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This issue covers Research & Development activities of Dibrugarh University for the Period of 1st October-31st of December, 2021.

Editorial Board

FACULTY OF SCIENCE

AND

ENGINEERING

JOURNAL PAPERS:

1. Rudrapal M, Gogoi N, D. **Chetia D** et al., 'Repurposing of phytomedicine-derived bioactive compounds with promising anti-SARSCoV-2 potential: Molecular docking, MD simulation and drug-likeness/ADMET studies' *Saudi Journal of Biological Sciences*, 2021, https://doi.org/10.1016/j.sjbs.2021.12.018

Abstract: In view of the potential of traditional plant-based remedies (or phytomedicines) in the management of COVID-19, the present investigation was aimed at finding novel anti-SARS-CoV-2 molecules by in-silico screening of bioactive phytochemicals (database) using computational methods and drug repurposing approach. A total of 160 compounds belonging to various phytochemical classes (flavonoids, limonoids, saponins, triterpenoids, steroids etc.) were selected (as initial hits) and screened against three specific therapeutic targets (Mpro/3CLpro, PLpro and RdRp) of SARS-CoV-2 by docking, molecular dynamics simulation and drug-likeness/ADMET studies. From our studies, six phytochemicals were identified as notableant-SARS-CoV-2 agents (best hit molecules) with promising inhibitory effects effective against protease (Mpro and PLpro) and polymerase (RdRp) enzymes. These compounds are namely, ginsenoside Rg2, saikosaponin A, somniferine, betulinic acid, soyasapogenol C and azadirachtin A. On the basis of binding modes and dynamics studies of protein–ligand intercations, ginsenoside Rg2, saikosaponin A, somniferine were found to be the most potent (in silico) inhibitors potentially active against Mpro, PLpro and RdRp, respectively. The present investigation can be directed towards further experimental studies in order to confirm the anti-SARS-CoV-2 efficacy along with toxicities of identified phytomolecules.

2. Zothantluanga JH, Gogoi N, Shakya A, **Chetia D**, Lalthanzara H, 'Computational guided identification of potential leads from Acacia pennata (L.) Willd. as inhibitors for cellular entry and viral replication of SARS-CoV-2'*Future Journal of Pharmaceutical Sciences*, 2021, 7 (1), 1-18

Abstract: SARS-CoV-2 uses a human protease called furin to aid in cellular entry and its main protease (Mpro) to achieve viral replication. By targeting these proteins, scientists are trying to identify phytoconstituents of medicinal plants as potential therapeutics for COVID-19. The study was aimed to identify promising leads as potential inhibitors of SARS-CoV-2 Mpro and furin using the phytocompounds reported to be isolated from Acacia pennata (L.) Willd. A total of 29 phytocompounds were reported to be isolated from A. pennata. Molecular docking simulation studies revealed 9 phytocompounds as having the top 5 binding affinities towards SARS-CoV-2 Mpro and furin. Among these phytocompounds, quercetin-3-O-α-L-rhamnopyranoside (C_18), kaempferol 3-O-α-Lrhamnopyranosyl-(1 → 4)-β-D-glucopyranoside (C_4), and isovitexin (C_5) have the highest drug score. Based on binding affinity, molecular properties, drug-likeness, toxicity parameters, ligand interactions, bioavailability, synthetic accessibility, structure– activity relationship, and comparative analysis of the experimental findings with other studies, C_5 was identified as the most promising phytocompound. C_5 interacted with the active site residues of SARS-CoV-2 Mpro (GLU166, ARG188, GLN189) and furin (ASN295, ARG298, HIS364, THR365). The oxygen atom at position 18, the –OH group at position 19, and the 6-C-glucoside

were identified as the pharmacophores in isovitexin (also known as apigenin-6-C-glucoside). It has been concluded that compounds having oxygen atom at position 18 (C-ring), –OH group at position 19 (A-ring), and 6-Cglucoside attached to the A-ring at position 3 on a C6–C3–C6 flavonoid scaffold could offer the best alternative to develop new leads against SARS-CoV-2

3. Kumawat MK, **Chetia D**, 'Synthesis, Antimalarial Activity Evaluation and Molecular Docking Studies of Some New Substituted Spiro-1, 2, 4, 5-Tetraoxane Derivatives' *Pharmaceutical Chemistry Journal*, 2021, 55 (9), 1-7

Abstract: Eight new substituted spiro-1,2,4,5-tetraoxane derivatives were synthesized and characterized by a number of analytical and spectroscopic techniques. The molecules were subsequently screened for in vitro antimalarial activity against chloroquine sensitive (3D7) and chloroquine resistant (RKL-9) strains of Plasmodium falciparum. These substituted spiro-1,2,4,5-tetraoxane derivatives were studied by molecular docking analysis in the active site of Falcipain-2 as a putative protein. Most of the synthesized compounds exhibited moderate to very good activity toward the parasite in comparison to the standard drug, chloroquine. Three compounds showed potent antimalarial activity against chloroquine sensitive strain of P. falciparum (3D7). One compound showed a very good activity against both chloroquine sensitive strain (3D7) as well as chloroquineresistant strain of P. falciparum (RKL-9). The top scored compounds having low binding energy interacted with the active site of Falcipain-2 in molecular docking studies.

4. Singh B, **Chetia D**, &Kumawat MK, 'Synthesis and In Vitro Antimalarial Activity Evaluation of Some New 1, 2-Diamino - propane Side-Chain-Modified 4-Aminoquinoline Mannich Bases'*Pharm Chem J*, 2021, 55, 724-731

Abstract: Twelve novel 1, 2-diaminopropane side chain modified 4-aminoquinoline Mannich bases were synthesized and characterized by a number of analytical and spectroscopic techniques. The molecules were subsequently screened for invitro antimalarial activity against chloroquine sensitive strain of Plasmodium falciparum (3D7). On antimalarial activity screening, all the compounds showed MIC between 15.6 – 125 μg/mL. Two compounds were found moderately potent against chloroquine sensitive strain of P. falciparum (3D7) compared to chloroquine.

5. Saurav Haloi, Monali D Saikia, **Subrata Borgohain Gogoi**, Rajkamal Mohan, Tapas Medhi. 'Aggregation and adsorption behaviour of Achromobacter sp. TMB1 produced rhamnolipids on sandstone core in relation to Microbial enhanced oil recovery', *Journal of Petroleum Science and Engineering*, 205

Abstract: In this article, the adsorption characteristics of bacterial surface-active rhamnolipids produced by ACHROMOBACTER sp. TMB1 were studied on sandstone core collected from Upper Assam oil field, India with emphasis on adsorption equilibrium and kinetics. Studied rhamnolipid reduced the interfacial tension between aqueous phase and oil to 0.9 mN/m from 39.1 mN/m. Micelle formation and aggregation behaviour of the rhamnolipids were also evaluated along with their wettability alteration properties. Gibbs free energy and

surface area per molecules of rhamnolipids were found to be −22.592 kJ/mol and 106.45 A^{o2}, respectively. The adsorption was confirmed through FTIR patterns of pure and rhamnolipid treated sand particles, which indicated the chemisorption mechanism of the process. Orcinol test was used to quantify the biosurfactant adsorbed on sandstone. In batch experiments, temperature, pH, salinity and adsorbent dose effect on adsorption efficiency were found to be significant. Further, the observed adsorption data were fitted with different isotherm models and found better fits with Freundlich isotherm after determined parameters of each model. The isotherm exhibited monolayer adsorption behaviour on the substratum bellow the CMC concentration. Above CMC value, the adsorption process tends to be associated with the formation of monomer↔micelle↔vesicle mechanism. Among four kinetic models, second-order model exhibited better predictions and was the most suitable kinetics model for rhamnolipids adsorption predictions. The adsorption equilibrium and kinetic behaviour of rhamnolipid onto sandstone corroborated chemisorption and involvement of functional groups during the process.

6. Kalpajit Hazarika, Dr. (Mrs.) **Subrata Borgohain Gogoi**, 'Clay Analysis of Upper Assam Basin for Chemical Enhanced Oil Recovery', *Journal of Geological Society of India*, 138-144

Abstract: The success and failure of different chemical enhanced oil recovery (CEOR) techniques can control to a large extent by the presence of different types of clay, its surface area and the reactivity of the clay with the injected chemicals during CEOR techniques. Therefore, reservoir clay analysis is important to study the CEOR process in general and to formulate the CEOR slug in particular. This study pertains to the underground porous media of upper Assam basin. In this paper effective porosity, absolute permeability, minerals and clays present in porous media is studied. Effective porosities were determined to estimate the total pore volume and more importantly the connecting pores and the throat volumes. The absolute permeability are exclusively the properties of the porous media, which determines the ease of flow of fluid through the porous media. Rock petrography study was done by examining the thin sections under optical microscope, Scanning Electron Microscope (SEM) and X-ray Diffractometer (XRD). From these studies the mineral and clay content of the reservoir was characterized, which helps to study the feasibility of a CEOR in upper Assam basin. This petrography study provides two- and three-dimensional accurate description of minerals of reservoir rock and clay particles. The porous media is a sandstone with high porosity and low absolute permeability. The clays present are smectite, kaolinite and illite with a dominance of smectite and kaolinite, conforming to the swelling and disintegration.

7. Rajput, M.K.; Konwar, M.; **Sarma, D.** 'Hydrophobic natural deep eutectic solvent THY-DA as sole extracting agent for arsenic (III) removal from aqueous solutions' *Environ. Technol. Innov*. 2021, 24, 102017

Abstract: This study was aimed to develop a methodology for removal of toxic arsenite (As^{3+}) species from contaminated aqueous solution using hydrophobic natural deep eutectic solvent (NADES) as a sole extracting agent. Herein, thymol (THY) and decanoic acid (DA) based hydrophobic NADESs THY-DA (1:1), THY-DA (2:1) and THY-DA (1:2) were prepared. THY-DA (1:2) offers advantageous physicochemical properties in comparison of other two DESs, therefore, employed as the sole extracting agent for removal of As^{3+} species in natural water conditions. More than 90 % extraction efficiency (E%) for As^{3+} was attained for high (5 mg/L)

as well as low (100 µg/L) concentration at optimal extraction conditions (100 mg of DES, 6 min sonication, pH 6.5–7, 25°C). DES was characterised by nuclear magnetic resonance (NMR) and Fourier transform infrared (FTIR) spectroscopy. Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray spectroscopy (EDS) techniques were used to confirm the presence of arsenic in the DES phase. Physicochemical properties such as density, melting point, moisture and solubility of DESs were also investigated. The DES was regenerated using 0.1 M HCl as stripping agent and reused thrice without observing any significant drop in extraction efficiency (E%). The FTIR spectra of the DES phase were recorded before and after the extraction of As^{3+} species to better comprehend the extraction mechanism.

8. Konwar, M.; Hazarika, R.; **Sarma, D.** 'Synthetic advances in C(sp2)-H/N-H arylation of pyrazole derivatives through activation/substitution' *Tetrahedron*, 2021, 102C, 132504.

Abstract: N-heterocyclic compounds and their biological activities are very well known to every researcher. Out of all N-heterocycles, pyrazole is one of the important N-heterocyclic compounds which is a planar five membered aromatic ring with six delocalized p-electrons. As there are various synthetic routes available in literature for the synthesis of pyrazoles, we put our effort for C(sp^2)-H arylation of pyrazole derivatives. In this review, we try to describe C(sp^2)-H arylation in various positions of pyrazole ring (C-3, C-4, C-5 and Nearylation) through activation or substitution and their medicinal properties associated with it. As the literature reveals, such kind of C(sp^2)-H and N-H arylated pyrazoles possess astonishing medicinal properties, they can be firmly incorporated into novel drug molecules which is enough for these molecules to promote themselves as an interesting topic in the present era.

9. Brindaban Gohain, Rituparna Chutia, & **Palash Dutta** (2021). 'Distance measure on intuitionistic fuzzy sets and its application in decision-making, pattern recognition, and clustering problems' *International Journal of Intelligent Systems*. https://doi.org/10.1002/int.22780

Abstract: decision-making under uncertainty is consistently an essential fear and the most challenging circle of exploration. to manage the uncertainty, the intuitionistic fuzzy set (ifs) assumes a critical part in taking care of the conditions wherein decision-makers furnish an alternative with a grade of membership and a non-membership. distance measures of IFSS are apparatuses used in different decision- making problems, such as medical investigation, pattern recognition, multicriteria decision-making, clustering problems, and other real-world problems. as such, various distance measures were developed by different researchers and applied to decision-making problems with situation-based deficiencies. motivated by this, in this paper, a symmetric

distance formula is being proposed for effectively determining the distance between the information held by IFSS the distance formula involves membership degree, non-membership degree, the difference of the minimum of the cross-evaluation factor, and the difference of the maximum of the cross-evaluation factor. furthermore, it is being proved that the proposed distance formula follows all the axiomatic definitions of a distance measure. numerical examples depict the efficiency of the proposed distance measure. hence, this measure is being applied to practical problems of decision-making, pattern recognition, and clustering problems. this measure is not restricted to a particular domain of study; it can be effectively applied in diverse decision-making problems.

10. **Palash Dutta**, & Borah, G. (2021). 'Robot selection problem via fuzzy TOPSIS method using novel distance and similarity measure for generalized fuzzy numbers with unequal heights' *New Mathematics and Natural Computation*, 1-46.

Abstract: background: mega multinational companies are highly dependent on robots to handle the maximum of their machinery workload, which significantly reduces human labor and saves valuable time as well. however, as vital as the role of robots is, a much more challenging task is its selection. moreover, the robots need to be evaluated on the grounds of different specifications and their ease of handling, which results in a smooth and work-efficient environment.

Objective: The prime objective of this paper is to devise a fruitful decision-making model for a robot selection problem, which utilizes a multi-criteria decision-making method known as Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The TOPSIS method is based on the newly defined distance measure involving generalized fuzzy numbers with unequal heights (GFNUHs).

Methodology/Approach: At first, we define a novel distance measure based on the "expected value" and "variance" of GFNUHs, where both the parameters are evaluated with the help of the αα-cut method. We then also give the expression for the distance-based similarity measure and investigate some of their properties. Both the distance and the similarity measure(s) are then validated for their effectiveness through a hypothetical case study of pattern recognition. Moreover, we consider 10 different bunches of generalized fuzzy numbers (GFNs) and present a comparative study with the already established measures to establish the efficiency and superiority of our proposed measures. Finally, the distance measure is deployed in the TOPSIS method, which facilitates suitable robot selection by an automobile company.

Findings/Results: A comparison of results for the proposed distance measure and the similarity measure with the existing ones is presented which proves that the proposed measure(s) are effective and usable.

Novelty/Value: The evaluation of expected value and variance of GFNUHs with the help of αα-cut technique is a completely original idea showcased in this paper and its improved version of TOPSIS for GFNUHs as discussed shall add a new direction in the realm of decision-making.

11. Bulendra Limboo & Palash Dutta, (2021). 'A q-rung orthopair basic probability assignment and its application in medical diagnosis' Decision Making: Applications in Management and Engineering. DOI: https://doi.org/10.31181/dmame191221060l

Abstract: Dempster-Shafer theory is widely used in decision-making and considered as one of the potential mathematical tools in order to fuse the evidence. However, existing studies in this theory show disadvantage due to conflicting nature of standard evidence set and the combination rule of evidence. In this paper, we have constructed the framework of q-rung evidence set to address the issue of conflicts based on the q-rung fuzzy number due to its more comprehensive range of advantage compared to the other fuzzy or discrete numbers. The proposed q-rung evidence set has the flexibility in assessing a parameter through the q-rung orthopair basic probability assignment consisting of membership and non-membership belief degree. Moreover, as the proposed q-rung orthopair basic probability assignment consists of pair of belief degrees, the possibility of conflicts cannot be ignored entirely. In this regard, a new association coefficient measure is introduced where each component of the belief degrees is modified through the weighted average mass technique. This paper uses various concept such as fuzzy soft sets, Deng entropy, association coefficient measure and score function for decision-making problem. Firstly, to obtain the initial q-rung belief function, we have implemented the Intuitionistic fuzzy soft set to assess the parameter of the alternatives and Deng entropy to find the uncertainty of the parameters. Secondly, the association coefficient measure is used to avoid the conflict through the modified form of evidence. Finally, we combined the evidence and found the score value of the Intuitionistic fuzzy numbers for the ranking of the alternatives based on the score values of alternatives. This study is validated with the case study in the medical diagnosis problem from the existing paper and compared the ranking of alternatives based on the score function of belief measures of the alternatives.

12. **Palash Dutta**, (2021). 'An Advanced Arithmetic Approach to GTIFNs and Its Application in Medical Analysis' *New Mathematics and Natural Computation*, *17*(01), 105-143.

Abstract: Intuitionistic fuzzy set (IFS) is the straight simplification of fuzzy set theory (FST). Nevertheless, estimation of the arithmetic operation on generalized intuitionistic fuzzy number (GIFNs) is a critical apprehension. This paper presents an attempt to set up a novel method for effectively resolving the drawbacks of conform arithmetic operations on generalized triangular intuitionistic fuzzy numbers (GTIFNs). For this purpose, decomposition theorems for generalized

trapezoidal intuitionistic fuzzy numbers (GTrFNs) are studied. Numerical examples are illustrated herewith. Finally, to validate the requirement of a novel elucidation, an application in medical analysis has been carried out under this setting.

13. **Partha Protim Borthakur**, T. Nath, and D. Hatibaruah, 'The Application of the Queuing Theory in a Vehicular Traffic Intersection Point', for Estimating and Optimization of Traffic Congestion in Dibrugarh, Assam', *Indian Journal of Natural science.* vol. 12, no. 69, pp. 36218–36229, 2021

Abstract: Overcrowding on the highways is aggravating and bothersome. In recent years, the number of traffic has been rapidly increasing. This shift could be attributed to various factors, including population growth, limited resources, everyone's desire for their own vehicle, urbanization, etc. Well-functioning transportation infrastructure is critical in meeting the needs of individuals daily. Transportation is a critical aspect for urban incorporation at the individual level since it provides access to economic activities, facilitates family life, and aids in forming social networks. The number of vehicles has expanded in tandem with the expansion of our Indian economy, resulting in a significant increase in traffic congestion in road traffic. Due to the ever-increasing automotive volume, long and inconvenient traffic bottlenecks occur at most of the traffic intersections point in most of the towns in India. This work uses queuing theory and statistical experiments to analyze the traffic circumstances of an intersection in a particular city, create a mathematical model, and compare it to the actual data. A traffic intersection pointing the Thanachariali area in Dibrugarh town, Assam, India, was chosen for analysis in this study. The majority of the data for the junction point simulation came from observations. The outcome demonstrates the application of queuing theory to the study of intersection traffic flow. Using Queuing Theory, we simulate and estimate traffic congestion on Thanachariali traffic intersection points. This strategy aims to figure out what factors cause traffic congestion and then works to improve traffic flow. A Poisson process is considered to govern the traffic flow.

14. **Partha Protim Borthakur**, G. Sarma, H. Hazarika, and S. Bhattacharyya, 'Micro Algae Asterarcyssp. : A Potential Source for Biodiesel Production' *Indian Journal of Natural science.* vol. 12, no. 69, pp. 35547–35555, 2021

Abstract: The world's economic progress is heavily reliant on fossil fuel supplies, which are restricted not just in terms of availability but also in terms of pollution. Due to the scarcity of fossil fuels, substantial attempts have been made to find alternative biofuels such as bioethanol and biodiesel. The production of biodiesel from micro-algae has several advantages, including higher algal biomass and oil productivities. In this present study, the microalgae Asterarcys sp. was isolated from freshwater samples. The predominant strain of Asterarcys sp. was screened from the samples. Asterarcys sp. (NEIST BT13) was used here as the experimental microalgal strain. The strain shows good growth properties with a specific growth rate of 0.19/day and a doubling time of 3.60 days. The lipid content of the cell after extraction was found to be 20.3% dry cell weight on the 15th day

of growth. As a result, Asterarcys sp. has a high fatty acid and lipid content compositions, proving to be a viable strain for biofuel production.

15. L Gogoi, AK Das, S Chaliha, **P K Saikia** 'Investigation on the structural properties and correlation of the optical constants of $Cd_{1-x}Zn_xS$ thin films with bath deposition temperature', *Chinese Journal of Physics***,** Vol. 74 (2021) 389–405 https://doi.org/10.1016/j.cjph.2021.08.027

Abstract: Cd1-xZnxS thin films were deposited by chemical bath deposition (CBD) technique, which is simple and cost effective, in a chemical bath containing appropriate amount of cadmium acetate, zinc acetate, and thiourea as precursors, in a clean glass substrate. The deposition was carried out by varying the bath temperatures (70 ◦C, 75 ◦C, 80 ◦C, and 85 ◦C) of the precursor solution. The XRD results indicate the existence of hexagonal structures of Cd1-xZnxS with an average crystallite size of ~ 27–41 nm. EDX studies confirm the presence of Cd, Zn, and S in the films. HRTEM and SAED patterns show the crystalline nature of the films with the coexistence of the hexagonal phase. The optical constants viz; optical band gap, Urbach energy, static refractive index, and optical conductivity were studied by using UV- Vis transmission spectra as a function of CBD temperature. It was observed that with the increase of bath temperature in the above range, there were concomitant decreases in optical band gap from ~3.3 to 2.8 eV. The Urbach energy, optical conductivity, and static refractive index of the films increase with the increase in bath deposition temperature. FTIR studies confirm the formation of ternary Cd1-xZnxS thin films.

16. **Kuki Kalpita Mahanta** & RimzimBordoloi'A Time Series Analysis on Tea Production of Kondoli Tea Estate, Assam'*Assam Statistical Review*. Vol. 33(2).

Abstract: Assam is known as the tea capital of India. Assam has approximately eight hundred tea estates and it solely produces more than half of the total tea production of India. Kondoli Tea Estate, falls in Nagaon District of Assam, is an old Tea Estate established during British Rule. The time series analysis of tea production can enable us to extract relevant information from the available data and to find out the association between different factors affecting tea productivity and it will help us to upsurges yield in future days. Keeping these points in mind in this paper an attempt has been made to study the tea production data of Kondoli Tea Estate, Nagaon for the period 2008 to 2019. To find the correlation between Rainfall and Average Tea Production Karl Pearson's correlation coefficient and for time series analysis method of Simple Average, Ratio to Moving Average and Link Relative Method and for Forecasting the tea production of the Tea Estate Exponential smoothing methods are employed here. From the study it is observed that, the tea production increases when temperature and rainfall are high and use of appropriate level of fertilizer increases the tea production. The tea production is maximum during the months August, September and October in every year. Some good amounts of forecasted values for tea production of Kondoli Tea Estate for the year 2020 to 2024 are also calculated here using exponential smoothing method.

17. Ali F, Alom S, **Zaman K.** Berberine 'A Comprehensive Review on its Isolation, Biosynthesis, Chemistry and Pharmacology' *Asian Journal of Chemistry*; vol-33 (11): 2548 – 2560, (2021).

Abstract: The isoquinoline compounds from alkaloidal class have been excellent source of important phytoconstituents having wide range ofpharmacological activities. Berberine is a protoberberine alkaloidal compound obtained from Berberis genus plants which belongs tofamily Barberidaceae. Due to its unique structural properties, berberine and its derivatives has been exploited extensively for its potentialuses in various pharmacological targets such as cancer, inflammation, diabetes, gastrointestinal disorder, viral and microbial infections,neurological disorder like Alzheimer, anxiety, schizophrenia, depression, *etc*. This review illustrates the updated information on berberinewith respect to its isolation, biosynthesis, chemical synthesis, structural modification and pharmacological activities. An extensive literaturesearch were carried out in various search engine like PubMed, Google Scholars, Research Gate and SCOPUS by using keywords likeBerberine, protoberberine alkaloids, isoquinoline derivatives, pharmacological effects, *etc*. Prephenic acid is the starting material forbiosynthesis of berberine. Structural modifications lead to generation of various potential derivatives, which earn patents by researchers.Besides toxicities, the complications of low solubility and bioavailability should be eliminated. To improve its safety, efficacy and selectivitythe berberine should be carefully derivatized.

18. Paul A., Raizung M., **Zaman K**., Chaudhary S. K., Shakya A. 'An Overview on Phytochemical and Pharmacological Profile of *Morus Alba* Linn'*Current Bioactive Compounds*; 17(8): 2021 (**DOI**: 10.2174/1573407216666201228114004; **Bentham Science**)

Abstract:

Background: Morus alba Linn. commonly known as white mulberry, belongs to the family Moraceae, and is a promising traditional medicine. In Asia, besides its use in the preparation of delicacies, every part of this plant is utilized in traditional medicine. Over the past decade, studies related to the identification and isolation of biologically active compounds, with flavonoids as the major class of phytoconstituents, from this plant have been reported. These phytoconstituents are not only found to be beneficial for the maintenance of general health but also are associated with a range of potential pharmacological activities such as antioxidant, anti-inflammatory, anti- diabetic, anticancer, hepatoprotective, cardioprotective, neuroprotective to name a few.

Objective: This review aims to provide upgraded and comprehensive information regarding the phytochemical, ethnomedicinal use and pharmacological profile of the plant Morus alba Linn. Methods: The significant information has been collected through various databases viz. PubMed, Scopus, Web of Science, Science Direct based on the recent findings, using different terms of Morus alba.

Results: The outcome of the study suggests that Morus alba is a multifunctional plant with numerous phytochemicals, and possesses a range of pharmacological activities.

Conclusion: The data assembled on Morus alba will be beneficial to trigger research in various fields of pharmaceutical and allied sciences to explore the medicinal importance of this unique plant.

19. **Bondita Robidas** and **Subrata B. Gogoi**, 'Identification of best fit crude oil of upper Assam basin for pipeline transportation'*Journal of Petroleum Exploration and Production Technology*, Springer Publication

Abstract: This paper attempts to identify a crude oil (CO) from eight different CO samples with a wide range of ^{o}API gravity from 13 to 43 belonging to Upper Assam Basin, India, to formulate the identified CO for pipeline transportation. Studies were conducted to understand the physical, rheological, and viscoelastic properties of the CO samples where physical properties included pour point (PP) and ^{o}API gravity, the rheological properties included viscosity (η), kinematic viscosity (K.V.), viscosity gravity constant (VGC), shear stress (τ) and shear strain (γ′) and the viscoelastic properties were elastic modulus (G)' and viscous modulus (G"). This research aims at achieving PP<9 °C for CO for the ease of flow through pipeline even during the extreme winter season in Assam when the ambient temperature drops below 10^{o} C. SKO in 0%, 5%, 10%, and 15% was added with all CO samples to determine the physical, rheological and viscoelastic properties at 30 °C, since PP of most of the CO samples was near 30 °C. However, the important properties of SKO, i.e. smoke point, flash point and boiling point, were not addressed here as SKO was used for improving flowability through pipeline. Correlation coefficients (CC) were determined using CORREL function in Microsoft Excel to investigate the relationship between ^{o}API gravity and the other properties for all the CO samples to identify the best fit CO. CO3 and CO8 were identified from the relationships as the most desired CO samples and CO3 was obtained as the best fit CO for the pipeline transportation.

BOOK CHAPTERS:

1. Pompy Patowary, Manash Pratim Pathak, Pronobesh Chattapadhyay, **Md. Kamaruz Zaman.** "Nanomedicine for Management of the Pulmonary Disorders" in Yashwant Pathak and Nazrul Islam (Editors), *Handbook of Lung Targeted Drug Delivery Systems: Recent Trends and Clinical Evidences*, eBook ISBN: 9781003046547 (DOI https://doi.org/10.1201/9781003046547) **Taylor &Franchis** [Chapter-18] 2021.

2. Johirul Islam, Hemanga Hazarika, Probin Kr Roy, PompyPatowary, PronobeshChattapadhyay, Y V Pathak, **Md. Kamaruz Zaman**. "Regulatory Perspectives and Concern Related to Nanoparticle Based-Lung Delivery" in Yashwant Pathak and Nazrul Islam (Editors), *Handbook of Lung Targeted Drug Delivery Systems*, eBook ISBN: 9781003046547 (DOI https://doi.org/10.1201/9781003046547), **Taylor &Franchis** [Chapter-43] 2021.

3. Maitreyee Sharma, 'An Analysis of Covariates of Post-partum Amenorrhoea among the Mishing Tribe of Assam', in *Nutrition and Health among Indian Tribes: With Special Reference to Eastern India* edited by Jyoti Ratan Ghosh and Jaydip Sen, Serials Publications, New Delhi

4. Maitreyee Sharma,'Pondering the Fundamental Link between Biocultural Adaptation and Demography: A Revisit to some Basic Initial Works', in *India's North-East: Contribution of Anthropology* edited by Nitul Kumar Gogoi and Maitreyee Sharma, The Registrar, Dibrugarh

University.

5. Geetanjali Devi, 'Locating the *Garbhagrihas* of the Temples of Greater Guwahati Assam', in Prof. Nitul Kumar Gogoi and Dr.Maitreyee Sharma (eds)*India's North-East: Contribution of Anthropology,* The Registrar, Dibrugarh University, Dibrugarh pp. 217-226, ISBN:978-93-5578-124-6

6. Bidyut Bikash Boruah and **Kuki Kalpita Mahanta**, 'Fertility Conditions and Socio-Economic Status of the Women of Assam: A Special Reference to Gaurisagar Block'Pp-73-88. *Research Trends in Mathematics and Statistics*. Vol-14. ISBN: 978-93-91538-54-5.

7. Rudrapal M. **Chetia D**., 'Malaria and Recent Developments in Antimalarial Drugs. in: Neglected Tropical Diseases and Phytochemicals in Drug Discovery'Egbuna C, Akram M, Ifemeje JC (Eds), John Wiley & Sons, September, 2021, 499-542, ISBN: 9781119617143 (Online), 9781119616603 (Print)

8. **DigantaSarma**, Sultana J.; Hazarika, R.; Dutta, B. "Basic Ionic Liquid Catalyzed Cycloaddition Reactions for The Synthesis of 1,2,3-Triazoles". Advances in Organic Synthesis. Volume 15, pages 379-417. Editor: Atta-ur-Rahman, FRS. Publisher: Bentham Books. ISBN (online): 978-981-4998-48-2; ISBN (print): 978-981-4998-49-9; ISBN (paperback): 978-981-4998-50-5

9. Gaurangajit Borah, **Palash Dutta** and G.C. Hazarika, 'Fractional Derivatives: A Numerical Insight into Flow Problems Involving Second Grade Fluid under Fuzzy Environment', *Modeling and Computation in Vibration Problems,* Volume 2, IOP Science, 13-17

EDITED BOOKS:

1. Nitul Kumar Gogoi and Maitreyee Sharma, '*India's North-East: Contribution of Anthropology*', The Registrar, Dibrugarh University, Dibrugarh-786004 Assam, ISBN- 978-93-5578-124-6

CONFERENCE PAPERS:

1. **Abhijit Boruah**,**Tazid Ali**,Nayan M. Kakoty, M.B Malarvili, 'OROnto: An Ontology for Recognition of Grasping Objects' in conference "IEEE INDICON 2021" organized by IIT Guwahati 19th – 21st December 2021, Publisher: IEEE

2. Hemanga Hazarika, Harshita Krishnatreya, Varun Tayagi, PronobeshChattapadhyay, **Kamaruz Zaman,** Essential Oil-based Cream provides effective mosquito repellency, 14th International Conference of Medical Arthropodology (SOMA); "Moving towards the Elimination of Malaria from India" (27 November 2021).

RESEARCH GRANTS/PROJECTS RECEIVED:

SN	Project Title	PI	Co-PI	Funding Agency	Duration of the Project	Amount
1	Development of High-Performance Modified Polymers for Enhanced Oil Recovery from Non-Producing Reservoirs	Dr. Akhil Agarwal, Department of Microbiology Central University of Rajasthan	Dr. (Mrs.) Subrata BorgohainGogoi	Core Research Grant of the Science and Engineering Research Board (SERB)	7.12.21 – 7.12.24 (3 years)	₹ 4.00 Lakhs

AWARDS AND RECORGNITIONS:

1. Dr.Parmita Phukan was awarded Phd. on Title: "Development of Greener Methodologies for Carbon-Carbon and Carbon-Nitrogen Bond Formation Reactions"under supervision of Prof Diganta Sarma, Dept of Physics, Dibrugarh University

2. Dr.Joydeep Borah was awarded Phd. on Title: "Computer Oriented Numerical Solution of Some Fuzzified Boundary Value Problems of Fluid Mechanics" Under the supervision of Prof G.C.hazarika and Dr Palash Dutta, Dept of Mathematics, Dibrugarh University

FACULTY OF EARTH SCIENCES

AND

ENERGY

JOURNAL PAPERS:

1. Majumdar, D., Gogoi, A. and Ghatak, A.2021.An investigation of Fe-Ti, V in the north-east Karbi Hills,Shillong Plateau, northeast India: Implication formineralization. *Geological Journal*. Special issue:1–13. https://doi.org/10.1002/gj.4312.

Abstract:
The Kulamati gabbro-anorthosite complex in the Karbi Hills of the Shillong Plateau, north-east India is a newly discovered stratified Fe-Ti-V-bearing magmatic body that has been classified as a titano-magnetite ore. The host gabbro-anorthosite is found intruded into the Mesoproterozoic Shillong Group. The stratified Fe-Ti-V oxide body consists mostly of magnetite-rich and magnetite-poor layers. The magnetite-rich bands are composed of titanomagnetite, haematite, ilmenite, and coulsonite with minor Al spinel, while the mineral constituents of silicate bands contain plagioclase, clinopyroxene, olivine, apatite, and chlorite. Titaniferous magnetites display a wide variety of subsolvus features, including Al-spinel–magnetite–ulvöspinel exsolutions and crystallographically oriented ilmenite exsolutions, but magnetites are exclusively vanadiferous. Comprehensive chemical analyses show that the ore is rich in TiO2 (10.98–12.78 wt%) and V2O5 (1.32–1.47 wt%). Ti is attributed by the presence of rutile, titanite, and ilmenite, while V is attributed by coulsonite as a solid solution component in the titanomagnetite. It records moderate to high Al2O3 (4.51–5.46 wt%), with enrichment of FeO and Fe2O3 (26.22–28.32 wt% and 39.34–42.86 wt%, respectively), which can be attributed to the presence of magnetite-spinel-ulvospinel. Higher Fe2O3 and lower FeO are indicative of oxidizing conditions of the ore-forming environment. The rare earth element (REE) patterns have (La/Yb)N and (Ce/Yb)N ratios comparable to an evolved basaltic melt, with light REE being enriched compared to heavy REE and a positive Eu anomaly. The electron probe micro analyser data of magnetite is conformable with the bulk chemistry, and shows consistently high FeO (70.87– 88.06 wt %), Cr2O3 (1.02–2.44 wt%), TiO2 (0.16–6.20 wt%), and V2O3 (1.47–2.26 wt %), with trace amounts of Al, Si, Mg, Mn, and PGE. As per targeted parameters, the ore occurrence distinctly belongs to a stratified Fe-Ti-V class, where alternate thick (>1.0 m) and thin (<20 cm) strata resulted from the late magmatic crystallization of the original tholeiitic composition.

2. Kalita, P., Goswami, T.K., Phukon, P., Srivastava, H. B. 2021. Deformation temperature, differential stress, and strain rate variation across the Bomdila Gneiss, western Arunachal Himalaya, India. *International Journal of Earth Sciences.* DOI:10.1007/s00531-021-02132-7

Abstract:
Constraining deformation temperature, differential stress, and strain rate variation from deformed rocks is crucial in developing tectonic models. The outcrop to grain scale fabrics of the Bomdila Gneiss (BG) in the Lesser Himalayan Sequence (LHS) of the western Arunachal Himalaya is studied to understand the variation of the intensity of deformation across the mylonitic batholithic intrusive. The BG represents a Paleoproterozoic magmatic activity in the LHS and subsequently underwent Miocene Himalayan orogenesis. The upper and lower contacts of the BG with Dirang Formation and Miri Quartzite are demarcated by Dirang Thrust

(DT) and Bome thrust (BT), respectively, while in the middle, it has another thrust contact with the Tenga Formation, known as the Tenga Thrust (TT). The intensity of deformation across the BG is constrained through microstructural analysis, piezometric study, and fractal dimension analysis. Manifestations of the dynamic recrystallization are evidenced through grain boundary migration, sub-grain rotation, and grain boundary bulging microstructures of quartz crystals. We have estimated the deformation temperatures from microstructural characterization such as grain boundary migration, sub-grain rotation, and grain boundary bulging. The differential flow stresses are calculated through piezometric study. While, the fractal dimension values calculated through area–perimeter method along with deformation temperatures reveal the rates of strain in the BG. The deformation temperatures, differential flow stresses, and rates of strain in the BG are elevated near the thrust zones with maximum near TT and within the BG increases from SE to NW direction towards DT. Both BT and TT are imbrications indicating southward propagation of the thrusts in sequence. The initially buried BG under the Greater Himalayan Crystalline has been considered to exhume through the TT along with BT. An inverted thermal profile within the BG is found along the traverse, which may be due to the thrust imbrications in the MCT footwall.

3. Borgohain, P., Bezbaruah, D., Gogoi, M.N. and Gogoi, Y.K. 2021.Petrography and diagenetic evolution of the Barail sandstones of Naga Schuppen belt, North East India: implication towards reservoir quality. *Current Science* 121(8):1107-1113. DOI:10.18520/cs/v121/i8/1107-1113

Abstract:
Rock-thin section, scanning electron microscopy and X-ray diffraction analyses have been employed to describe in detail the mineralogical constituents, diage-netic alterations and their impact on reservoir quality of Oligocene Barail sandstones of Naga Schuppen belt, North East India. The Barail Group comprises of alternate beds of hard and compact sandstones with siltstone, shale, carbonaceous shale, and a few thin intermittent coal seams in the upper part of the rock sequence. Petrographic analysis indicates that quartz (42.02-55.02%) is the most dominant mineral constituent followed by rock fragments (6.85-15.67%) and feldspars (0.00-1.97%) with different types of cement in the studied sandstones. Quartz overgrowth, formation of pseudo matrix, authigenic growth of secondary minerals and precipitation of clay within the pore spaces tend to reduce the primary and secondary porosities of the rocks. However, in certain samples, the grain coating restricts or hinders cementation and preserves porosity during deep burial, but decreases permeability at pore throats. Partial dissolution and intragranular fracturing of the framework minerals provide sites for pore growth. Pyrite framboids and iron oxides inhibit quartz cementation, but infill pore spaces. The present study shows that original pore morphologies, as well as secondary porosities within the sandstones tend to be destroyed to a large extent by the diagenetic processes.

4. Paul M. Betka, Thomson, S.N., Sincavage, R., Zoramthara,C., Lalremruatfela, C., Lang, K.A., Steckler, M. S., Bezbaruah, D., Borgohain, P. and Seeber, L.2021. Provenance Shifts During Neogene Brahmaputra Delta Progradation Tied to Coupled Climate and Tectonic Change in the Eastern Himalaya. *Geochemistry Geophysics Geosystems*.V:22, Issue:12. https://doi.org/10.1029/2021GC010026.

Abstract:
The Bengal Basin preserves the erosional signals of coupled tectonic-climatic change during late Cenozoic development of the Himalayan orogen, yet regional correlation and interpretation of these signals remains incomplete. We present a new geologic map of fluvial-deltaic deposits of the Indo-Burman Ranges (IBR), five detrital zircon fission track analyses, and twelve high-n detrital zircon U-Pb age distributions (dzUPb) from the Barail (late Eocene–early Miocene), Surma (early–late Miocene), and Tipam (late Miocene–Pliocene) Groups of the ancestral Brahmaputra delta. We use dzUPb statistical tests to correlate the IBR units with equivalent age strata throughout the Bengal Basin. An influx of trans-Himalayan sediment and the first appearance of ~50 Ma grains of the Gangdese batholith in the lower Surma Group (~18–15 Ma) records the early Miocene arrival of the ancestral Brahmaputra delta to the Bengal Basin. Contributions from Himalayan sources systematically decrease up section through the late Miocene as the contribution of Trans-Himalayan Arc sources increases. The Miocene (~18–8 Ma) deposition of the Surma Group records upstream expansion of the ancestral Brahmaputra River into southeastern Tibet. Late Miocene (<8 Ma) progradation of the fluvial part of the delta (Tipam Group) routed trans-Himalayan sediment over the shelf edge to the Nicobar Fan. We propose that Miocene progradation of the ancestral Brahmaputra delta reflects increasing rates of erosion and sea level fall during intensification of the South Asian Monsoon after the Miocene Climate Optimum, contemporaneous with a pulse of tectonic uplift of the Himalayan hinterland and Tibet.

5. Borah, B. and Mech, B. 2021. A review on applications of bio-products employed in drilling fluids to minimize environmental footprint. Environmental Challenges. Volume 6:100411.

Abstract:
The continuous growing requirement in energy and shrink in the production together calls for thrive in new technologies in the oil and gas industry. Understanding of drilling fluid properties aid to design a fluid system with better properties that can be useful for drilling non-traditional hydrocarbon reservoirs. Drilling fluids are colloids to which a number of additives have been added in order to perform some specific properties. Conventional chemical additives that are employed to regulate properties of drilling fluids pose various problems because of their environmental and personnel safety issues. Some of these additives are toxic, non-biodegradable and have a negative impact on the environment. The oil and gas industries produces a huge amount of spent drilling fluid, produced water, and accumulated drill cuttings from drilling operations, which are the sources of environmental pollution. Present day's environmental safety concerns are triggering the research and use of alternative multifunctional biodegradable and environmentally friendly drilling fluid additive. Hence comes the play of bio products to bypass these challenges. This review article is undertaken to highlight the application of some green bio products in drilling fluid to aid researchers and the oil and gas industry. This article also emphasizes how these bio products support in improvement of the drilling fluid properties while remaining cost effective.

ARTICLES:

1. Title of the article: Dibrugarh University in human resource development for oil industries.

   Authors: Prof. Kalpana Deka Kalita, Page No: 5, Name of the newspaper/magazine: Sentinel Daily News Paper, 2nd October, 2021

RESEARCH GRANTS/PROJECTS RECEIVED:

1. Project title: Sedimentation Model, Diagenetic Heterogeneity and Reservoir Properties of Tura Formation (Upper Paleocene- Lower Eocene) of Upper Assam Basin
   PI: Prof. Pradip Borgohain, Dept. of Petroleum Technology, D. U
   Co- PI: Dr. DevojitBezbaruah, Dept. of Applied Geology, D.U
   Funding Agency: DST-SERB (File no. CRG/2021/007514)
   Duration: Dec, 2021- Dec. 2024
   Amount: 38,54,820/-

CONFERENCE/WORKSHOP HOSTED:

1. Department of Applied Geology, Dibrugarh University organized Prof. Porag Kumar Boruah Memorial Third Golden Jubilee Lecture

   Convener: Prof. Kalpana Deka Kalita

   Number of Participants: 190

   Date and Time: 21st December, 2021 (Tuesday), 2.30 pm onwards

   Lecture Title: "GEOLOGY IN THE NEW ENERGY ORDER"

   Speaker: Mr. Indrajit Barua, Executive Director (retd), Basin Manager-Frontier of Oil India Ltd.

2. Dr. Borkha Borah, Department of Petroleum Technology has hosted a National Conference on "Recent Technological Advancement and Research Opportunities in Oil and Gas Industry" from 29th October to 30th October 2021.

3. Dr. Borkha Borah, Department of Petroleum Technology has hosted a One-week international workshop on "Enhanced oil recovery" from 9th November to 15th November 2021.

FACULTY OF BIOLOGICAL SCIENCES

JOURNAL PAPERS:

1. Sonowal, J., Singh, M. K., Konwar, K., Dey, P. and Biswas, S.P. **2021.** Sagittal otolith morphology and biometric relationships of three snakehead species from the upper Brahmaputra Basin, India. *Egyptian Journal of Aquatic Biology & Fisheries*. Volume 25, Issue 4: 643-654. DOI: 10.21608/EJABF.2021.193356.

   Abstract: Morphometrics of sagittal otolith of three snakeheads species; CHANNA PUNCTATA (Bloch, 1793), CHANNA GACHUA (Hamilton, 1822) and CHANNA STRIATA (Bloch, 1793) from the upper Brahmaputra Basin, India were investigated. The study revealed variations in otolith sizes and shapes among the three species. The largest sagittal otolith was observed in C. STRIATA followed by C. PUNCTATA and C. GACHUA. Evaluation of relationships of total length and fish weight with sagittal length, width and mass indicated that all the three species are inclined towards a particular otolith morphometric character. The findings of the present study provide novel morphological as well as biometric data for predicting the length and weight of the fishes which may serve as an important identification tool for the fishes along with the associated morphometric characters.

2. Singh, M.K., Borgohain, P., Kaur, K., Gogoi, S. 2021. Emergence of Plants in Fish Pigmentation. Agricultural Research. https://doi.org/10.1007/s40003-021-00551-1.

   Abstract: Pigmentation plays a significant role in fish for consumer acceptability. Making and maintaining of aquarium containing pigmented ornamental fishes have evolved into a lucrative business in recent years. A number of pigments, primarily carotenoids are mainly responsible for the beautiful colouration of ornamental fishes. As fish cannot synthesize carotenoids de novo, there is a need of supplementation of carotenoids in the diet. Since natural sources of pigments are low-cost and more environmental friendly than the synthetic pigments, many studies have been carried out to test various plant-based natural carotenoids for enhancement of fish pigmentation. Forty-one plant species belonging to 28 families have been found widely used in imparting colouration to different species of fishes. Of these, 19 species were shown to be highly potential in fish pigmentation. Flowers, leaves, roots and whole plant are used in the study. Plant by- product like rice bran has also been used in fish pigmentation. The present review discusses about the potential plants used in fish pigmentation, their efficiency and the associative parameters along with the survival rate, growth and immune system promoter of the target species.

3. Saikia, S., Sonowal, S. and Singh, M.K. 2021. A Study on Butterfly Diversity of Lower-Doigrung (Bijuli) Reserve Forest of Golaghat, Assam, India. *Research Journal of Agricultural Sciences*.Volume12, Issue 5: 1641-1645.

Abstract: Butterflies are very subtle and charming creature in the world which is considered as pollution indicator and natural pollinator. The present study aims to elucidate the richness and diversity of butterflies from Lower-Doigrung (Bijuli) reserve forest of Golaghat, Assam. A total of 60 species of butterflies belonging to five families were recorded during the study, of which, 5 species were found to be included in the rare category. The family Nymphalidae was found to be most dominant with 26 number of species followed by Lycaenidae (13 species), Papilionidae (9 species), Pieridae and Hesperiidae with 6 species each. The results of the current study will help in implementing proper conservation strategies of butterfly diversity in the protected area.

4. Singh, M.K.,Sonowal, S. andSaikia, S. 2021. A Study on Length-Weight Relationship and Condition Factor of Three Important Freshwater Fish Species of MaijanBeel, Dibrugarh, Assam, India. *Asian Journal of Biological and Life Sciences.* Volume10, Issue 3:1-5.

Abstract: The aim of current investigation is to report the length-weight relationship (LWRs) of three economically important as well as ornamental fish species, namely *Channa stewartii*, *Heteropneustesfossilis*and *Trichogasterfasciata*found in MaijanBeel, Dibrugarh, Assam, India. 148 fish specimens belonging to the families Chanidae, Clariidae and Belontiidae were collected and used for the study. The result reported that the exponent 'b' in the LWRs ($W=aL^b$) were ranged between 2.61 and 3.00 showing allometric and isometric pattern of growth. The coefficient of correlation (r) recorded in the range of 0.91 to 0.96 and showed high degree correlation in all the species. The Fulton's condition factor (K) value was varied for each species from 0.53 to 1.79. These parameters are of great important to evaluate the biology, habitat condition, management of the population dynamics and stock assessment of the fishes.

5. Bhuyan, P., Bordoloi, R. and Singh, M.K. 2021. Studies on Digestive Enzymes in Different Size Groups of *Channa aurantimaculata*Musikasinthorn, 2000.*Egyptian Journal of Aquatic Biology & Fisheries*. Volume 25, Issue 6 (*article in press*).

Abstract:Amylase, cellulase, trypsin, chymotrypsin, lipase and total protease are considered as primary digestive enzyme in fish study. *Channa aurantimaculata*Musikasinthorn, 2000 is an omnivore fish species specifically found in Brahmaputra River of Assam, India. Due to their attractive physical features this fish is also used as aquarium fish despite of using as food. This study aims to observe digestive enzyme (amylase, cellulase, trypsin, chymotrypsin, lipase and total protease) activities from the gastrointestinal tract (GI tract) in different size group (adult, juvenile and fry) of *C. aurantimaculata* by using quantitative enzyme assay. After collection, some of the adult fishes were cultured and fed with small live fishes whereas others were freshly dissected to conduct experiments. In fry age group, α amylase activity was highest (1±0.31 unit·mg protein-1) and in juvenile group protease activity was found highest (4.6±3.1 unit·mg protein-1). In adult, total protease, trypsin, chymotrypsin and lipase activities were significantly higher ($p<0.05$) than juvenile and fry age group. A comparative study was conducted on total protease activity between wild and cultured fish species in adult, juvenile and fry age group and significant difference ($p<0.05$) was observed only in adult age group of wild and culture species.

Present study also concluded that protease enzyme is the primary digestive enzyme (0.9±0.39 - 17.01±8 unit·mg protein-1) found in *C. aurantimaculata* which support their carnivorous type of food habit with relative gut length less than one (0.45-0.59) in different age group.

6. Gogoi, N., Gogoi, A., Neog, B., Baruah, D. and Saikia, P. 2021. Phylogenetic Analysis and Genetic Diversity of *Garcinia* Species Using ITS Region and ISSR Markers.*Proceedings of the National Academy of Sciences*, India Section B: Biological Sciences volume 91:343–351(https://doi.org/10.1007/s40011-021-01227-0).

Abstract: Characterization of germplasm is an important pathway between the conservation and utilization of genetic resources in various breeding programs. Genetic variability and genetic relationships were accessed among the 42 genotypes of *Garcinia* L. of Upper Assam, using the ISSR-DNA markers. A total of 42 random decamer oligonucleotides of PKBT and UBC series were examined to generate the ISSR profiling, out of which 16 primers produced reproducible and scorable bands. A total of 142 amplicons was obtained, with 91.56% of polymorphic bands. Monomorphic band percentage was calculated and found to be 8.48% with 0.65 of PIC value and EMR, MI values were calculated and found to be 7.90 and 5.52, respectively. Genetic similarity matrix, based on Jaccard's coefficient ranged from 0.30 to 0.97 indicating to be least. A dendrogram constructed by the unweighted pair group method with arithmetic average formed four distinct clusters. ITS1 regions were found to be efficient barcode for the assessment of phylogenetic relationships between *Garcinia* genotypes. The present investigation recommends the usefulness of ISSR technology for the study of genetic similarity among different genotypes of *Garcinia* L.

7. Saikia, P., Neog, B., Gogoi, N. and Baruah, D. 2021.Assessment of the Genetic Diversity of Joha Rice Germplasms by using Simple Sequence Repeat Markers.*Indian Journal of Agricultural Research.* Volume 55 Issue 6: 681-687.*Ecology, Environment & Conservation.*

Abstract: The assessment of the genetic diversity within germplasm collections can be accomplished using simple sequence repeat (SSR) markers and association mapping techniques. The present study was conducted to evaluate the genetic diversity of a colored rice germplasm collection containing 376 black-purple rice samples and 172 red pericarp samples, conserved by Dong-A University. There were 600 pairs of SSR primers screened against 11 rice varieties. Sixteen informative primer pairs were selected, having high polymorphism information content (PIC) values, which were then used to assess the genetic diversity within the collection. A total of 409 polymorphic amplified fragments were obtained using the 16 SSR markers. The number of alleles per locus ranged from 11 to 47, with an average of 25.6. The average PIC value was 0.913, ranging from 0.855 to 0.964. Four hundred and nine SSR loci were used to calculate Jaccard's distance coefficients, using the unweighted pair-group method with arithmetic mean cluster

analysis. These accessions were separated into several distinctive groups corresponding to their morphology. The results provided valuable information for the colored rice breeding program and showed the importance of protecting germplasm resources and the molecular markers that can be derived from them.

8. Borgohain, B., Neog, B. and Saikia, P. 2021.*Elaeagnus latifolia* (Linn), An Underutilized Fruit of North-East India: A Comprehensive Review. *Res. Jr. of Agril. Sci*.Volume12, Issue6: 2261–2266.

Abstract: *Elaeagnus latifolia* Linn, a large woody scandent shrub belongs to family Elaeagnaceae and is found in wild as well as semi wild habitat of South East Asia, extending up to Middle East and Europe. Its fruits are rich in vitamins, minerals, essential fatty acids and other bioactive compounds such as phenolics, flavonoids. They have been used in many traditional medicines by the various ethnic communities of the region as hepatoprotective, anti-inflammatory and antipyretic agents. Due to the presence of high antioxidant lycopene in the fruit pulp, this fruit is believed to have anticancer property and also shows tyrosinase inhibitory activity. The extracts of leaves and fruits have antibacterial property against some gram-positive and gram-negative bacteria. Though these fruits have many nutritional benefits, it is considered as an underutilized fruit of North East India, due to lack of knowledge of locals and not grown commercially. Due to over exploitation and loss of natural habitat, the plant is facing a threat to exist in the wild. Hence, proper scientific intervention is required for the conservation and sustainable utilization of the plant for future improvement programs.

BOOK CHAPTERS:

1 Sonowal, S., Saikia, C. and Singh, M.K. 2021. Length-weight relationship and condition factor of *Amblypharyngodon mola* (Hamilton, 1822) from Dibrugarh, Assam. In: Current Biological Research: Eds. Jayanta Sonowal, UrmikaPangchopi and Sajidur Rehman. pp. 83-89, ISBN: 978-93-5566-144-9.

2 Borgohain, P., Kaur, K.,Kachari, A. and Neog, B. 2021. Larvicidal efficacy of seven native fishes of Upper Brahmaputra Basin.*In*Advances in Animal Research, Ed. J.Das Global Net Publication (India) ISBN 978-93-91166-56-4.119-127.

3 Borthakur, S. and Bora, D.S. 2021.A study concerning alternate host plant selection by *Helopeltistheivora* Waterhouse (Helopeltis:Miridae) *In* "Integrated pest management strategies for sustainable agriculture" edited by N. Nair and A. Guha. New Delhi Publisher ISBN:978-93-91012-44-1.

4 Borthakur, S. and Bora, D.S. 2021. A study on foliar epicuticular wax composition of *Camellia sinensis* O. Kuntze (Ericales:Theaceae) and certain alternate host plants of H.

theivora Waterhouse (Hemiptera: Miridae) *In* Current Biological Research edited by J. Sonowal, U.Phangchopi, S. Rahman ISBN:97893-5566-1449

AWARDS & RECOGNITION:

1. Dr. D.S. Bora, Professor, Department of Life Sciences deliverd a talk on “Bioefficacy potential of terpenoid extracts of plants against *Aedes aegypti* and *Aedes albopictus*" in Annual meeting of Entomological Society of America, Entomology,2021 held on Oct31 – Nov3, 2021 in Denver. (Virtual mode).
2. Ms. Pallavi Dowarah was awarded Phd. on her work entitled, “Studies on certain xylanase producing bacteria and their impact on bleaching bamboo pulp” under the supervision of Prof. Bijoy Neog of the Department of Life Sciences, Dibrugarh University.

FACULTY OF SOCIAL SCIENCES

JOURNAL PAPERS:

1. Bipul Choudhury, 'Miles Bronson and the Effort to understand the Assamese people: A Case for the Anglo-Assamese Dictionary'*Journal of Historical Research*, vol. xx, ISSN: 2277-7563, pp.1-15

Abstract: Dictionaries are a link between the past and the present as well as the future. It preserves several traditions which define a particular age and traditions. Miles Bronson's Dictionary is one of the examples which unlock several aspects of the Assamese society and culture which can help in shedding lights on several aspects of the Assamese society and culture from the point of view of the outsider.

2. Siddhartha Pait, 'Mising Religious Belief: Understanding the Myth Through the Paradoxes of Texts, Shamonds of the Gong', *Journal of Asiatic Society of Mumbai*, ISSN-0972-0766, Vol.xciv, No.4, 2021

Abstract: This is a selective study on the religious beliefs of Misings or the 'Miri' tribes of northeast India. It attempts to discuss on the set of beliefs on matters related to ethics and moral principles in the prolonged migratory history of the Misings. The work finds a missing link between the Hindu mythical beliefs and paradoxical affinity with Buddhism. Their own set of beliefs are influenced by different cultures with whom they come into contact, with which otherwise they were devoid of anything to be called 'religion'.

3. Rashmi Rekha Bhuyan, 'Religious Interaction in Early Medieval Kamarupa: An Insight into the *Kalikapurana*', *Indian Historical Review*, Vol. 48 (2), December 2021, SAGE Publication,pp. 218-232, DOI: 10.1177/03769836211052098

Abstract: Like all other world religions, Brahmanism and Buddhism, the two prominent religious traditions of India, have histories of development and transformations since their inception. Depending on the socio-economic and political scenario religions are subject to change, often in their basic beliefs and rituals and at certain point of time interaction between diverse religious traditions also becomes inevitable. Although opponent by nature in their early philosophies, Buddhism and Brahmanism got entwined at certain phase of history, when many Buddhist deities and rituals were accommodated within the purview of Brahmanism and vice-versa. In the history of Brahmanical tradition, this interaction is traceable in the narratives of Puranic texts composed during the first millennium years of the Christian era. For the present study one such Puranic text: the *Kalikapurana,* composed in Kamarupa (early Assam) during the early medieval period, has been taken into account to understand the process of interaction between Brahmanism and Buddhism in the historical context of early Assam. Being primarily Brahmanical religious texts, the Puranas contain traces of Buddhism only in 'covert' form: in the form of myth. Focusing on some myths narrated in the *Kalikapurana,* the present study will discuss the existence of Buddhism in early Brahmaputra valley prior to the coming of Brahmanism. It will help us to understand the strategies adopted by the immigrant Brahmins to accommodate the prevailing traits under the purview of Brahmanical Hinduism.

4. Dibyajyoti Dutta ‘Prospects of Gandhian World Order in a Violence-Stricken World’, *Journal of Politics*, pp. 273- 282, vol. XXI, ISSN: 2277-5617.

Abstract: The present day the world order is marked by increased competitiveness and hostilities. The onward march of neo-liberal globalization facilitates widespread consumerism and individualism which incommodes collective-spirited society that the Father of the Nation, M.K. Gandhi envisioned. The essence of Gandhian thought stands on the edifice of non violence and freedom. Contrary to that, the contemporary world order is heavily driven by the Darwinian dictum of the 'survival of the fittest'. In view of this, this article examines the relevance of Gandhian worldview that intends to develop a egalitarian society.

5. Monoj Kumar Nath, ‘Formation, Growth and Breakdown of Immigrant Vote Banks of Congress in Assam’, *Journal of Politics*, pp. 1-27, vol. XXI, ISSN : 2277- 5617.

Abstract: This paper is an attempt to understand how immigrant vote banks were formed in Assam, a state from India's northeast, after independence, and eventually how these vote banks disappeared, in a region which has remained peculiar from other states of the country because of its complex immigration problem.Becoming the sole ruling political party after independence, Congress owned these vote banks which started to disintegrate after Assam witnesses an anti-immigration agitation between 1979 and 1985 and by the 2016 Assam assembly elections, the party had lost its entire immigrant vote banks. This paper argues that growing communalism in the politics of Assam is the dominant cause of the breakdown of the immigrant vote banks. It mainly analyses the political developments in Assam surrounding the immigrant vote banks based on official election data.

6. Satyadeep Lahkar and **Borun Dey** ‘Globalization, Tea Industry and Trade Unionism: an Overview with special reference to Assam ChahKarmachari Sangha (ACKS), *Journal of Politics*, pp. 142-150,vol. XXI, ISSN: 2277- 5617.

Abstract: It would not be an exaggeration in saying that the notion as well as practice of globalization is influencing each and every aspect of human life and society. Be it social, political or cultural arenas of present world, the deep imprint of globalization is so vivid that none of them can claim themselves being free from the impacts of globalization. In this context, it has been widely seen that globalization has also impacted the social movements going worldwide. Given the scenario, the spirit of trade unionism or more specifically trade union movements, major segments of social movement have also been seen receiving impacts of globalization to a great extent. In this connection, it may be highlighted that the tea industry of Assam and the trade union movement pertaining to the same has received tremendous changes owing to globalization. Hence, the present paper aims at throwing some critical lights on the dynamics of globalization, tea industry and trade unionism paying special attention to Assam ChahKarmachari Sangha. The paper is qualitative in nature and historic-analytical methods are used. Further, it is based on primary sources i.e., field investigation and interviews made and taken by interview along with consulting relevant secondary literature.

7. Priyanka Sharma, ‘Dam(n)ed the Kopili: Reflections and Implications’, *Journal of Politics*by pp. 237-250, Vol. XXI, ISSN: 2277- 5617.

Abstract: Damming rivers has become one of the focal components of development activities undertaken by the post-colonial state in India. Regarded as engineering marvels transforming the economy through a range of services like power generation, irrigation,navigation etc., dams are often seen as the panacea of development bringing qualitative changes in the lives of the people. The state of Assam which abounds in water resources already has two dams- the 275 MW Kopili hydroelectric power project and the 100 MW Karbi Langpi power project with more in the offing. Caught up in an intense struggle over damming rivers vis-à-vis its effects on the environment and livelihood security of the people, Assam has seen people's movements and resistance against dams. This paper is an attempt to highlight the experiences of the people with regard to the Kopili Hydro Electric Power Plant in Assam and reflect on the implications of damming the Brahmaputra.

8. Rimon Bhuyan Gogoi ‘A brief Engagement with the Idea of Indigeneity’,*Journal of Politics*, pp.65-82, vol. XXI, ISSN: 2277- 5617.

Abstract: Indigeneity is a complex concept to explain. This paper tries to move through some trajectories involved in the discourses surrounding the category. In a world hegemonised by capitalist institutions and western perspective, indigeneity has for long been understood in terms of alterity or the 'other'. In the last couple of decades, however, newer discourses have begun to emerge exploring the meaning of the category. It is being broadly understood (though not limited to) original inhabitants of a place or people inhabiting a place prior to colonisation. The agency of the indigenous people themselves have been now identified as primary in any acceptable discourse. The role of international agencies like the UN is important here. Understanding these complex categories requires going beyond capitaocentrism and accepting the essential diversities and multiplicities of the people's identities.

BOOK CHAPTERS:

1. Rashmi Rekha Bhuyan, ‘ItihasLekhan, JatiyotabadaruPrachinAsomSamparkioCinta-Carcha’ (in Assamese) In MukutSarma (ed.) *Hengdang: A Commemoration Volume of Mahavir Lachit Divas*, Bhasa Publication, Guwahati, November, 2021

CONFERENCE/WORKSHOPS HOSTED:

1. Department of History organized a Workshop on ‘Reading Medieval Assamese Manuscripts’, 9th-12th December,2021

2. Department of History organized a Lecture on ‘Exploring the Route of Siu-ka-pha’, 2nd December, 2021

3. Department of History organized an Invited lecture on 150th birth anniversary of Pandit Hemchandra Goswami, 8th December, 2021

4. Dr Manuj Dutta: Center for Social Work Studies organized workshop on ‘Group Processes and Facilitation’, 2-4 November, 2021

5. Dr Manuj Dutta: Center for Social Work Studies on ‘Designing the Thought Process: A Survival Strategy’, 9th- 11thNovember, 2021

6. Dr Manuj Dutta: Center for Social Work Studies on ‘Basics of Gender and Sexuality’, on 15th November, 2021

7. Dr Manuj Dutta: Center for Social Work Studies on ‘Role of Society in Cancer Care’ on 12th December, 2021

FACULTY OF EDUCATION

JOURNAL PAPERS:

1. Title of the paper: Teachers' Mental Health: A Retrospection Author: Dr. Mantu Baro, Centre for Studies in Physical Education & Sports, Journal name: Journal of Frontline Research in Arts & Science.

   Volume No. 09, Journal Date and Year: April 2021 ISSN No. 2249-9903

2. Title of the paper: A Statistical Mode for Prediction of Lower Limb Injury of Active Sportsperson Author: Dr. Mantu Baro, Centre for Studies in Physical Education & Sports, Journal name: International Journal of Human Movement and Sports Sciences. Volume No.09, Journal Date and Year: November 2021, ISSN No. 23181-4403, 2381-4381.

3. Title of the paper**:** A Study on Athletics Infrastructure and Students Participation Status of Higher Education Institute of Tripura

   Author: Dr. Siddhartha Sarma, Journal name: Online International Interdisciplinary Research Volume No. 11, Journal Date and Year: 4th July 202,1 ISSN No. 2249-9598

BOOK CHAPTERS:

1. Chapter Title: Saosri,Rafwdthi (Fitness) arw Beram Hwbthanaiyao Saosriari Swlwngthaini Cwnangthi Author: Dr. Mantu Baro

   Page No. 147-156

   Book Title: Covid-19,Jiewsa, Surjee Arw Sangrangthi

   Publisher: Swrjilu Publication, Guwahati

   Editors: Olindra Brahma

   ISBN No. 978-93-5416-677-8

FACULTY OF HUMANITIES AND LAW

PUBLISHED BOOKS:

1. Pallavi Deka Buzar boruah, Department of Assamese: *Tulanamulak Sahitya aaru Paridheeya kshetra* (Edited), All Dhemaji District Student's Union, Dhemaji, 1st Edition, 2021, ISBN: 978-81947995-66.
2. Pallavi Deka Buzarboruah, Department of Assamese: *Gabeshana Padhwtibijyan*, (Authored), Banalata, Dibrugarh, Guwahati-1, 1st Edition, 2017, 2nd edition, 2021.

BOOK CHAPTERS:

1. Pallavi Deka Buzarboruah, Department of Assamese: 'Bhupen Hazarikar Gitat Manavprem Aru dexaatmabodhar Baiplavik Sur', in the book *Bhasa Sahitya Sanskritit Ebhumuki*, Edited by Mantu Maran, Golden Jubilee Celebration, Na-Talpathar L.P School, Tinsukia, ISBN: 978 81 048854 9-8, 1st edition, 2021, pp. 188-194.
2. Pallavi Deka Buzarboruah, Department of Assamese: 'Asamiya Jatiyatabadar Nava Nirmata Lakshminath Bezbaroa', in the book *Bezbaroar Shristi Aru Dristi*, Edited by Nivedita Bora Handique, All Dhemaji District Student's Union, ISBN: 9789 89196-43-6, 1st edition, 2021, pp. 145-158.
3. Pallavi Deka Buzarboruah, Department of Assamese: 'Sampratik Asamiya Sahityar Paridhiya Prakar Baichitrya', in the book *Chintar Samikhyan*, Edited By Arun Baruah, Kalpataru Publication on behalf of Editorial & Publication Committee of Assam College Teacher's Research Unit, ISBN: 978 81 953705 2-8, 1st edition, August 2021, pp. 9-18.
4. Pallavi Deka Buzarboruah, Department of Assamese: 'Bedanta Darsan Aru Sankardevar chinta: Saampratik Prasangikata', in the book *Namdhwaj*, Edited by Dr. Binod Ch. Bora, Bhaona Udjapan Samiti, Dibrugarh University, ISBN: 978 93 92610 11 0, 1st Edition, December, 2021, pp. 5-11.

FACULTY OF COMMERCE

AND

MANAGEMENT SCIENCE

ARTICLES:

1. Pransu Raj Kaushik, Assistant Professor, Centre for Management Studies: Genocidal rape is a peril of conflict we must not ignore, published in www.eastmojo.com dated: December 19, 2021.
2. Pransu Raj Kaushik, Assistant Professor, Centre for Management Studies: Assam's never ending tryst: "The illegal settlers", published in www.eastmojo.com dated: November 17, 2021.

CONFERENCE/WORKSHOP HOSTED:

1. Pransu Raj Kaushik, Assistant Professor, Centre for Management Studies: Acted as a Resource Person in the programme, "Short-Term Orientation Programme for Future Managers interested in Tea Industry leading to Sustainable Development of the Industry", organized by the NGO, "BalSakha-Assam", in collaboration with the Centre for Tea and Agro Studies, Dibrugarh University on 26 October, 2021, on the topic, "Effective Leadership Skills for Effective Performance".

2. Pransu Raj Kaushik, Assistant Professor, Centre for Management Studies: Acted as a Resource Person in the programme, "Capacity Building Programme for Small Tea Growers on Managerial Skills", organized by the child rights organization and independent member of the International Save the Children Alliance, "Save the Children India, Bal Raksha, Bharat", in collaboration with the Centre for Tea and Agro Studies, Dibrugarh University on 20 December, 2021, on the topic, "Need for Professional Outlook and Managerial Skills by STGs".