyst preparations, gram scale synthesis, in performing dry reactions, doing combiflash column chromatography, using solvent purification system, schlenk line, HPLC, Handling reactors of volume from 500ml - 10li capacity.

Thank you.

Dr. Mahesh Kumar Zilla
Associate scientist
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Email: maheshkumar763@gmail.com

Curriculum vitae

Dr. Mahesh Kumar Zilla (DOB 15, July 1985)
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Permanent Address

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Objective

To succeed in an environment of growth and excellence these provides me job satisfaction, self-development and help me to achieve personal as well as organizational goals.

Academic Profile

Postdoctoralfellow	Korea university, Institute of Pharmaceutical Science and Translational Research, Sejong campus (From Sep 2021 to July 2022)
Research scientist	Aragen Life Sciences (From June 2021 to August 2021)
Research scientist	Sai Life Sciences (From July 2020 to May 2021)
Postdoctoralfellow	IISER Berhampur from April 2019 to April 2020
Postdoctoralfellow	In IIT roorkee from Dec 2017 to Feb2018
Job contractresearchfellow	Sep 2016 – March 2017 (With Dr. S Raghavan,Senior Principal Scientist at CSIR-IICT).
Ph.D	Awarded inSep-2016 from IIIM Jammu
SeniorResearchFellow	2012-2015 (IIIM-CSIR)
JuniorResearchFellow	2010-2012(IIIM-CSIR)
Title ofthesiswork	**“Isolation, synthetic modification of natural producttodevelop lead molecules and development of new synthetic methodologies for the preparation of**

	biologically active molecules" Supervisor - **Dr. Asif Ali** (asifali@iiim.ac.in) Indian Institute of Integrative Medicine, Jammu
M. Sc Organic Chemistry	2005-07 qualified with first division (65%) from **Acharya Nagarjuna University**, India
B. Sc (Maths, Physics & Chemistry)	2002-2005 qualified with first division (65%) from **Acharya Nagarjuna University**, India

Specializations

- Natural product chemistry
- Synthetic chemistry
- Medicinal chemistry
- Heterocyclic compounds preparation
- Development of new synthetic methodologies
- Total synthesis
- Catalysis
- Asymmetric synthesis

Research Experience

- Postdoctoral research fellow at IISER Berhampur from April 2019 - April 2020
- Postdoctoral fellow in IIT Roorkee from Dec 2017 - Feb2018
- Postdoctoral research associate from Sep 2016 - March2017 in IICT, Hyderabad
- Senior Research Fellow from March 2012 - Sep2016 in IIIM, Jammu
- Junior research fellow from March 2010-March 2012 in IIIM, Jammu

Fellowships andAwards

- Awarded Research Fellowship from UGC as Senior Research Fellow for PhD (March 2012-March 2016)
- Awarded Research Fellowship from UGC as Junior Research Fellow for PhD (March 2010-March 2012)
- Qualified in joint CSIR-UGC-NET exam in DEC 2008
- Qualified in joint CSIR-UGC-NET exam in JUNE 2009

Researchexpertise

- Synthetic chemistry
- Extraction and Isolation of bioactive active molecules from medicinal plants
- Extraction and isolation of secondary metabolite from microbial sources using column chromatography and HPLC
- Synthetic modification of natural products to enhance the activity
- NMR interpretation of natural products as well as synthetically new compounds through 1D and 2D NMR, IR, ESI-LCMS spectra
- Developing of new synthetic methodologies
- Total synthesis of natural products

- Heterocyclic compounds preparation
- Able to identify experimental problems and resolve them independently
- Capable of both collaborative and independent research
- Possession of good communication and management skill
- Computer skills and chemistry tools such as Chem. draw, Mestrenova, literature search through scifinder, dictionary of natural productsetc.
- Catalyst preparation and screening for new reactions

Reactions and Reagents handled

- Synthetic chemistry
- Diazomethane salt preparation and reactions carried out using diazomethane
- Benzyne intermediate preparation
- Multicomponent reactions with benzyne
- Reactions handling with diazoester
- Grubbs Ring closing metathesis
- Mitsunobu reaction
- Suzuki Coupling
- Sonogashira Coupling
- N-BuLi
- Grignard reaction
- Metal catalysed reactions (Zn, Pd, Cu) etc.
- Rearrangement reactions, named reactions
- LDA, LiHMDS, NaHMDS
- DIBAL-H reactions
- Preparation of Binol derived catalysts and screening for asymmetric synthesis
- Chiral oxazaborolidine catalysts

Conferences

- Participated in International Conference on Drug Discovery at Bits-Pilani Hyderabad campus held in 29th Feb to 2nd March 2020.

List ofPublications

- **An efficient synthesis of 4-phenoxy-quinazoline, 2-phenoxyquinoxaline, 2-phenoxy-pyridine derivatives by aryne chemistry**

Mahesh K. Zilla, Sheena Mahajan, Rajni Khajuria, Vivek K. Gupta, Kamal K. Kapoor, Asif Ali, *RSC Advances* (Accepted 2021)

- **Syntheses and Biological Importance of Herboxidiene/GEX1A**

BarlaThirupathi, Mahesh Kumar Zilla.***ChemistrySelect*,2019, *4*, 11944– 11958. Impact factor – 1.71**

- **Inhibition of Twist1-mediated invasion by Chk2 promotes premature senescence in p53-defective cancercells**

Debasis Nayak, Anmol Kumar, Souneek Chakraborty, Reyazur Rasool, Hina Amin, Archana Katoch, Veena Gopinath, Vidushi Mahajan, **Mahesh K Zilla**, Bilal Rah, Sumit G Gandhi, Asif Ali, Lekha Dinesh Kumar and Anindya Goswami. ***Cell Death and Differentiation***, **2017, 1–13. Impact factor –8.184**

- **A convergent synthesis of alkyne-azide cycloaddition derivatives of 4-α, β-2- propyne podophyllotoxin depicting potent cytotoxicactivity**

Mahesh K. Zilla, Debasis Nayak, Ram A. Vishwakarma, R, Parduman Raj Sharma, Anindya Goswami, Asif Ali. ***European Journal of Medicinal Chemistry***,**Volume 77, 2014, 47-55. Impact factor – 3.447**

- **4'-demethyl-deoxypodophyllotoxin glucoside isolated from *podophyllum hexandrum* Exhibits potential anticancer activities by altering Chk-2 signaling pathway in MCF-7 Breast cancer cells**

Mahesh K. Zilla, Debasis Nayak, Hina Amin, YedukondaluNalli, Bilal Rah, Souneek Chakraborty, SurederKitchlu, Anindya Goswami, Asif Ali. ***Chemico-Biological Interactions***, **Volume224, 2014, 100-107. Impact factor – 2.557**

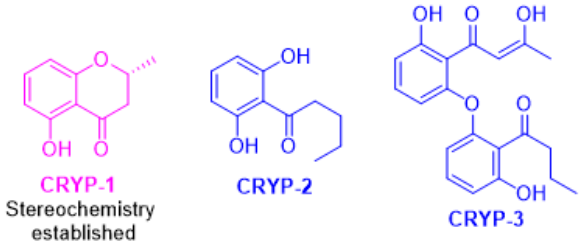
- **Bioactive metabolites from an endophytic *cryptosporiopsis sp.* Inhibiting *clidemiahitra***

Mahesh K. zilla, MasroorQadri, Anup S. Pathania, Gary A. Strobel, YedukondaluNalli, Sunil Kumar, Santhosh K. Guru, Shashi Bhushan, Sanjay K. Singh, Ram A. Vishwakarma, Syed riyaz-Ul-Hassan, Asif Ali. ***Phytochemistry***, **Volume 95, 2013, 291-297. Impact factor – 2.547**

Description of Publications

Bioactive metabolites from an endophytic *cryptosporiopsis sp*. Inhibiting *clidemiahitra*
Mahesh K. zilla, ***Phytochemistry,* Volume 95, 2013, 291-297**

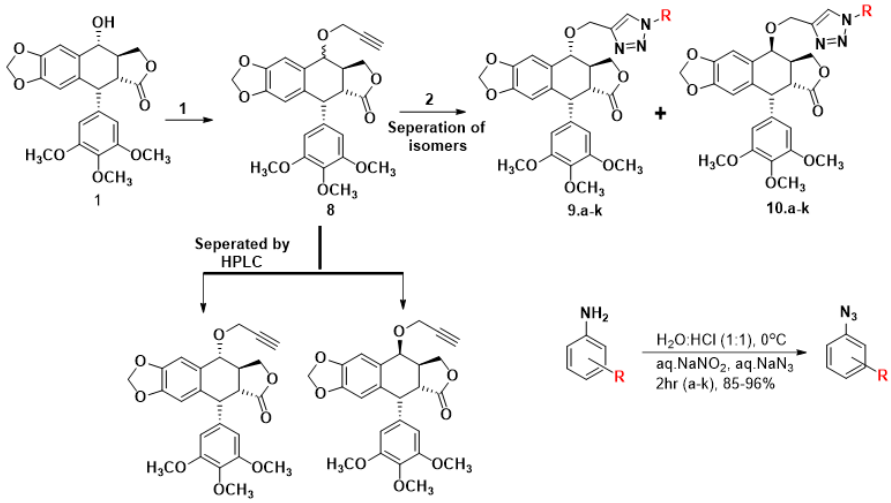
An endophytic *cryptosporiopsis sp.* was isolated from *Clidemiahirta*and analyzed for its secondary metabolites that lead to the isolation of three bioactive molecules and their structures were determined by spectroscopic methods as (R)-5-hydroxy-2- methylchroman-4-one (**1**), 1-(2,6-dihydroxyphenyl)pentan-1-one (**2**), and (*Z*)-1-(2-(2-butyryl-3-hydroxyphenoxy)-6-hydroxyphenyl)-3-hydroxybut-2-en-1-one (**3**). Compound **1** exhibited significant cytotoxic activity against the human leukemia cell line, HL-60 with an IC_{50} of 4µg/ml. In addition, out of these compounds **2** and **3** were active against several bacterial pathogens. Compound **2** was active against *Bacillus cereus, Escherichia coli, Staphylococcus aureus* with IC_{50} values varying from 18 to 30µg/ml, andcompound **3** displayed activity against *Pseudomonas fluorescens* with an IC_{50} value 6 µg/ml. Compounds **2** and **3** are novel whereas compound **1** was reported earlier but the stereochemistry of its C-2 methyl is established for the first time.



A convergent synthesis of alkyne-azide cycloaddition derivatives of 4-α, β-2- propyne podophyllotoxin depicting potent cytotoxicactivity

Mahesh K. Zilla, *European Journal of Medicinal Chemistry*, Volume 77, 2014,47-55

A facile synthetic approach to construct the O-propargyl derivatives of 4α and 4β-(1,2,3-triazol-4-yl)-podophyllotoxin and 4'-Demethyl-4'-4*β*-(1,2,3-triazol-4-yl)-epipodophyllotoxin were synthesized by means of click chemistry. Cytotoxicities were screened against distinct human cancer cell lines PC-3, PANC-1, COLO-205 and A-549, were investigated by MTT assay. The most potent molecule that we observed is **9k**, which possessed the highest cytotoxicity on all the four cancer cell lines with average IC_{50} values of 3.8-22 nM. The compound further found to be inducing apoptosis and strongly hindering the motility and migration ability of aggressive prostate cancer PC-3 cells.

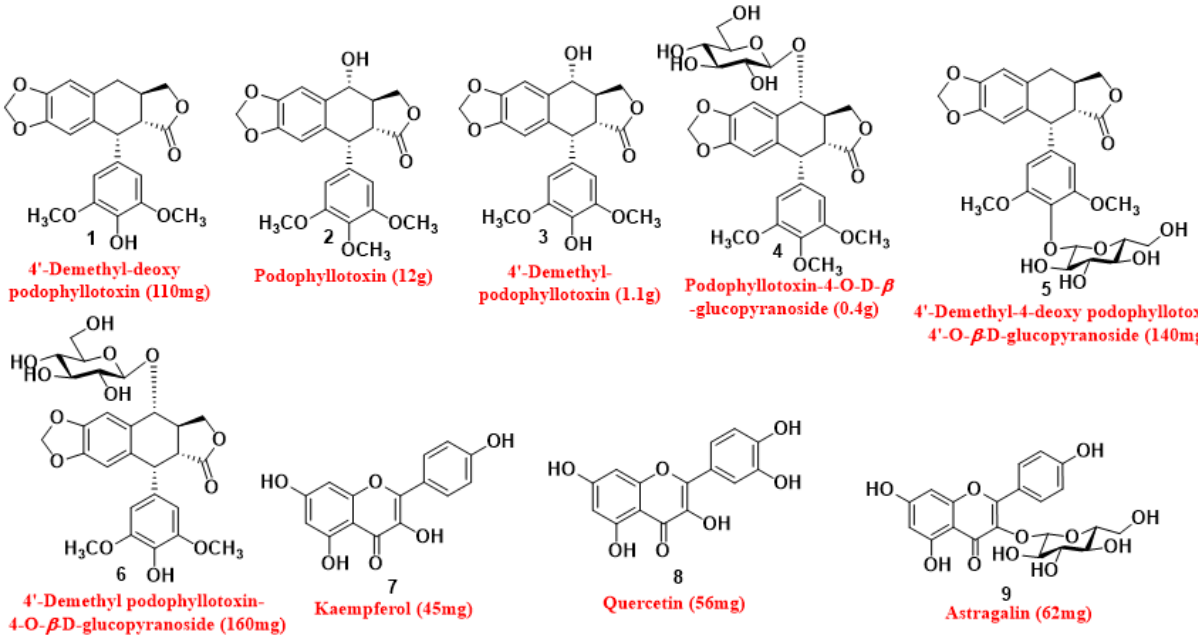


1. DCM, 0°C, BF_3OEt_2, 10min, propargyl alcohol, 1hr, 95% **2**. Sodium ascorbate, $CuSO_4.5H_2O$, *t*-BuOH/H_2O (1:1), 1-azido (a-k)

4'-demethyl-deoxypodophyllotoxin glucoside isolated from *podophyllum hexandrum*Exhibits potential anticancer activities by altering Chk-2 signaling pathway in MCF-7 Breast cancer cells

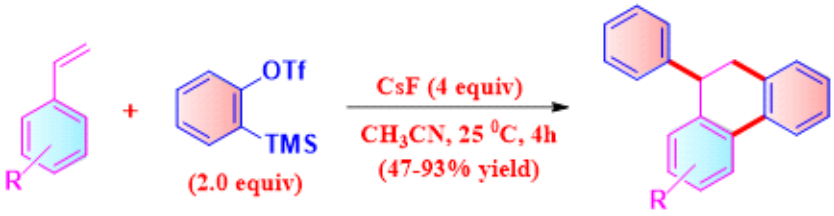
Mahesh K. Zilla, *Chemico-Biological Interactions*, Volume224, 2014, 100-107

We investigated the root of *Podophyllum hexandrum*as a potential source of lead bioactive metabolites with anticancer activity. The present study led to the isolation of six known aryltetralin-type lignans designated as 4′-demethyl-deoxypodophyllotoxin (**1**), podophyllotoxin (**2**), 4′-demethyl-podophyllotoxin (**3**), podophyllotoxin-4-O-β-d-glucopyranoside (**4**), 4′-demethyl-deoxypodophyllotoxin-4-O-β-d-glucopyranoside (**5**), 4′-demethyl-podophyllotoxin-4-O-β-d-glucopyranoside (**6**), along with three known flavones Kaempferol (**7**), Quercetin (**8**), Astragalin (**9**) from the root of *P. hexandrum*.



Compounds (**1**–**9**) exhibited the remarkable cytotoxic potential in diverse cancer cell lines. **5** therapeutic potentials were extensively studied first time which exhibiting antiproliferative and ROS generating activity than its non-glycoside analogue **1**. Furthermore, **5** augmented the apoptotic cascades in MCF-7 breast cancer cells, viz. nuclear condensation, membrane blebbing, probably by destabilizing the micro-tubular protein tubulin. Strikingly, our docking study and in vitro assays demonstrate that **5** bind to and modulate checkpoint kinase-2, a key cell cycle regulatory protein in normal and cancercells.

A facile synthesis of 9-Aryldihydrophenanthrenes via CsF-catalyzed cascade cyclization of arynes andStyrenes

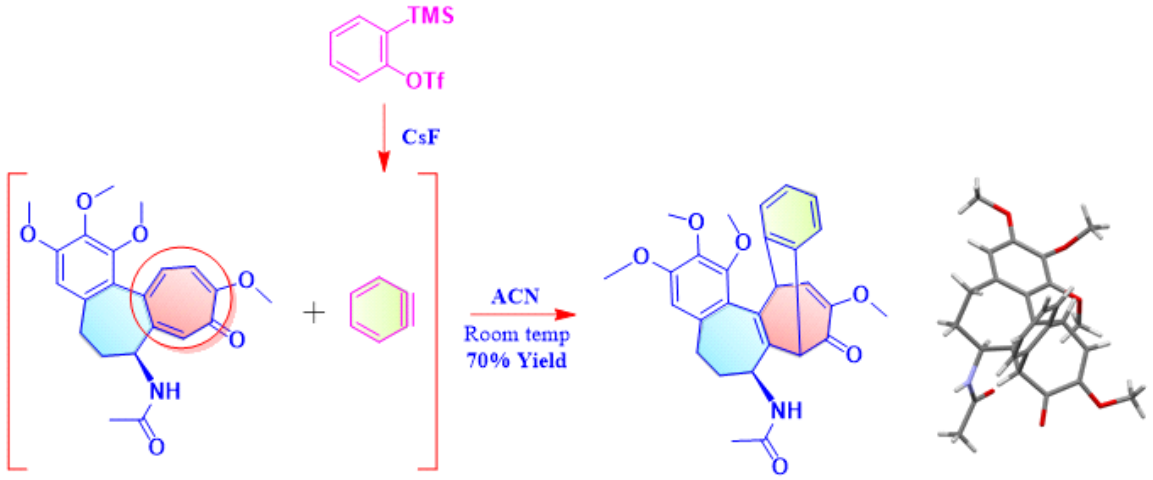


A versatile synthesis of 9-Aryldihydrophenanthrene derivatives was developed starting from readily available distinct styrenes undergo Diels–Alder reactions with O- (trimethylsilyl)aryl triflates as dienophile. The reaction proceeds through arynes under mild conditions, and provides the final products in good to excellent yields have been developed. This synthetic methodology can be extensively used for the total synthesis of phenanthrene natural products in efficient manner. Here we first report the optimized condition and synthesize the twelve 9-phenyl 1,10- dihydrophenanatharene derivatives with the diastereomeric ratio was (1:1), which was determined by HPLC using the RP- chiral column.

Synthetic modification on Colchicine

We have developed a Diels-Alder reaction on colchicine with aryne was generated from trimethyl silyl phenyl triflate by using cesium fluoride giving Diels-Alder cycloaddition adduct

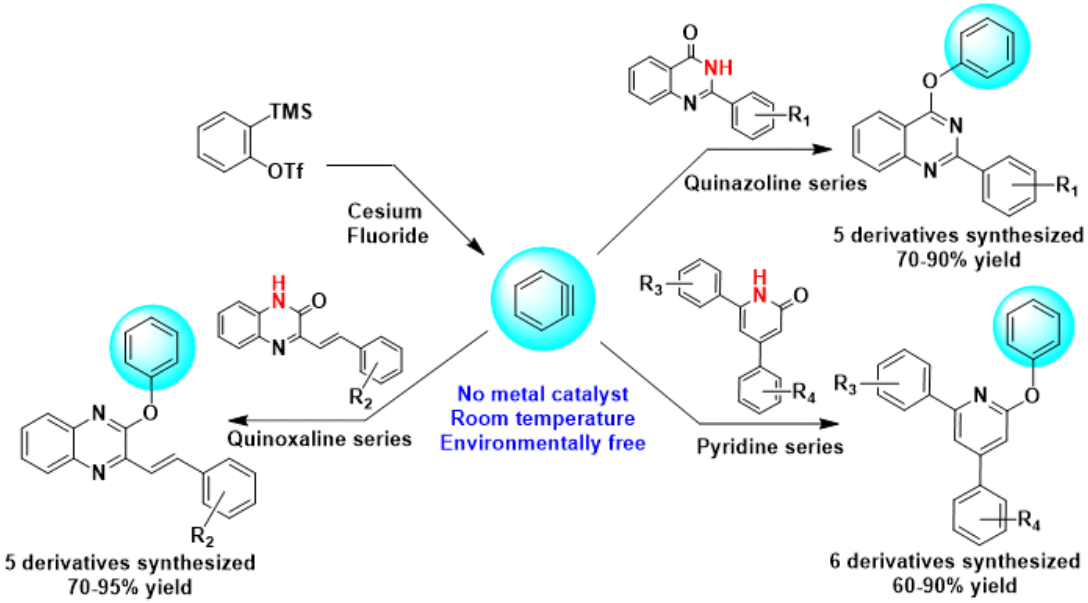
in 70% yield at room temperature with the general reaction procedure. And the structure of the product was confirmed by crystallographic structure.



An efficient synthesis of 4-phenoxy-quinazoline, 2-phenoxyquinoxaline, 2-phenoxy-pyridine derivatives by aryne chemistry

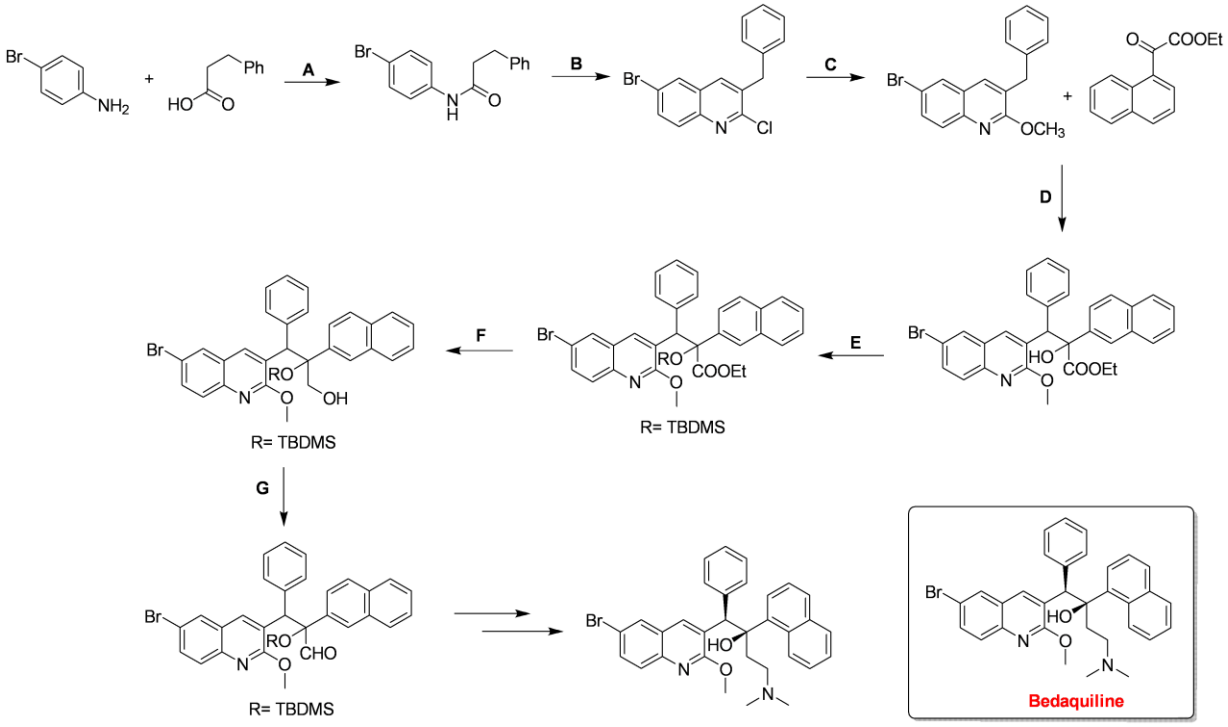
Mahesh K. Zilla, Sheena Mahajan, Rajni Khajuria, Vivek K. Gupta, Kamal K. Kapoor, Asif Ali,*RSC Advances* (Accepted 2021)

In organic synthesis arynes are one of the most important classes of organic species were useful as substrates in variable reactions for developing of new synthetic methodologies, preparation of heterocyclic molecules and used in the total synthesis of several natural products. Because of highly electrophilic in nature of arynes, arynes are easily participating in reaction with other reactants and gives addition, insertion type of products with good yield of atom economy. We have developed a methodology on heterocyclic compounds with aryne intermediate with good yield and metal freereaction.



Synthesis of Bedaquilone

After getting my Ph.D. degree I had moved to total synthesis group in Indian Institute of Chemical Technology, there I was worked out on the total synthesis of antitubericlosis drug molecule **BEDAQUILONE** for sixmonths.

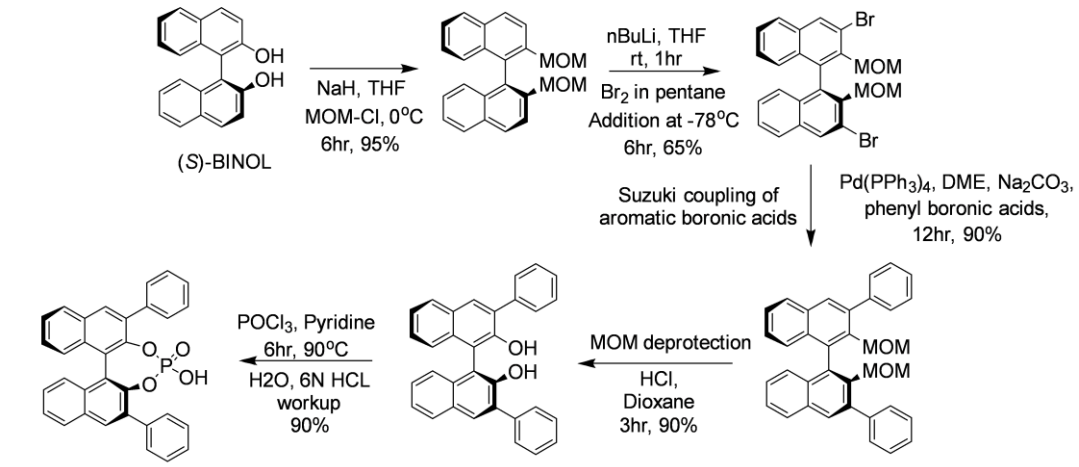


Reagents :**A**. $SOCl_2$, Et_3N, DCM, 97% **B**. DMF, $POCl_3$, 65% **C**. NaOMe, MeOH 95% **D**. nBuLi, DIPA, $ZnBr_2$ -78^oC **E**. TBDMSCl, Et_3N **F**. $LiAlH_4$**G**. IBX, DCM.

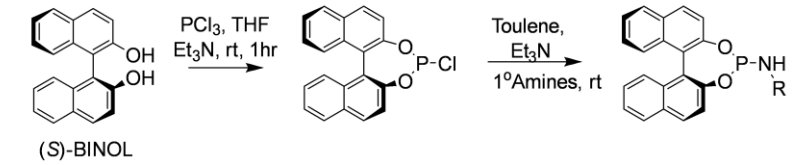
Development of asymmetric reactions using Binol catalysts

In Dec 2017, I had selected as a postdoctoral fellow in IIT Roorkee Department of chemistry in catalysis group, there I have gained knowledge in catalyst preparation and performing the catalyticreactions

Binol phosphoric acid derivatives



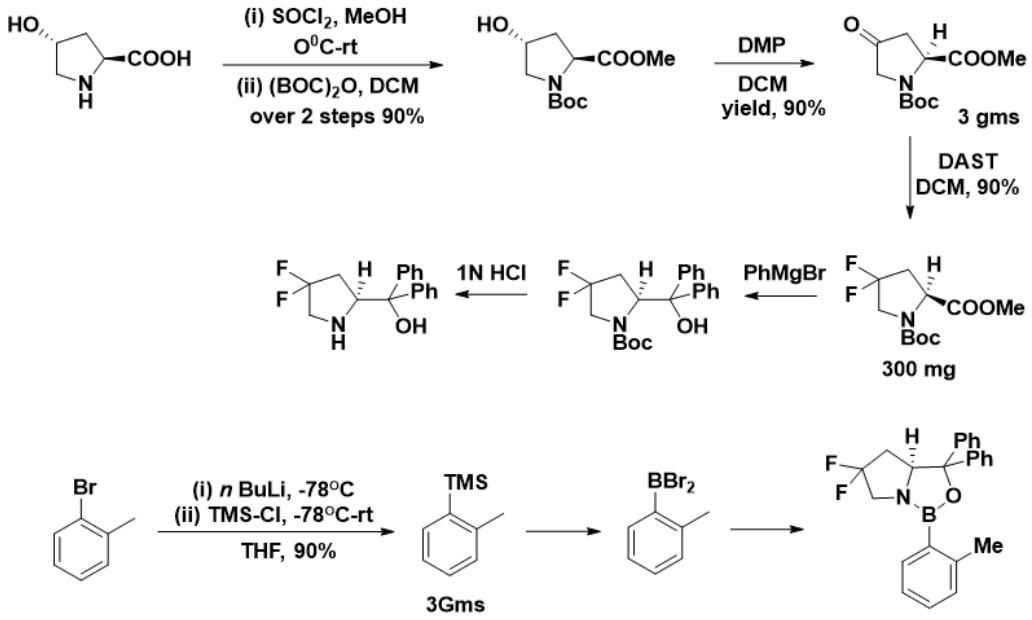
Binol phosphoramidite derivatives



In total synthesis project

In April 2019, I had selected as a postdoctoral fellow in IISER Berhampur Department of chemistry in total synthesis group of Dr.ThirupathiBarla (Student of Noble laurate E J Corey), there my research topic was Total synthesis associated with chiral oxazoborolidine catalyst for enantioselective reaction.

Preparation of Chairal Oxazoborolidene catalyst



Declaration

I hereby declare that all the information given above is true to the best of my knowledge and belief that the document in the support of the information will be forwarded when required.

Dr. Zilla Mahesh Kumar

References

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