FORMAT FOR ASSESSMENT OF COMPLETED PROJECT
(This brief report should not exceed 2 pages including pictures)

1. Title of the project: Design and Synthesis of Hybrid Molecules for Multi-Drug-Resistant Tuberculosis

2. DBT Sanction Order No., date, duration, and total budget of the project:

BT/PR25173/NER/95/1055/2017 dated July 20, 2018

Total budget: Rs. 50,79,996/-

Rs. 31,29,996/- (For Tezpur University)

Rs. 19,50,000/-(For CSIR-CDRI, Lucknow)

3. Name of the Principal Investigator & institute:

Dr. Sajal Kumar Das

(Principal Investigator from Tezpur University, Assam (Northeast India)

Dr. Arunava Dasgupta

(Principal Investigator from CSIR-CDRI, Lucknow, Uttar Pradesh)

Dr. Sidharth Chopra

(Co-Principal Investigator from CSIR-CDRI, Lucknow, Uttar Pradesh)

4. Aims & objectives of the project t/study (maximum 150 words):

For NER Institute:

Objective 1: To design and synthesize hybrids of SQ109 and BM212 as effective chemotherapeutic agent for the treatment of TB and MDR-TB.

Objective 2: To design and synthesize hybrids of SQ109 and NITD-304 as effective chemotherapeutic agent for the treatment of TB and MDR-TB.

Objective 3: To design and synthesize hybrids of NITD-304 and BM212 as effective chemotherapeutic agent for the treatment of TB and MDR-TB.

For NON-NER Institute:

Objective 1: To perform in vitro, ex vivo and in vivo screening of the synthesized compounds against drug-susceptible as well as drug-resistant Mtb isolates that includes activity utilizing conventional and specific media conditions.

Objective 2: To assess the cytotoxicity of the hits against Vero cells (those hits which possess MIC <1 mg/L and Selectivity index of >10, will be tested in the Intracellular killing of Mtb within macrophage/macrophage cell lines).

Objective 3: Assessment of the hits for static or cidality (those hits which have MIC <1 mg/L, Selectivity index of >10 and cidal will be assessed in in vivo mouse models of TB infection).

5. Outcome and salient achievements (maximum 250 words) under the project.

This project has been severely hampered due to the COVID-19 pandemic situation and untimely release of the research grant. In fact, third year grant money was not released. The PI and the manpower suffered a lot to run the project in a systematic manner. Despite several hurdles, different series of compounds have been successfully synthesized to find new antitubercular agents. In particular, we have synthesized small libraries of 11-aryl-11*H*-indeno[1',2':4,5]imidazo[1,2-a]pyridines, indole–pyrrole hybrids with basic side chain, hydroxyl-substituted 1,3-oxazolidin-2-ones and pyrazino[1,2-*a*]indoles through the development of suitable reaction conditions. The corresponding synthetic methodologies are unprecedented in their paradigm, diversity-oriented, high-yielding and have broad substrate scope. Among all these synthesized compounds, indole–pyrrole hybrid compounds showed promising activity against gram +ve bacterial species S. aureus ATCC 29213 but unfortunately none of these synthesized compounds exhibit antitubercular activity against different mycobacterial species like M. Tuberculosis H37Rv and MDR-TB

clinical isolates. Nevertheless, we believe that pyrazino[1,2-*a*]indoles which have recently been synthesized have the potential to exhibit antitubercular activity.

6. Whether the outcome has lead to early translation research? No

7. Research publications emanated from the project (a list of publications may be provided along with the impact factor and citation index of the journal).

i. Synthesis of 11-aryl-11*H*-indeno [1′,2′:4,5] imidazo[1,2-*a*]pyridines via dehydrative cyclization of aryl (2-arylimidazo[1,2-*a*]pyridin-3-yl)methanols. H. Borgohain and S. K. Das*, *Tetrahedron Lett.* **2019**, *60*, 2070.

ii. Switching of regioselectivity in base-mediated diastereoselective annulation of 2,3-epoxy tosylates and their *N*-tosylaziridine analogs with 2-mercaptobenzimidazole. A. J. Das, H. Borgohain, B. Sarma and S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *18*, 441.

iii. Regioselectivity of the trifluroethanol-promoted intramolecular N-Boc–epoxide cyclization en route to 1,3-oxazolidin-2-ones and 1,3-oxazinan-2-ones. H. Borgohain, K. Talukdar, B. Sarma and S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *8*, 7401.

iv. Base-mediated intramolecular one-pot double-cyclization of epoxide-tethered 2-fluorobenzenesulfonamides: an avenue to 1,4-benzoxazine-fused benzothiaoxazepine-1,1-dioxides. J. Das, B. J. Bora, S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *18*, 220.

v. Trifluoromethanol-Mediated Cyclization of Two-Carbon-Tethered Epoxide–N-Boc Pairs: Completely Regioselective Synthesis of 3,6-Disubstituted 1,3-Oxazinan-2-ones. J. Das, R. Chouhan, H. Borgohain, B. J. Bora, and S. K. Das*. *Synthesis*, Just accepted manuscript (DOI: 10.1055/a-2019-1455)

vi. Base-Mediated, Chemo- and Regioselective (4+2) Annulation of Indole-2-carboxamides with 2,3-Epoxy Tosylates toward 1,2-Fused Indoles. A. J. Das and S. K. Das*. *Journal of Organic Chemistry*, 2023, *Manuscript under revision*

8. Patents filed or granted, if any (a list may be provided). None

9. Benefits gained:

- Scientific & Technical expertise gained:

One project JRF was employed in this project. The JRF obtained substantial amount of experience in synthetic organic chemistry while executing different synthetic methodologies.

- No. of NER manpower (including PI & staffs) trained in the Non-NER Institute: NIL
- No. of visits by Non-NER Researchers to NER Institutes and vise-versa: NIL
- Training in any new techniques, if any: Nil

10. Number of Ph.Ds. / JRF/RA/ Students trained/ benefited from the project indicating the genders of the manpower: 04

11. Whether the project has helped in creating a Technology Platform? No

12. Technology transferred to any industrial partner, if any. No

13. Future potential and prospects of the outcome in the present project (maximum 150 words).

The synthetic methodologies have the potential for the application in the synthesis of bioactive compounds. It is expected to accelerate the discovery of hit molecules from several series of the designed molecules by the implementation of our skills in organic synthesis and chemical biology. The designed molecules are expected to have broad impact on several areas, from basic research to chemical biology and drug discovery efforts.

SKdas 10.02.23

Dr Sajal Kumar Das
(PI Name & Signature)

Assistant Professor
Department of Chemical Sciences
Tezpur University
Tezpur - 784028

Final Project Report for the DBT Twinning Project entitled

"Design and Synthesis of Hybrid Molecules for Multi-Drug-Resistant Tuberculosis"

DBT Sanction No.: BT/PR25173/NER/95/1055/2017 dated July 20, 2018

Section-A: Project Details

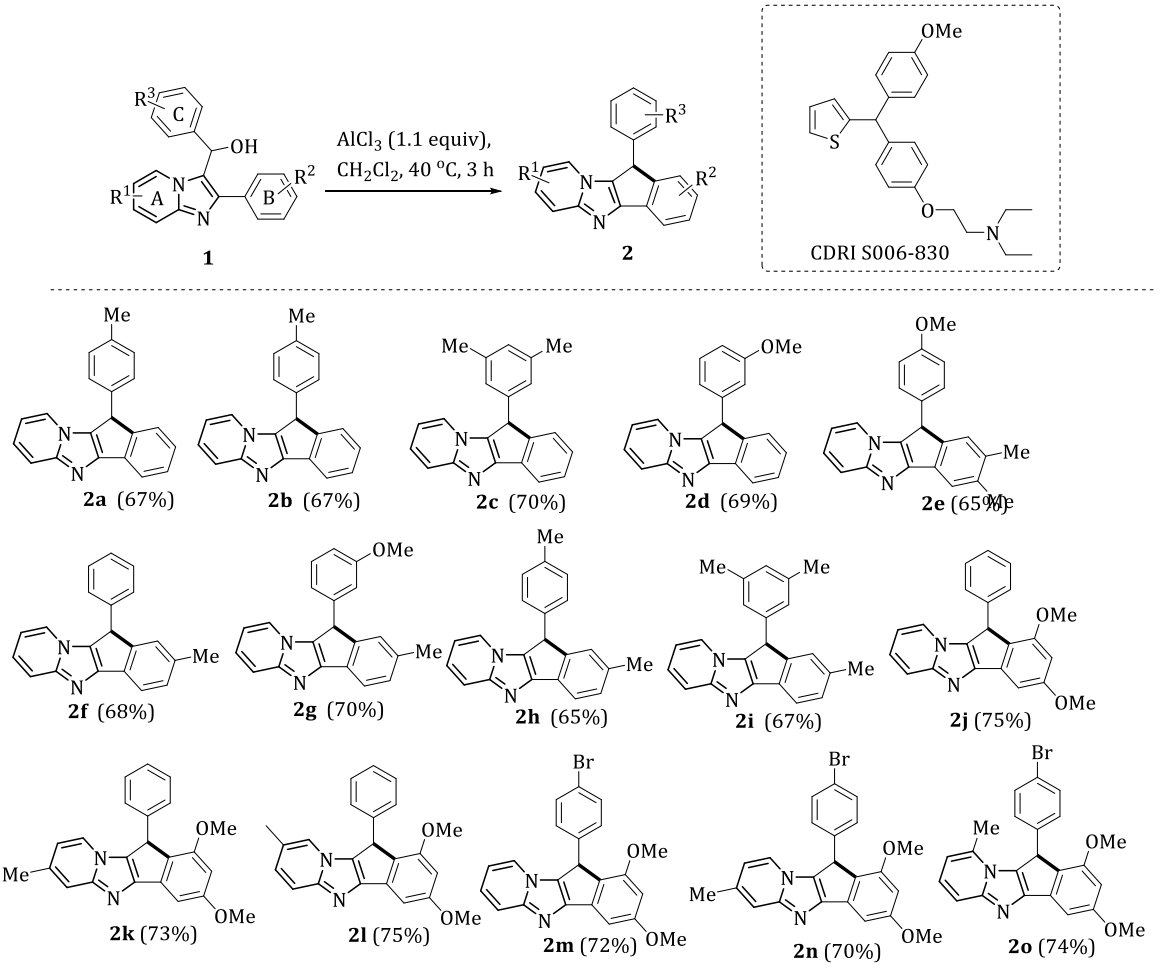
A1.	**Project Title:**	Design and Synthesis of Hybrid Molecules for Multi-Drug-Resistant Tuberculosis
A2.	**DBT Sanction Order No. & Date:**	BT/PR25173/NER/95/1055/2017 dated July 20, 2018
A3.	**Name of Principal Investigator:**	Dr. Sajal Kumar Das (Principal Investigator from the Northeast India) Dr. Arunava Dasgupta (Principal Investigator from Collaborating Institute)
	Name of Co-PI/Co-Investigator:	Dr. Sidharth Chopra (Co-Principal Investigator from Collaborating Institute)
A4.	**Institute:**	Tezpur University, Assam and CSIR-CDRI, Lucknow, Uttar Pradesh
A5.	**Address with Contact Nos. (Landline & Mobile) & Email:**	**Dr. Sajal Kumar Das** Assistant Professor Departmentt. of Chemical Sciences Tezpur University P.O.- Napaam, Tezpur Dist-Sonitpur, Assam-784 028 Phone: +91- 3712- 265066, Extn: 5066 Fax: +91- 3712- 867005 Email: sajalkd@tezu.ernet.in **Dr. Arunava Dasgupta** Principal Scientist, Division of Microbiology CSIR-Central Drug Research Institute Sector 10, Jankipuram extension, Sitapur Road, Lucknow-226031, UP

		Phone: +91-0522-2772450, EPABXExtn: -4437 Fax: +91-522-2771941 E-mail: a.dasgupta@cdri.res.in
A6.	**Total Cost**	Rs. 50,79,996/- Rs. 31,29,996/- (For Tezpur University) Rs. 19,50,000/-(For CSIR-CDRI, Lucknow)
A7.	**Duration:**	Three years (an extension of 6 months was granted)
A8.	**Approved Objectives of the Project:**	A. For the group of Dr Sajal Kumar Das (Tezpur University): Objective 1: To design and synthesize hybrids of SQ109 and BM212 as effective chemotherapeutic agent for the treatment of TB and MDR-TB. Objective 2: To design and synthesize hybrids of SQ109 and NITD-304 as effective chemotherapeutic agent for the treatment of TB and MDR-TB. Objective 3: To design and synthesize hybrids of NITD-304 and BM212 as effective chemotherapeutic agent for the treatment of TB and MDR-TB. B. For the groups of Dr Arunava Dasgupta and Dr Siddarth Chopra (CSIR-Central Drug Research Institute, Lucknow) Objective 1: To perform in vitro, ex vivo and in vivo screening of the synthesized compounds against drug-susceptible as well as drug-resistant Mtb isolates that includes activity utilizing conventional and specific media conditions. Objective 2: To assess the cytotoxicity of the hits against Vero cells (those hits which possess MIC <1 mg/L and Selectivity index of >10, will be tested in the Intracellular killing of Mtb within macrophage/macrophage cell lines). Objective 3: Assessment of the hits for static or cidality (those hits which have MIC <1 mg/L, Selectivity index of >10 and cidal will be assessed in in vivo mouse models of TB infection).
A9.	**Specific Recommendations made by the Task Force (if any):**	None

Section-B: Scientific and Technical Progress

B1. Progress made against the Approved Objectives, Targets & Timelines during the Reporting Period:

Initially, we undertook the synthesis of a series of 11-aryl-11*H*-indeno[1',2':4,5]imidazo[1,2-*a*]pyridines **2** (Scheme 1) as new triarylmethane analogs of antituberculosis drug CDRI S006-830 which is a potent triethylamine containing antitubercular compound. As shown in Scheme 1, compounds **2** were synthesized via intramolecular Friedel–Crafts alkylation of carbinols **1**.

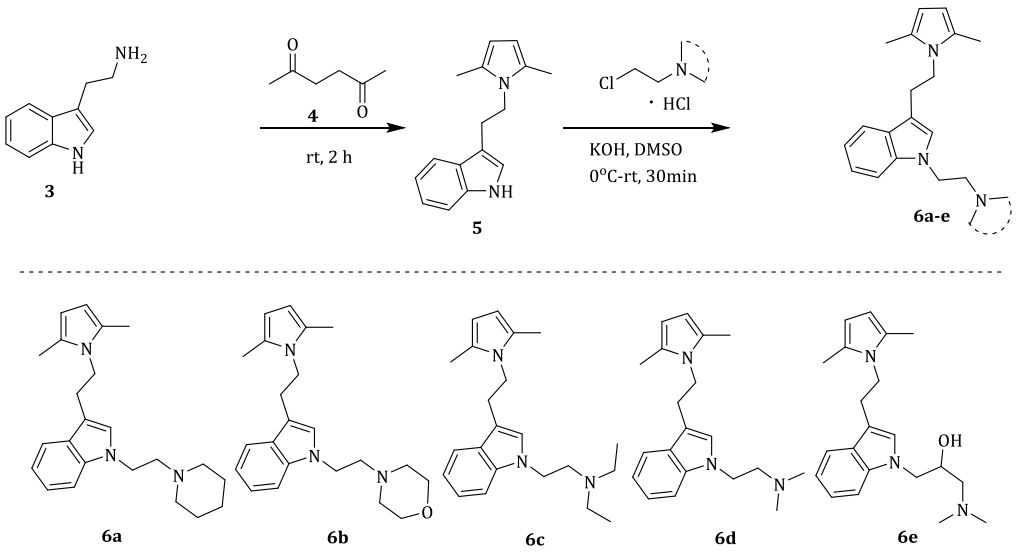


Scheme 1: Synthesis of 11-aryl-11*H*-indeno[1',2':4,5]imidazo[1,2-*a*]pyridines as possible antitubercular agents.

All the synthesized final molecules were evaluated (at CDRI by the collaborating research group of this project) against M. tuberculosis H37Rv strains following micro almar blue assay and agar microdilution technique. Unfortunately, all of the synthesized compounds did not show significant activity, showing MIC of > 25 μg/mL in both the techniques.

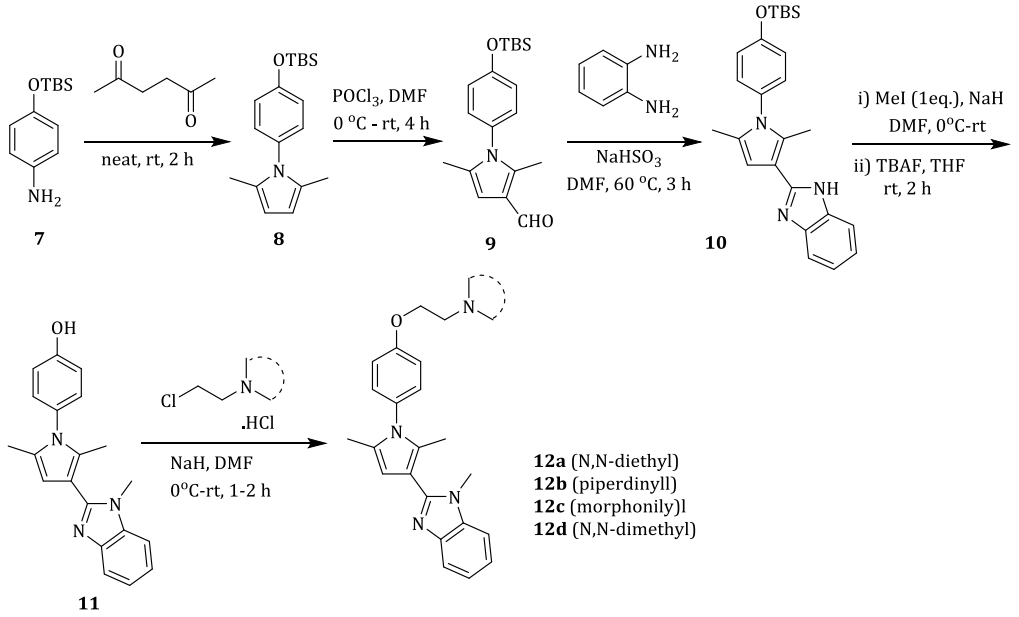
Next, we focused on the synthesis of a new indole-pyrrole hybrid compound with basic side chain. In this context, commercially available tryptamine **3** was treated with diketone **4** to synthesize indole-tethered pyrrole derivative **5** (Scheme 2). Compounds **5** were then

alkylated with different basic chains to afford the targeted compounds **6a-e**.



Scheme 2: Synthesis of indole-tethered pyrroles as possible antitubercular agents.

To prepare another series of indole-tethered pyrroles, 4-tertiarybutylsilyloxy aniline **7** was reacted with hexane-2,4-dione to obtain compound **8**. Vilsmeir–Haack reaction of **8** afforded aldehyde **9** which was treated with *o*-phenylenediamine in the presence of $NaHSO_3$ to obtain benzimidazole-pyrole hybrid **10**. *N*-Methylation of **10** followed by TBS deprotection generated **11**. Finally, *O*-alkylation of **11** with four different basic chains led to the targeted hybrids **12a-d**.



Scheme 3: Synthesis of additional indole-tethered pyrroles as possible antitubercular agents.

Initially all the compounds were tested for their biological activity by determining the minimum inhibitory concentrations (MIC) against a panel of bacterial species (Tables 1). This included the gram –ve species *E. coli* ATCC 25922 and gram +ve S. aureus ATCC 29213

followed by K. pneumoniae BAA 1705, A.baumannii BAA 1605 and finally P. aeruginosa ATCC 27853. Remarkably, compounds **6a–e** exhibited promising activity against gram +ve bacterial species S. aureus ATCC 29213 with MIC 16 μg/mL although compounds **12a–d** were found to be inactive (MIC >64 μg/L). Unfortunately no member of the series displayed significant activity against any other species of the bacterial panel showing MIC of > 16 μg/mL. Nevertheless, testing of both of these two series of compounds against different mycobacterial species like M. Tuberculosis H37Rv and MDR-TB clinical isolates indicate that they do not possess significant activity.

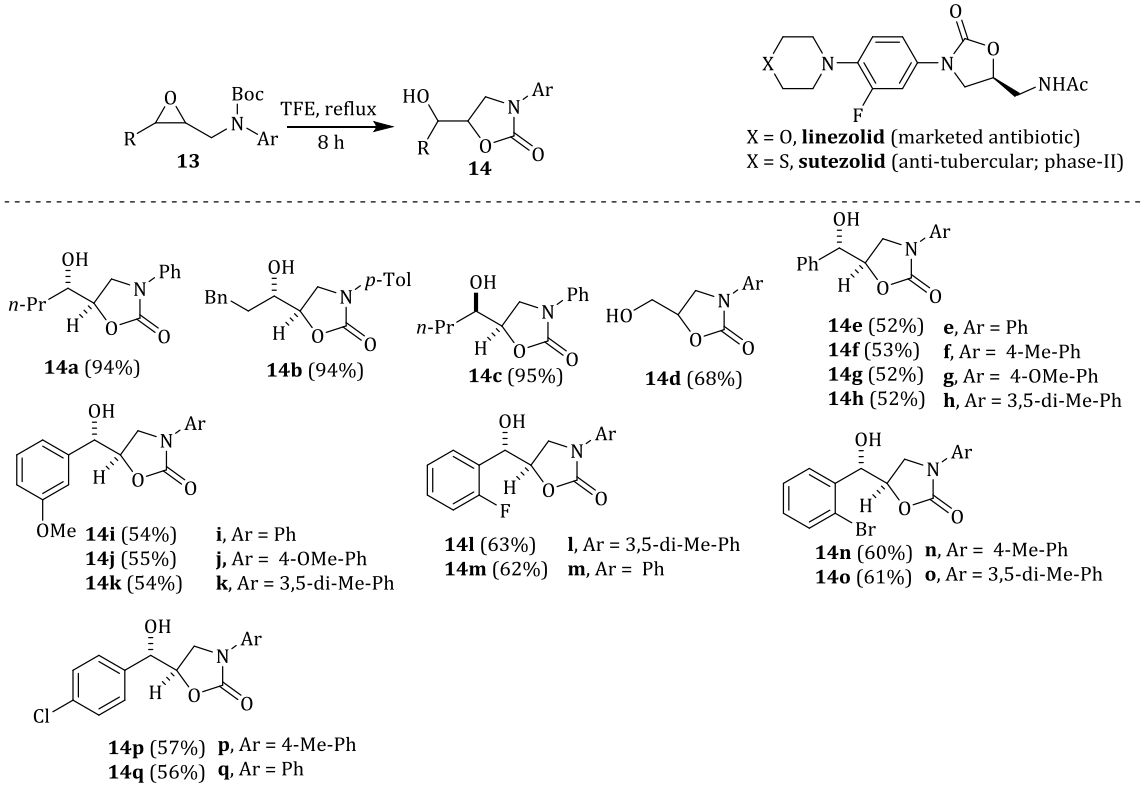
Table 1

S.No.	compound	*E.coli* ATCC 25922	*S.aureus* ATCC 29213	*K.pneumonia*e BAA 1705	*A.baumannii* BAA 1605	*P.aeruginosa* ATCC 27853
1	**6a**	>64	**16**	>64	>64	>64
2	**6b**	>64	**16**	>64	>64	>64
3	**6c**	>64	**16**	>64	>64	>64
4	**6d**	>64	**16**	>64	>64	>64
5	**6e**	>64	**16**	>64	>64	>64
6	**12a**	>64	>64	>64	>64	>64
7	**12b**	>64	>64	>64	>64	>64
8	**12c**	>64	>64	>64	>64	>64
9	**12d**	>64	64	>64	>64	>64
10	**Levofloxacin**	0.0156	0.125	64	8	1

The cyclic carbamates 1,3-oxazolidin-2-one and 1,3-oxazinan-2-one occupy a prominent position within the realm of heterocyclic chemistry. For many years, 1,3-oxazolidin-2-ones and 1,3-oxazinan-2-ones have been known for their use as chiral auxiliaries and amino alcohol synthons in organic synthesis. Beyond this, however, today they permeate a wide and diverse range of other synthetic applications. Moreover, these core structures are also prevalent in synthetic and natural compounds that have found tremendous applications in medicinal chemistry. For instance, numerous synthetic compounds such as toloxatone, linezolid, sutezolid, befloxatone and tezizolid based on 5-substituted-*N*-aryl-2-oxazolidinone structural motif have been known to possess various bioactivities, perhaps the most celebrated among which are the antibacterial properties against multiple-drug resistant Gram-positive bacteria.

In the next work, we synthesized a series of 1,3-oxazolidin-2-ones as possible anti-tubercular agents via intramolecular N-Boc – epoxide cyclization (Scheme 4). This reaction could proceed in a diastereoselective fashion in refluxing trifluoroethanol, in the absence of any external promoter or catalyst. Substrates bearing an alkyl group at the C-3 position furnished 1,3-oxazolidin-2-ones in a complete regioselective fashion via 5-exo epoxide ring-opening cyclization, thereby paving the way to synthesize alkyl side chain-bearing analogs of the antidepressant drug toloxatone. On the other hand, replacing the alkyl group with an aryl group resulted in easily separable mixtures of 1,3-oxazolidin-2-ones and 1,3-oxazinan-2-ones, the former being obtained as major products. Remarkably, a tetralin-bearing substrate underwent fully regioselective 6-endo ring closure en route to the corresponding 1,3-

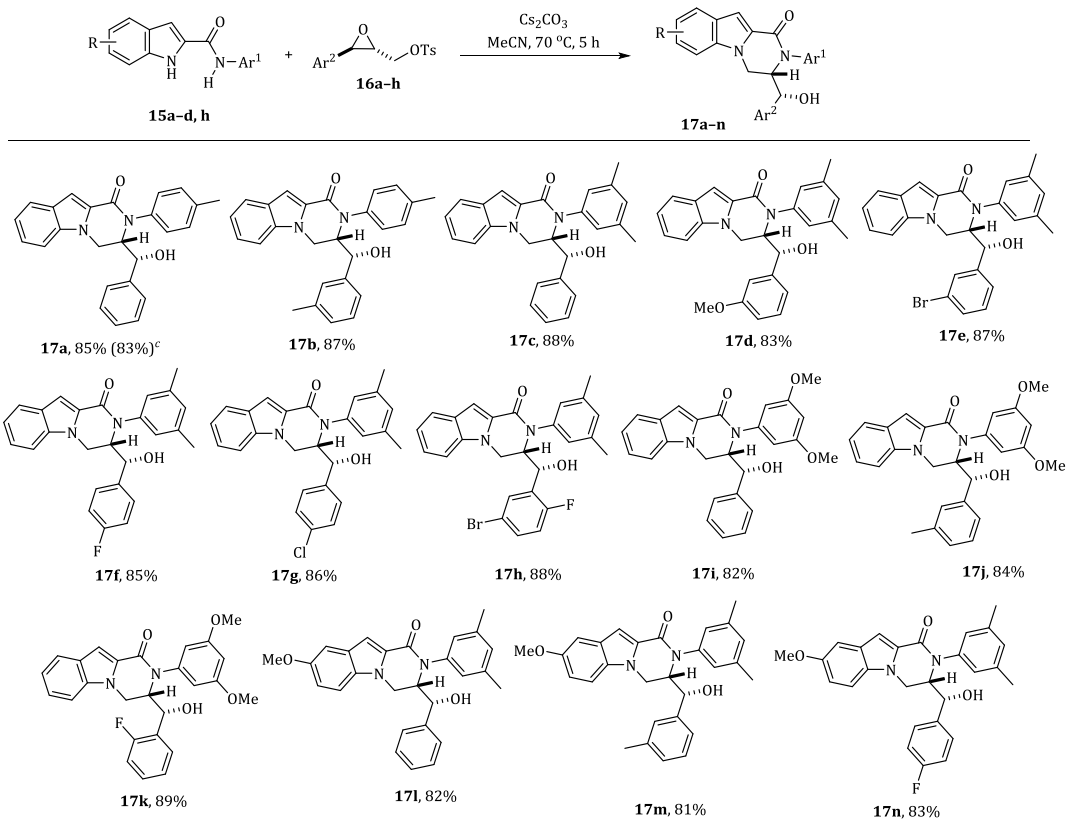
oxazinan-2-one. Unfortunately, testing of both of these two series of compounds against different mycobacterial species like M. Tuberculosis H37Rv and MDR-TB clinical isolates indicate that they do not possess significant activity.



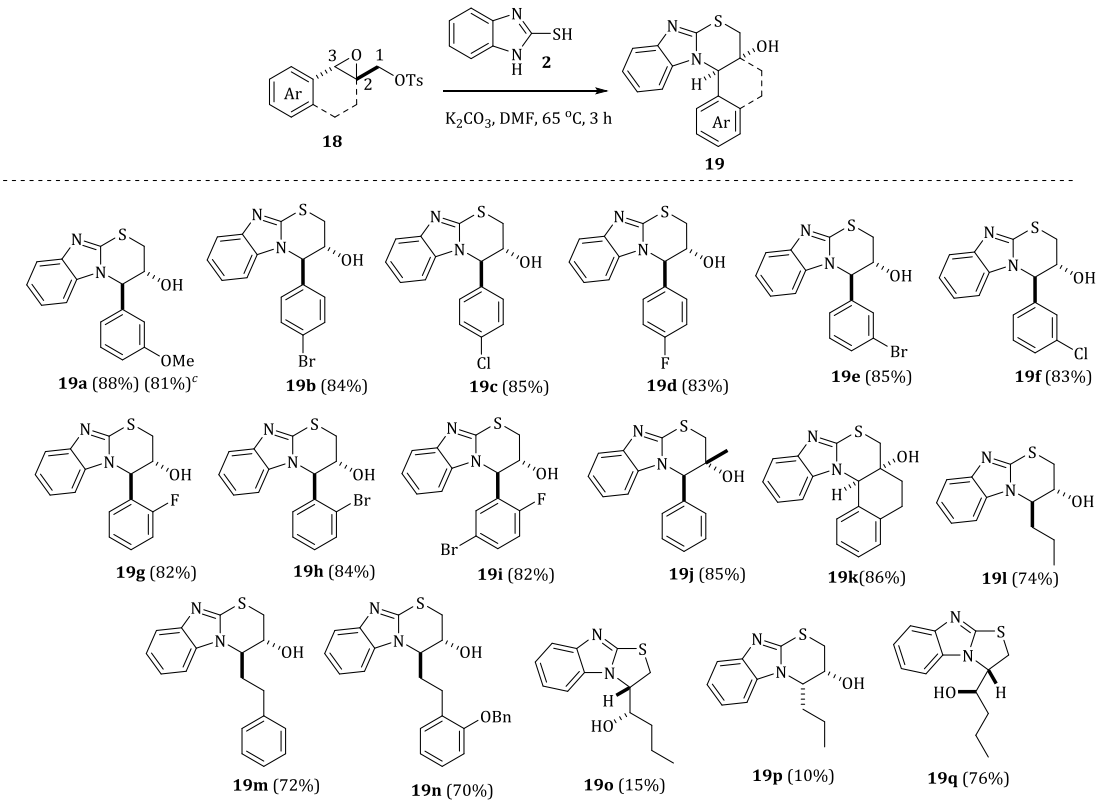
Scheme 4: Synthesis of 1,3-oxazolidin-2-ones as possible antitubercular agents.

In another work, we have designed a new series of pyrazino[1,2-*a*]indoles **17** as a hybrid of two bio-relevant privileged scaffolds indole and pyrrole with a hydrophobic –OH handle (Scheme 5). Along this direction, indole-2-carboxamides **15** were treated with 2,3-epoxy tosylates **16** in presence of Cs_2CO_3 in acetonitrile at 70 °C and 3,4-dihydropyrazino[1,2-*a*]indol-1(2*H*)-ones **17a–n** were formed in complete diastereoselective fashion by [4+2] annulation of **15** and **16**. In vitro evaluation of all the synthesized compounds **17** against different mycobacterial species like M. Tuberculosis H37Rv and MDR-TB are on-going.

A base-mediated tandem dinucleophilic cyclization of readily accessible 2,3-epoxy tosylates with 2-mercaptobenzimidazole has been developed for the one-pot diastereoselective synthesis of benzimidazole-based tricyclic compounds equipped with two stereogenic centres (Scheme 5). With *trans*-substrates bearing an aryl or alkyl substituent at C3 position, the reaction involves an initial S—C1 bond-forming intermolecular alkylation followed by an N—C3 bond-forming, endo-selective intramolecular epoxide ring-opening cyclization reaction. A spectacular regioselectivity switching (tandem S—C3 and N—C1 bond formation reaction) was observed with related *trans*-*N*-tosylaziridine substrates. Wide substrate scope, complete diastereoselectivity, high to fully regioselectivity and mild transition metal-free conditions renders this protocol particularly efficient and practical.



Scheme 4: Synthesis of 1,3-oxazolidin-2-ones as possible antitubercular agents.



Scheme 5: Synthesis of 3,4-dihydro-2*H*-benzo[4,5]imidazo[2,1-*b*][1,3]thiazines as possible antitubercular agents.

B2. Summary and Conclusions:

This project has been severely hampered due to the COVID-19 pandemic situation and untimely release of the research grant. In fact, third year grant money was not released. The PI and the manpower suffered a lot to run the project in a systematic manner. Despite several hurdles, different series of compounds have been successfully synthesized to find new antitubercular agents. In particular, we have synthesized small libraries of 11-aryl-11*H*-indeno[1',2':4,5]imidazo[1,2-a]pyridines, indole–pyrrole hybrids with basic side chain, hydroxyl-substituted 1,3-oxazolidin-2-ones and pyrazino[1,2-*a*]indoles through the development of suitable reaction conditions. The corresponding synthetic methodologies are unprecedented in their paradigm, diversity-oriented, high-yielding and have broad substrate scope. Among all these synthesized compounds, indole–pyrrole hybrid compounds showed promising activity against gram +ve bacterial species S. aureus ATCC 29213 but unfortunately none of these synthesized compounds exhibit antitubercular activity against different mycobacterial species like M. Tuberculosis H37Rv and MDR-TB clinical isolates. Nevertheless, we believe that pyrazino[1,2-*a*]indoles which have recently been synthesized have the potential to exhibit antitubercular activity.

B3. Details of New Leads Obtained, if any: NIL

B4. Details of Publications, technology developed & Patents, if any emanated from the project:

1. Synthesis of 11-aryl-11*H*-indeno [1′,2′:4,5] imidazo[1,2-*a*]pyridines via dehydrative cyclization of aryl (2-arylimidazo[1,2-*a*]pyridin-3-yl)methanols. H. Borgohain and S. K. Das*, *Tetrahedron Lett*. **2019**, *60*, 2070.

2. Switching of regioselectivity in base-mediated diastereoselective annulation of 2,3-epoxy tosylates and their *N*-tosylaziridine analogs with 2-mercaptobenzimidazole. A. J. Das, H. Borgohain, B. Sarma and S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *18*, 441.

3. Regioselectivity of the trifluroethanol-promoted intramolecular N-Boc–epoxide cyclization en route to 1,3-oxazolidin-2-ones and 1,3-oxazinan-2-ones. H. Borgohain, K. Talukdar, B. Sarma and S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *8*, 7401.

4. Base-mediated intramolecular one-pot double-cyclization of epoxide-tethered 2-fluorobenzenesulfonamides: an avenue to 1,4-benzoxazine-fused benzothiaoxazepine-1,1-dioxides. J. Das, B. J. Bora, S. K. Das*. *Organic & Biomolecular Chemistry*, 2020, *18*, 220.

5. Trifluoromethanol-Mediated Cyclization of Two-Carbon-Tethered Epoxide–N-Boc Pairs: Completely Regioselective Synthesis of 3,6-Disubstituted 1,3-Oxazinan-2-ones. J. Das, R. Chouhan, H. Borgohain, B. J. Bora, and S. K. Das*. *Synthesis*, Just accepted manuscript (DOI: 10.1055/a-2019-1455)

6. Base-Mediated, Chemo- and Regioselective (4+2) Annulation of Indole-2-carboxamides with 2,3-Epoxy Tosylates toward 1,2-Fused Indoles. A. J. Das and S. K. Das*. *Journal of Organic Chemistry*, 2023, *Manuscript under revision*.

B5. Benefits gained:

- Scientific & Technical expertise gained:

One project JRF was employed in this project. The JRF obtained substantial amount of experience in synthetic organic chemistry while executing different synthetic methodologies.

- No. of NER manpower (including PI & staffs) trained in the Non-NER Institute: NIL
- No. of visits by Non-NER Researchers to NER Institutes and vise-versa: NIL
- Training in any new techniques, if any: Nil

Section-C: Details of Grant Utilization#		
C1.	**Equipment Acquired or Placed Order with Actual Cost:**	Acquired with Actual Cost of Rs. 2,98,200.00 (Rupees Two Lakh Ninety Eight Thousand Two Hundred Only) Attached as Appendix A
C2.	**Manpower Staffing and Expenditure Details:**	Attached as Annexures A and B
C3.	**Details of Recurring Expenditure:**	Attached as Appendix B (Utilization Certificate) and Appendix C (Statement of Expenditure)
C4.	**Financial Requirements for the Next Year with Justifications:**	Not applicable
#Grant utilization details (UC&SE, Assets Certificate & manpower details) also required to be submitted separately as per the prescribed format		

10.02.23
Dr Sajal Kumar Das
(PI Name & Signature)

Assistant Professor
Department of Chemical Sciences
Tezpur University
Tezpur - 784028

[Signature(s) of the Investigator(s)]

Instructions:

(i) *All the information needs to be provided; otherwise the Progress Report will be treated as incomplete. In case of 'Nil' / 'Not Applicable' information, the same may be indicated.*

(ii) *In case of multicentre project, a combined Progress Report should be submitted incorporating the progress of all components. The Project Co-coordinator/ PI will be responsible for this.*

(iii) **Please indicate the reporting period [i.e. Year 1/2/3/4/5].*

(iv) *Submission of Progress Report by the end of the 11th month of grant sanction is linked with further continuation of the project and timely release of funds for the next year.*

Appendix-C

Statement of Expenditure referred to in para 9 of the Utilisation Certificate

Showing grants received from the Department of Biotechnology and the expenditure incurred during the period from **April 01, 2021 to 19th January 2022**.

Item	Unspent balance carried forward from previous year	Grants received from DBT during the year	Expenditure	Balance {(2+3)-4}	Remarks
1	2	3	4	5	6
1. **Non-Recurring** (i) Equipment	1,800.00	NIL	NIL	1,800.00	
2. **Recurring**					
(i) Human Resource	78,871.00	2,51,129.00	1,42,000.00	1,88,000.00	
(ii) Consumables	0.00	4,00,000.00	4,00,000.00	0.00	
(iii) Travel	7,728.00	42,272.00	21,321.00	28,679.00	
(iv) Contingency	18.00	49,982.00	49,982.00	18.00	
(v) Overheads	32.00	99,968.00	99,947.00	53.00	
(vi) Interest	17,343.00	5,464.00 (earned)	17,343.00 (returned)	5,464.00	
Total	1,05,792.00	8,48,815.00	7,30,593.00	2,24,014.00	

SKdas2 14.7.22

(PROJECT INVESTIGATOR)

Dr. Sajal Kumar Das
Assistant Professor
Department of Chemical Sciences
Tezpur University, Napaam
Dist - Sonitpur, Assam 784028

(FINANCE OFFICER)

Finance Officer
Tezpur University

26/7/22

(HEAD OF THE INSTITUTE)

Registrar
Tezpur University

Appendix-B

Utilisation Certificate

(For the period of 1st April 2021 to 19th January 2022)

1. Title of the Project/Scheme: **Design and Synthesis of Hybrid Molecules for Multi-Drug-Resistant Tuberculosis**

2. Name of the Organization: **Tezpur University, Assam**

3. Principal Investigator: **Dr. Sajal Kumar Das**

4. Deptt. of Biotechnology sanction order No. & date of sanctioning the project: **BT/PR25173/NER/95/1055/2017 dated July 20, 2018**

5. Amount brought forward from the previous financial year quoting DBT letter No. & date in which the authority to carry forward the said amount was given: **Rs 1,05,792.00 (Unspent amount of the previous financial year)**

6. Amount received from DBT during the financial year (*please give No. and dates of sanction orders showing the amounts paid*): **Rs 8,43,351.00**

7. Other receipts/interest earned, if any, on the DBT grants: **Interest earned: Rs 5,464.00**

8. Total amount that was available for expenditure during the financial year (Sl. Nos. 5, 6 and 7): **Rs 9,54,607.00**

9. Actual expenditure (excluding commitments) incurred during the financial year (statement of expenditure is enclosed): **Rs 7,30,593.00**

10. Unspent balance refunded, if any *(Please give details of cheque No. etc.):* **Rs 2,24,014.00** [refunded to Consolidated Fund of India (Bharat Kosh); transaction ref. no. 0808220001787 (for 5,464) and + 0808220001684 (for Rs. 218550/-)]

11. Balance amount available at the end of the financial year: **Rs 00.00**

12. Amount allowed to be carried forward to the next financial year vide letter No. & date: **Rs 00.00**

SKdas
14.7.22

1. Certified that the amount of **Rs 7,30,593.00** mentioned against col. 9 has been utilised on the project/scheme for the purpose for which it was sanctioned and that the unspent balance of **Rs 2,24,014.00** has been refunded to Consolidated Fund of India (Bharat Kosh) with transaction ref. no.

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilised for the purpose for which it was sanctioned.

Kinds of checks exercised:

1. Cash Book
2. Ledgers
3. Vouchers
4. Bank Statements

SKdas 14.7.22

(PROJECT INVESTIGATOR)

Dr. Sajal Kumar Das
Assistant Professor
Department of Chemical Sciences
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Finance Officer
Tezpur University

(HEAD OF THE INSTITUTE)

Registrar
Tezpur University

(To be countersigned by the DBT Officer-in-charge)