7th Convention
Society for Ethnopharmacology, India

&

International Symposium on

"Combating COVID-19 - Ethnopharmacology & Traditional Food and Medicine"

December 17-19, 2020

PROCEEDING OF THE CONVENTION

Organized by:

Institute of Bioresources & Sustainable Development, Imphal (IBSD-Imphal)
जैव संसाधन एवं स्थायी विकास संस्थान, इंफाल
An Autonomous Institute under Dept. of Biotechnology, Govt. of India
Takyelpat, Imphal 795001, India
www.ibsd.gov.in

In Association with

Society for Ethnopharmacology, India (SFE-India)
"Globalizing local knowledge and localizing global technologies"
23/3 Saktigarh, Kolkata, India
www.ethnopharmacology.in

&

International Society for Ethnopharmacology (ISE)
switzerland
www.ethnopharmacology.org

For further details please visit:
www.ibsd.gov.in // www.ethnopharmacology.in

https://ibsd.webex.com/ibsd/j.php?MTID=me45d893a3ecda69bba9df925a3d7d5cb

INSTITUTE OF BIORESOURCES AND SUSTAINABLE DEVELOPMENT (IBSD)
An Autonomous Institute of Department of Biotechnology (DBT), Govt. of India
Takyelpat, Imphal-795001, Manipur
Centres & Nodes: Gangtok, Sikkim | Shillong, Meghalaya | Aizawl, Mizoram
Website: www.ibsd.gov.in

The Institute of Bioresources and Sustainable Development (IBSD) was established at Imphal, Manipur in 2001 as an autonomous research institute under the Department of Biotechnology, Ministry of Science and Technology, Government of India. The mission of the institute is "Bioresources development and their sustainable use through biotechnological interventions for the socio-economic growth of the region" with the Goal of "Scientific management of bioresources in the Indian region falling under Indo-Burma Biodiversity Hotspot". IBSD has its regional centre at Sikkim and two nodes at Meghalaya and Mizoram respectively to carry out outreach activities.

North East Region (NER) of India is a genetic treasure trove of plants, animals, and microorganisms. It belongs to the 12 richest mega biodiversity hotspot regions of the world under Indo-Burma Biodiversity Hotspot. The region falls in the bio-geographic tri-junction and a centre of gene diversity for many plants, animals, and microorganisms, and covers two global biodiversity hotspots namely, Eastern Himalayas and Indo-Burma biodiversity hotspot thereby forming a unique biogeographic province encompassing major biomes recognized in the world. This region alone dominates half of the country's biodiversity which needs to be explored through evidence-based scientific validation. To explore the unexplored, IBSD carries out research and development activities in the areas of plant resources, microorganisms, traditional foods, and animal resources to phytopharmaceuticals, nutraceuticals, and industrial applications, and these research works has been categorized under several verticals like, plant resources; animal resources; microbial resources, fermented food, and value addition; eco-restoration, bioenergy and biofuel; and phytopharmaceutical mission, ethnobotany, ethnopharmacology and drug discovery.

IBSD is extensively working on medicinal plants of NE India for the development of Phytopharmaceutical drugs with special emphasis on diabetics, neurodegenerative diseases, anticancer, antiviral, antimicrobial, phyto-insecticides etc. IBSD has

documented large number of medicinal plants used by the traditional healers for scientific intervention for the characterization of bioactive compounds as therapeutic agents and development of translational research components for phytopharmaceutical drug development from bio resources of NER. The institute is working on quality evaluation and validation of natural products, traditional medicine, and fermented food. The institute is planning to establish phyto-markers library useful as standard reference compounds for evaluation of phytopharmaceuticals and setting up as the standard phyto-marker laboratory in future. In combating the recent Covid-19 pandemic, IBSD has clustering and supporting NER India Covid-19 testing facilities. A testing centre under the auspicious of IBSD has been recognized by ICMR and it is fully functional at IBSD-JNIMS, Manipur since July 2020. The centre is working in collaboration with Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal.

To support all the research activities 19 scientists, technical staffs, several Ph.D. Scholars and Post Docs are working in different areas of natural products development in every aspect for promotion and development of bioresources of NER of India.

7th Convention: SFE-INDIA, 2020

International Symposium on

"Combating COVID-19 - Ethnopharmacology and Traditional Food & Medicine"

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In Association with:

Society for Ethnopharmacology (SFE - INDIA)
Saktigarh, Kolkata, India
www.ethnopharmacology.in

International Society for Ethnopharmacology (ISE)
Switzerland
www.ethnopharmacology.in

Medicinal plants used in traditional system of medicine are serving as the potential source of therapeutic alternative to manage human health for years together. COVID-19 has emerged as global pandemic and currently, no effective medical treatment exists to combat this disease. In India AYUSH systems of medicine has been promoted as immune-protection strategy. Drug discovery and development from medicinal plants is a challenging task, which requires expertise and experience. Newer technologies are employed to understand the chemistry, pharmacological activity, and their underlying mechanisms of action of medicinal plants as a lead towards drug development from botanicals. Several ancient Indian medicinal plants have been traditionally used in Ayurveda as immunomodulators and anti-infectives. Traditionally used Indian Medicinal plant has been explored as a potential candidate for the development of newer drug from several decades. So, our Ancestral knowledge may provide an effective alternative to combat this pandemic situation through translational research approach.

The 7th Convention of Society for Ethnopharmacology, India (SFE - INDIA) and International Symposium on "Combating COVID-19 - Ethnopharmacology and Traditional Food & Medicine" is being organized virtually (online mode) by Institute of Bioresources and Sustainable Development (IBSD), an autonomous Institute under Dept. of Biotechnology, Govt. of India, Imphal, India. On behalf of the IBSD, SFE-India and ISE, I would like to convey my warm welcome to you all for joining the 7th convention of SFE -INDIA.

This symposium will be highlighting on several crucial and contemporary issues for therapeutic evaluation including immunomodulatory and anti-infective potential to develop safe and efficacious product from medicinal plants together with scientific validation and quality evaluation. I feel this convention will provide an ideal platform for interaction and dissemination of knowledge & ideas between scientists, professionals from Industry and academia, traditional healthcare practitioners and technologists for promotion and development of medicinal plants through translation of our ancestral knowledge. The organizers of this conference have made every effort to make the scientific events more interactive with maximum input in every aspect of ethnopharmacology and medicinal plant research.

I would like to thank all the participants for their and interest to make this event successful. I wish you all a very effective scientific interaction during this program. I gratefully acknowledge the service rendered by the organizing committee members of SFE-India, all the scientists and staffs of IBSD for their active support for organizing this convention.

Wish you Merry Christmas and a wonderful New Year ahead.

Prof. Pulok K. Mukherjee, PhD, FRSC, FNASc
Director
Institute of Bioresources and Sustainable Development
Takyelpat, Imphal, Manipur 795001, India

Day 1: Thursday: December 17, 2020

INAUGURATION OF THE PROGRAMME: 10:00 AM - 12:00 PM (IST)

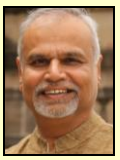
Dr. Rajkumar Ranjan Singh
Member of Parliament (Lok Sabha)
Manipur, India

Vaidya Rajesh Kotecha
Secretary
Ministry of AYUSH,
Govt. of India, New Delhi

Shri Chandra Prakash Goyal
Joint Secretary
Department of Biotechnology
Govt. of India, New Delhi

Dr Thirumalachari Ramasami,
Former Secretary
Department of Science and Technology
Govt. of India, New Delhi

Shri. Shekhar Dutt
Former Governor, State of Chhattisgarh &
Advisor, Society for Ethnopharmacology,
India



Dr. Bhushan Patwardhan
Vice Chairman
University Grant Commission
New Delhi

Dr. JLN Sastry
CEO
National Medicinal Plant Board
Govt. of India, New Delhi

Dr. Roy Upton
President
American Herbal Pharmacopoeia, USA

Dr. Ashiho A. Mao
Director
Botanical Survey of India
Govt. of India, Kolkata

Shri Birendra K Sarkar
President,
Society for Ethnopharmacology,
Kolkata India

Dr. C. K. Katiyar
Vice President
Society for Ethnopharmacology
Kolkata, India

Dr. Anamika Gambhir
Scientist F, Coordinator-IBSD,
Dept. of Biotechnology
Govt. of India, New Delhi

Shri Indraneel Das
Vice President
Society for Ethnopharmacology, Kolkata, India

Prof. Pulok K Mukherjee
Director, IBSD, Imphal, India
Secretary, Society for Ethnopharmacology, Kolkata, India
President, International Society for Ethnopharmacology, Switzerland

Keynote Lectures:

Introduced by: **Shri Indraneel Das,** Vice President, Society for Ethnopharmacology, Kolkata, India

Speaker		Title
Keynote Lecture: 1 **Dr. Thirumalachari Ramasami** Former Secretary Department of Science and Technology Govt. of India, New Delhi		Ethnobiology in New Normal after COVID 19
Keynote Lecture: 2 **Dr. Roy Upton** Executive Director American Herbal Pharmacopoeia, USA		American Herbal Pharmacopoeia: Triphala Monograph and Therapeutic Compendium

Keynote Lecture: 3

Dr. JLN Sastry
CEO
National Medicinal Plant Board
Govt. of India, New Delhi

Potential Immunomodulatory Herbs for Covid-19 management

Plenary Lectures: Session I: 12:05 PM - 01:45 PM (IST)

Chairperson:

Prof. G.A. Shantibala, Dept. of Life Sciences, Manipur Central University, Manipur, India
Dr. Sudripta Das, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Prof. Thingbaijam Binoy Singh , Dept. of Botany, Manipur University, Manipur, India

Speaker		Title
Lecture: 4 **Shri Birendra K. Sarkar** President, Society for Ethno pharmacology, India & CEO, Parker Robinson Ltd, Kolkata, India		Welcome note: "Society for ethnopahramcology in developing tarditional medicine"
Lecture: 5 **Prof. N. Rajmuhon Singh** Dept of Chemistry, Manipur Central University Manipur, India		Need of revitalization of traditional knowledge of manipur: With Special Reference to Dying, Health Care and Fermented Foods
Lecture: 6 **Prof. Alexander N. Shikov** Dept. of Pharmaceutical Formulations St. Petersburg State Chemical Pharmaceutical University, Russia		Fucoidan and COVID-19: some benefits based on biomolecular mechanisms
Lecture: 7 **Prof. Pramod Tandon** Former, Vice-Chancellor, North-Eastern Hill University, Shillong		North-East India: People, Bioresources and livelihood options under COVID-19 Scenario
Lecture: 8 **Prof. Ibrahim Jantan** School of Pharmacy Taylor's University, Malaysia		Plant-based immunomodulators as potential candidates for development of adjunctive therapy for COVID-19

Plenary Lectures: Session II: 01:50-03:20 PM (IST)

Chairperson:

Dr. N. Udupa, Coordinator, SFE-Manipal Chapter, Manipal Academy of Higher Education, Manipal, India
Dr. Kumaraswamy Jeyaram, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Alka Mukne, Coordinator SFE-Mumbai Chapter, Professor, Bombay College of Pharmacy, Mumbai, India

Speaker		Title
Lecture: 9 **Dr T.R. Santhosh Kumar** Scientist Integrated Cancer Research Rajiv Gandhi Centre for Biotechnology Trivandrum, Kerala, India		Cell and cell free assays for SARS CoV 2 viral entry inhibitors from natural products: assay development and screening.

Lecture: 10

Prof. Marco Leonti
University of Cagliari, Italy
Secretary, International Society for Ethnopharmacology, Switzerland
&
Dr. Caroline Weckerle
Institute of Systematic and Evolutionary Botany, University of Zurich, Switzerland
Treasurer, International Society for Ethnopharmacology, Switzerland


Recommended standards for conducting and reporting ethnopharmacological field studies

Lecture: 11

Prof. Souad Skalli
Faculty of Science
Mohammed V University in RABAT
Morocco

Does the use of herbal medicines containing non-steroidal anti-inflammatory constituents of herbal origin increase Covid-19 complications risk?

Lecture: 12

Dr. Ng. Iboyaima Singh
Chief Scientist
Traditional food & Sensory Science
CSIR-Central Food Technological Research Institute, Mysore

Health & Wellness foods as Immunity booster and Intervention of CFTRI's Technologies

Plenary Lectures: Session III: 03:25-05:00 PM (IST)

Chairperson:

Dr. Tapan K. Mukherjee, Former Scientist and Editor IJTK, CSIR-NISCAIR, New Delhi
Prof. L. Sanju Kumar Singh, Dept. of Biotechnology , Manipur University, Manipur, India
Dr. Biseshwori Thongam, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India

Speaker		Title
Lecture: 13 **Prof. Rudolf Bauer** Department of Pharmacognosy University of Graz Austria		How can ethnopharmacology contribute to the fight against Covid-19
Lecture: 14 **Dr. Manoj Kumar Modi** Scientist E Dept. of Biotechnology, Govt. of India, New Delhi, India		DBT's programs of Medicinal and Aromatic Plants- An Overview
Lecture: 15 **Prof. Fernão Castro Braga** Faculty of Pharmacy, Federal University of Minas Gerais Brazil		Integrating chemical and biological data to explore que potential of Brazilian plants for developing anti-arthritic agents
Lecture: 16 **Dr. Anurabha Ray** Dept. of Pharmacology Jamia Hamdard, New Delhi		New insights into the effects of *Witahnia somnifera* (Ashwagandha) in respiratory disease

Plenary Lectures: Session IV: 05:00-07:00 PM (IST)

Chairperson:

Dr. C. K. Katiyar, Vice President, SFE-India, CEO Healthcare (Tech), Emami Ltd., Kolkata
Dr. H. Sunitibala Devi, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Ningomba Swapana, Department of Chemistry, Manipur Technical University, Manipur, India

Speaker		Title
Lecture: 17 **Prof. Pulok K Mukherjee** Director, Institute of Bio resources and Sustainable Development, Imphal, India		"Bioresources of NER- Perspectives of IBSD"
Lecture: 18 **Prof. Robert Verpoorte** Natural Products Laboratory, Leiden University, The Netherlands		Learn from Nature, learn from our ancestors
Lecture: 19 **Prof. Thomas Efferth 2** Institute of Pharmacy and Biomedical Sciences Johannes Gutenberg University, Mainz, Germany		Antiviral activity of 1,2,4-trioxanes of the artemisinin type
Lecture: 20 **Prof. N. Debananda Singh** Dept. of Biochemistry, Manipur Central University Manipur, India		Microbiome in the 21st Century: Ethnopharmacology for Human and Plant Health in the New Millennium
Lecture: 21 **Dr. Debprasad Chattopadhyay** Director ICMR-NITM Belagavi, Karnataka, India		Furin and TMPRSS2 receptor blocking: can it be a potential therapeutic option for Covid-19?
Lecture: 22 **Prof. Rajib Bandyopadhyay** Dept. of Instrumentation & Electronics Engg., Jadavpur University, Kolkata		Non-invasive and rapid quality assessment of medicinal plants using NIR and Raman spectroscopy

Day 2: Friday: December 18, 2020

Panel Discussion: Session V: 10:00–01:00 PM (IST)

"Food as Medicine – Exploring therapeutic potential"

Chairperson:

Dr. Subhash C. Mandal, SFE Executive Member, Directorate of Drugs Control, Govt. of West Bengal, Kolkata
Dr. Y. Rajashekar, Institute of Bioresources and Sustainable Development, Imphal, India
Dr. Sinam Yoirentomba Singh, Project Co-ordinator, MSME, Technology Centre, Imphal, India
Dr. Ningthoujam Sanjoy Singh, G.P Womens College, Imphal, Manipur, India

Speaker		Title
Welcome note: **Prof. Pulok K Mukherjee** Director, Institute of Bioresources and Sustainable Development, Imphal, India		Welcome note: "Food as Medicine – Exploring therapeutic potential"
Lecture: 23 **Dr. Mohd. Aslam** Former Adviser (Scientist 'G') Dept. of Biotechnology,Ministry of Science & Technology, Govt. of India, New Delhi		"Phytopharmaceuical misison – Initiatives of DBT"
Lecture: 24 **Prof. Jyoti Prakash Tamang** Department of Microbiology Sikkim Central University, Gangtok, Sikkim		Eat Traditional Foods as Drugs to Combat COVID-19: A Hypothesis
Lecture: 25 **Dr Rajan Radhakrishnan** Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai		Potential role of Natural Products in the fight against Covid-19
Lecture: 26 **Dr. Subhra Chakraborty** Director DBT -National Institute of Plant Genome Research, New Delhi		Plant-derived metabolites in fighting COVID-19 pandemic
Lecture: 27 **Dr. Arun Bandyopadhyay** Director CSIR-Indian Institute of Chemical Biology Jadavpur, Kolkata, India		Repositioning R&D activities for the mitigation of Covid-19 – Efforts of CSIR-IICB
Lecture: 28 **Prof. Sitesh C. Bachar** Faculty of Pharmacy University of Dhaka Dhaka, Bangladesh		Ethnopharmacological evaluation of Ginger available in Bangladesh
Lecture: 29 **Dr. Pallab K. Haldar** Director School of Natural Product Studies, Jadavpur University, Kolkata		IBSD-JU initiatives of Research on Natural Resources –Special Referenece to Zebra Fish model
Lecture: 30 **Dr. Sayeed Ahmad** Coordinator, SFE-Delhi Chapter, School of Pharmaceutical Education & Research, JAMIA HAMDARD, New Delhi, India		Phytochemical analysis & ethnopharmacology

Ethnopharmacology Conclave: Session VI: 01:15 PM–02:45 PM (IST)

Moderators:

Dr. Prakash R. Itankar, Department of Pharmaceutical Sciences, R. T. M. Nagpur University Nagpur, India
Dr. Ch. Brajakishor Singh, Institute of Bioresources and Sustainable Development, Imphal, India
Dr. L. Sathiyanarayanan, Poona College of Pharmacy, Bharati Vidyapeeth, Pune, India

Name		Title
Lecture: 31 **Prof. Pulok K Mukherjee** Director, Institute of Bioresources and Sustainable Development, Imphal, India		Ethnopharmacology Conclave "Traditional healers – Source of therapeuticals from nature"
Lecture: 32 **Dr. Bob Allkin** The Royal Botanic Gardens, Kew United Kingdom		
Lecture: 33 **Dr. Prakash R. Itankar** Coordinator, SFE-Nagput Chapter,Department of Pharmaceutical Sciences, R. T. M. Nagpur University, Nagpur, India		Traditional Community Health Practitioners of India as COVID Warriors
Lecture: 34 **Dr. L. Sathiyanarayanan** Coordinator, SFE-Pune Chapter,Associate Professor, Poona College of Pharmacy, Bharati Vidyapeeth, Pune, India		Research potential of indian propolis

Lecture: 35

Shri. Vaidya Sukhalal Ji
Traditional Healthcare Practitioner
Jharkhand, India

Lecture: 36

Shri. Nirmal Kumar Awasthi
Traditional Healthcare Practitioner
Raipur, Chhattisgarh, India

Lecture: 37

Shri. Tombiraj
Traditional Healthcare Practitioner
Manipur, India

Lecture: 38

Dr. Krishankanta Nath
Traditional Healthcare Practitioner
Jorhat, Assam

Lecture: 39

Shri. Ramkrishna Pokhriyal
Traditional Healthcare Practitioner
Uttarakhand, India

Lecture: 40

Shri. Vaidya B. Arumugapandian
Traditional Healthcare Practitioner
Chennai, India

Lecture: 41

Shri. Shridhar Desai
Traditional Healthcare Practitioner
Uttara Kannada, Karnataka

Lecture: 42

Shri. Anup Sarkar
Traditional Healthcare Practitioner
Kolkata, India

Plenary Lectures: Session VII: 02:50 PM–04:30 PM (IST)

Chairpersons:

Prof. N. Mohilal, Dept. of Zoology, Manipur University, Manipur, India

Dr. Chandana Barua, Coordinator, SFE-Gauhati Chapter, College of Veterinary Science, Guwahati.
Dr. Samar Roychowdhury, Institute of Bioresources and Sustainable Development, Imphal, India
Dr. Albert Chiang, Institute of Bioresources and Sustainable Development, Imphal, India

Name		Title
Lecture: 43 **Dr Surajit Sinha** School of Applied and Interdisciplinary Sciences, Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700 032, India		Combination Approach for the Management of Coronavirus Infection using Antisense- based Antiviral Therapy and Immunomodulators
Lecture: 44 **Dr. Dilip Ghosh** Director, Nutriconnect, Sydney, Australia		Role of Nutraceuticals/Botanicals in Immunity during Covid-19 pandemic
Lecture: 45 **Dr. Arindam Maitra** Associate Professor National Institute of Biomedical Genomics Kalyani, WB, India		PAN-INDIA 1000 SARS-CoV-2 RNA Genome Sequencing Reveals Temporal Haplotype Diversities and Emerging Mutations in India
Lecture: 46 **Dr. Partha Roy** Dept. of Biotechnology, Indian Institute of Technology Roorkee, Uttarakhand		Anti-osteoporotic and anti-osteoclastogenic effect of medical plants with special reference to *Piper betle* leaf extract and its main active constituent hydroxychavicol: A mechanistic analysis

Student Interactive Forum: Session VIII: 04:30–06:30 PM (IST)

Moderators:

Mr. Fabien Schultz, International Society for Ethnopharmacology,
Technical University of Berlin, Neubrandenburg University of Applied Sciences, Germany

Dr. Sarangthem Indira Devi, Institute of Bioresources and Sustainable Development, Imphal, India

Dr. Kshetrimayum Birla Singh, Dept. of Zoology, Manipur University, Manipur, India

Dr. Sunil Thorat, Institute of Bioresources and Sustainable Development, Imphal, India

Dr. Santanu Bhadra, Member, Society for Ethnopharmacology, Kolkata, India

Name	Title
Lecture: 47 **Cate Risener** USA	Exploring the Potential of Natural Products to Combat COVID-19
Lecture: 48 **Imrat** India	Anti-viral potential of small double-stranded RNA (dsRNA) produced by food fermenting lactic acid bacteria
Lecture: 49 **Tenille Esmear** South Africa	The potential of gold nanoparticles of a Southern African plant waste product for SARS CoV2
Lecture: 50 **Amit Kar** India	Metabolome analysis and interaction potential of *Plumbago zeylanica* with CYP450 enzyme

Lecture: 51 **Fengke Lin** China	Ethnobiology-guided investigations on microbiological and biochemical profiles of Laowo dry-cured ham, an indigenous fermented food from Southwestern China
Lecture: 52 **N. Bunindro Singh** India	Isosecotanapartholide; A novel biofumigant derived from Indian ancient medicinal plant
Lecture: 53 **Pia Raab** Austria	Ethnopharmacological investigations of the bark of *Albizia julibriss*in Durazz.
Lecture: 54 **Subhadip Banerjee** India	Immunoprotective potential of Ayurvedic herb Kalmegh (*A. paniculata*) against Covid -19

Day 3: December 19, 2020

Plenary Lecture: Session IX: 10:00-12:30 PM (IST)

Chairpersons:

Dr. A. Guneshwar Sharma, Directorate of Health Department, Ministry of AYUSH, Govt. of Manipur, India
Dr. Nanaocha Sharma, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Th. David , National Institute of Technology, Imphal, India
Prof. Sanmoy Karmakar, Dept. of Pharm Tech. Jadavpur University, Kolkata, India

Name		Title
Welcome note: **Prof. Pulok K Mukherjee** Director, Institute of Bio resources and Sustainable Development, Imphal, India		"Developing bioresourecs of NER – Ethnopharmacological perspectives"
Lecture: 55 **Prof. Geoffrey A. Cordell 4** President Natural Products Inc., USA		Cyberecoethnopharmacolomics and the Quality Control of Traditional Medicines
Lecture: 56 **Dr. N. C. Talukdar** Vice Chancellor Assam down town University (AdtU) Guwahati		Variation in biosynthesis of an effective anticancer secondary metabolite,mahanine in Murraya koenigii is related to soil physicochemistry and weather suitability of the sites of its cultivation
Lecture: 57 **Dr. J. Wijayabandara** Faculty of Allied Health Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka		Immunostimulatory effects by traditional medicines – An attractive and safer alternative to combat COVID-19 virus
Lecture: 58 **Prof. Joykumar Meitei Laishram** Central Agriculture University Imphal, Manipur, India		Genetic studies of fragrance and pericarp colour and molecular markers in Black Scented Rice of Manipur (*Chakhao*)
Lecture: 59 **Dr. K. Mruthunjaya** Coordinator, SFE-Mysuru Chapter Dept. of Pharmacognosy JSS College of Pharmacy, JSS Academy of Higher Education & Research, Mysuru, India		Herbs as a source of platelet enhancers
Lecture: 60 **Prof. Sanjit Dey** Department of Physiology Calcutta University, Kolkata, India		Natural Phytochemicals are Mother Nature's Weapon Against Diseases

Oral Presentation I: Session X: 12:30-03:00 PM (IST)

Chairpersons:

Dr. Satyanshu Kumar, Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat, India
Dr. Rajesh Singh Pawar, Truba Institute of Pharmacy, Bhopal, India
Dr. Sauvik Halder, Dept. of Chemistry, Jadavpur University, Kolkata
Dr. Pardeep K. Bhardwaj, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Lokesh Deb, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Saleemulla Khan, Principal, P A College of Pharmacy, Mangalore, Karnataka
Dr. Sabeela Beevi, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India '
Dr. L. Shantikumar Singh, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India

Name	Title
Kimi Ralte Institute of Bioresources and Sustainable Development-Mizoram Node, Aizawl, India.	*Plukenetia volubilis'* L. (Euphorbiaceae), "*sacha inchi*" growing in Mizoram: A rich natural source of omega-3 and omega-6 fatty acids.
Bharti Kashyap Institute of Bioresources and Sustainable Development, Meghalaya Node, Shillong, India	*Swertia chirayita*, a critically endangered medicinal plant, conservation through *ex-situ* cultivation in Shillong Meghalaya, India.
Saimon Shahriar Department of Pharmaceutical Chemistry, University of Dhaka, Bangladesh	Anxiolytic, Antidepressant and Thrombolytic Potential of Achyranthes Aspera L. Aerial Parts: in-vivo, in-vitro and in-silico Techniques
Joshua Khumlianlal Institute of Bioresources and Sustainable Development, Imphal, India	Study of the diversity and pharmacological property of Macrofungi from three Districts of Manipur
Sheeba Nazir Department of Pharmaceutical sciences, School of Applied Sciences & Technology, University of Kashmir, Srinagar, India.	Ethno medicinal Importance of *Lavatera cashmiriana* Camb. – A wild herb of Kashmir Himalaya
Varsha Thapa Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Endophytes from *Paris polyphylla* Smith, an indigenous plant of Sikkim Himalaya exhibiting antifungal activities
Ningombam Malemnganbi Chanu Lovely Professional University, Punjab	Comparative analysis of the anticancer potential of *Moringa oleifera* L. varieties
Rupesh Banerjee School of Natural Product Studies, Jadavpur University, Kolkata, India.	Phytochemical profiling and *In vitro* antibacterial potential of Argyreia speciosa Linn.: A Traditional Medicinal Plant
Y. Rajlakshmi Devi Institute of Bioresources and Sustainable Development, Imphal, India	Gut microbiota associated with oak tasar silkworm, *Antheraea proylei* J. (Lepidoptera: Saturniidae) infecting with Tiger band disease.
Prashant Kumar Singh Pachhunga University College, Mizoram University, Aizawl, India.	Computational screening of natural compounds and conventional antiviral drugs to discover potent pan-serotype inhibitors against Severe Acute Respiratory Syndrome-Corona Virus-2 (SARS-CoV2) molecular targets
Suhas R. Dhaswadikar Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, India	Phytochemical standardization and anti-hemorrhoidal potential of leaves from Dolichandrone falcata in croton oil induced hemorrhoid rat model

Subecha Rai Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Anti-microbial activity of an endophytic actinomycete from *Panax sokpayensis* against *Staphylococcus aureus*
Okram Abemsana Devi College of Community Science, Assam Agricultural University, Assam, India	Phytochemical screening of secondary metabolites from four aquatic plants of Manipur
Gopinath Mondal Institute of Bioresources and Sustainable Development, , Imphal, India	Feeding entertainment of daily rhythm of mRNA expression of melatonin bio-synthesizing enzyme genes and clock associated genes in the zebrafish gut.
Madhusmita Mahapatra Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Traditional Healthcare Knowledges of West Sikkim, North-East India
Bhumika Gurung Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Hypoglycemic potential of Tupistra nutans Wall. (Nakima)
Robinson Huidrom Institute of Bioresources and Sustainable Development, Imphal, India.	Phytochemical and GC-MS profiling of volatile flavor compounds in two Asian wild rice- *O. rufipogon* Griff. and *O. nivara* Sharma et Shastry
Raut P Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, India	Development And Evaluation Of Transdermal Patches With Cissus Quadrangularis Plant Extract
Saini Mayanglambam Institute of Bioresources and Sustainable Development, Imphal, India.	A promising potential extract of Crofton weed, *(Ageratina adenophora)* to control cruciferous pests
Barun Dasgupta School of Natural Product Studies, Jadavpur University, Kolkata, India	Metabolite profiling & evaluation of CYP450 interaction potential of *Benincasa hispida*- An Indian medicinal food plant
Mohammad Faheem Khan Era's Lucknow Medical College, Era University, Lucknow, UP, India	Identification of Dietary Molecules as Potential SARS-CoV-2 Agents by using Computational Approach
Heisnam Rameshwari Devi Institute of Bioresources and Sustainable Development, Imphal, India.	*In vitro* anticancer potential of some freshwater cyanobacteria from Northeast India
Ng Ngashangva Institute of Bioresources and Sustainable Development, Imphal, Manipur	De novo whole genome sequencing and proteomic analysis of antimicrobial peptides from Paenibacillus peoriae IBSD35, an endophytic bacterium isolated from traditionally used medicinal plant Millettia pachycarpa Bentham.
N Mekrini Jennifer Institute of Bioresources and Sustainable Development, Imphal, Manipur	Evaluation of phytochemical analysis of Prunus species from Mao, Manipur
Thounaojam Salvia Devi Dept of Microbiology, Sikkim Manipal Institute of Medical Sciences (SMIMS), Gangtok, Sikkim, India	Drug resistance pattern of E-coli and Klebsiella pneumonia isolated from clinical samples (Central Referral Hospital, Sikkim): a cause of concern in today's era.
Seha Singha School of Natural Product Studies, Jadavpur University, Kolkata, India	Marker profiling and *in-vitro* α-glucosidase & α-amylase inhibitory potential of *Cucurbita maxima* fruits – A food plant

Oral Presentation II: Session XI: 02:30-05:00 PM (IST)

Chairpersons:

Mr. Prabir Banrerjee, EC Member, Society for Ethnopharmacology, India
Dr. Pramod HJ, Head. Dept. of Pharm. Tech., KLE university, Belgaum, India
Dr. J.K. Shukla, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Mr. Amitavo Das, EC Member, Society for Ethnopharmacology, India
Dr. Evanylla Kharlyngdoh, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Mr. Bharat Somkuwar, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India
Dr. Amit Kumar Rai, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India

Name	Title
Lokesh Deb Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Identified therapeutic resources from industrial waste of *Cymbopogon flexuosus* (Nees ex Steud.) W. Watson (East Indian lemon grass)
Subecha Rai Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Actinomycetes isolates from *Panax sokpayensis* of Sikkim exhibiting antibacterial activity
Pardeep Kumar Bhardwaj Institute of Bioresources and Sustainable Development, Regional Centre, Sikkim, India.	Chemical and molecular analysis of ginsenoside biosynthesis in *Panax sokpayensis*: A potential ginseng resource from Northeastern Himalaya
Weekar Younis Raja Faculty of Applied Sciences and Technology, University of Kashmir, Srinagar, India	Hypolipidemic potential of hydro alcoholic root extract of Viburnum cotinofolium d.don in cholesterol induced albino rats
Khaidem Devika Chanu Institute of Bioresources and Sustainable Development, Imphal, India.	Phytochemical analysis of *Ageratina adenophora* plant for its antiproliferative and antitumor properties against human cancer cell lines
Yugeshwari modak Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, India	Polyherbal Formulation Derived from Traditional Medicinal Plants for the Treatment of Arthritis
Sonia Sougrakpam Institute of Bioresources and Sustainable Development, Imphal, India.	Chemistry and behavioural activity of essential oil of *Artemisia* sp. against *Aedes aegypti*
Sayan Biswas School of Natural Product Studies, Jadavpur University, Kolkata, India.	Enhanced bioavailability and hepatoprotective potential of optimized (+) catechin catechin-phospholipid complex
P.C. Lalbiaknii Department of Botany, Mizoram University, Aizawl, India	In silico Validation and Pharmacological Activity of potent antiviral and anti-inflammatory Ethno-medicinal plants used by Traditional healers and Herbalists within Lunglei District, Mizoram
Hijam Aruna Chanu Department of Biotechnology, Manipur University, Imphal, India	Evaluation of antioxidant and neuroprotective activities of crude methanol extract of *Salix tetrasperma* leaves.
Ruth Zomuansangi Department of Biotechnology, Mizoram University, Aizawl, Mizoram	Anti-microbial and Antibiofilm potential of Viniferin (Phyto-compounds) against *Streptococcus pneumoniae*
Awadhesh Kumar Aromatic and Medicinal Plants, Mizoram University, Aizawl, India	Collection, Documentation of Ethnomedicinal Plants and Ethnic Foods of AO Tribe of Mokokchung, Nagaland
Kabrambam Dasanta Singh Institute of Bioresources and Sustainable Development, Imphal, India.	A study on insecticide molecule isolated from *Dillenia indica* against stored grain pests

P. B. Lalthanpuii Department of Zoology, Mizoram University, Aizawl, Mizoram	Pharmacological potentials of *Acmella oleracea*, an ethnomedicinal plant of the Mizos
Soibam Thoithoisana Devi Institute of Bioresources and Sustainable Development, Imphal, India.	Cytotoxic activity of *Garcinia xanthochymus* extract against lung cancer cell line A549.
Suparna Ghosh School of Natural Product Studies, Jadavpur University, Kolkata, India.	Anti-Cholinesterase potential and safety evaluation of standardized *Ipomoea aquatica* (Forsk) extract
Sijagurumayum Dharmajyoti Devi Institute of Bioresources and Sustainable Development, Imphal, India.	Differential gene expression and immunohistochemical localization of the key melatonin bio-synthesizing enzymes in the testis of zebrafish (*Danio rerio*).
Kshetrimayum Vimi Institute of Bioresources and Sustainable Development, Imphal, India.	Anti-proliferative activity of crude methanolic extract of *Paris polyphylla*.
Subhalakshmi Shijagurumayum Department of Botany, Manipur University, Imphal, India	Metabolite Profiling of different pigmented rice (*Oryza sativa L.*) and study of antioxidant properties.
Leichombam Mohindro Singh Institute of Bioresources and Sustainable Development, Imphal, India.	Antioxidant and antimicrobial activity from methanolic extract of *Phylanthus niruri*
Thokchom Sonia Devi North Eastern Regional Institute of Science & Technology, Arunachal Pradesh, India	Role of wild banana pseudostems in socio-economic development, livelihood support and traditional medicine in Manipur
Sandipan Jana School of Natural Product Studies, Jadavpur University, Kolkata, India	Metabolite analysis and *in-vitro* α-glucosidase inhibitory potential *Luffa acutangula* (L.) Roxb (ridge gourd
Thangjam Davis Singh Department of Biotechnology, Manipur University, Imphal, India	Anticancer effect of 'Compound X' and its synergistic effect to enhanced the therapeutic potential of chemotherapeutic drug 'Cisplatin'.
Nilesh K. Mehta Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, India	A Comparative pharmacognostic study of A*sparagus racemosus* collected from wild and cultivated habitat
Surmani Huidrom Institute of Bioresources And Sustainable Development, Takyel, Imphal, India	Characterisation of antibacterial activity of Lactic acid bacteria from fermented passion fruit beverages

Valedictory Program: 05:00 PM -05:30 PM (IST)

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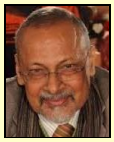

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ScientistIBSD, Imphal, India

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Scientist, IBSD, Imphal, India

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Director, IBSD, Imphal, Manipur, India

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CV & ABSTRACT OF SPEAKERS

7th Convention of

Society for Ethnopharmacology, India

&

International Symposium

on

"Combating COVID-19- ethnopharmacology & Traditional Food and Medicine''

December 17-19, 2020

KEY NOTE LECTURES

Dr. Thirumalachari Ramasami

Former Secretary to Government of India, Ministry of Science and Technology, Nayudamma Abdul Wahid Chair Professor, Anna University, Centre of Academic and Research Excellence, CSIR-Central Leather Research Institute, Adyar, Chennai, India

Dr T. Ramasami is the former secretary to the Government of India. He served in the Ministry of Science and Technology during May 2006-14. Prior to joining DST as Secretary, he was the Director of Central Leather Research Institute, Chennai during 1996- 2006. He has made some important research contributions in the areas of chemistry of chromium, electron transfer phenomena, molecular sciences, environmental sciences and technology as a scientist. His contribution to the changes in the technological paradigm in Indian leather sector based on "Do Ecology" options is well known. During the period of his directorship, CLRI made some impactful contributions. His tenure in DST as Secretary saw some landmark changes in both department and in Indian science, technology and innovation sector. He was a major contributor to the ideas behind, INSPIRE, PURSE, formation SERB and formulation of Science, Technology and Innovation policy 2013. He is winner of Bhatnagar prize in chemical sciences in 1993, Padma Sri 2001, Padma Bhushan 2014 and many others. He is Fellow of Indian Academy of sciences, Indian National Science Academy, The National Academy of Sciences and India, Indian National Academy of Engineers, and The World Academy of Sciences.

Title: Ethnobiology in New Normal after COVID 19

Dr. Thirumalachari Ramasami

Former Secretary to Government of India, Ministry of Science and Technology Nayudamma Abdul Wahid Chair Professor, Anna University, Centre of Academic and Research Excellence, CSIR-Central Leather Research Institute, Adyar, Chennai, 600 020, India.

Discipline of ethnobiology is truly an interdisciplinary science. It involves the study of past and present. It relies on relationships between humans, cultures and their biological environment. The traditional use of plants and animals for meeting sociological and health care need of the mankind has been the primary motivator for research in ethnobiology. Ethnobiology is a field study based subject and involves interactions of people and seamless connectivity among societies.

COVID 19 as a global pandemic has thrown open several challenges. Social distancing has become a global norm. It is unlikely in the new normal after COVID 19 pandemic field work dependent knowledge disciplines could revert to “practices of the periods prior to COVID 19. That the SARS-CoV-2 may have originated from wild animals raises many new challenges in ethnozoology for averting future pandemics of the COVID 19 type. Ethnobotany offers new scope for coping with such pandemics by increasing the immunity levels of human beings against the virus.

While COVID 19 has thrown open several challenges, its transmission pathways and spread may have caused some irreversible changes in social interactions among people with online mode communication channels playing more serious roles than the past. Practice of ethnobotany in the new normal could far different from those of earlier times.

Post COVID 19 reality is likely to pose both new challenges and hitherto unavailable opportunities for all field study based investigations including ethnobiology. Participative research involving local communities would need new tools and even setting up platforms for remote interactions and communication. It is proposed to outline a Challenge, Opportunity, Strategy and Threat (COST) analysis of COVID 19 pandemic on the way ethnobiology could reshape in the new normal.

Dr. Roy Upton

President, American Herbal Pharmacopoeia, USA

Dr. Roy Upton, RH, DipAyu is the founder, executive director, and editor of the American Herbal Pharmacopoeia (AHP). Roy is also co-founder and past president, of the American Herbalists Guild (AHG), and serves on botanical expert advisory committees of AOAC International, the American Botanical Council, NSF International, the Lloyd Library and Museum, the journal Chinese Herbal Medicines, and the World Journal of Traditional Chinese Medicine. Roy is actively involved in many aspects of herbal product quality control as Director of the California-based herbal company Planetary Herbals, as a member of the Standards Committee of the American Herbal Products Association, and member of the Expert Advisory Committee for the Botanical Safety Handbook. Roy has been working and practicing professionally as an herbalist since 1981. He is trained in Ayurvedic, Traditional Chinese, and Western herbal medicine and has also studied and worked extensively with Native American and Caribbean ethnobotanical traditions.

Title: American Herbal Pharmacopoeia: Triphala Monograph and Therapeutic Compendium International collaboration for the promotion of Ayurveda

Dr. Roy Upton

As evidenced by the explosion and acceptance of traditional Chinese medicine worldwide, the Western world is in dire need of directions in health care to complement the focus of disease care reflected in modern conventional medicine practices. The United States is particularly suited for Ayurveda as public health statistics are among the worst in the world in all metrics of health, America has the most expensive system worldwide, other Indian traditions such as yoga are in every community, and the relatively free market presents unique opportunities for the promotion of Ayurveda and all it has to offer. Triphala is one of the most important compounds of Ayurveda and perhaps the oldest continually used herbal formula on the planet. The development of the AHP's Triphala Monograph and Therapeutic Compendium was a result of an international collaboration with experts in India to provide the most comprehensive treatise on Triphala in the English language and provides a model for future collaborations. More importantly, Ayurveda, with its various branches of practices ranging from dietetics, materia medica, pancha karma, yoga, and meditation, presents a fully realized system of integrative medicine of immense benefit to public health.

Dr. JLN Sastry

CEO, National Medicinal Plant Board, Govt. of India, New Delhi

Dr. J.L.N. Sastry hails from a traditional Ayurvedic family from South India (Kakinada, Andhra Pradesh). He is currently working as CEO-NMPB (National Medicinal Plants Board), Ministry of AYUSH, Govt. of India, New Delhi since 8th January 2020. He was Head & Vice-President, Healthcare Research, Dabur India Ltd., for 8 years before joining NMPB. He had > 30 years of professional experience in various capacities. He is involved with practice; teaching; drug development & clinical research He worked for 12 years as govt Medical Officer (Ayurveda) both state and central Govt. before joining Dabur as Head-Clinical Research in 2004 (2004-07). Then he practiced for 5 years before joining Dabur again. He was holding additional responsibilities of honey & glucose and bio-resources division of Dabur India Ltd. Dr. Sastry is a post-graduate in Ayurveda i.e., M.D. (Ayurveda) from NTR Univ. of Health Sciences. He did his Ph.D. from Maharashtra Univ. of Health Sciences. He is recipient of two gold medals from Nagarjuna University during under graduation and he is recipient of a silver medal and a gold medal for his PG dissertation. His work 'CARDIAC DISEASES & THEIR MANAGEMENT THROUGH AYURVEDA' received national award – 2002 from Vaidyaratnam, Trissur. He received “CHARAK INTERNATIONAL AWARD” from AAPNA association, USA in October 2010. He published more than 15 reference books on various aspects of Ayurveda. He got more than 30 publications in various journals. He had presented several clinical and scientific papers at regional, national and international seminars (>50 No.s). He had given Radio-talks, TV interviews, and guest lectures at various prestigious institutes. He was a member in almost all industrial bodies in one or other capacity. He is present member of the USP-HMC South Asia Expert Committee; PCIM&H (Pharmacopoeia Commission for Indian Medicine & Homoeo.); HS-Code Committee of RIS / FITM; FSSAI-AYUSH Expert Committee on Nutraceutical herbs.

Title: Potential Immunomodulatory Herbs for Covid-19 management

PLENARY LECTURES

Prof. N. Rajmuhon Singh

Dept. of Chemistry, Manipur Central University, Manipur, India

Prof. N. Rajmuhon Singh specializes in Physical Chemistry and is currently the Chairman Library Committee at Manipur University. He has rendered his services to the Manipur University in the university Administration since 2001 till date holding various post such as Dean, School of Mathematical and Physical Sciences, Dean of Students' Welfare Manipur University, Head, Department of Chemistry, Manipur University, Member of Syndicate, Senate, Court, Board of Studies, Academic Council, Deputy Co-Ordinator, UGC- SAP etc. Prof. N. Rajmuhon Singh has 35 years of Teaching Experience, supervised and co- supervised a lot of PhD and M.Phil students including M.Sc dissertation and projects. He has published 13 Major Research Project, 110+ Research Paper, Books and was a peer reviewer in Elsvier and Spriger. He is a recipient of Junior Research Fellowship (UGC LASER SCHEME), Naorem Amuba Singh Teacher Award 2010, Certificate of Appreciation, 2013 for Engendering a Strong Environmental Conscience; State Science Communicator Award, 2016; and Best Science Writer, Wangkheirakpam Gautam Memorial Award 2020.

Title: NEED OF REVITALIZATION OF TRADITIONAL KNOWLEDGE OF MANIPUR: With Special Reference to Dying, Health Care and Fermented Foods

Prof. N. Rajmuhon Singh

"Indigenous people are entitled to the recognition of the full ownership, control and protection of their cultural and intellectual property. They have the right to control, develop and protect their science, technologies and cultural manifestations, including human and other genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs and visual and performing arts" – Article 29 of the UN Draft Declaration on the Rights of the Indigenous People, 1993. The decade beginning January 1, 1995 was being observed as the "International Decade for the World's Indigenous and Ethnic People". There is an inextricable link between indigenous ethnic culture and biological diversity. The North-Eastern region of India and Specially Manipur is a genetic treasure house of plant, animal and microbial resources. Traditional knowledge or native skills of the ethnic people is biodiversity conservation and bio resource management including medicinal plants/herbs, hill farming, livestock management, food fermentation etc., are well known and worth documentation for modern science. Several approaches need to be explored to document and to strengthen the initiatives on bio-resource products and their management. There are a number of traditional knowledge systems, viz. traditional healing, dying, handicrafts, fishing, gardening, etc. amongst the 29 ethnic communities of Manipur. It is the need of the hour to work for revitalization of indigenous traditional knowledge of Manipur. In this paper, emphasis is given to three indigenous knowledge system: traditional knowledge of dying, traditional knowledge of healthcare system and traditional knowledge of fermentation process.

Prof. Alexander N. Shikov

Dept. of Pharmaceutical Formulations, St. Petersburg State Chemical, Pharmaceutical University, Russia

Alexander Shikov Ph.D., Dr. pharm.Sci. is the Professor at the Department of Pharmaceutical Formulations at the St. Petersburg State Chemical Pharmaceutical University since 2016. He completed his PhD at the Saint-Petersburg State Chemical Pharmaceutical Academy in 1995 and obtained his Dr. Pharm.sci. degree from Saint-Petersburg State Chemical Pharmaceutical Academy in 2006. Dr. Shikov began his career with the St-Petersburg State Chemical Pharmaceutical Academy in 1992 as a professor assistant at the department of drugs technology and phytopreparations. He became a Deputy of the general director in science at the Interregional Center “Adaptogen”, St-Petersburg, Russia in 1998, deputy of the general director at the St-Petersburg institute of Pharmacy in 2008, and was promoted to Professor at the Department of Pharmacology of the North West State Medical University named after I.I. Mechnikov, St-Petersburg, Russia in Sept. 2009. He serve as associate editor of *Journal of Ethnopharmacology* (Elsevier BV, The Netherlands) from 2015, associate editor of Frontiers in Pharmacology Ethnopharmacology (Frintiers Media S.A.) from 2018, and as member of editorial board *Phytomedicine, International Journal of Phytopharmacology and Phytotherapy* (from 2009), *Chinese Herbal medicine* (from 2013), *Chinese Journal of Natural Medicine* (from 2013), *Synergy* (from 2013), and *World Journal of Traditional Chinese Medcine* (from 2014). He has been authored or co-authored about 200 articles in Russian and international peer-reviewed journals. His main research interest is focused on plant adaptogens,marine oroducts, standardization of natural products (herbal and marine), pharmacokinetic of natural compounds and approaches to improvement of bioavailability of natural molecules

Title: Fucoidan and COVID-19: some benefits based on biomolecular mechanisms

Alexander N. Shikov

Marine seaweeds have been used in the traditional medicine of many countries and are of interest for the development of new effective drugs. Fucoidans are biologically active sulfated polysaccharides that are synthesized by brown algae. Their analogs have not yet been found in terrestrial organisms. In recent years, fucoidans have become the subject of increased attention and numerous studies. Fucoidan has displayed potent radical scavenging and reducing power activities. It significantly inhibits the cyclooxygenase-2 (COX-2) enzyme with a greater selectivity index than the synthetic non-steroidal anti-inflammatory drug indomethacin. Fucoidan attenuated the lipopolysaccharide-induced expression of mitogen-activated protein kinase p38. Fucoidan prolongs the activated partial thromboplastin time and thrombin time. A significant increase in prothrombin time was observed after the concentration of fucoidan was increased above 80 μg mL−1. This evidenced that fucoidan may have an effect on intrinsic/common pathways and little effect on the extrinsic mechanism. Antioxidant, anti-inflammatory, and anticoagulant drugs have been recently recommended for the management of COVID19 complications. It has been suggested that a proper dose of anti-oxidants may ameliorate the cardiac injuries of critically ill patients with COVID19. Chinese scientists have come to the conclusion that anti-inflammatory treatment, started at the right time, is crucial in the therapy of patients with COVID19. Prophylactic doses of low-Mw heparins are recommended for all patients who require hospitalization for the management of COVID19 coagulopathy. In summary, fucoidan could be considered as a prospective candidate for the amelioration of the treatment of patients with COVID19; however, additional research in this field is required.

Prof. Pramod Tandon

Former, Vice-Chancellor, North-Eastern Hill University, Shillong

Prof. Pramod Tandon, former Vice-Chancellor of North-Eastern Hill University, Shillong is a widely recognized educationist, scientist and institution builder who has rendered exceptional and distinguished service to the people of the northeastern region of India for nearly four decades. Presently, Prof. Tandon is Chief Executive Officer of Biotech Park, Lucknow, promoting entrepreneurship in biotechnology-based industry for the benefit of society. During the last five decades, he has made seminal contributions in micropropagation, re-establishment in nature, and recovery and conservation of critically endangered endemic plants of Northeast India. Mass micropropagation programme of forest plants by his group has direct relevance to societal needs and economic development. Prof. Tandon is a Fellow of the National Academy of Sciences, India, Indian Botanical Society, Linnean Society of London and International Society of Environmental Botanists, and served as a member of many Academic bodies and National Task Forces including Scientific Advisory Committee to the Cabinet, Government of India and National Advisory Council to the Prime Minister. Prof. Tandon is the recipient of many prestigious awards and recognitions, notably: Padma Shri (2009); Award of Millennium Plaques of Honour (2008-'09); B.P. Pal National Environment Fellowship Award on Biodiversity (2002-'04), Ministry of Environment & Forests, Government of India.

Title: North-East India: People, Bioresources and livelihood options under COVID-19 Scenario

Pramod Tandon

North-Eastern region of India is very rich in cultural, ethnic, linguistic and biodiversity. Being a small area inhabited by mostly tribes and sub tribes, it has 50% of country's fauna and flora. The region is reported to be the richest reservoir of genetic variability in a large group of plants. Many crop plants are considered to have originated here with numerous wild relatives. Medicinal plant wealth and traditional knowledge systems are astounding. The people of the region are dependent on forest bioresources for their livelihood. However, the main challenge remains to bring about socio-economic development of the region neglected for so long. Using judiciously the bioresources can bring about prosperity of the region. Towards this end, there is a strongly-felt need for entrepreneurship development amongst the youth of the region for livelihood opportunities. Covid-19 pandemic though not so serious in North-East has opened up many new avenues for the people of the region. The daunting task is to prepare for costly but beneficial revolution in healthcare. Concerted efforts of scientists from Research & Development Institutes, Academic Institutions and Industry can really help in development of bioresources of the region particularly for combating the present pandemic. This presentation will introduce some of the areas mentioned above as a way forward for preparation of the foundation for the long-term development of the bioresources of the region.

Prof Ibrahim Jantan

School of Pharmacy, Taylor's University, Malaysia

Dr. Ibrahim Jantan is a Professor in Medicinal and Natural Products Chemistry at Taylor's University, Selangor, Malaysia. He graduated from University of Mansoura, Egypt with B.Pharm (Hons) degree in 1981, obtained his MSc in Medicinal Chemistry from University of Minnesota, USA in 1985 and his PhD degree in Natural Products Chemistry from the University of Malaya in 1993. He was the founding Dean of the Faculty of Pharmacy, Universiti Kebangsaan Malaysia from 2008 to 2015. He is the President of the Malaysian Natural Products Society and a Research Advisor of Nan Yang Academy of Sciences (Singapore). He has more than 33 years of research experiences in natural products and medicinal chemistry and pharmacological activities of natural products. He has supervised 22 PhD & 23 MSc. students. He has published over 190 papers in ISI-indexed journals, and been invited to deliver many keynote, plenary and invited lectures in local and international conferences.

Title: Plant-based immunomodulators as potential candidates for development of adjunctive therapy for COVID-19

Dr. Narayan C. Talukdar

Assam Down Town University, Sankar Madhab Path, Panikhaiti, Guwahati-781026

N. C. Talukdar, Vice Chancellor, Assam down town University and former Director of IASST, DST, Guwahati and IBSD, DBT, Imphal. He did his Ph. D. from University of Saskatchewan, Saskatoon, Canada. His research interests include medicinal plant resources, traditional knowledge based drug discovery, soil microbial biodiversity, integrated nutrient management and ecological farming. He had 15 years of teaching experience with research in AAU Jorhat and supervised 25 Ph. D. research, 20 M. Sc. thesis dissertation research. He has published more than 100 research papers, edited one book, filed and published 12 Indian patents and 1 International patent. He is a Recipient of Canadian Commonwealth Scholarship, FAO Rome Fellowship, DBT Overseas Associateship. For his able leadership of 7 years, IASST bagged “Assam State Science Award 2019” of the Ministry of Science and Technology, Govt. of Assam for excellence in Scientific Research and carrying the benefits to masses including among weaker sections of Society. Currently he is also a national consultant of Food and Agricultural Organization (FAO), Rome.

Title: Variation in biosynthesis of an effective anticancer secondary metabolite,mahanine in Murraya koenigii is related to soil physicochemistry and weather suitability of the sites of its cultivation

Narayan C. Talukdar

Murraya koenigii (MK) leaf is a rich source of bioactive secondary metabolites and it has received inordinate attention in drug development research. Several factors control formation of secondary plant metabolite(s) in medicinal plants. In this research, we determined the cause of variation in bioavailability and content of a vital bioactive phytochemical, mahanine in the MK leaves collected from different geographical locations of India, varying in soil properties and weather parameters. MK leaves and soil samples were collected from around the plant base in quintuplicate from each site across five states of India at similar time point. Mahanine content was determined and compared among samples from different regions. The quantitative analysis data comprised that MK-leaves of southern part of India contains highest amount of mahanine, which is 16.9 times higher than that of MK-leaves of north-eastern part of India (which measured as the lowest). The results suggested that pH, conductivity and bacterial populations of the soil samples were positively correlated with mahanine content in the MK-leaves. For examples, the average soil pH of the southern India sites was in basic range (8.8 ± 0.6); whereas that of the north-east India sites was in slightly acidic ranges (6.1 ± 0.5) and mean soil conductivity value for the north east India soils was 78.3 ± 16.3 µS/cm against mean value of 432.4 ± 204.5 µs/cm for south India soils. The results of this study clearly show that higher level of bioactive phytochemical, mahanine in MK leaves depend upon geographical location, weather suitability and physiochemical and microbial parameters of soils of its cultivation sites**.**

Prof. Marco Leonti

Department of Biomedical Sciences, University of Cagliari, Italy

Marco Leonti graduated in Biology at the University of Basel (CH) in 1996. From 1999 to 2000 he conducted ethnomedical and anthropological field research in Mexico and got his PhD degree in pharmacognosy from the ETH (CH) in 2003, with a study focusing on the ethnopharmacological, phytochemical and biological evaluation of indigenous medicinal plants. After post-doc positions at the London School of Pharmacy and the University of Cagliari (Italy), he was made Associate Professor at the Department of Biomedical Sciences of the University of Cagliari, where he teaches pharmacognosy. He is currently engaged in the isolation and structure elucidation of cannabimimetic, antibacterial, and cytotoxic secondary metabolites from plants and traditional medicines. His research follows evolutionary approaches and focuses mainly on the cultural history of human plant use and the rationale of human plant selection for medicine and nutrition.

Dr. Caroline S. Weckerle

Institute of Systematic and Evolutionary Botany, University of Zurich, Switzerland

Caroline Sonja Weckerle has a Ph.D. in natural sciences, entitled “Morphology, taxonomy and phytochemistry of selected genera of Sapindaceae”, and a diploma in botany (M.Sc.). From 2007 to 2010, she was a postdoctoral researcher in ethnobotany and phytochemistry at the Institute of Systematic Botany, University of Zurich. She is now an assistant professor at the Institute of Systematic Botany in the University of Zurich. She has written more than 35 peer reviewed articles. She is working on the Continuum between ritual and medicinal plant use; Ethnobotany in Switzerland - Traditional and contemporary use of (medical) plants

Title: Recommended standards for conducting and reporting ethnopharmacological field studies

Marco Leonti, Caroline S. Weckerle

What are the minimum methodological and conceptual requirements for an ethnopharmacological field study? How can the results of ethnopharmacological field studies be reported so that researchers with different backgrounds can draw on the results and develop new research questions and projects? And how should these field data be presented to get accepted in a scientific journal such as JEP? We focus on conducting and reporting ethnopharmacological field studies on medicinal plants or materia medica and associated knowledge of a specific people or region. We highlight the most frequent problems encountered in literature, own fieldwork and insights gained from peer-reviewing of field studies. Research needs to be ethical and legal, and follow local and national regulations. Primary ethnopharmacological field data need to be collected and presented in a transparent and comprehensible way. In short this includes: 1) Relevant and concise research questions, 2) Thorough literature study encompassing all available information on the study site from different disciplines, 3) Appropriate methods to answer the research questions, 4) Proper plant use documentation, unambiguously linked to voucher specimens, and 5) Qualitative and quantitative analyses of the collected data, the latter relying on use-reports as basic units.

Prof Souad Skalli

Faculty of Science, Mohammed V University in RABAT, Morocco

Dr Souad Skalli is a Professor of Ethnobotany of the Faculty of Science, Mohammed V University in Rabat (Morocco) since January 2017. She is a WHO Herbal Medicines (HM) consultant since 2002. Before her new responsibilities, Pr Souad Skalli worked as a senior scientist and researcher in the Centre Anti Poison et de Pharmacovigilance du Maroc (CAPM) since 1996, and has been heading the Unit of Pharmacovigilance of Herbal Medicines at this center from 2000 to 2016. She participated and conducted, since 2002, many WHO workshops in relation with the pharmacovigilance of HM and she is co-author of many WHO guidelines for the safety monitoring of herbal products and phytovigilance of herb-drug interactions. She has contributed actively to set up and run pharmacovigilance of HM activities in many countries (Morocco, Senegal, Cambodia, United Arab Emirates and Oman). Pr Souad Skalli, since 2013, has been invited to the UMC International Pharmacovigilance Training Course as a guest speaker in HM. She was invited as a lecturer for many premeeting courses during the annual International Society of Pharmacovigilance (ISoP) meetings. She has also given many lectures and courses to health professionals, primarily physicians, pharmacists, Scientists on HM topics: Phytotherapy, Ethnobotany, HM adverse reactions, Phytovigilance, Herb-drug interactions, HM legislation and regulatory status, Pharmacognosy and Ethnopharmacology in Morocco and in many other countries. Pr Souad Skalli is the author of several publications investigating HM and herb-drug interactions.

Title: Does the use of herbal medicines containing non-steroidal anti-inflammatory constituents of herbal origin increase Covid-19 complications risk?

Prof Souad Skalli

The use of nonsteroidal anti-inflammatory drugs (NSAIDs) in patients with Covid-19 may increase complications of this disease such as sepsis and cardiovascular or respiratory difficulties. This lecture aims to stress if the use of herbal medicines (HMs) containing non-steroidal anti-inflammatory constituents of herbal origin may increase Covid-19 complications risk by analogy with NSAIDs. As active compounds of some HMs may have a better anti-inflammatory effect than NSAIDs, as many of HMs have shown the presence of prostaglandin synthesis inhibitors, and as some herbal compounds with anti-inflammatory properties have led to side effects, the adopted therapeutic attitude towards Covid-19 patients in relation to NSAIDs must include HMs containing non-steroidal anti-inflammatory constituents of herbal origin as they can mimic the effects of conventional NSAIDs. Caution should be exercised until concrete evidence emerges surrounding this type of HMs when they are used in the Covid-19 patients in order to advise clinicians on how best to treat patients with Covid-19.

Dr. Ng. Iboyaima Singh

Chief Scientist, Traditional food & Sensory Science, CSIR-Central Food Technological Research Institute, Mysore

Prof. Iboyaima is currently a Chief Scientist and Head, Traditional Food and Sensory Science. He studied Food Tech. and got his PhD at CFTRI, University of Mysore, 2004. His area of research includes Membrane processing Technology, Fruit juices and Beverages, Value added products from tropical and sub-tropical fruits, Value added products from underutilized fruits and vegetables, Natural pigments from plant sources, Hurdle Technologies. He has published 20 research papers, 5 book chapters and 18 patents. He received several awards like “N.N.Mohan Memorial Award” (2 times) for the best research paper instituted by All India Food Preservers’ Association, New Delhi; “Guru Joga Award” for being the top ranking student in the area of Fruit and Veg. Technology of M.Sc.(Food Tech) course at CFTRI,1989 awarded by the All India Food Preservers Assn., New Delhi; Dr. Mahadeviah Award-2016 for the contribution to the development of Food Processing Industries in the Country by the All India Food Preservers Assn., New Delhi etc.

Title: Health & Wellness foods as Immunity booster and Intervention of CFTRI's Technologies

Dr. Ng. Iboyaima Singh

COVID19 has certainly put the whole world in a worrying situation, where everyone is afraid of self-isolation and is quarantined. This infectious disease is especially dangerous for the elderly as they are more prone to getting affecting by it. And the reason behind is that they do not have a very strong immunity. And they are more likely to have other serious lifestyle diseases like diabetes, blood pressure, lung disease, or even heart disease that can lower the body's immunity. It's a proven fact that good health and nutrition go hand in hand. Foods also need to provide macro and micronutrients that aid in boosting immunity. As the elderly are more prone to coronavirus, a diet rich in certain vitamins, minerals and nutrceuticals can create a wall of immunity. In this connection, the elderly consumers are looking for health and wellness foods like heart-healthy diet, designer foods for specific cures, dietary supplements, and complementary therapies for the reduction, reversal, and prevention of lifestyle disease risks. These foods are considered as immunity booster. Not only does the consumer expect nutrition in their processed products but also expect the food processors to have food safety systems in place during processing and packaging. In this context, the importance of some of the health and wellness products developed at CSIR-CFTRI will be highlighted in the presentation for the benefit of food industries, new-entrepreneurs or start-ups and better market opportunities in today's ever-demanding consumers' choice on nutritional, therapeutical, immunity booster and sensory qualities of the food products.

Prof. Rudolf Bauer

Department of Pharmacognosy, University of Graz, Austria

Prof. Rudolf Bauer studied pharmacy and got his PhD at University of Munich, Germany. He is now the Deputy Head, Institute of Pharmaceutical Sciences, University of Graz, Austria. He‘s an expert in natural product chemistry, analysis and activity-guided isolation of plant constituents. He has published more than 380 research papers and has edited several books. He is chairman of the TCM expert group and member of expert group 13A of the European Pharmacopoeia Commission. He received several awards, like “Outstanding International Scientist Award (Pranab Banerji Memorial Award) of Society for Ethnopharmacology India (SFE), and in 2019, the Varro Tyler Prize of the American Society of Pharmacognosy, as well as the Honorary Doctorate of University of Helsinki.

Title: How can ethnopharmacology contribute to the fight against COVID-19

Prof. Rudolf Bauer

COVID-19 has become pandemic and a global threat. However, treatment options are still very limited, and it will take time until vaccination will protect the global human community. Therefore, we should explore also other options, like traditional medicines which have been used for centuries to treat fever and infectious diseases. Ethnopharmacology can play an important role in the fight against COVID-19, by using traditional medical knowledge and transferring it into modern science and drug development. Since viruses, the cause of such diseases, have not been known in the past, we have to focus on traditional medicine which has been used for the symptoms of severe cases of COVID-19, which are sepsis, cardiovascular, and/or respiratory complications. Besides, many traditional medications may be preventive and boost the immune system. Therefore, we should focus also on such herbal drugs. One big advantage of traditional medicines in the current crisis is, that they are already on the market and available. Nevertheless, we have to be careful not to make false claims and to raise exaggerated expectations. Therefore, we should apply the principles of evidenced based medicine, and have to request proof of efficacy, safety, and quality. Traditional Chinese Herbal Medicine (TCM) has been intensively used during the recent crisis, and has been reported to have some beneficial effect. Also, the use of Ayurveda and turmeric for COVID-19 have been recommended. However, the efficacy of herbal drugs in COVID-19 treatment has also been questioned. Therefore, we certainly need more research in this field. It is necessary to perform controlled clinical studies with standardized products, to elucidate the mode of action and to identify the active principles. The active constituents of such traditional medicines may also become new drug leads. The huge number of known natural compounds can be screened for relevant activities very fast by an in-silico approach. However, verification by pharmacological testing is still needed. In summary, there is huge potential, but a lot of basic and clinical research still needs to be done, and approved new drugs may be available only for COVID-30.

Prof. Fernão Castro Braga

Faculty of Pharmacy, Federal University of Minas Gerais, Brazil

Fernão Castro Braga is a full Professor of Phytochemistry in the Faculty of Pharmacy at the Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil. He is a pharmacy graduate who completed his PhD in chemistry at the same university. During his doctorate studies, he undertook an internship at the Eberhard-Karls University, Tübingen, Germany, and thereafter he joined the Ludwig-Maximilians University, Munich, Germany, as a Post-Doc. He is author/co-author of over 115 scientific publications and has ten patents deposited in Brazil or abroad. His work focuses the phytochemical investigation of Brazilian plant species, aiming at the isolation of compounds with anti-inflammatory, anti-viral and antihypertensive activities, as well as the standardization and chemical-biological validation of medicinal plants and derivatives for products development. FCB has several international collaborations and was a member of the consultant committee of the Brazilian Pharmacopoeia for chemical markers (2008-2012). He was formerly the Head of Department of Pharmaceutical Products (2005-2007) and the coordinator of the Graduate Course on Pharmaceutical Sciences from UFMG (2014-2017). Since 2000, he is a Productive Fellow associated to CNPq/Brazil (National Council for Scientific and Technological Development). He is presently the vice-director of the Steering Committee of the Laboratory of High Resolution Nuclear Magnetic Resonance, UFMG.

Title: Integrating chemical and biological data to explore que potential of Brazilian plants for developing anti-arthritic agents

Fernão C. Braga

The management of rheumatoid arthritis (RA) often demands multidrug treatment and current therapies are based on costly biological drugs that require parenteral administration. The development of orally-bioavailable drugs is therefore demanded and medicinal plants may represent a valid strategy. The presentation will focus on recent advances obtained with the medicinal plant *Echinodorus grandiflorus*, whose leaves are used in Brazil to treat RA. Firstly, we established an association between the contents of swertiajaponin, swertisin, *trans*-aconitic (TAA) and chicoric acids with the inhibition of TNF-α release elicited *in vitro* by extracts and fractions of the species. A standardized flavonoid-rich fraction was produced and given orally to mice with antigen-induced arthritis. It reduced several inflammatory parameters, including neutrophil recruitment to the joint cavity and in periarticular tissue, the levels of cytokines, mechanical hypernociception, and cartilage and bone destruction. In the sequence, mono-, di-, and triesters of TAA were prepared and administered orally to mice with LPS-induced acute arthritis. Diesters were the most active derivatives and bioactivity improved by increasing the length of the aliphatic chain of the alcohol employed in reaction. In general, the esters showed higher potency than TAA. The diethyl, di-*n*-butyl, and di-*n*-octyl esters of TAA reduced the cellular infiltration into the knee joint, especially of neutrophils. In conclusion, diesters of TAA and flavonoids were identified as potentially useful derivatives / compounds from *E. grandiflorus* leaves for the management of RA.

Dr. Anurabha Ray

Dept. of Pharmacology, Jami Hamdard, New Delhi

Prof. Arunabha Ray, MD, Ph.D, FAMS, FIPS, FIACS (Canada) is Professor and Head, Dept. of Pharmacology at Hamdard Institute of Medical Sciences and Research (HIMSR), Jamia Hamdard, New Delhi. He was formerly Director, Vallabhbhai Patel Chest Institute (VPCI), University of Delhi; Director-Professor and Head, Department of Pharmacology at the VPCI, University of Delhi; and, Dean, Faculty of Medical Sciences, University of Delhi. Prof. Ray is a medical graduate (MBBS) from the Calcutta University, with MD and PhD degrees in Pharmacology from the University College of Medical Sciences (UCMS), Faculty of Medicine, University of Delhi, with postdoctoral training/experience in the Canada and USA. He has 40 plus years of professional experience in field of basic and clinical pharmacology and allied biomedical sciences at undergraduate (MBBS) and postgraduate levels, and is actively involved in the teaching and conducting/supervising biomedical research activities of MBBS, postgraduate (MD) as well as doctoral (PhD) students in pharmacology and toxicology. He continues to be a prolific researcher in the areas of preclinical and clinical pharmacology and toxicology, especially with a novel translational approach. He is actively pursuing extramurally funded projects in his areas of research interest and is expert member of several technical/scientific advisory committees/boards in India and abroad. In view of his expertise in his area of research, he has been globally recognized and invited to several national/international conferences to speak and/or chair sessions and universities/organizations as visiting scientist/guest speaker. He is expert member/chairperson at several academic/research committees at organizations like ICMR, DST, DBT, AYUSH, DRDO, CDSCO etc. as well as reputed medical institutions/universities in the country and abroad. As recognition for his contributions in the area of medical education and biomedical research, he has been the recipient of several awards and honors from apex scientific and professional bodies. He was Founder-President of Delhi Pharmacological Society and is President of Society for Nitric Oxide and Allied Radicals (SNOAR). In view of his contributions in the field of medical/biomedical teaching and research, Prof. Ray was elected Fellow of the National Academy of Medical Sciences (FAMS, 2005), Fellow of the Indian Pharmacological Society (FIPS, 2007) and Fellow of the International Academy of Cardiovascular Sciences (FIACS, Canada, 2016). He has more than 200 publications is author of several text and reference book chapters, is editor of 05 books in his areas of expertise, and author of a Textbook in Pharmacology.

Title: New insights into the effects of *Witahnia somnifera* (Ashwagandha) in respiratory disease

Prof. Robert Verpoorte

Natural Products Laboratory, IBL, Leiden University, Leiden, The Netherlands

Pharmacists degree (1972), PhD (1976) Leiden. Lecturer Leiden University 1976-1987, 1987 professor and head department of Pharmacognosy. 2011 Emeritus professor. Guest professor in London (UK), Uppsala (Sweden), Amiens (France), Reims (France), Florence (Italy), Seoul (Korea), and Hilo (USA). 1992-1998 Vice-Chairman and Chairman committee of the Phytochemical Society of Eu¬rope (PSE). Author/co-author of 790+ scientific papers, 4 books, 6 patent applications. 2019 H factor 76 (Web of Science), 102 (Google Scholar) 84 (Scopus). Editor (1996-2002) and Editor-in-chief of Journal of Ethnopharmacology (IF2019 3.520)(2003-2016). Editor-in-chief Phytochemistry Reviews (IF2019 4.587) since 2001. Executive Editor Biotechnology Letters (IF2019 1.982) since 2006. He supervised 68 PhD-theses, 150+ MSc theses. Honorary Doctorate University Amiens, France (2004) and University Uppsala, Sweden (2012). Received 2007 the PSE Medal. Honorary professor at the Hong Kong Baptist University 2015. Received 2015 Gusi Peace Prize in Manila, Philippine and 2017 the Egon Stahl Medal in Gold by the International Society of Medicinal Plants and Natural Products Research for his lifetime scientific work. 2018 Qihuang International Prize of the China Association of Chinese Medicine. 2018, 2019 and 2020 he was among the 1% most cited authors on the Web of Science.

Title: Learn from Nature, learn from our ancestors

Prof. Robert Verpoorte

In ancient times our ancestors explored nature for all kind of products, including medicines. In these early days, different medicinal plants were discovered and probably became part of the trade between regions. Some of the successful herbal medicines spread all over the world, like opium, cannabis, Cinchona bark, and Atropa belladonna. The holistic approach of our ancestors resulted in the use of complex medicinal preparations that consists of a number of different ingredients. However, in the Mediterranean region the focus moved to the plant itself to identify the active ingredients. A number of important drugs were isolated in the 19th century, and chemists identified the structures and synthesized the active compounds. The 20th century became the era of synthesis, creating thousands of new compounds, to cure major ailments. In the 21rst century the synthesis approach is weaning, as for most major ailments there are good drugs. Instead big pharma has gone for biologicals. Their fast response on COVID-19 resulting in the production of novel vaccines, shows their strength. A novel antiviral drug would costs at least 10 years to develop. So overseeing the situation, the question is where to focus with natural products research for finding new drugs. Should we all go for studies on antivirals, or should we focus on other diseases where in terms of public health a lot could be gained. Should we focus on lifestyle diseases or infectious diseases? Should we screen compounds at random, or should we start from traditional medicines? Should we go for screening on known targets or should we go for a systemic approach using in-vivo test organisms? We need to discuss these questions taking into account both ethical, and economical aspects. In my lecture I will illustrate various technologies that can be applied in our studies for novel biologically active compounds or extracts.

Prof. Thomas Efferth

Institute of Pharmacy and Biomedical Sciences, Johannes Gutenberg University, Mainz, Germany

Professor Thomas Efferth is chair of the Department of Pharmaceutical Biology, Institute of Pharmacy and Biochemistry, Johannes Gutenberg University, Mainz, Germany. He is biologist by training (Technical University of Darmstadt, Germany). His doctoral thesis was completed at the German Cancer Research Center (DKFZ), Heidelberg, Germany (1990). Dr. Efferth was awarded the Ludolf-Krehl-Prize of the Southwest German Association for Medicine (1991), the Willmar-Schwabe-Award of the German Society for Medicinal Plant Research (2006), the citizen medal of the City of Heidelberg, Germany (2008), the CESAR Award for Translational Oncology (2011), the SCENTED drop Award on medicinal and flagrant herbs (2015), and the Qihuang International Award of the Chinese Association of Chinese Medicine (2017). Since 2018, he is full member of the World Academy of Sciences. He headed a research group for Pharmaceutical Biology at DKFZ (2005-2009) and was adjunct professor (apl.) at the University of Heidelberg (2007-2009). In 2009, he took over the Chair of Pharmaceutical Biology (full professorship) at the Johannes Gutenberg University, Mainz. Furthermore, he is honorary professor at the Northeast Forestry University, Harbin, and at the Zhejiang Chinese Medical University, Hangzhou, China. Moreover, he is visiting professor at the Zhejiang University of Science and Technology, Hangzhou, China and honorary adjunct professor at the Chinese University Hong Kong. Thomas Efferth has published 660 PubMed-listed papers and in peer-reviewed journals in the field of cancer research, pharmacology, and natural products (Hirsch-factor: 83; citation rate: >30,000; acc. Google Scholar) and a textbook on ‘Molecular Pharmacology and Toxicology’ (Springer Publisher; 2006). He holds 7 patents. The scientific results were communicated in over 270 oral presentation and invited lectures and over 200 poster presentations at national and international conferences and meetings. He is editor-in-chief of Phytomedicine as well as co-editor, associate editor and editorial board member of several other scientific journals and scientific advisory board member of the German Pharmaceutical Society and several other institutions. Thirteen of his former lab members promoted to leading academic positions (1 vice-president, 2 full professors, 10 associate/assistant professors). The focus of Dr. Efferth's research is on tumor pharmacology, network pharmacology, and recently also on COVID-19.

Title: Antiviral activity of 1,2,4-trioxanes of the Artemisinin type

Prof. Thomas Efferth

Traditional Chinese medicine commands a unique position among all traditional medicines because of its 5000 years of history. Our own interest in natural products from traditional medicines was triggered in the 1990s, by artemisinin-type sesquiterpene lactones from Artemisia annua L. As demonstrated in recent years by us and others, this class of compounds has activity against malaria, cancer cells, and schistosomiasis. Interestingly, the bioactivity of artemisinin and its semisynthetic derivative artesunate is even broader and includes the inhibition of certain viruses, such as human cytomegalovirus and other members of the Herpesviridae family (e.g., herpes simplex virus type 1 and Epstein-Barr virus), hepatitis B virus, hepatitis C virus, and bovine viral diarrhea virus. A role against SARS-CoV-2 mediated COVID-19 is discussed. Analysis of the complete profile of the pharmacological activities and molecular modes of action of artemisinin and artesunate and their performance in clinical trials have further elucidated the full antimicrobial potential of these versatile pharmacological tools from nature.

Prof. N. Debananda Singh

Dept. of Biochemistry, Manipur Central University, Manipur, India

Prof. N. Debananda Singh is currently a working professor at Dept. of Biochemistry, Manipur University, Canchipur and Former HOD (2007-2010 and 2016-2019). His Research areas includes Microbial especial actinobacterial diversity in Manipur, keratinolytic bacteria and applications in medicine and agriculture, rhizospheric and endophytic bacteria from ethnomedicinal plants and their biocontrol and PGP activities in rice and chakhao cultivars/varieties, insect-associated microbiome and scientific biography. Prof. N. Debananda Singh is a recipient of ASM/UNESCO award for microbiology education (2010). He was a visiting scientist, YIM (Yunnan Institute of Microbiology, China, 2011) and visiting resource person, Isfahan University, Iran (2010) etc. Prof. N. Debananda Singh has published more than 50 peer-reviewed articles, books, and book chapters. Guided PhD scholars, MSc students and is involved in many extramural and intramural MSc project dissertation work. He has completed 9 DBT sponsored projects and has 1 ongoing project (besides minor projects from DSTE, Manipur etc.). He have conducted nearly 2 dozen hands-on workshops on microbial techniques, HPLC, PCR, flow cytometry, ultracentrifugation and other techniques conducted for college teachers/MSc/BSc student. He has conducted more than 78 biotech outreach programs and had make a lot of media appearances.

Title: Microbiome in the 21st Century: Ethnopharmacology for Human and Plant Health in the New Millennium

Dr. Debprasad Chattopadhyay

Director, ICMR-NITM, Belagavi, Karnataka, India

Dr Debprasad Chattopadhyay is currently serving as Scientist G & Director at ICMR-National Institute of Traditional Medicine (NITM), Belagavi Karnataka since August 2016 with a lien from ICMR-Virus Unit, Kolkata, where he served since 1994 as Scientist. He has obtained his PhD in 1989 from Jadavpur University after Post-Graduation in Botany with Microbiology in 1983. He then moved to London Hospital Medical College and Statens Serum Institute (Copenhagen) for Post-Doctoral work (1990-1992). His research field includes search for Ethnomedicinal leads against difficult-to-treat infections through the documentation and validation of purity, safety and potency of traditional practices of Indian tribes with molecular mechanism of action in vitro and in animal model. His pioneering work in the area of antiviral drug development has been highly acclaimed, with publications in highly reputed Journals and patents. He has established personal contact with diverse ethnic communities of Bay Islands (Onge-Nicobarese-Shompen), Jharkhand (Birhore), Maharashtra (Kattabhai), Gujrat (Bhil-Kathodi-Padhar), Rajasthan (Mina-Baldias-Kannis) and West Bengal (Santal-Munda-Oraon-Bhumiji-Lodha) to document and validated their age-old health-care practices to translate traditional information into medical innovation. Dr Chattopadhyay is credited with Eight patents, four leads, 55 popular-science articles and 137 (108 International) research articles in prestigious peer-reviewed Journals including Review, Chapters and Books (RG Score: 37.19; h-Index: 33; i10-Index: 77; Impacts: 547.7; Citations: 3580). He is serving as the Editor of Frontiers in Pharmacology, Section Editor Medicinal Chemistry, Mini Review in Medicinal Chemistry, Editorial Board Member of Journal of Ethnopharmacology, Current Proteins and Peptides, Current Traditional Medicines etc, and Reviewer of 40+ peer-reviewed Journals of repute; Examiner, PhD Guide, and visiting Faculty of Universities, and is the recipient of several. Dr Chattopadhyay is the Fellow of the British Society for Antimicrobial Chemotherapy, Member of DST-SERB PAC and YSLS Expert Committee, Board of Studies (Pharmaceutical Technology, Jadavpur University), Research Advisory Board (Chemical Technology, Calcutta University) etc. He has produced 15 PhDs and completed 17 National Task Force Projects on ethnomedicines of marginalized communities of India, and is the member of Review and Approval Committee of several funding agencies. He successfully planned, established and deployed COVID-19 diagnostic lab at ICMR-NITM in collaboration with the Govt. of Karnataka. Currently, the lab has performed more than 45000 tests, serving the mankind at this unprecedented pandemic. He is currently engaged in research and development of antiviral herbal formulation to combat Covid-19 infection.

Furin and TMPRSS2 receptor blocking: can it be a potential therapeutic option for Covid-19?

Dr. Debprasad Chattopadhyay

Currently, Covid-19 pandemic creates global panic across the continents, as people throughout the globe have been affected by this highly contagious viral disease. The scenario is deteriorating due to lack of proper and specific target-oriented pharmacologically safe prophylactic agents or drugs, and or any effective vaccine. However, drug development is urgently required to back to the normalcy and to combat this pandemic. Here, we have proposed two novel targets: Furin and TMPRSS2, as Covid-19 preventive or treatment strategy, based on their pathophysiological implication on SARS-CoV-2 infection from earlier studies with CoV-1, MERS, and influenza virus infection via viral entry, priming, fusion, and endocytosis. An earlier study suggested that Furin and TMPRSS2 knockout mice had reduced level of viral load and a lower degree of organ damage. Here, we highlight the promise of some selected novel and potential anti-viral Phytopharmaceutical that bind to Furin and TMPRSS2 as target and few of them had shown promising anti-viral response in both preclinical and clinical study with acceptable therapeutic safety-index. Thus, this strategy may limit life-threatening Covid-19 infection and its mortality rate through nano-suspension based intra-nasal or oral nebulizer for preventing or treatment of mild to moderate infection.

Prof. Rajib Bandyopadhyay

Department of Instrumentation & Electronics Engg., Jadavpur University, Kolkata

Rajib Bandyopadhyay is Professor in the Department of Instrumentation and Electronics Engineering., Jadavpur University, Kolkata, India. He has guided eighteen students for Ph.D. and eight students are at present working under him. He is involved in research in the area of machine olfaction, electronic tongue and spectroscopic techniques for different applications. The research group at Jadavpur University in collaboration with CDAC, Kolkata has developed electronic nose and tongue systems for quality evaluation of tea. Presently, he has started research in the area of spectroscopic techniques for agricultural applications. Prof. Bandyopadhyay has published more than 50 papers in reputed international journals and more than 100 papers in national and international conferences. He was the President of International Society for Automation (ISA), Kolkata Chapter in 2015 and 2016. He is also a Research Professor of ITMO University, Russia.

Non-invasive and rapid quality assessment of medicinal plants using NIR and Raman spectroscopy

Rajib Bandyopadhyay

Quality assessment of medicinal plants is of utmost importance as the quality varies due to many several reasons like geographical variation, cultivar, season etc. The quality assessment, till date, is based either on human expertise or complex chemical analysis methods. These methods are not only invasive, but employ reagents and expensive analytical instruments and are confined in the laboratories only. On the other hand, during the last few decades, spectroscopic methods, especially the Near Infrared (NIR) and Raman techniques have become powerful analytical tool for gathering quantitative and qualitative information from a wide variety of products in the agricultural, nutritional, petrochemical, textile and pharmaceutical industries. The techniques are non-destructive, rapid and simple to operate, require small samples, and are applicable for use with solid samples and can determine in situ the concentration of various phytochemicals at the same time. In this talk, application possibilities of NIR and Raman spectroscopy for the quality estimation of medicinal plants will be discussed. The calibration methods and the development of low-cost devices with some preliminary results will also be presented.

Dr. Mohd. Aslam

Former Adviser (Scientist 'G'), Dept. of Biotechnology,Ministry of Science & Technology, Govt. of India, New Delhi

Dr. Mohd. Aslam is M.Sc., M. Phil. and Ph.D. in Botany and worked as Advisor (Scientist ‘G’) in the Department of Biotechnology (DBT). His work involved in planning, coordination and monitoring of various R&D programmes in the areas of Bioresources, Plant and Environmental Biotechnology. He was also working as the nodal officer in DBT for two institutions – Institute of Bioresources and Sustainable Development (IBSD), Imphal, Manipur and International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi and also for Biotech Industry and Research Assistance Council (BIRAC), New Delhi.

Title: “Phytopharmaceuical misison – Initiatives of DBT”

Prof. Jyoti Prakash Tamang

Department of Microbiology, Sikkim Central University, Gangtok, Sikkim

Professor Jyoti Prakash Tamang is the senior Professor in Department of Microbiology, Sikkim Central University and currently holding the honorary prestigious International Centre for Integrated Mountain Development (ICIMOD) Mountain Chair. He is a pioneering food microbiologist working on ethnic fermented foods and beverages of the Himalayas for 34 years focusing on sequence-based taxonomy, metagenomics, gastronomy of Himalayan ethnic foods, bioinformatics, food safety, nutrition, and health-benefits. He has received several national including DBT-Bio-Science Award in 2005 and international awards, fellows of several academics and members of national and international fora in food science and microbiology related committees. He has published more than 180 research publications including 7 books from Taylor and Francis (USA) and Springer Nature (Singapore), with cumulative impact factors of 190 and citations of 5300 and h-index of 39 in SCOPUS. He also has one Patent. Professor Tamang held several administrative posts in Sikkim University: first Registrar (2011-2013), Dean, School of Life Sciences (2012-2020) and Officiating Vice-Chancellor (2017-18).

Title: Eat Traditional Foods as Drugs to Combat COVID-19: A Hypothesis

Dr Rajan Radhakrishnan

Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai

Dr. Radhakrishnan is a pharmacologist and a US-registered pharmacist in the States of Utah and West Virginia, currently serving as a professor of pharmacology at the Mohammed Bin Rashid University College of Medicine in Dubai. He has more than 20 years of combined experience in teaching, research, and academic administration. He received his BPharm degree from the University of Kerala, India; MSc in pharmacology (Medicinal Plants option) from the University of Strathclyde, UK; and PhD in pharmacology from the National University of Singapore (NUS). He did his postdoctoral fellowship in pain neurobiology at the University of Iowa, USA. Dr. Radhakrishnan has taught pharmacology to pharmacy, medical and dental students in different universities in Malaysia, USA and UAE. He has also served as the Academic Affairs Dean at the Schools of Pharmacy in Roseman University and University of Charleston in the USA. Dr. Radhakrishnan is an active member of the American Association of Colleges of Pharmacy (AACP), American Pain Society (APS), and Society for Neuroscience (SFN). He has published 40 peer-reviewed research articles, 5 book chapters and several abstracts. He is one of the editors of *Phytotherapy Research* (Wiley), and Editorial Board Member of *Journal of Pain* (Elsevier) and *Inflammopharmacology* (Springer). He is also a collaborating editor of Lippincott Illustrated Reviews: Pharmacology 7e. Dr. Radhakrishnan serves as a reviewer for more than 15 international scientific journals. His current research interests are pain neurobiology, mechanisms of inflammatory pain, pharmacology & toxicology of natural products, and scholarship of teaching and learning (SoTL).

Title: Potential role of Natural Products in the fight against Covid-19

Dr. Subhra Chakraborty

Director, DBT -National Institute of Plant Genome Research, New Delhi

Dr. Subhra Chakraborty, Director, National Institute of Plant Genome Research obtained her Ph.D in Plant Molecular Biology from Jawaharlal Nehru University in 1997. After a brief career as Research Scientist at the Centre for Plant Molecular Biology, Jawaharlal Nehru University, she joined National Institute for Plant Genome Research in 1998 as one of the founding faculty and has been continuously ascending the ranks ever since. She was a Visiting Scientist at the Yale University, USA. Trained as a molecular biologist and biotechnologist, she got interested in protein science and was instrumental in initiating and establishing Plant Proteomics and Translational Genomics research in India. The major research interest of her laboratory focuses on Nutritional Genomics, Plant Immunity, Multi-host resistance, Proteomics and Plant Biotechnology. The targeted research has direct implications in plant and human health and vital to food and nutritional security. Dr. Chakraborty is actively associated with national and international proteomics societies. Currently, she is serving as President, Proteomics Society, India (PSI); Council Member, Human Proteome Organization (HUPO); Co-chair of Food & Nutrition Initiative and HPP-SAB of HUPO; Council Member & Country Representative, Asia Oceania Agricultural Proteomics Organization (AOAPO). She is serving as member of research bodies and national committees concerning education, academic activities, research funding and policy planning in India. She has been given JC Bose National Fellowship Award, Tata Innovation Fellowship Award, National Young Women Bio- scientist Award, NASI-Reliance Industries Platinum Jubilee Award in Biological Sciences, Technology Development Award, Young Women Bio-scientist of Promise Award, An Inspiring Women Engineer/Scientist, Professor Hiralal Chakraborty Award of ISCA, Platinum Jubilee Lecture Award of ISCA, Overseas Associateship Award, Young Scientist Award of IUBMB, Professor Hiralal Chakraborty Gold Medal from National Botanical Society & University of Calcutta. She is an elected Fellow of the National Academy of Sciences, India; the Indian Academy of Sciences, Bengaluru; the National Academy of Agricultural Sciences, India.

Title: Plant-derived metabolites in fighting COVID-19 pandemic

Dr. Arun Bandyopadhyay

Director, CSIR-Indian Institute of Chemical Biology, Jadavpur, Kolkata, India

Dr. Arun Bandyopadhyay is working as the Chief Scientist and Director, Indian Institute of Chemical Biology, Jadavpur, Kolkata, India. Dr. Bandyopadhyay has been working on the Identification of Protein Biomarker for Risk Assessment of Cardiovascular Disease, Cardiac Hypertrophy and Management of Respiratory Diseases. He has published more than 140 research/review publications in reputed peer reviewed journals and 04 patents. He is the fellow of National Academy of Science, India (FNASc).

Tile: Repositioning R&D activities for the mitigation of Covid-19 – Efforts of CSIR-IICB

Prof. Sitesh C Bachar

Professor and Chairman, Faculty of Pharmacy, University of Dhaka, Dhaka, Bangladesh

Dr. Sitesh C Bachar is working as a Professor and Chairman in the Department of Pharmacy, Faculty of Pharmacy, University of Dhaka, Bangladesh. He received his B.Pharm (Hons) and M.Pharm degrees from the University of Dhaka with credential. Professor Bachar was awarded a PhD in Pharmacy from Jadavpur University, Kolkata 700 032, West Bengal, India in 1996. Professor Bachar, is a well-recognized medicinal chemist, with particular expertise in the synthesis of indan-based anti-inflammatory, analgesic, plants growth regulatory compounds, and structure activity studies. He is an outstanding medicinal chemist with pharmacy educational background. He also possesses an especial expertise in isolation, purification and pharmacological evaluation of Bangladeshi traditional and herbal medicines and their quality. Professor Bachar has been successful in securing a number of research grants to support his research. As an academician and experienced in hospital and clinical pharmacy management, Prof. Bachar has implemented the clinical and hospital pharmacy training and services in Bangladesh. Prof. Bachar has the opportunity to publish several publications in high-impact international journals in the area of medicinal and natural products chemistry. Over the years, Prof Bachar has shown his ability to sustain high quality research activities, excellent academic profile and a great deal of collaborative skills. He has also journal editorial advisory memberships, grant reviewing and journal article reviewing expertise.

Title: Ethnopharmacological evaluation of Ginger available in Bangladesh

Prof. Pallab K Haldar

Director, School of Natural Product Studies, Jadavpur University, Kolkata

Prof. Pallab Kanti Haldar completed his B.Pharm (2000), M.pharm (2002) and Ph.D. (2006) from Jadavpur University, Kolkata, India. He is presently working as Professor in the Department Of Pharmaceutical Technology and Director, School of Natural Product Studies, Jadavpur University, India. Pr. Haldar Has about 17 years of experience in Teaching and Research in the field of Pharmacology and Toxicology. He was posted as Professor and Head, Division of Pharmacology at Himalayan Pharmacy Institute, Majhitar, Sikkim for two years. Dr. Haldar and his research team presently engaged to find out lead molecule from natural source used for various life threatening diseases like cancer, diabetes. He has one patent and above 140 national and international Research papers. He is life member of different academic and scientific body such as Indian Pharmacological Society, APTI, SFE, FIC etc.

Title: IBSD-JU initiatives of Research on Natural Resources –Special Referenece to Zebra Fish model

Dr. Sayeed Ahmed

Department of Pharmacognosy and Phytochemistry, Jamia Hamdard, New Delhi, India.

Dr Sayeed Ahmad, (Assistant Professor) Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, JamiaHamdard (Hamdard University), New Delhi, has been associated in teaching and research with UG, PG and PhD level students in the field of herbal drugs and natural products, since 2005 after completion of his Doctorate in Pharmacognosy and Phytochemistry.He has been honoured with the University Gold Medal, DST fast track young scientist award (2007), CST-UP young scientist award (2008-09), DST BOYSCAST, AICTE Career award (2009-10), PD Sethi award in year 2009, 2013 and 2015 for best publications on HPTLC, Al Ameen College of Pharmacy award (2014 & 2015) for best publications in IJPER, Prof ML Khurana Memorial Award for best publication in IJPS-2015, as well as UGC research award 2016 and SFE Young Ethnopharmacologist Award 2017 for his contribution in Natural Product Research. He did his postdoc from Albert Einstien College of Medicine New York, USA (2011) also worked as Visiting Scientist in Sultan Qaboos University, Muscat, Oman (2012) as well as invited as Expert Pharmacognosist at University of Khartoum Sudan and National Medicinal and Poison Board, Sudan (2017). He has to his credit > 247 publications including 27 reviews, 4 book chapters and 29 proceedings in several refereed journals (Total Impact factor > 300, h-index 22, i10 index 51, Citations > 1879). He has his participation in over 50 conferences in India and abroad with more than 250 abstracts. He is the sole author of a book “Introduction to Pharmacognosy” (Publisher IK International, 406 pages) as well as Five Manuals for Practical in Pharmacognosy, widely used by UG and PG students of Pharmacy. He is actively associated with several academic and professional organizations in India and abroad and is the reviewer of > 40 journals of international repute in chromatography, herbal drugs and analysis. He is the member of *National Unani Pharmacopoeial Committee (AYUSH),* EC member of APTI and IPA (Delhi branch) as well as Associate Editor of *Journal of Natural Remedies, Annals of Phytomedicine* and *Journal of Medicinal Plant Research*. He has also organised Three national level seminars and Two Workshops on herbal drugs and botanicals and delivered > 42 invited talks and chaired 13 scientific sessions at different forums on herbal drugs and chromatography. He has supervised 26 M Pharm and 22 PhD scholar.

Title: Phytochemical analysis & ethnopharmacology

Dr. Prakash R. Itankar

Department of Pharmaceutical Sciences, R. T. M. Nagpur University, Nagpur, India

Dr. Prakash is currently working as Associate Professor and Section Head of Pharmacognosy at Department of Pharmaceutical Sciences, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur (India). He's specialized in developing the educational strategies, driving the research activities within the perspective of Pharmacognosy. He is well experienced in Sensitizing, socializing and reinstatement of lost glory to the drugs of natural origin as well as exploring new drug molecules, novel combinations and novel dosage forms. His keen interests were Seeking patents, collaborating with academic and industrial partners, imbibing entrepreneurship, supporting and bridging the gap of scientific ambiguity amongst the traditional practitioners and end users. He has great interest in social activities and students personality program. Dr. Prakash has 26 years and 4 months of industrial and teaching experience.He has guided 86 M. Pharm, 72 MD (Ayurveda), 08 Ph.D. students, and 05 students pursuing Ph.D. and has done lots of Research Projects based on Research Problems of Industry: Dr. Prakash is a Recipient of Prestigious "Ethnopharmacology Outstanding Service award 2015" of Society for Ethnopharmacology India; "Mahatma Fule life time achievement for excellence in social work – Anandibai Joshi award for services in Health 2015"; "SFE- Outstanding Local Chapter Award-2018" and "Best Teacher Award 2018" of Rashtrasant Tukadoji Maharaj Nagpur University 2018.

Title: Traditional Community Health Practitioners of India as COVID Warriors

Dr. Prakash R. Itankar

Wild edible plants play an important role in human diet and medicines; all living organisms require a large number of substances from food to complete their life cycle. Tribals only act as promoters to these wild species. In India, there are over more than 500 major tribal communities. The tribes have developed their nutritional habits based on their traditional knowledge about medicinal and nutritional uses of plants in their vicinity; they also use wild plants for food, medicine, fodder construction material, fuel, wood and other purposes. The learned person among such communities is traditionally called as Guni or Vaidu or Vaidya; however, the best terminology being used in modern context is calling them “Traditional Community Health Practitioners” (TCHP). During the state of Covid, we were in constant touch with these TCHP members across several states in India. After the interaction with the TCHP members, we learnt about their approach in updating themselves about the COVID 19 and then making strategies to cope up with the situation, using their traditional knowledge, experience and exploring the local flora and fauna. Besides, they stood firmly with the local administration in COVID management and extended their unconditional services to the community; which is worth appreciating. Their treatment modules were mostly designed according to the availability of local plants and local conditions ex. high altitude regions, cold areas, hot areas etc. They claim improvement in the immunity of the people to whom medication was given and thus promote their products and practices as a preventive COVID medicine. There are several examples of clinical significance wherein, the TCHPs have successfully managed the quarantine centres housing the prospective COVID patients by offering their medicines and services. The scientific perspective of their treatment to the COVID positive patients should be studied sincerely by the scientific community. Besides their products, their practices shall also be studied, verified scientifically and validated using the laboratory infrastructure in research institutes. A scientist must work with them for rational standardisation of these wild medicinal plants based remedies, protecting and partnering their intellectual property rights to make our nation “Atmanirbhar” in the field of traditional medicines.

Dr. L. Sathiyanarayanan

Associate Professor, Poona College of Pharmacy, Bharati Vidyapeeth Deemed to be University, Pune, Maharashtra, India

Dr. Sathiyanarayanan is presently holding the position as Director, Centre for Food testing Laboratory and Associate professor in Pharmaceutical Chemistry, at Bharati Vidyapeeth Deemed University, Poona College of Pharmacy, Pune, Maharashtra, India. He graduated from The Tamilnadu Dr MGR Medical University Chennai, Tamilnadu, and completed PhD from Bharati Vidyapeeth Deemed University, Pune, India. He has published over 65 research papers in peer reviewed international journals and national journals and presented around 60 papers in various conferences. His area of research interest is natural product research including herbal drug standardization, herb-drug interaction studies and exploring role of natural products in neuroprotection. He received the prestigious 'Career award for young teacher' (Rs. 10.5 Lakh) from the All India Council of Technical Education, New Delhi, India, a statutory body of government of India for his research project on Self emulsifying system as extraction tools for herbals in the year 2010-13. He received The Best Researcher Award 2013 from Bharati Vidyapeeth Deemed University for the year 2013. IASTAM Baityanath award 2019, He received Dr. P.D sethi award of merit three times in the year 2011, 2012 and 2017. He is the recipient of various research projects worth of around rupees 1 crore from various funding agencies including UGC, DST, National Medicinal Plant Board-Department of Ayush and AICTE. He is recipient of AICTE Entrepreneursip Development Cell grant, seminar grant, UGC travel grant, AICTE travel grant and various Industrial projects. His international visits include Switzerland, UK, Germany, Greece, Australia and Bangladesh to the universities including, University of oxford, School of Pharmacy, UCL- London, University of strathclyde Scotland, University of wolverhampton and university of Bradford. He is serving as an Associate editor for the Pharm. Methods journal, and editorial board member of some journals and reviewer for several international journals. He is chairman Board of study, Bharati Vidyapeeth Deemed to be University, Co-ordinator for Society of Ethnopharmacology-Pune Local Chapter, Life member - Association of Pharmacy Teachers of India, Indian Pharmaceutical Association (IPA), IASTAM India, Hon. Treasurer, IPA Pune, and approved research guide for PhD and PG students of Bharati Vidyapeeth Deemed University. He has delivered around 60 invited lectures in various programmes including international and national conferences and AICTE Quality Improvement Programme for teachers.

Title: Research potential of INDIAN PROPOLIS

Dr. Sathiyanarayanan Lohidasan

Apiculture (Beekeeping) is a constant growing sector commercially, and India being one of the largest producers of honey and beeswax, generates huge volumes of revenue through its exports. However, it neglects the value of another wonder bee product named ‘Propolis’, which is a complex resinous substance collected by honeybees from tree buds, comprising of plant exudates, salivary secretion, pollen and waxes. Propolis is a natural substance collected by bees Apis mellifera from several plant species. It is used to protect hive from intruders and natural phenomena. Propolis has been used in folk medicine for centuries. It is known that propolis possesses anti- microbial, antioxidative, anti-ulcer and anti-tumour activities. More than 300 compounds such as phenolics, terpenes, hydrocarbons, acids, flavonoids, coumarine have been identified. Propolis contains diverse array of phytochemical constituentsnamely phenolics, flavonoids, prenylated derivatives, terpenoids, caffeic acid and its derivatives, chalcones, benzophenones etc. The variable chemical composition is strongly dependent on the vegetation around the hive, climatic conditions, bee species, and therefore can have significant impact on the quality and bioactivity. Several researchers have reported about its plethora of therapeutic and healing effects. We have reported the neuroprotective activity of Indian propolis for the first time in amyloid beta induced memory deficit rat model. Moreover formulations of propolis using nano technology for anticancer activity have been attempted. Further studies are underway to establish chemical profiling to address the geographical variation of chemical constituents in Indian propolis. Till now no credible standardization model available for characterization of its complex chemical composition. The presentation focuses on the research potential of Indian propolis, gaps in Propolis research, challenges in its commercialization, and some of the approaches and methodologies that are undertaken by our team as case study.

Dr. Surajit Sinha

School of Applied and Interdisciplinary Sciences, Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700 032, India

Prof. Surajit Sinha is Professor and Head in School of Applied and Interdisciplinary Sciences, Indian Association for the Cultivation of Science, Kolkata. His research interest include synthesis of Inhibitors of Hedgehog signaling pathway for the development of anti-cancer therapy, Zebrafish Biology, Synthesis of morpholino oligonucleotides for antisense therapy targeting Duchenne muscular dystrophy , Drug delivery vehicle to improve bioavailability of impermeable drugs, antisense reagents and biomolecules. He holds a PhD. Degree from IISc, Bangalore and Postdoctral Fellowship from University of California and from Standford University, USA. Prof. Sinha has published 59 research papers, 03 book chapters and also has 02 patent (USA).

Title: Combination Approach for the Management of Coronavirus Infection using Antisense-based Antiviral Therapy and Immunomodulators

Prof. Surajit Sinha

As there is currently no commercially available vaccine or efficacious therapeutic for the treatment of COVID-19 and because of its frequent mutation and complex mode of action, an alternative approach is essential to manage the infection. Morpholino antisense oligonucleotides are routinely used for gene silencing and morpholino has already been tested against different types of viruses, hence morpholino therapy could be particularly useful as it can be easily and selectively designed against the RNA of Coronavirus for its inhibition viral replication. Such designed Morpholino is sequence-specific and expected not having interaction with human RNA. At the same time, immunomodulating agents from medicinal plants could be useful to potentiate the cytokine storm through the immediate production of IFNβ and IFNα, the molecular signaling components develop antiviral response against viral infection. Our lab is involved to generate morpholino-based antisense reagents to control the function of different genes in genetic disorder diseases and shown successful gene knockdown in cancer cells, zebrafish model and mouse model. We would like to explore the combination therapy using morpholino-based antisense reagent to target SARS-CoV-2 genomic sequence along with the development of nutraceuticals from medicinal plants to boost the immunity of host cells. Based on the analysis of SARS-CoV-2 genomic sequence, morpholino has been synthesized which will be tested targeting SARS-Covid 19 virus. Parkia roxburghii is a traditional medicinal plant, extensively used as food and medicine to boost the immunity. We have made the plant extracts to evaluate the immunomodulatory activities in immunological pathway for the preparation of nutraceuticals. Such combination treatment could be safe and effective in the treatment of COVID-19 and may offer a new therapeutic approach to the treatment of viral diseases.

Dr. Dilip Ghosh

Director, Nutriconnect, Sydney, Australia

Dr. Dilip Ghosh has received his PhD in biomedical science from India & post-doc from USDA-ARS, HNRCA at Tufts University, Boston. He is an international speaker, facilitator and author and professionally associated with Nutriconnect, & Trigonella Labs, Australia; Adjunct-Industry Fellow, NICM Health Research Institute, Western Sydney University. He is a fellow of American College of Nutrition (ACN), professional member of Australian Institute of Food Science & Technology (AIFST), an advisor and executive board member of Health Foods and Dietary Supplements Association (HADSA), & The Society for Ethnopharmacology, India (SFE-India) and also in editorial board of several journals. His research interest includes oxidative stress, bioactive, clinically proven functional food and natural medicine development, regulatory and scientific aspects of functional foods, nutraceuticals and herbal medicines. Dr. Ghosh has published more than 100 papers in peer reviewed journals, numerous articles in food and nutrition magazines and books. His most recent two books, “Pharmaceutical to Nutraceutical: A Paradigm shift in disease prevention” & “Natural Medicines-Clinical efficacy, Safety and Quality” under CRC Press, USA has been published in 2017 & 2019. His latest book, “Nutraceutical in Brain Health & beyond” is just published by Elsevier/Academic Press

Title: Role of Nutraceuticals/Botanicals in Immunity during Covid-19 pandemic

Dr Dilip Ghosh

Viral infections including coronavirus (CoV), play an important role in human disease spectrum, and recent pandemic of Covid-19 have highlighted again the importance of prevention as a critical issue in safeguarding public health. Despite the progress made in immunization and drug development, many viruses lack preventive vaccines and efficient antiviral therapies. Botanical-derived products provide a rich resource for novel antiviral drug development based on evidences Until the world discovered any real solution, evidence-based nutraceuticals/dietary supplement/complementary medicines/herbal medicines (different country coined different regulatory names) may possess some advantages in preventing or treating the SARS-CoV-2 infection. Few recent clinical trials' outcomes showed very promising results.

Topics to be discussed:

- Current therapeutic intervention and future global initiative including vaccines
- Most promising botanicals/nutraceuticals/traditional natural medicines clinical intervention trials around the world
- Combination therapy of botanical medicines and pharmaceuticals would be a future game
- Role for pharmaceutical industry at this juncture?

Dr. Arindam Maitra

Associate Professor, National Institute of Biomedical Genomics, Kalyani, WB, India

Dr. Arindam Maitra is an Associate Professor of the National Institute of Biomedical Genomics, Faculty In-Charge of Core Technologies Research Initiative, and the Project Coordinator of International Cancer Genome Consortium – India Project. His research interests include genomics of head and neck and gastric cancer and genomics of preterm birth. He is a recipient of the Grand Challenge India funding for development of method to predict adverse pregnancy outcomes using clinical, genomics and proteomic markers of maternal stress. Since the outbreak of SARS-CoV-2, he has been spearheading the genome sequencing initiative in NIBMG.

Title: PAN-INDIA 1000 SARS-CoV-2 RNA Genome Sequencing Reveals Temporal Haplotype Diversities and Emerging Mutations in India

Dr. Arindam Maitra

The PAN-INDIA 1000 SARS-CoV-2 RNA Genome Sequencing Consortium has sequenced 1058 SARS-CoV-2 genomes from samples collected across eight states within India. Multiple lineages of SARS-CoV-2 are circulating in India, probably introduced by travel from Europe, USA, and East Asia. A2a (20A/B/C) was found to be predominant, along with few parental haplotypes 19A/B. The temporal haplotype diversities landscape in each region appears to be similar pan India, with haplotype diversities peaking between March-May, with A2a (20A/B/C) emerging as the predominant one by June. Detailed mutational analyses and the possible implication of these mutations for disease management will be presented.

Dr. Partha Roy

Molecular Endocrinology Laboratory, Department of Biotechnology, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand

Dr. Partha Roy completed his Bachelors and Masters in Zoology from the University of Kalyani, West Bengal. He obtained his PhD from Visva Bharati University, India and then he moved for Postdoctoral studies at Institute of Reproductive & Developmental Biology, Imperial College London, UK. Currently he is a Professor in the Department of Biotechnology, Indian Institute of Technology (IIT) Roorkee, India. Prior to joining at IIT Roorkee he served as Research Scientist at Glenmark Pharmaceuticals Ltd., Mumbai, India. His current research interest is development and validation of nutraceuticals for the cure and management of various diseases with special emphasis on diseases like cancer, diabetes and bone related disorders. He has published more than 120 research papers in peer reviewed journals and with high number of citations and authored several book chapters. He is the recipient of Outstanding Teacher Awards at IIT Roorkee in 2014 and 2019. He is also the receipt of Ramkumar Award for Outstanding Teaching and Research 2016 at IIT Roorkee. Professionally he is serving various scientific and academic bodies in India as panel members. He has visited various universities/institutes across the world as Visiting Faculty.

Title: Anti-osteoporotic and anti-osteoclastogenic effect of medical plants with special reference to Piper betle leaf extract and its main active constituent hydroxychavicol: A mechanistic analysis

Partha Roy

The human skeletal system is a multifunctional complex organ system that undergoes the process of renewal through a continuous cycle of resorption and formation by osteoclasts and osteoblasts respectively. While bone loss is inevitably observed with progressing age, several other factors like gender, low calcium and vitamin D in the diet, alcohol/tobacco consumption, long-term use of corticosteroid-medications, several malignancies, certain genetic factors and hormonal imbalances can also adversely affect the bone mass. The current need for skeletal healthcare research is focused on the discovery of novel osteo-anabolic agents that can restore the bone mass as well as maintain the physiological balance between bone formation and resorption in osteoporotic conditions. Several investigations have suggested that phytoconstituents from various fruits, leaves, roots or other plant parts can influence the process of bone formation and its resorption. In the current study, we explored the effects of certain phytochemicals including betel leaf extract (BLE) and its major phytoconstituent, hydroxychavicol (HCV), in the promotion of osteogenesis (bone cell formation) and inhibition of osteoclastogenesis (bone cell resorption) in in vitro and in vivo models. During inflammation, inflammatory cytokines are released from the cells of the immune system and stimulate osteoclastogenesis by increasing the production of TNF-α and RANKL as a result of which osteoporosis is triggered. It is known that NF-κB and MAPK pathways play a major role in osteoclastic bone resorption thus leading to osteoporosis. Our results exhibited that both BLE and HCV exert an osteogenic effect through promotion of β-catenin/pGSK3β signalling and inhibit osteoclastogenesis through NF-κB, MAPK: P38 and JNK signalling pathway. Moreover, betel leaf extract and hydroxychavicol ameliorate glucocorticoid-induced osteoporosis in rats via inhibition of NF-κB, MAPKs namely p38 and JNK signalling pathways. The improved bone microarchitecture and tissue morphology in response to BLE and HCV in osteoporotic rats further substantiated their role as bone-anabolic agents. Thus, the nutraceutical potential of betel leaf extract and hydroxychavicol can be explored further to mitigate several skeletal complications in future.

Dr. Geoffrey A. Cordell

President Natural Products Inc., USA

Professor Emeritus Geoffrey A. Cordell obtained his Ph.D. in indole alkaloid chemistry at the University of Manchester in 1970, and after two years at M.I.T. joined the College of Pharmacy, University of Illinois at Chicago, holding several senior administrative positions; he retired in 2007. The author of about 600 research publications and reviews, two books on alkaloids, and the editor of 37 books, including 29 volumes in "The Alkaloids Chemistry and Biology" series, he has about 26,900 citations and an h-index of 81. He is on the Editorial Advisory Board of 30 international scientific journals, and has been a plenary speaker at over 185 international meetings. An Honorary Professor at universities in China, India, and the Philippines, he is also a Visiting Professor in Malaysia (four universities), Japan, Thailand, Mexico, Brasil, Peru, and Colombia. He was named Outstanding International Ethnopharmacologist of the Year in 2015 by the International Society of Ethnopharmacology and received the Norman Farnsworth Research Achievement Award of the American Society of Pharmacognosy (ASP) in 2019, where he is one of sixteen Honorary Members. He presently assists countries and universities in the development of traditional medicines and of their administrative and research resources. His interests include the chemistry and biosynthesis of alkaloids and cyberecoethnopharmacolomics.

Cyberecoethnopharmacolomics and the Quality Control of Traditional Medicines

Geoffrey A. Cordell

A newly coined term, cyberecoethnopharmacolomics, will be discussed in relation to traditional medicines and their quality control. It is an integrated approach for the translation of the indigenous use of natural resources for the benefit of patients, through evidence-based research. “Cyber-“indicates the need for large, holistic information systems of accumulated data on plant uses, identification and assessment, for the storage and analysis of research data, for spectroscopic interpretation, and for blockchain technology. It reflects that, for most of the world, all relevant knowledge is at hand, literally. “Eco-“ emphasizes the importance of thinking and acting in a sustainable manner regarding the plant material, and developing sustainable laboratory practices. It also indicates the need to assess the impact of climate change on medicinal and aromatic plants, their distribution, and their metabolite profile. “Ethno-“ indicates a fundamental respect for the historical and contemporary use of plants by various societies, and a commitment to compile, analyze, and prioritize this information. “Pharmacol-“ reflects that the studied material(s) will be assessed in a manner biologically relevant to the reported use(s). “Omics” refers to five facets of natural product development: i) taxonomics, the unequivocal identification of the plant; ii) genomics, for identification and for seeking biosynthetic pathways; iii) metabolomics, examining and identifying the compound diversity, and the correlation with reproducible biological activity; iv) agronomics, the transition to supply sustainability; and v) economics, the acquisition, manufacture and marketing stages for a product which is cost-appropriate for industry, and is available and affordable for the patient.

Dr T.R. Santhosh Kumar

Scientist, Integrated Cancer Research, Rajiv Gandhi Centre for Biotechnology, Trivandrum, Kerala, India

T.R.Santhosh Kumar, a PhD from SCTIMST is an established researcher in the area of Apoptosis and Cancer Drug Resistance. With the support from International foundation of Science, Sweden, he has initiated his research on developing cell based Assays using genetically encoded probes. He has successfully developed several FRET based assays for cancer drug screening with an ambitious goal of developing this assay in to the NCI drug screening cell line panels. Now his lab focuses on interrelation between programmed cell death and mitophagy in the dynamics of cancer recurrence after chemotherapy .He has a strong interest in translational research on Oral and Breast cancer resistance. He has contributed to our understanding of how heat shock proteins regulate tumor stem cells and described an assay to identify drugs that target cancer stem cells. His effort to translate most of these assays for commercial drug screening for Pharmaceutical industries is a remarkable money generating model. He is the recipient of Innovative Young Biotechnologists award from Department of Biotechnology and is serving as a Task force member of Cancer Biology & IYBA selection committee. He has established a central cell line repository at RGCB that acts as the national cell resource for Indian researchers.

Title: Cell and cell free assays for sars cov 2 viral entry inhibitors from natural products: assay development and screening

Dr.T.R.Santhosh Kumar

The human transmembrane protein, Angiotensin converting enzyme 2 (ACE2) acts as the receptor for SARS CoV 2 spike protein, and is a potential therapeutic target in preventing viral infection. Even though it is expected that natural products with unique structures and safety are likely to have potential activity against this target, we are yet to discover a potential lead form natural products. Rapid, cost effective sensitive methods are important for screening the binding inhibitors. Recent developments in molecular probes and genetically encoded sensors offer great opportunity for the development sensitive assay system based on the biology of viral entry mechanisms. We have developed both cell based and cell free system capable of rapid screening of binding inhibitors using genetically encoded probes. A cell free bead based system using immobilized fluorescent S protein showed potential utility to screen soluble fluorescent ACE2 binding inhibitors to Spike protein in high- throughput screening. Expression of Spike and ACE2 in diverse cells employing donor and acceptors fluorescent pairs further supported FRET based screening approach in cell based system. Compared to the SARS CoV 2 pseudovirion and live viral methods, these assays are rapid, cost effective and can be utilized in high-throughput screening mode. Real time imaging and life time imaging approaches employed for the screening are extremely sensitive and confirmatory in nature and have potential utility in novel therapeutic discovery.

Dr. J. Wijayabandara

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Dr. Wijayabandara received his B.Sc (special) Degree in Chemistry from University of Sri Jayewardenepura, Sri Lanka in 1986 and subsequently obtained his Ph.D in molecular medicine from the same university in 1994 under the collaborative research program with Faculty of Pharmacy, State University of Utrecht, The Netherlands. He worked as the Founder Manager of Quality Assurance and Research Laboratory of State Pharmaceuticals Corporation of Sri Lanka (1997-2000), prior to joining Faculty of Medicine, University of Colombo in 2000. He has been a Senior Lecturer in the Department of Pharmacology and Pharmacy, Faculty of Medicine, University of Colombo from 2000 to 2011. He has contributed significantly in establishing the degree level pharmacy education in the country. He has also been a Visiting Research Scientist to the International Center for Chemical and Biological Sciences, University of Karachi, Pakistan since 2006. Besides teaching at University of Sri Jayewardenepura as a Senior Lecturer in Pharmacy, Dr. Wijayabandara served as the Director of Bandaranaike Memorial Ayurvedic Research Institute, Ministry of Health, Nutrition and Indigenous Medicine, Sri Lanka (2017 – 2018). He is presently holding the position of Head, Department of Pharmacy and Pharmaceutical Sciences, Faculty of Allied Health Sciences, University of Sri Jeyewardenepura, Sri Lanka. He was a member of Board of Management of Institute of Indigenous Medicine, University of Colombo and the Chairman of Ayurveda Pharmacopoeia Revision Committee, Sri Lanka. He has also been appointed as a panel member of the Formula Committee of Department of Ayurveda, Sri Lanka. Dr. Wijayabandara is a member of several organizations including International Society of Ethnopharmacology, GP-TCM Research Association and Asian Society of Pharmacognosy. He is currently engaged in the isolation and structure elucidation of pharmacologically active constituents from medicinal plants and finished traditional medicines, ethnobotanical field research and standardization and quality control of traditional medicines. Dr. Wijayabandara has published over 30 research articles in national and international journals and 3 patents. Dr Wijayabandara has shown his ability to sustain high quality research activities, excellent academic profile and a great deal of collaborative skills. He has been invited as a guest speaker in several national and international conferences.

Immunostimulatory effects by traditional medicines – An attractive and safer alternative to combat COVID-19 virus

Jayantha Wijayabandara

Our body's multitier immune system plays an important role in the mechanisms involved in many diseases. The role of host immune function has become increasingly important in expanding our understanding of the mechanisms that are involved in the body's ability to prevent cancer, infections, inflammations, allergic conditions etc. Selecting the appropriate drug targets is very important for controlling, preventing and even curing many diseases. Historically and traditionally immune system has been a main target in the achievement of many important preventive and therapeutic successes. The human body is continuously exposed to invading pathogens such as viruses, bacteria, protozoan parasites, which more or less weaken the function of the immune system and thereby generate immunosuppression. There are no effective vaccines against some severe infections or parasitic diseases, and many chronic diseases are the consequence of an unbalanced or impaired immune system. We should realize that the incidence of severe infections such as COVID-19 and AIDS might be positively influenced by a restoration of the suppressed immune system. Although the terms "immune system" "immunostimulants" or "immunomodulators" are not encountered in original and classical Ayurvedic texts, translation and interpretation of various Ayurveda terms directly refer to "immunostimulant" or "immunomodulator". It is felt that Ayurvedic and traditional concepts of preventive health care have shown certain links with non-specific immunostimulation. The non-specific immunostimulation or immunopotentiation can be caused with the use of some medicinal plants. The Ayurveda system of medicine details the concept of immunostimulation by the term rasayana. The use of herbs for improving the overall resistance of body against common infections and pathogenes has been a guiding principle of traditional systems of medicine including Ayurveda. As far as preventive strategies are concerned, the major solution at this crucial juncture of COVID-19 coms from potentiating our immune system. Hence, using scientifically proven traditional remedies and food supplements with immunostimulatory effects prophylactically could be a promising and a smarter approach in the management of COVID-19. This talk will mainly present immunostimulatory properties of some medicinal plants which have been extensively investigated in various studies.

Prof. Joykumar Meitei Laishram

Central Agriculture University, Imphal, Manipur, India

Prof. Joykumar Ngangkham is Professor and Ex-Dean at the College of Agriculture, CAU, Imphal. He completed his Master at Tashkent Agricultural University, Tashkent, UzSSR, USSR and PhD at Academy of Sciences UzSSR, Tashkent, USSR. Prof. Joykumar Ngangkham has developed Varieties of Orchids, Maize (Popcorn) and Black scented Rice. He was an external examiner of Ph.D. Thesis, has Supervised Ph.D. and Post-Doctoral fellows. He has successfully completed and executed a good number of projects from various funding agency such as DSTE, DST, DBT, CSIR, ICEF& LDA and NMPB. Prof. Joykumar is a Founder member of the Manipur state scientific Committee for establishment of Institute of Biodiversity and sustainable Development (IBSD) in Manipur under Dept. of Biotechnology Govt. Of India; Member of Manipur State Horticulture Development Committee, Member of Manipur State Oilseed Development Committee, Resource person of the Committee for drafting Environment status of Manipur State, Task force member of DBT GOI for North east India, Non Official Member of the NATIONAL BIODIVERSITY AUTHORITY, Government of India and Member of various other Departments.

Title: Genetic studies of fragrance and pericarp colour and molecular markers in Black Scented Rice of Manipur (Chakhao)

Joykumar Meitei Laishram

Studies on the genetic control of fragrance and pericarp colour in Black Scented Rice of Manipur (Chakhao) also known as Forbidden Rice in China, is very rare, though both the characteristics are economically very important in global rice trade. A study was made to investigate the nature of genetic control of these important characters in Black Scented Rice of Manipur (Chakhao) during 2017 to 2019 in CAU, Imphal. The studies revealed that the fragrance/aroma was controlled by a single dominant gene unlike other studies of aromatic basmati and jasmine rice types where a deletion occurred in BADH2 gene of an 8-bp in the 7th exon at the 8th chromosome resulting a single recessive gene controlling accumulation of 2-AP for the fragrance/aroma. It was revealed that enough 2-AP was not accumulated in Black Scented Rice of Manipur (Chakhao) which has NUTTY fragrance. On the other hand other volatile compounds such as 2-pentylfuran, hexanal and nonanal were accumulated much higher than 2-AP which suggested that other genes/gene combinations might be involved in controlling the fragrance. In our study in all 9 crosses involving 3 Black fragrant and 3 white non fragrant genotypes all the F1 were observed to be fragrant and in the F2 they were segregated into 3:1 phenotypic ratio (3fragrant:1 non fragrant). For pericarp colour it was observed that in all crosses the F1 were black and in F2 it was segregated into 9:3:3:1 (9 black: 3brown:3 reddish: 1 white) phenotypic ratio. Based on this possibility it was assumed that when Pb genes is the only dominant allele, the colour of the grain is brown whereas when Pp is the only dominant allele, the colour of the grain is red but when both Pb and Pp are dominant alleles, the colour of the grain is black or purple and when pp and pb are recessive it gave white colouration of pericap. Molecular markers for MAS for fragrance and pericarp colour it was found that external primers, ESP and EAP which produced an expected fragment of approximately 580bp as a positive control of homozygosity / heterozygosity of scent in all rice genotypes under study. When external primers, ESP and EAP, were paired with internal primers INSP and IFAP, two bands of 355bp and 257bp were produce indicating 355-bp for fragrant and 257-bp for non-fragrant geneotypes. To discriminate black rice from red and white rice, we have designed two CAPS marker for OSB1 gene and were used to amplify DNA fragments with an expected size of 349/351 bp (black/white). The 349-bp amplicon in black rice was cleaved into two fragments of 127 bp and 222 bp sizes when digested by BamHI, whereas white genotypes with 351- bp amplicon were not cleaved by BamHI. With Indel markers a 14-bp long sized Rc fragment in red rice was used to develop an Indel marker for this gene. The size difference between amplified DNA fragments was confirmed between red rice (156 bp) and black/white rice (142 bp). In our study only one cultivar had red pericarp colour and placed at 156bp and as such all the cultivars having black pericarp colour were found at 142 bp.

Dr. K. Mruthunjaya

Dr. K. Mruthunjaya completed M. Pharm, in Pharmacognosy in the year 1999 from Govt. College of Pharmacy, Bangalore and PhD 2009 from Rajiv Gandhi University of Health Sciences, Karnataka, Bengaluru. Presently Dr. Mruthunjaya is working as a Professor & Head in the Dept. of Pharmacognosy at JSS College of Pharmacy, Mysuru, which is a constituent college of JSS Academy of Higher Education and Research, Mysuru, India. He has more than 20 years of teaching and research experience in the said college. His area of research is identifying, screening and validation of antioxidant herbs for their various biological properties. So far more than 20 anti-oxidant herbs were screened for their various biological properties especially for their Hepatoprotective, anticancer, anti-inflammatory activities. He has guided and Co-guided more than 20 M.Pharm students and around 15 PG Scholars of Medical, Dental and Life Sciences discipline. He has guided and co-guided 10 PhD Scholars. He is also visiting faculty of Govt. Ayurveda Medical College and Hospital. He is member of Editorial board of many national journals and reviewer of many reputed journals. He is member of many profession bodies like, IPA, APTI, ISP and SFE. Presented several presentations in national and international conferences and published 75 research and review articles in peer reviewed journals.

Title: Herbs as a source of platelet enhancers

Dr. K. Mruthunjaya

According to the 2016-17 survey of WHO, in a year, an estimated 390 million dengue infections occur in the world. Of these 500,000 cases develop into dengue hemorrhagic fever, in which 25,000 death estimated annually worldwide. More than 47,000 chemotherapy patients are suffering with thrombocytopenia per year and 10 cases of immune thrombocytopenic purpurea in 10000 population every year. And there are many other diseases and disorders where platelet depletion is the one of the major cause of death. Since last couple of years, when there was increasing trend of Dengue outbreak, especially in India and later, use of Carica papya leaf juice as a remedy to Dengue and its efficacy in increasing the platelet count, made us to explore its properties and mechanism of action. Also, in this current study we have explored the platelet enhancing activity of another two indigenous herbs (identity of these two herbs will be revealed during the presentation). Papaya leaf juice was initially evaluated for its anti-thrombocytopenic activity in alcohol liver disease (ALD) induced thrombocytopenia model in rats. Later subjected for sequential fractionation to identify the phyto-constituents using LCMS and HPLC. Efficacy of the bio-guided fractions were investigated in chemotherapy induced Thp model in rats where hematological parameters, biochemicals endogenous antioxidant levels and molecular biomarkers such as TPO levels and cMpl receptor expression were determined. In case of other two herbal extracts, platelet enhancing property is explored in alcohol liver disease (ALD) induced thrombocytopenia model and anticancer drug induced thrombocytopenia model. C. papaya leaf juice extract significantly enhanced the platelet count in ALD induced thrombocytopenia rats. Phytochemical screening reveals the presence of phenolic and flavonoids in different fractions. Treatment with C. papaya leaf juice and its bio guided fractions in Cyp induced ThP model for 14 days normalized the elevated bleeding and clotting time and reversed the Cyp induced elevation of endogenous antioxidant levels. A significant increase in the serum thrombopoietin (TPO) level and low expression of CD110/ cMpl receptor was observed in Cyp treated group, compared to normal and was reversed upon C. papaya extract CPJ and CPJ-BT treatment at 400mg/kg dose. Whereas in case of other two plant extracts similar findings were obtained. We have concluded that the C. papaya leaf juice enhances the platelet count in all the aetiology of thrombocytopenia by regulating the TPO production and cMpl receptor expression on megakaryocytes. Similar conclusion was drawn but understanding the mechanism of action is not concluded.

Prof. Sanjit Dey

Department of Physiology, Calcutta University, Kolkata, India

Prof. Sanjit Dey is currently working as a Professor, Department of Physiology, University of Calcutta. He had his expertise in Molecular Biology as he earned PhD degree. He went abroad for pursuing translational research at UCLA, USA and as Visiting Scientist at MD Anderson Cancer Centre, USA, 2008 under DBT Overseas Fellowship. He is active member of many International and national organizations apart from his pedagogy and administrative responsibilities. He is a member of National Academy of Sciences, India, (NASI). He has many publications in high impact factor international journals as part of the evidence based research. He is promoting and advocating the health promotion role of phytochemicals from Moringa oleifera, seabuckthrone or Colored fruits and vegetables. He has supervised a significant number of research grants from almost all Government funding agencies to establish the proof of principles of health promotion by plant products. He worked on many indigenous plants of India. Among them *Moringa oleifera*, seabuckthrone or Colored fruits and vegetables. His current running project proposals are focused on exploring role of phytochemicals in Pain amelioration, cancer therapy by radiation sensitization, anti-inflammatory and immunomodulatory functions.

Title: Natural Phytochemicals are Mother Nature's Weapon Against Diseases

ABSTRACT FOR PRESENTATION

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IBSD - SFE - 01

Plukenetia volubilis' L. (Euphorbiaceae), "*sacha inchi*" growing in Mizoram: A rich natural source of omega-3 and omega-6 fatty acids.

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Plukenetia volubilis L. (Euphorbiaceae), "sacha inchi" or "mani del monte" is a potential bioresources growing in Mizoram. Its seed oil contains omega-3 and omega-6 fatty acids and is a good source of polyunsaturated fatty acid. The roasted seeds and leaves of sacha inchi are edible. Fresh leaves are used as laxatives. Traditionally seeds are uses in the treatment of neurodegenerative disorders and as digestives. The recent research finding shows the significant role of omega-3 fatty acid in the prophylaxis of COVID-19 infection. Every year *P. volubilis* seeds are being exported to the neighbouring countries as a rich source of omega-3 and omega-6 fatty acids. Several products of sacha inchi (shampoo, cosmetics, and oil) are available in Myanmar, Europe, China and African countries. The microbiome of medicinal plants has profound impact on the metabolome of the host, and thus could influence the efficacy of herbal medicine. So exploring the associated microbiome including endophytes of *P. volubilis* could have significant impact on the host plant secondary metabolites. However, in India in general and in Mizoram in particular, *P. volubilis* not using on a commercial scale as a natural source of omega-3 and omega-6 fatty acids.The biochemical metabolic pathway and theit interactions in *P. volubilis* are still had scope to study in-depth using metabolomics. Therefore, metabolomics study of *P. volubilis* by using microbiome and Phyto-Pharmacological tools will open an opportunity for commercial utilization of *P. volubilis* in the local market as a nutraceuticals or therapeutic agent.

IBSD - SFE - 02

Swertia chirayita, a critically endangered medicinal plant, conservation through *ex-situ* cultivation in Shillong Meghalaya, India.

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Swertia chirayita (Roxb. ex Fleming) Karsten belonging to Family: Gentianaceae is internationally renounced critically endangered plant of temperate Himalayas. *S. chirayita* is among the foremost reputed plants of Indian system of medicine (Ayurveda) and incorporated in the Indian Pharmacopoeia List 1946. It is one of the 32 prioritized medicinal plants by National Medicinal Plants Board, New Delhi, Government of India. *S. chirayita* is medicinal importance due to the presence of bitter glycosides, xanthones, flavonoids, triterpenoids and iridoid. *S. chirayita* shows anticarcinogenic, hepatoprotective, hypoglycemic, antihepatotoxic, anti-inflammatory, antimicrobial, antileprosy, antimalarial, antioxidant and CNS depressant activities. *S. chirayita* is used traditionally as a home remedy for malarial fever, indigestion, intestinal worms in children, liver diseases, cough, cold, asthma, headache, boils, scabies, etc. Deminishing natural populations of *S. chirayita* from wild has necessitated *ex-situ* cultivation for its conservation. A study was conducted for the *ex-situ* cultivation of *S. chirayita* at altitude 1500±10 m above MSL in Upper Shillong region of Meghalaya, India and the eco-physiological adaptation study was conducted. The plant showed the successful growth and yied during its seed to seed cycle showing varied adaptive strategies during its pluri-annual life cycle of more than two years. The successful seasonal harvest of bitter glycosides rich leaves and growth performance results encourages its incorporation into mixed crop cultivation or on marginal lands for additional income of farmers. The study showed successful growth and yield during its seed to seed cycle. Two to three leaves harvestings per year can be taken and suggested from the plant cultivated in the niche environment of Upper Shillong, Meghalaya while maintaining the plant for further growth before the final yield after two and half years.

IBSD - SFE - 03

Anxiolytic, Antidepressant and Thrombolytic Potential of Achyranthes Aspera L. Aerial Parts: in-vivo, in-vitro and in-silico Techniques

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Achyranthes aspera L. (known as Apang, Aghara or Apamarga in India) of the Amaranthaceae family was reported to have several ethnopharmacological properties. The methanol extract of its aerial parts was investigated for potential anxiolytic, thrombolytic and antidepressant activities at 100, 200 and 400 mg/kg body weight doses. In-vivo tests included the forced swimming test (FST), the tail suspension test (TST) and the hole-board test (HBT), all for testing anxiolytic and antidepressant activities, in Swiss Albino mice using diazepam as the standard whereas the thrombolytic ability was tested in-vitro using streptokinase as the standard. Additionally, in- silico experiments were conducted with the help of Discovery Studio, PyRx, UCSF Chimera and various online tools for the purpose of molecular docking analysis, PASS prediction and ADME/T. The extract displayed a significant (p < 0.05) reduction of immobility time in FST and TST and increased head dipping in HBT. It also yielded significant (p < 0.001) clot lysis ability at the lowest dose. The docking scores were found to be ranging from − 2.31 kcal/mol to − 7.4 kcal/mol. Spathulenol, diazepam and hydroquinone showed the best binding affinity and all compounds were found safe in the ADME/T study. The findings demonstrated that this species might have the potential to be used in drug development research for the treatment of anxiety, depression and blood coagulation.

Keywords: *Achyranthes aspera* L., antidepressant, anxiolytic, thrombolytic, in-silico

IBSD - SFE - 04

Metabolome analysis and interaction potential of *Plumbago zeylanica* with CYP450 enzyme

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Background: In ancient system of Medicine, medicinal plants play a crucial role for maintaining human health in many developing countries for centuries for curing a plethora of diseases. Medicinal plants are considered to be safer through their traditional practices; the quality evaluation, safety and scientific validation are utmost essential to develop safe and efficacious herbal remedy for the betterment of Human health.

Aim of the study: This study is aimed to identify the metabolites present in the *Plumbago zeylanica* (PZ) extract together with the quantification of active metabolite. Further, interaction potential of the PZ extract and its bioactive phytomolecule with Cytochrome P450 isozymes (CYP3A4, 2D6, 2C9, 1A2) was evaluated by CYP450 enzyme inhibition assay.

Material and Methods: Ultra-performance liquid chromatography-quadrupole/ time-of-flight mass spectrometry (UPLC-QTOF-MS) analysis was performed to detect and identify the phytoconstituents in the PZ extract. CYP450 enzyme interaction potential of PZ and plumbagin was carried out through CYP-CO assay and fluorometric high throughput screening (HTS) assay for individual isozymes.

Results: CYP-CO assay revealed that the interaction potential of PZ extract on the liver microsomes was found to be lesser than the standard inhibitor ketoconazole. PZ extract and plumbagin showed relatively higher IC_{50} values than the respective standard inhibitors in the fluorimetric assay. UPLC-QTOF-MS analysis showed the presence of a number of active phytomolecules present therein.

Conclusions: This study suggested that the PZ extract and plumbagin contributes negligible interaction potential with CYP450 isozymes. So, the formulation is considered to be safe for its therapeutic management without any potential drug interaction involving CYP 450 isozymes.

Keywords:

*Plumbago zeylanica***,** Plumbagin, Ayurveda, UPLC-QTOF-MS, Cytochrome P450.

IBSD - SFE - 05

Study of the diversity and pharmacological property of Macrofungi from three Districts of Manipur

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Manipur is a hill-girt State that experience different types of climatic zones and falls in the Indo-Burma Biodiversity hotspots, which harbors large population of fauna, numerous plants and fungal species. Wild Edible Mushrooms are one of the important food sources of rural people and are rich source of nutrients. Mushroom are the macroscopic fruiting body of macro fungi belonging to the Basidiomycetes and Ascomycetes, which have been consumed by man for various purposes including their texture and medicinal properties. In this study, 200 wild mushrooms are collected from three districts of Manipur namely Senapati, Pherzawl and Churachandpur. The collected mushrooms were documented, identified, preserved and extracted using ethyacetate as solvent. Primary screening of the antibacterial properties of the extracted wild mushrooms were carried out and it was observed that many of the wild mushrooms exhibit broad spectrum antibacterial activity against *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 11632, *Pseudomonas aeruginosa* ATCC 15442, Bacillus cereus MTCC 430, *Shigella* flexneri ATCC 12022 and *Enterococcus faecium* ATCC 35667. The zone of inhibition was calculated in mm and compared it against ampicillin as positive control.

Keywords: Wild Mushrooms, antibacterial, diversity.

IBSD - SFE - 06

Ethno medicinal Importance of *Lavatera cashmiriana* Camb. – A wild herb of Kashmir Himalaya

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Ethno medicinal knowledge of locally available wild plants grown in Union territory of Kashmir, India has contributed to tremendous efforts of scientists to unleash some major compounds of interest to mankind. The forests of Kashmir are occupied with huge number of plants comprising of great medicinal activity which needs to be evaluated by scientific fraternity. This presentation will be an attempt to authenticate ethno medicinal uses of a locally available herb of this region known as sozposh (Kashmiri) or Hollyhook or *Lavatera cashmiriana* Camb. The plant was collected from Drung, Tangmarg area of Kashmir. The plant has been evaluated for its phytochemical composition using various standard tests. Plant root was assessed for its medicinal properties and the results obtained proved the traditional folklore claims of this plant. IC_{50} value of methanolic root extract was found to be equal to 227.89 µg/mL as compared to standard Ascorbic acid with a value of 146.88 µg/mL. Root extracts were checked for phenolic content and methanol extract exhibited an appreciable amount of activity. The extract contained many phytoconstituents as exhibited by qualitative tests. Methanolic extract also showed antimicrobial activity against various bacterial strains as *Staphylococcus aureus, Salmonella typhi, E.coli* etc. The present study proved *Lavatera cashmiriana* Camb. to be a potential plant source for discovery of many potent compounds, which may be beneficial for human healthcare.

Key words: Ethno medicinal, *Lavatera cashmiriana* Camb. Methanolic root.

IBSD - SFE - 07

Endophytes from *Paris polyphylla* Smith, an indigenous plant of Sikkim Himalaya exhibiting antifungal activities

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Endophytes are microorganisms that colonize living, internal tissues of plants without causing apparent harm to the host. Plant diseases, caused by various microorganisms, including bacteria, viruses, fungi, nematodes and protozoa, affect agricultural practices and result in significant crop losses. The extensive use of agrochemicals has adverse effects on human health, environment and also reduces agricultural sustainability. Reduction or elimination of fertilizers, pesticides and agrochemicals will have minimal impact to our ecosystem and lead to sustainable agriculture. Endophytes are seen as a hidden bioresource that have the potential to provide an unexplored source of strains for potential biocontrol applications. In this study, Plant samples of *Paris polyphylla* Smith was collected from Jorbotey area in Uttarey, West Sikkim. The plant tissues (leaves, stems and roots) were subjected to surface sterilization process prior to isolation of endophytes using a suitable culture media such as Malt Extract agar (MEA), Streptomyces agar (STA), Potato dextrose agar (PDA). 12 isolates from *P. polyphylla* were obtained and 4 isolates have been identified. All the isolates were evaluated for antagonistic capability against fungal phytopathogens (*Fusarium oxysporum, Fusarium moniliforme, Sclerotinia sclerotiorum, Alternaria alternata, Colletotrichum gloeosporioides*) by dual culture technique. The identified 4 isolates of *Paris polyphylla* showed antagonistic activities against all the phytopathogenic fungal strains and percentage of inhibition were calculated. Our results suggest that these strains of endophytic fungi exhibiting antagonistic activities could be used as a promising candidate for potential biological control agent.

Keywords: Endophytes, *Paris polyphylla*, Dual culture, Biocontrol agent

IBSD - SFE - 08

Title: Comparative analysis of the anticancer potential of *Moringa oleifera* L. varieties

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Moringa oleifera Lam., or 'drumstick tree,' is a multipurpose plant which is considered as a supreme source of phytonutrients. It has an enormous medicinal (anticancer, antitumor antiulcer, hepatoprotective, antidiabetic, diuretic, antifungal, antibacterial, antioxidant, anti- inflammatory, antipyretic, antiepileptic, antispasmodic, hypocholestemic andantihypertensive) and nutritional (proteins, vitamins and minerals) properties. it contains a distinctive combination of bioactive compounds like kaempferol, Chlorogenic acid, quercetin, Phenolic acid, Myrecytin, Caffeic acid, Gallic acid etc. The ethanolic leaf extract of M. oleifera varieties, 'PKM1', 'PKM2', 'Jaffna', 'ODC' and 'Conventional' has been used to analyse their viability and cytotoxicity on HepG2 (human liver cell line) by using the MTTassay. It is been observe that MOL extract drugs decreases the cell viability. Therefore, the comparative study reveals that ethanolic leaf extract of Jaffna has stronger anticancer property than PKM1, PKM2, ODC and conventional respectively; it exhibits Jaffna variety can be an alternative source for synthetic drugs.

IBSD - SFE - 09

Gut microbiota associated with oak tasar silkworm, *Antheraea proylei* J. (Lepidoptera: Saturniidae) infecting with Tiger band disease.

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Antheraea proylei J., is an economically important silkworm of North Eastern region of India reared for the production of the tasar silk. The silkworm is often exposed to various microbial diseases caused by bacteria and viruses, including the recently a dreadful viral disease known as tiger band disease. The disease causes significant damage to larvae and elicits pupal mortality, thus posing a serious threat to the linked economic activities. The gut microbiome of silkworms plays an important role, in nutrient acquisition and immunity. In this study, we have reported molecular characterization of gut associated bacteria of healthy and diseased tasar silkworms. Bacterial profile of healthy and diseased silkworm respectively was identified by 16S rRNA gene sequencing and analysis. *Bacillus toyonensis* and *Bacillus thuringiensis* were commonly found in healthy larvae whereas *Bacillus aryabhattai* and *Bacillus megaterium* were found in diseased larvae. The family Bacillus of phylum Firmicutes was dominant in both healthy and diseased silkworms. To the best of our knowledge, this is the first attempt to study *A. proylei* midgut microbiota from a biodiversity hotspot in Northeastern India. Present study might be helpful in disease prognosis and further comprehensive analysis on midgut microflora may lead towards the development of effective strategies for management of these economic silkworms.

Keywords: *Antheraea proylei,* gut microflora, 16S rRNA, oak tasar silkworm

IBSD - SFE - 10

Computational screening of natural compounds and conventional antiviral drugs to discover potent pan-serotype inhibitors against Severe Acute Respiratory Syndrome-Corona Virus-2 (SARS-CoV2) molecular targets

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Presently, an emerging disease (COVID-19) has been spreading across the world due to coronavirus (SARS-CoV2). For treatment of SARS-CoV2 infection, currently hydroxychloroquine has been suggested by researchers, but it has not been found enough effective against this virus. The present study based on in silico approaches was designed to enhance the therapeutic activities of hydroxychloroquine by using curcumin as an adjunct drug against SARS-CoV2 receptor proteins: main-protease and S1 receptor binding domain (RBD). The webserver (ANCHOR) showed the higher protein stability for both receptors with disordered score (<0.5). The molecular docking analysis revealed that the binding energy (-24.58 kcal/mol) of hydroxychloroquine was higher than curcumin (-20.47 kcal/mol) for receptor main-protease, whereas binding energy of curcumin (-38.84 kcal/mol) had greater than hydroxychloroquine (-35.87 kcal/mol) in case of S1 receptor binding domain. Therefore, this study suggested that the curcumin could be used as combination therapy along with hydroxychloroquine for disrupting the stability of SARS-CoV2 receptor proteins.

Keyword: SARS-CoV2, main-protease, S1 receptor binding domain, hydroxychloroquine, curcumin, ANCHOR, Molecular docking

IBSD - SFE - 11

Phytochemical standardization and anti-hemorrhoidal potential of leaves from Dolichandrone falcata in croton oil induced hemorrhoid rat model

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The leaves of plant *Dolichandrone falcata* Seem. (Bignoniaceae) are used traditionally by the local healers of Osmanabad district of Maharashtra, India in treatment of piles and diabetes. The main objective of the present study was to scientifically justify the traditional claims of the leaf extract of the plant *D. falcata* (EDF), traditionally used in treatment of hemorrhoid. EDF was first subjected to phytochemical standardization with the help of HPLC using rutin as a marker. Hemorrhoid was induced to the rats using croton oil rat model, while treatment with EDF was carried out for 5 days orally at 200 and 300 mg/kg and their severity of inflammation was calculated followed by estimation of Evans blue dye level as a marker of inflammation. The hemorrhoidal tissues were also subjected to cytokine profiling and biochemical evaluation such as protein, nitric oxide, lipid peroxidation, superoxide dismutase, catalase and liver enzymes inblood along with histopathology. EDF demonstrated the presence of phenols compounds, flavonoids, tannins, alkaloids, carbohydrates and saponins as major phytochemicals, while rutinwas reported to be 3.08 % w/w. Further, the results depicted more potent anti-hemorrhoidalactivity of EDF at 200 mg/kg orally which was evident through inflammatory index grading. The result also depicted a significant decline in the expression of TNF-α, IL-1β, IL-6 in treated animal tissue and also significantly restored the altered antioxidant and liver enzymes. Histopathological study showed minimal inflammation and reduced dilated blood vessels confirming tissue recovery. Thus the study scientifically justified the anti-hemorrhoidal activity of EDF that may be due to an inhibition in the expression of pro-inflammatory cytokines, its antioxidant potential, where rutin could be considered as major contributing factor.

Keywords: Anti-hemorrhoidal activity, antioxidant, croton oil, cytokines, Evans blue dye, rutin

IBSD - SFE - 12

Anti-microbial activity of an endophytic actinomycete from *Panax sokpayensis* against *Staphylococcus aureus*

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Subsequent to the high valued discovery of endophytic fungi, *Taxomyces andreanae* isolated from *Taxus brevifolia* that produces anticancer compound Taxol (paclitaxel), many efforts have been made to identify endophytes as sources of associated plant natural products and other therapeutic compounds. *Panax*, one of the most famous medicinal plants in the Araliaceae family, occupies an important position in Traditional Chinese Medicine. *Panax sokpayensis*, an endemic species of the Sikkim Himalayas was explored for their associated endophytes and screened for their ability to produce antimicrobial agents. Fourteen endophytic actinomycetes isolates were isolated which was subjected to submerged fermentation on CSPYME broth, the centrifuged culture filtrate was analyzed for antimicrobial activity by adopting agar well diffusion method against *Bacillus subtilis* MTCC 441, *Bacillus subtilis* MTCC 2757, *Listeria monocytogenes* MTCC 839, *Mycobacterium phlei* MTCC 1724*, Escherichia coli* MTCC 10312, *Klebsiella pneumoniae* MTCC 139 and *Staphylococcus aureus* clinical pathogens. One isolate designated as PSRA5 showed specific activity only against the *S. aureus* and was identified by sequencing its 18SrRNA as *Actinoalloteichus cyanogriseus*. Hence, the present work is intended to acquire medicinal functionalities of the plant without endangering the ever diminishing plant resources.

Key words: Endophytes, Antimicrobial potential, Actinomycetes strain PSRA5

IBSD - SFE - 13

Phytochemical screening of secondary metabolites from four aquatic plants of Manipur

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The study includes the phytochemical screening of secondary metabolites from four aquatic plants of Manipur viz. *Cyperus haspan* L. (Kauthum), *Nelumbo nucifera* Gaertner (Thambou), *Sagittaria sagittifolia* L. (Koukha*), Zizania latifolia* turez. (Eshing kambong). The phytochemicals were extracted from samples using four different solvents i.e. methanol, ethanol, water and petroleum ether. The aqueous extracts from theplants were extracted using maceration method. Qualitative phytochemical screening of various extractions from four aquatic plants confirmed the presence of various bioactive compounds like phenols, flavonoids, saponins, terpenoids, steroids, anthocyanins, tannins, etc. The antioxidant activity of four aquatic plants was analyzed using the DPPH method ranged from 22.08±0.09% to 88.07±0.08% inhibition. The result suggests that the phytochemical properties and potential antioxidant activity of four aquatic plants could account for treating various health and disease conditions for its diversified medicinal properties. It may lead to the isolation of new and novel secondary metabolites for the generation of new drugs and cosmetic products.

Keywords: Phytochemical screening, secondary metabolites, aquatic plants, Manipur

IBSD - SFE - 14

Feeding entertainment of daily rhythm of mRNA expression of melatonin bio-synthesizing enzyme genes and clock associated genes in the zebrafish gut.

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The aim of the present study was to investigate the presence of melatonin biosynthesis enzyme genes in the gut of zebrafish and the daily rhythm profile of mRNA expression of melatonin bio-synthesizing enzyme genes (*tph1*, *aanat1*, *aanat2,* and *asmt*) and clock genes (*bmal1a*, *clock1a*, *cry1a,* and *per1b*) in the gut of zebrafish in alternate feeding regime under regular photoperiod. Accordingly, zebrafish were randomly distributed into two feeding groups in the laboratory condition, one was the normal feeding (NF) group where food was supplied at light phase (ZT03 and ZT10), another one was the altered feeding group (AF) where food was provided at dark phase (ZT15 and ZT22) for 30 days. Primarily, the presence of melatonin biosynthesizing enzyme genes has been confirmed in the zebrafish gut by immunohistochemistry and endpoint PCR. Subsequently, in both groups, the daily variation of melatonin bio-synthesizing enzyme genes and core clock genes transcript were analysed by qRT-PCR in the gut. This study reveals an opposite phage in the daily variation of *tph1*, *aanat2,* and *asmt* mRNA expression in AF, compare to the NF condition. In contrast, all core clock genes in the gut display a rhythmic expression in both feeding schedule without any change in the acrophase. In this, studies the localization of melatonin bio-synthesizing enzyme genes in the zebrafish gut was done and explains. This expression profile indicates that the gut melatonin bio-synthesizing enzyme genes may be controlled through the feeding cycle, but clock genes need other influence to entrain. As the melatonin is a multi-potent molecule, the change in the rhythmic expression of its bio-synthesizing enzyme genes through feeding clue may lead to a desynchronization in the fish physiology.

IBSD - SFE - 15

Traditional Healthcare Knowledges of West Sikkim, North-East India

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Evolution of mankind is integrated with development of indigenous technology to meet their needs by informal experimentations. Ethnomedicobotany is one of the tools that help to deal with the direct relationship of plants and man to prevent and cure ailments. Ethnopharmacology is the scientific study of ethnic groups and their use of drugs. North-East India is in the Indo-Burma and Himalayan biodiversity hotspot in world map and the indigenous medicinal plants grown in the region are useful folk medicines used by the people of this region. With these backgrounds, we have completed 1 st phase cross culture ethnopharmacological survey in West Sikkim district. Audio-Visual and written documentation of traditional healthcare knowledge were completed. Altogether, 26 formulations were documented that contain 34 different plant parts and 7 animal parts. Those 26 different formulations are used for treating 24 different human ailments. After having generated a large database, our initial focus was for pharmacological evaluation of selectedformulations/plants for their effectiveness against particular diseases model as claimed by thelocal healers. The scientific research on medicinal plants used in traditional practices andapplication of ethno-medicinal products in the healthcare system substantially help in sustainable development of traditional healthcare practices of the region.

IBSD - SFE - 16

Hypoglycemic potential of Tupistra nutans Wall. (Nakima)

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Tupistra nutans Wall., commonly known as Nakima is an expensive and popular vegetable of Sikkim, India due to its medicinal properties against metabolic disorders. In present study, antidiabetic property of hydroalcoholic extract (HA-Tn) of T. nutans inflorescences was (150mg/kg, b.w.) evaluated by using streptozotocin (STZ 75mg/kg i.p.) as well as Alloxan monohydrate (140 mg/kg, b.w.) induced diabetes on rats, oral glucose tolerance test on rats and Mitochonrial Succinate Dehydrogenase (SDH) Assay. The HA-Tn at the dose of 150 mg/kg showed marked reduction in serum levels of Fasting Blood Glucose, Glycosylated hemoglobin, LDL, Total cholesterol and Triglycerides, whereas, an increase in Total protein and HDL level as compared to STZ (positive control) and Alloxan treated groups for anti-diabetic activity respectively. Glibenclamide (5 mg/kg) was considered as standard drug. Induction of diabetes significantly reduced the mitochondrial marker enzyme, Succinate Dehydrogenase. Administration of the test extract, HA-Tn improved the liver mitochondrial dysfunction in experimental animals. There was an increase in the marker enzyme levels of mitochondrial Succinate Dehydrogenase as compared to the diabetic control animals. These observations established the traditional claim and thus Tupistra nutans could be a potent antidiabetic agent for use in near future.

IBSD - SFE - 17

Phytochemical and GC-MS profiling of volatile flavor compounds in two Asian wild rice- *O. rufipogon* Griff. and *O. nivara* Sharma et Shastry

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Objectives: The current work primarily aims to investigate the qualitative analysis of phytochemical compounds and identification of the volatile compounds associated in two different Asian wild rice- O. rufipogon and O. nivara.
Methodology: The plant extracts are prepared from grains of the wild rice. The extracts are diluted in the methanol (CH 3 OH) for its chemical profile with different phytochemicals and GC-MS methods.
Results: The findings of the current paper disclosed the presence of bioactive compounds such as phenolic, tannins, carbohydrates, triterpenoids, terpenoids, saponin, and steroids. The absence of the flavonoids and alkaloids is also detected in both the samples. The GC-MS results highlighted that there is minimal (0.09) difference in retention time among the samples. The total number of volatile flavor compounds detected in the samples- O. rufipogon and O. nivara types are 22 and 21. Both the samples yields five different compounds from it. n-hexadecanoic, carbonic acid 2-dimethylaminoethyl neopentyl ester, (9Z, 12Z)- 1, 3, Dimethoxypropan-2-yl octadeca- 9, 12-dienoat, propylene glycol monooleate, (R)-2,7,8,-Trimethyl-2-2((3E,7E,)-4,8,12, trimethlytrideca- 3,7 compounds are generated from O. rufipogon sample. In contrast, O. nivara yields hexadecanoic acid, Bis (2- (Dimethylamino) ethyl) ester, Decanoic acid, 2-oxo-, methyl ester, tetradecanoic acid, 2,3-dihydroxy propyl ester, 9,12-Octadecadienoic acid (Z, Z)-, 2-hydroxyl-1-(hydroxyme).
Conclusion: The detected compounds associated in wild rice became a reputable source of varied anti-oxidative and nutritive compounds that can be applied in health improvement issues. Henceforth, these bioactive compounds can be integrated into the manufacture of remedies to avert and combat against the premier chronic diseases in human.
Keywords: Volatile; Wild rice; GCMS; Anti-oxidant; and Bioactive.

IBSD - SFE - 18

Development and Evaluation of Transdermal Patches With *Cissus Quadrangularis* Plant Extract

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Aim: The aim of the present research work was to prepare and evaluate the transdermal patches of *Cissus Quadrangularis* extract.

Objective: To check the antibacterial activity of *Cissus Quadrangularis* aqueous extract.

Methods: *Cissus Quadrangularis* aqueous extracts was prepared using maceration method. The transdermal patch was prepared by the solvent evaporation method using hydroxyl propyl methyl cellulose (HPMC E -15) in different concentrations. Dibutyl Phthalate and DMSO were used as plasticizers and permeation enhancer.

Result: The results showed that extract of *Cissus Quadrangularis* possess antibacterial activity and Staphylococcus aureus is significantly more susceptible as compared to the other tested strains. The prepared transdermal patches were evaluated for their physiochemical characteristics such as physical appearance, weight uniformity, thickness, folding endurance and moisture content. The thickness of various patches was found to be uniform. The thickness of the patch varied from 0.154 to 0.236. The folding endurance was found to be consistent and the weight uniformity was good and within range.

Conclusion: *Cissus Quadrangularis aqueous extracts was prepared using maceration method.* The extracts were then screened for the presence of phenols, flavonoids, tannin, saponin, alkaloids, glycosides, phytosterols and carbohydrate. Antimicrobial study was carried out for the aqueous extracts.

IBSD - SFE - 19

A promising potential extract of Crofton weed, (*Ageratina adenophora*) to control cruciferous pests.

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Agricultural crops are highly affected by various types of insect pest which often lead to loss of productivity. For this chemical insecticides are often used to control the pests from spreading. Subsequently, overuses of insecticides have negative impacts such as development of resistance by the pest, toxic effects to other non-target organisms and hazardous effects on environment**.** To overcome the drawbacks of chemical pesticides, people have started using botanicals for control of crop pests as an alternative way.
In the present study, the insecticidal activity of four different plant species viz; *Eurya sp, Elsholtzia sp, Toona ciliata and Ageratina adenophora* against the cabbage cluster caterpillar, *Crocidolomia pavonana* were evaluated. Among them, Crofton weed, *Ageratina adenophora* (Spreng.) extracts showed significantly high antifeedant activity. Further, antifeedant activity of various extracts of *A. adenophora* viz; hexane, ethyl acetate, chloroform, acetone and methanol were investigated using leaf disc no-choice method against third instar larvae of *C. pavonana* at different concentrations. It was observed that hexane extract of Crofton weed, *A. adenophora* (Spreng.) exhibited significantly high antifeedant activity at dosage of 3 mg/ml against the larvae of *C. pavonana.* Further, isolation of bioactive molecules from active extract is needed through bioassay guided fractionation using high performance liquid chromatography. The result reveals that hexane extract of *A. adenophora* can be used as botanical pesticide in the future.

Keywords: Botanicals, *Crocidolomia pavonana*, *Ageratina adenophora*, Antifeedant activity, Chemical pesticides.

IBSD - SFE - 20

Identification of Dietary Molecules as Potential SARS-CoV-2 Agents by using Computational Approach

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Recently, Corona Virus Disease-2019 (COVID-19), caused by fatal strain of coronavirus named Severe Acute Respiratory Syndrome-2 (SARS-CoV-2) has been declared as a pandemic by the World Health Organization (WHO) on 11 March 2020. Globally, no therapy such as vaccines and specific therapeutic agents is available so far despite of some protease inhibitors and antiviral agents. In this regard, phytomedicine may be developed as therapeutic agents in the prevention and treatment of current COVID-19 disease. Thus, the aim of this study was to find out a suitable therapeutic agent from selected 17 dietary molecules, which could target SARS- CoV-2 encoded proteins. As per our result, epigallocatechin gallate (EGCG) (7) is a lead compound that could fit well into the binding sites of docked proteins of SARS-CoV-2. EGCGshowed very strong molecular interactions with the free enzyme of main protease (6y2e), chimeric receptor-binding domain complexed with human ACE2 (6vw1), and NSP15 endoribonuclease (6vww) encoded proteins of SARS-CoV-2, by showing binding energies -9.30, -8.66, and -8.38, kcal/mole respectively. EGCG is more active than three standard drugs that are currently being used in COVID 19, namely remdesivir and nafamostat. Therefore, EGCG (7) might be explored as a therapeutic agent for the treatment of COVID-19.

IBSD - SFE - 21

In vitro anticancer potential of some fresh water cyanobacteria from Northeast India

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Northeastern India is a biodiversity hotspot area with largely unexplored cyanobacteria rich in bioactive compounds. Four different cyanobacteria isolates namely *Tolypothrix sp. Calothrix sp. Stigonema sp*. extracted in solvent Dichloromethane: Methanol (2:1) were studied its cytotoxic effect in different cancer cell lines. The *in vitro* anticancer activity of those extracts was performed on Hela, A549, and H357 human cell lines using 3-(4, 5- dimethylthiazole-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. *Tolypothrix* extract reveals moderate cytotoxicity within 48h of incubation in all cells and the most pronounced responses were seen in Hela and A549 cells with reduced cell viability of 57µg/ml and 30µg/ml respectively. Cytotoxic activity was measured by apoptotic cell death through changes in cell surface and nuclear morphology. *Tolypothrix* extract reliable cell cytotoxicity exhibit cell death through caspase 3 dependant apoptosis. The significant changes in cell morphology like shrinkage and rounding up of cell after exposure to crude as well as column chromatography purified fractions of *Tolypothrix sp.* proved that the compounds have a potential candidate for an anticancer drug.

Keywords: Hot extraction, MTT assay, Western blotting, chromatography.

IBSD - SFE – 22

Identified therapeutic resources from industrial waste of *Cymbopogon flexuosus* (Nees ex Steud.) W. Watson (East Indian lemon grass)

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Cymbopogon flexuosus (Nees ex Steud.) W. Watson commonly known as East Indian lemon grass is a popular medicinal and aromatic plant of North-East, India. In world aromatic market India is considered to be third largest producers for lemon grass oil. The essential oil from the lemon grass is extracted by the stem distillation method and the decoction of lemon grass is a huge waste product after essential oil extraction. However, the traditional healthcare practitioners of North- East India use such decoction of lemon grass for treatment of various disorders. With these background, in the present work our aim was to investigate the therapeutic potential of concentrated decoction of lemon grass after the extraction of essential oil against high fat diet induced diabetes in Guinea pigs. The aqueous extract/concentrated decoction of *Cymbopogon flexuosus*, 90mg/kg (CF90), 30 mg/kg (CF 30) and Metformin (MFN) 500 mg/kg (reference standard) treatment reduced elevated fasting blood glucose level of animals at different days (mg/dl) in compared to diabetic control animals. The serum TNF-α and IL-1β levels elevated under high fat diet ingestion were significantly mitigated by three weeks treatment of CF90. These observations established the traditional claims and thus decoction of *Cymbopogon flexuosus* after oil extraction (the industrial waste) could be a potent source of therapeutic resources for treatment of metabolic disorder in near future.

IBSD - SFE -23

Actinomycetes isolates from *Panax sokpayensis* of Sikkim exhibiting antibacterial activity

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Panax, an important medicinal plant in the Araliaceae family occupies key position in Traditional Chinese Medicine. Screening of prospective endophytes from medicinal plant has become an important landmark during the exploration of novel compounds. With the reflection of various therapeutic values of phytochemicals from *Panax sp.,* exploration of the associated endophytes and screening for their ability to produce antimicrobial agents has been initiated. A total of 14 endophytic actinomycetes isolates with distinct characteristics were isolated from rhizome of indigenous *Panax sokpayensis* collected from Sikkim, India. After subjecting the isolates to submerged fermentation on CSPYME broth, the centrifuged culture filtrate was analyzed for antimicrobial activity by adopting Agar well diffusion method against various test bacteria viz. *Bacillus subtilis* MTCC 441, *Bacillus subtilis* MTCC 2757, *Listeria monocytogenes* MTCC 839, *Mycobacterium phlei* MTCC 1724*, Escherichia coli* MTCC 10312, *Klebsiella pneumoniae* MTCC 139, *Pseudomonas aeruginosa* MTCC 741*, Salmonella enterica* MTCC 733*, Shigella flexneri* MTCC 1457 and *Staphylococcus aureus* clinical pathogens. Out of 14 isolates, 04 isolates exhibited antibacterial activity against the test bacteria. One isolate designated as PSRA7 showed specific activity only against the *Bacillus subtilis* and *Mycobacterium phlei.* PSRA7 was identified by sequencing its 18SrRNA and was identified as *Saccharopolyspora gloriosae*. Further ongoing studies on the characterization of the isolate and the properties of the bioactive compounds produced are needed to draw a conclusion on the produced compound.

Key words: *Panax sokpayensis,* Endophytes, Antibacterial potential, Strain PSRA7

IBSD - SFE - 24

Chemical and molecular analysis of ginsenoside biosynthesis in *Panax sokpayensis*: A potential ginseng resource from Northeastern Himalaya

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Panax sokpayensis is a new species, which was first reported from Sikkim Himalaya, India. The main chemical constituents of *P. sokpayensis* are known as ginsenosides, which belongs to dammarene type triterpenoid saponins. These ginsenosides have immunomodulatory, antifatigue, anticancerous, antidiabetic and antioxidant properties. Due to high medicinal value, rhizomes of *P. sokpayensis* are harvested by many traditional healers from wild habitats. We quantified all the major ginsenosides ((Rg1, Rg2, Rf, Re, Rd, Rb1 and Rb2) in 10 years old rhizomes of *P. sokpayensis*. The total contents of these major ginsenosides were found comparable with already reported total ginsenoside contents of *P. ginseng*. Comparative metabolites profiling was also performed in different aged rhizomes (5, 8, 10, 20 years old) to quantify the variations in individual ginsenosides. To understand the biosynthesis of different ginsenosides, subtractive transcriptomes analysis was performed using leaf and rhizome of *P. sokpayensis*. A total of 20 genes involved in ginsenoside biosynthesis including key genes namely, *Farnesylpyrophosphate synthase*, *Squalene synthase*, *Squalene epoxidase*, *Cycloartenol synthase* and *Dammarenodiol-II synthase*, *β-amyrin synthase* were cloned. These genes were further analyzed for gene expression in leaf, stem and rhizome of *P. sokpayensis*. Some of these rate limiting genes are known to play pivotal role in controlling the metabolic flux of the ginsenoside biosynthetic pathway and therefore *farnesylpyrophosphate synthase* was functionally characterized in heterologous system. Combining the metabolomic and transcriptomic data, *P. sokpayensis* can be considered as potential ginseng resource from North-eastern Himalaya.

IBSD - SFE - 25

Hypolipidemic potential of hydro alcoholic root extract of Viburnum cotinofolium d.don in cholesterol induced albino rats

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Herbal drugs are well for their cost effectiveness and minimal side effects. Currently available hypolipidemic drugs have been associated with a number of side effects and there is always a need for developing novel drugs with higher efficacy and fewer side effects.. Viburnum cotinifolium D. Don (Adoxaceae) is commonly known as Smoke tree and has been traditionally used for the treatment of obesity, hepatic, menstrual cramps and intestinal cramps. The aim of this study was to access the hypolipidemic potential of hydro alcoholic root extract of Viburnum cotinifolium D. Don in cholesterol induced hyperlipidemic albino rats. Hyperlipidemia was induced in male albino rats. Hydro alcoholic root extract of Viburnum cotinifolium D. Don (200 and 400 mg/kg/Day) was administered as test drug. Atorvastatin (10 mg/kg/Day) as the standard. Serum lipid profile, Liver and Cardiac risk factors were estimated. The results revealed that hydro alcoholic root extract showed significant decrease in total cholesterol (61.5 mg/dl), triglycerides(92.33 mg/dl), LDL(16 mg/dl), VLDL(18.5 mg/dl), SGOT(163.833), SGPT(59.5) and total bilirubin (0.366 mg/dl) and significant increase in HDL(26.33 mg/dl) as compared to standard Atorvastatin. Further hypolipdemic effect need to be confirmed by using other in-vivo/ in-vitro models for its effective utilization as therapeutic agent for the management of hypolipidemia.

Keywords: Viburnum Cotinofolium Hyperlipidemia; Atorvastatin; Hypolipidemic

IBSD - SFE - 26

Phytochemical analysis of *Ageratina adenophora* plant for its antiproliferative and antitumor properties against human cancer cell lines.

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Cancer is a disease where genome of an organism is in constant change disrupting stable cell proliferation, differentiation as well as homeostasis and also leading to malignancy. Several cancer researchers are focusing more on safer and effective therapeutic methods relying upon naturally derived bioactive molecules from traditionally used medicinal plants. Many plants have been directly or indirectly used by traditional folk healers since time immemorial in many ailments including cancers. In the current study, the *Ageratina adenophora* plant leaves' extracts (AAL) have been investigated *in-vitro* for their cytotoxic and anticancer properties using crystal violet and MTT assay against cervical cancer (HeLa), adenocarcinomic alveolar basal epithelial (A549) and human pancreatic cancer (BxPC-3) cell lines. The cell viability and cytotoxic assays revealed that the hexane (H), ethyl acetate (EA) extracts of AAL showed activities against HeLa, A549 as well as BxPC3 cell lines. The crude AAL hexane extract was column fractionated and fractions designated as IVC, VA, VB, VC, VIA, VIB, VIC, IXA, IXC, XA, XC were selected and treated on HeLa cell. All the fractions showed activity however fraction VIB (Ethyl acetate 50%: ChCl3 50%) showed highest activity with 11.6% cell viability at 150µg/ml. The treated cells were morphologically rounded, shrunk and blebbed as seen under microscope. Further *in-vitro* studies are under way to elucidate the molecular basis of cell cytotoxicity and also the major phytochemical compound responsible for the activity.

Keywords: *Ageratina adenophora*, cytotoxicity, MTT assay, HeLa cell line, A549 cell line, BxPC-3 cell line.

IBSD - SFE - 27

Polyherbal Formulation Derived from Traditional Medicinal Plants for the Treatment of Arthritis

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Background- Arthritis is the “disease of the joints.” It is defined as an acute or chronic joint inflammation that often co-exists with pain and structural damage. Arthritis affects 15% people i.e. over 180 million people in India. **Objectives**- Phytochemical and Chromatographic evaluation of Polyherbal Formulation for the Treatment of Rheumatoid Arthritis.

Methods- The raw materials (shallaki, shevaga, nirgundi and langli) for polyherbal formulation were procured from S. B. Ayurved Pvt. Ltd., and capsules (500 mg) were prepared by direct filling method. It was investigated for its physiochemical, qualitative and quantitative phytochemical estimation and chromatographic evaluation.

Results- Physiochemical parameters revealed that all the observations were found to be within WHO guidelines limit. The qualitative phytochemical screening showed the higher abundance of terpenoids, Flavonoids and alkaloids. Quantitative phytochemical estimation showed higher percentage of alkaloids, flavonoids, flavonols and phenols. Chromatographic evaluation confirmed the presence of quercetin which can be used as biomarker.

Conclusion- The study will be helpful by providing a detailed phytochemical and chromatographic profile of polyherbal formulation and will act as general awareness for common people and researchers having interest in this respective area.

IBSD - SFE - 28

Chemistry and behavioural activity of essential oil of *Artemisia* sp. against *Aedes aegypti*

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Artemisia has a long history of used as folk medicine, insect repellent agent and as a culinary herb in Asian cooking. Essential oils usually contain a variety of volatile aromatic compounds such as terpenoids, phenylpropanoids, and aliphatic compounds with low molecular weight. The search for active phyto marker compounds from *Artemisia* has led to the discovery and isolation of essential oils (EOs) with interesting activity. Essential oil (EO) from the aerial part of *Artemisia* sp. collected from Ukhrul was investigated for its chemical composition and olfactometry choice assay. The chemical composition of oil extracted by Clevenger apparatus were analysed by GCMS. The compounds present in the essential oil were identified by the reverse search index and the major constituent is found to be Germacrene D (14.9%), D-Amorphene (10.75%), b-selinene (8.06%), Santolina triene (6.11%) and Caryophyllene (4.33%) out of the 90 identified compounds. The oil is prepared in different dose concentrations of 1000,100, 50 and 10ppm in acetone and tested for Y-tube behavior assay on *Aedes aegypti* mosquitoes. The mosquitoes show repellency behavior with response index of -0.6 on 100 ppm EO treatment. The response index is calculated using the number of insect response to the test, control and the total number of insect used in the experiment. Further investigations are needed to study in detail and greater understanding of *Artemisia* EO chemistry to reveals interesting activity. Thus, the oil can be good source of repelling mosquito and can provide an alternative for better vector management**.**

Keywords: Artemisia, essential oil, repellent, mosquito

IBSD - SFE –29

In silico Validation and Pharmacological Activity of potent antiviral and anti-inflammatory Ethno-medicinal plants used by Traditional healers and Herbalists within Lunglei District, Mizoram

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In today's ever changing world where technology and innovation are advancing leaps and bounds, researchers and scientists are all keeping their nose to the grindstone and pouring their blood, sweat andtears trying to be the best and make worthwhile advancements in their respective fields. Still, even afterso many experts have toiled day and night, the remedies and cures for most diseases known to man still elude invention/ discovery. However, there are also anecdotes of people who have been supposedly cured through the use of traditional medicines based on primitive knowledge and still value the traditional ways and ipso facto hold traditional medicine above modern medicine. As such, notwithstanding the effectiveness of tried and proven medicine that have gone through different levels of scientific scrutiny by experts, traditional medicines should not be simply disregarded and pushed asidebut aims at harmonizing. A total of 20 medicinal plants were recorded for distinct ailments through interrogation of tribal healers within Lunglei. The present study will reveal in silico validation of bioactive compounds which corresponds to Antiviral and Anti-inflammatory mechanisms using Biological Spectrum Analysis (PASS) recorded from herbalists to prove the efficacy and activity of such medicinal plants selected. ADME (Absorption, Distribution, Metabolism and Excretion) will be calculated using Molinspiration to describe the disposition of pharmaceutical compound within an organism following 'Lipinski rule'.

Key words: in silico, Antiviral, Anti-inflammatory, traditional medicines

IBSD - SFE - 30

Evaluation of antioxidant and neuroprotective activities of crude methanol extract of *Salix tetrasperma* leaves.

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Salix tetrasperma (Roxb.), locally known as “Ooyum” in Manipur, is a medicinal plant used to treat various ailments such as epilepsy, diabetes, fever, piles, rheumatism, swellings, stones in bladder, wound, ear pain, dysentery, cough and cold. The present study aimed at evaluating the anti-oxidant and neuroprotective potential of crude methanol extract of the leaves of *Salix tetrasperma.* The *in vitro* antioxidant activity of the extract was examined by using 2, 2´-diphenyl-1-picrylhydrazyl (DPPH) and 2, 2´-azino-bis-(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS) radical scavenging assays. Further, the neuroprotective activity of the extract was evaluated against rotenone-induced cell culture model of Parkinson’s disease (PD) in SHSY5Y cells. MTT assay was performed to determine the cell viability. The crude methanol extract was found to have high free-radical scavenging activities with EC_{50} values of 44µg/mL and 44.8µg/mL for ABTS and DPPH respectively. The extract also showed significant neuroprotection against rotenone treated SH-SY5Y cells at dosages of 40, 200, 1000, and 5000 ng/mL. Data from the results of the study revealed that the crude methanol extract of *Salix tetrasperma* leaves has both antioxidant and neuroprotective properties. Therefore, *Salix tetrasperma* might be a good source for many antioxidant and neuroprotective compounds and further studies could be conducted.

Keywords: Anti-oxidant, Neuroprotection, Parkinson’s disease and *Salix tetrasperma* (Roxb.).

IBSD - SFE - 31

Anti-microbial and Antibiofilm potential of Viniferin (Phyto-compounds) against *Streptococcus pneumoniae*

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Background: *Streptococcus pneumoniae* is a commensal bacteria found in nasopharynx and caused respiratory infection such as pneumonia, meningitis, bacteraemia, Otitis media in immune-compressed condition. Recent reports suggested that *Streptococcus pneumoniae* is a co-pathogen with SARS-CoV-2 virus causing COVID-19. The *Streptococcus pneumoniae* is known to exist in the nasopharynx in the form of biofilms, which is prime site of colonization of SARS-CoV-2 virus and bacteria. And the number of reports indicates that anti-inflammatory or antioxidant and co-infection control is feasible strategy to control covid-19 infection syndrome. Since the announcement of COVID-19 as a global pandemic in march 2020, a large number of papers have been published in a range of scientific journals discussing the potential of plant-derived natural products in treating COVID-19 and its complications. In this study we evaluated the antimicrobial and antibiofilm potential of a phyto-compound Viniferin against *Streptococcus pneumoniae*.
Methods: Viniferin (Sigma) was evaluated against *S. pneumonia* D39 strain for antibiofilm and antimicrobial activity. To evaluate the effects of compounds on planktonic growth, S. pneumonia was grown with different concentrations and growth was detected by measuring absorbance at 600 nm at different time intervals. Biofilm biomass was quantified using crystal violet (CV) microtiter plate assays. Alternation of biofilm structure was evaluated using Scanning electron microscopy (SEM) and live/dead biofilm staining using confocal microscopy (CF).
Results: The antimicrobial activity analysis showed that Viniferin inhibited *S. pneumoniae* growth at 20µm. Viniferin was effectively inhibited pneumococcal in vitro biofilm at 20 um. And eradiated pre- established biofilms at 2x MIC concentration of Viniferin. The time killing experiment observed that Viniferin killed the bacteria and reduced 2.8 log 10 bacteria at 2x MIC Concentration. However, these compounds are not able to stop the formation of the biofilm of Streptococcus pneumoniae at sub-MIC concentration. The CV absorption assay demonstrated that mode of action of Viniferin is bacteria cell membrane, and the Viniferin treatment causes leakage of cell contents.
Conclusion: Viniferin was effective in controlling Streptococcus pneumoniae growth both inplanktonic and in biofilms.

Keywords: Biofilm, Streptococcus pneumoniae, viniferin; co-infection

IBSD - SFE - 32

Collection, Documentation of Ethnomedicinal Plants and Ethnic Foods of AO Tribe of Mokokchung, Nagaland

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The AO Naga has a rich and diverse culture which they have been practicing and pass down from generation to generation. The aged people had more and diversified knowledge about the past history and culture as compared to young generation. Hence a survey has made in the AO tribe of Mokokchung, Nagaland in year 2019 and it was documented that there were 37 medicinal plant species belonging to 29 families were mostly used by the locals in their daily life. The plants species from family asteraceae were reported highly by the local community to cure different kinds of diseases. Decoctions were the most common method used by the locals as their mean of medication and use them throughout the whole year. Roots and the plant leaves were the most common plant parts used. Aged people had more knowledge about the traditional use of the plants, their collection, identification and preparation compared to the young generation. Apart from these traditional formulations as well as plants they have ethnic foods including spices, fermented and processed foods which are very rich in nutrition. In these foods they used to use lot of medicinal and aromatic plants reported for their valuable active compounds; these foods include rosüb, mayüng, meya-sü, mangmung-jang, napa and echak. Since, the AO tribe has the well-established traditional medicinal practices; therefore it is an urgent need to do the scientific validation of ethno-formulations for development of herbal medicine and conservation of ethnomedicinal plants through *in-situ* and *ex-situ* methods for sustainable utilization.

Key words: AO tribe, Ethno-formulations, Decoctions, Mokokchung, Scientific validation.

IBSD - SFE – 33

A study on insecticide molecule isolated from *Dillenia indica* against stored grain pests

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Insect pests can cause huge damage to the world's total agricultural production. Chemical insecticides though effectively manage the damage inflicted by stored grain pests, has several unwanted attributes such as environmental hazard, development of resistance by the target insect and toxic to non-target organisms including human being. Owing to this, several chemical insecticides have been banned in many countries. Consequently, there is huge demand for an alternative approach that is powerful, eco-friendly, and economically viable. Plant volatile organic compounds are known to possess insecticidal properties. They may be advocated for alternatives to synthetic insecticides. In my study, the ethnobotanical knowledge, specifically the fumigant property of *Dillenia indica* has been thoroughly studied. The ethyl acetate extract of *D. indica* leaves showed highest insecticidal activity with 83% mortality against *Sitophilus oryzae* and nearly 67% for *Tribolium. castaneum*. Using bioassay guided protocol, we have isolated a bioactive molecule from the ethyl acetate extract of *D. indica* leaves. The isolated compound was found to possess fumigant properties with LC_{50} (µg/l) of 29.97 against *S. oryzae* and 43.3 against *T. castaneum*. The antioxidant enzyme system of the test insects was also affected by the biomolecule. In conclusion, the result indicates that the leaves of *D. indica* possess fumigant property and the isolated molecule may be used as an alternative to chemical insecticides.

Keywords: *Dillenia indica*, fumigant, stored grain pests, *Sitophilus oryzae*, *Tribolium castaneum*,

IBSD - SFE -34

Pharmacological potentials of *Acmella oleracea*, an ethnomedicinal plant of the Mizos

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Acmella oleracea (RK Jansen) belonging to family Asteracea, is an imperative ethnomedicinal plant cultivated by the Mizos. Besides its usage as vegetable, it has long been used as a traditional medicine and is known for its diverse therapeutic uses. Extracts were prepared by hot continuous extraction in 5 litres Soxhlet apparatus using solvents of varying polarities such as hexane, chloroform and methanol. The solvents were evaporated to dryness in a rotary vacuum evaporator (Buchi Rotavapor® R-215) and the remaining crude extracts were stored for further analysis. The extracts were tested for phytochemicals, total antioxidant activity, free radical scavenging activity (2,2-diphenyl-1-picrylhydrazyl scavenging activity test) and antiparasitic activity against tapeworm of domestic fowl i.e. *Raillietina echinobothrida*. Our study showed that it contains as many as 55 compounds belonging 5 groups of phytochemicals such as alkaloids, tannins, phytosterols, reducing sugars and carbohydrates. These phytoconstituents are attributed to the healing properties of the plant. The extracts were found to possess high antioxidant activity, concentration dependent increase free radical scavenging activity and antiparasitic activities. The extracts exhibited various deformities on the scolex and teguments of the parasite as seen in Scanning Electron Microscopy (SEM). Thus, *A. oleracea* is a plant with diverse medicinal acclaims and the establishment of its use as an anthelminthic may be scientifically supported by the present study.

Keywords: *Acmella oleracea*, antioxidant, antiparasite, ethnomedicine, Mizo.

IBSD - SFE - 35

Cytotoxic activity of *Garcinia xanthochymus* extract against lung cancer cell line A549.

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Noncommunicable diseases (NCDs) such as cancer are the leading cause of death. Chemotherapy using drugs like cisplatin, carboplatin, cyclophosphamide, doxorubicin, melphalan, mitomycin-C and gemcitabine is considered to be the most effective method for treatment of cancer. However the efficacy of most of them are limited due to development of various side effects in the host or acquired drug resistance by cancer cells. Nowadays many plant derivatives are in use with varying success in an attempt to reduce the side effects and better the remedies for various malignancies.

This study provides an insight into use of the fruits of *Garcinia xanthochymus*, consumed by the ethnic Meitei communities of Manipur, India, as a potential candidate for phytochemical studies against lung cancer. Cytotoxic activity of the hexane extract was tested against A549 lung cancer cell lines using 3-(4,5-dimethylthiazole-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Crude hexane extract of the whole fruit of *Garcinia xanthochymus* exhibited a significant cytotoxicity in a dose dependent manner. This finding indicates that crude hexane extract of the fruits of *Garcinia xanthochymus* can be further used for isolation of novel bioactive compounds against lung cancer.

Key words: *Garcinia xanthochymus*, hexane extract, MTT assay.

IBSD - SFE -36

Anti-Cholinesterase potential and safety evaluation of standardized *Ipomoea aquatica* (Forsk) extract

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More than 46 million people individuals suffer from Alzheimer' like disorder disease (AD) worldwide according to the World Alzheimer Report 2015. Patients with AD face problems with finding the right words or understand what people are saying and they often undergo personality and mood changes. Many hypotheses put forward to explain the cause of AD include amyloid cascade, tau, cholinergic, inflammatory, Oxidative stress, vascular, Cholesterol, metallobiology, insulin signalling, and cell cycle hypotheses. Ipomoea aquatica (Forsk), of Convolvulaceae family has been used in traditional medicine in certain nervous conditions with sleeplessness, head-ache and calmness effect. Besides these the plant was also established scientifically for its anxiolytic, nootropic, CNS depressant and antiepileptic activity.

In this context the present work is undertaken to investigate the acetylcholinesterase and β-secretase enzyme inhibitory activity of standardized hydro-alcohol extract of *I. aquatica* by in-vitro method. The DPPH and hydroxyl free radical scavenging assay performed to understand the antioxidant property. Further, the interaction potential of the extract with Cytochrome P450 isozymes (CYP3A4 and 2D6) was evaluated by CYP450 enzyme inhibition assay. The HPTLC standardization data shows the presence of chlorogenic acid (0.53% w/w) in the extract. The IC_{50} values were found to be 124.89 µg/ml for DPPH and 168.99 µg/ml for hydroxyl radical scavenging assay where the IC_{50} values for standard ascorbic acid were found to be 93.21 µg/ml and 98.73 µg/ml respectively. The IC_{50} values for inhibition of acetylcholinesterase (AChE) enzyme and β-secretase were 136.94 and 174.04 µg/mL. The CYP- fluorimetric assay also revealed lesser interaction potential of the extract on the liver microsomes compared to the standard inhibitors (3A4-ketoconazole and 2D6-quinidine).

Keywords: AChE, β-secretase, antioxidant, CYP 450, HPTLC

IBSD - SFE - 37

Metabolite profiling & evaluation of CYP450 interaction potential of *Benincasa hispida*- An Indian medicinal food plant

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Type 2 diabetes mellitus is an assembly of diseases characterized by uneven levels of insulin resistance, improper insulin secretion and increased production of glucose from liver with postprandial hyperglycaemia being one of the major consequences. *Benincasa hispida* (ash gourd) from cucurbitaceae family is widely used in culinary purposes in many Asian countries including India. Traditionally, it has been used for the treatment of hyperglycaemia, epilepsy, asthma, as a diuretic, analgesic, various liver diseases, etc. While natural products are generally considered as safe when compared to the conventional drugs available, its inappropriate use may cause several herb-drug interactions. So, the safety profile is of utmost importance to assess natural products intended for human use.

The current study was focused on the quality evaluation through metabolite profiling of *Benincasa hispida* together with its anti-diabetic activity together with the safety profile through CYP450 inhibition of the traditional medicinal food plant.

Extraction of *Benincasa hispida* fruits was done with microwave assisted extraction technique. The α-amylase inhibition assay was performed spectrophotometrically using starch as a substrate with varying concentrations and acarbose as the positive inhibitor. The IC_{50} value for α-amylase was found to be 2.78±1.59 mg/ml and acarbose showed IC_{50} value of 2.32±0.72 mg/ml. Metabolite profiling was done by UPLC-QTOF-MS analysis. 21 metabolites were identified which might be responsible to treat type 2 diabetes mellitus by inhibition of both the enzymes. Further, the herb-drug interaction was assessed to prove CYP450 inhibitory potential of *Benincasa hispida*. The IC_{50} value for CYP3A4 was 198.23±1.49 µg/ml and CYP2D6 was 201.17±2.09 µg/ml compared to their standard inhibitors Ketoconazole (6.41±0.81 µg/ml) and Quinidine (3.17±0.47 µg/ml) respectively. So, *Benincasa hispida* fruits can serve as a functional food to address diabetes and diabetes related disorders in response to α-amylase enzyme, without any adverse effects.

IBSD - SFE - 38

Enhanced bioavailability and hepatoprotective potential of optimized (+) catechin catechin-phospholipid complex

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Catechins are group of polyphenolic compounds of flavonoid class belonging to the subgroup flavan-3-ols. It is found in green tea, black tea, wine, other plant foods such as fruits and cocoa products. (+) catechin is reported to have protective effects against liver damage. However the low oral bioavailability of this potent phyto-compound hampers its therapeutic potential. The aim of the present study was to develop a suitable drug delivery system which could enhance the bioavailability and hence hepatoprotective potential of this molecule. This has been developed in the form of phospholipid complex. The phospholipid complexes have been optimized by response surface methodology. CAPC were then prepared with the optimized process parameters and subjected to further evaluation by instrumental techniques including Fourier transform Infrared Spectroscopy (FT-IR), Differential Thermal Analysis (DTA), Scanning Electron Microscope (SEM), Particle size analysis and powder X ray diffraction (PXRD), *in silico* study. In vitro release study was performed by artificial gastric juice and intestinal juice and the dissolution efficiency of CAPC in different media was calculated. Effect on bioavailability and hepatoprotective potential of catechin in CAPC were evaluated in animal models. The formation of the Pharmacokinetic studies showed significant improvement of bioavailability of the complex compared to the pure molecule and physical mixture. In-vivo hepatoprotective activity study demonstrated a significant decrease in SGOT, SGPT, ALP, etc. Therefore, it was concluded that the phospholipid complex of **(+)** catechin may act as potential delivery system for improving its bioavailability and enhancing its hepatoprotective activity.

Keywords: (+) catechin, Response Surface Methodology, Molecular docking, Bioavailability, hepatoprotective activity

IBSD - SFE - 39

Differential gene expression and immunohistochemical localization of the key melatonin bio-synthesizing enzymes in the testis of zebrafish (*Danio rerio*).

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The vertebrate pineal gland rhythmically produces melatonin, a hormone involved in regulation of several physiological and behavioral processes. This study for the first time showed the presence of melatonin bio-synthesizing genes (*Tph1a, Aanat1, Aanat2 and Asmt)* in the zebrafish (*Danio rerio*) testis. Melatonin is reported to be produced mainly in the pineal organ, but there is also evidence for the presence of melatonin in a number of extra-pineal sites. Presence of single gene specific band in agarose gel electrophoresis after end-point PCR and a single peak in qRT-PCR melting curve analysis indicates that testis of zebrafish expresses the mRNA of enzymes for melatonin bio-synthesizing machinery. Furthermore, we tried to demonstrate the presence of melatonin bio-synthesizing enzymes at translational level by immunohistochemistry, which confirms the localization of both Aanat and Asmt proteins in the testis of zebrafish. Moreover, melatonin ELISA reveals a higher level in the testis than the serum at noon, but a similar concentration is observed during the mid-night. Moreover, testes display a rhythmic mRNA expression of *Tph1, Aanat1, Aanat2*, while *Asmt* is arrhythmic. These results support an almost ubiquitous bio-synthesis of melatonin in peripheral organs of zebrafish, which can be related with a local role of this hormone as autocrine or paracrine manner.

IBSD - SFE - 40

Phytochemical profiling and *In vitro* antibacterial potential of Argyreia speciosa Linn.: A Traditional Medicinal Plant

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Argyreia speciosa Linn. commonly called vidhara, belongs to the convolvulaceae family. Leaves of this plant have been traditionally used in various type of wound healing. It is reported to contain various glycosides, flavonoid glycoside and steroids. This encouraged us to investigate phytochemical profiling and *in vitro* antibacterial potential of *Argyreia speciosa* Linn. leaf extracts on both gram positive and gram negative bacteria. Hydro-alcoholic extract of the leaf of Argyreia speciosa was prepared. The UPLC-QTOF-MS analysis of the extract led to the identification of 20 different compounds in each cases based on their accurate mass, experimental and calculated m/z, molecular formula, error (in ppm), isotopic ratio and MS fragmentation pattern (matched within 5 ppm error tolerance). Screening of antibacterial activity was done using four different types of test bacteria: E. coli and P. aeruginosa (gram negative) and B. subtilis and S. aureus (gram positive). The minimum inhibitory concentration (MIC) was determined by visual inspection and spectrophotometric assay at 620 nm. Finally, the minimum bactericidal concentration (MBC) assay was performed and the activity of different concentrations of control, test and standard were compared. The result suggested that the plant extract along with its active phyto-constituent had potential anti-bacterial activity. This study shows the potential of *Argyreia speciosa* to be a promising source of anti-bacterial drug development.

IBSD - SFE - 41

Marker profiling and *in-vitro* α-glucosidase & α-amylase inhibitory potential of *Cucurbita maxima* fruits – A food plant

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Curcurbita maxima is commonly known as pumpkin and it is belongs to Cucurbitaceae family. Pumpkin is widely used in culinary purposes in many Asian countries. Due to the present of a large number of bioactive compound this plant exhibited antimicrobial, hypoglycemic, immunomodulatory, hepatoprotective activity. By inhibition of α-glucosidase and α-amylase enzyme have been proved to delay the glucose absorption resulting in decrease in the post prandial hyperglycemia and become a strategy for management of diabetes mellitus. The current study was focused to evaluate the quality and in-vitro α-glucosidase and α-amylase enzyme inhibitory assessment of Cucurbita maxima fruit extract. Fresh *Curcurbita maxima* fruits were collected, dried, powdered and extracted with hydro alcoholic solvent (70:30). Afterwards, dried extract (117 g) was suspended in water and partitioned successively with dichloromethane, petroleum ether and ethyl acetate (100 mL each). Further the extract was standardized by using cucurbitacin-E through HPTLC and RP-HPLC study methods. Heavy metals were assessed and estimated by using atomic absorption spectrometry. The standardized extract was screened for their inhibitory α-glucosidase and α-amylase activity by implementing acarbose as positive control through standard 96 well microplate based assay. Ethyl acetate fraction of Cucurbita maxima fruits was showed maximum inhibition (IC_{50} value: 3110±40.02 µg/mL (α-glucosidase) 3700±44.84 µg/mL (α-amylase)) for both the enzymes. Further research is underway to find the detailed mechanism of inhibition and phytomolecule response.

Keywords: Cucurbitaceae, *Cucurbita maxima*, HPTLC, RP-HPLC, Cucurbitacin-E, α-glucosidase, α-amylase

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Immunoprotective potential of Ayurvedic herb Kalmegh (*Andrograpgics paniculata*) against COVID-19

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COVID-19, has emerged as global pandemic and currently, no effective medical treatment exists to combat this disease. In India AYUSH systems of medicine has been promoted as immune-protection strategy. *Andrographis paniculata* (Burm. F) Nees (AP) mentioned in Ayurveda has been widely used for treating sore throat, flu, and upper respiratory tract infections which may provide possible novel therapeutic approaches, exclusively targeting SARS-CoV-2 and its pathways. The present work uses LC/MS-MS metabolomics and combination synergy analysis based on network pharmacology to mine multimode evidence that molecules from kalmegh provides immune-protection and anti-viral response via involving different pathways like toll-like receptor pathway,PI3/AKT pathway and MAP kinase pathways against COVID 19 infection. Our results suggest a synergy between andrographolide and its chemo-similars identified as safe and successful anti-inflammatory agent having affects on upper respiratory agent having effects on upper respiratory tract infections and can significantly decrease the production of cytokines and pro-inflammatory factors in COVID-19.

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Antiproliferative activity of crude methanolic extract of *Paris polyphylla.*

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Cancer is the leading cause of death globally with approximately 70% from the low and middle income countries. Limitations of the current chemotherapeutic agents are a rising concern which highlights the importance and need for new therapeutic drugs to treat cancer. Exploration for superior cytotoxic agents from natural compounds serves to be a key line in the discovery of new anticancer drugs. The vast structural diversity of natural compounds from plants from the biodiversity rich region of the North-East India will serve as a valuable source of new therapeutic drugs. *Paris polyphylla* is known for its rich phytochemicals and its high value for medicine owing to its ability to cure a number of diseases. *Paris polyphylla* is distributed in tropical to temperate region of South East Asia, particularly in Bhutan, China, India, Laos, Myanmar, Nepal, Thailand and Vietnam. In Manipur, it is distributed in Hengbung, Maram,Mao,Purul and Makui regions of Senapati district, Ukhrul district and Puilong in Tamenglong district. Rhizome of *Paris Polyohylla* was collected from Mao and extracted with Methanol using soxhlet. The crude methanolic extract of *Paris Polyphylla* (CMPP) was evaluated for anticancer property in HeLa and H357 cell lines. CMPP inhibits the proliferation of H357 and HeLa cells with IC_{50} 18.66 µg/ml and 5.23µg/ml as determined by MTT assay. CMPP suppressed the colony forming abilities of HeLa and H357 cells. CMPP induces apoptosis in H357 by down regulating Mcl1 and Bcl2 proteins through PARP and Caspase 3 pathway.

Keywords: *Paris Polyphylla*, MTT assay, Western Blot, Soxhlet extraction.

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Metabolite Profiling of different pigmented rice (*Oryza sativa L.*) and study of antioxidant properties.

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Seven pigmented rice varieties and a non-pigmented variety were used to perform metabolite profiling using Gas chromatography Mass spectra (GC-MS). PCA analysis could fully distinguish between these cultivars. Sugars, organic acids, amino acids and fatty acids were present as the major metabolites. Analysis of antioxidant activities revealed that black and red rice seeds had higher activity than white rice seeds. DPPH, ABTS and reducing power assays were the methods used to study the antioxidant properties. Total phenolics and flavonoids were found to be highest in black rice Athebu ium (6.9 mg/g and 4.5 mg/100g) and the lowest was found in white rice Mahim (1.01 mg/g and 1 mg/g). Among black rice cultivars total anthocyanins was found to be highest in Athebu ium (182.46 mg/L) and lowest in Napneng dengmei (94.6 mg/L). Cyanidin-3-glucoside and Peonidin-3-glucoside were the common anthocyanin pigments identified from the LC-MS analysis of methanolic extracts of the black rice varieties. There were significant differences observed in colour characteristics of rice flours.

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Antioxidant and antimicrobial activity from methanolic extract of *Phylanthus niruri*

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Background: Free radicals are being generated as a part of normal body metabolism. They are also known to be the causing factor for many ailments including cancer and hence needed to be investigated. *Phylanthus niruri* commonly known as stonebreaker is generally used for the treatment of kidney stone ailments since ancient times.

Materials and methods: The present study aimed to investigate the antioxidant and antimicrobial activity of the methanolic extract of *Phylanthus niruri*. The antioxidant activity of *Phylanthus niruri* extract was evaluated using 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals scavenging method and the antimicrobial activity was determined by agar well diffusion method against pathogens responsible for common infections of skin, respiratory, urinary and gastro-intestinal tracts. They were obtained from ATCC (American Type Culture Collection) and MTCC (Microbial Type Culture Collection).For the antioxidant activity, six different concentrations of methanolic extracts of *Phylanthus niruri* (0.5, 1, 1.5, 2, 2.5 and 3) mg/ml were taken and their radicals scavenging were measured at 517nm.

Results: From the results of DPPH radical scavenging activity assay, it was obtained that the radical scavenging activity of the methanolic extracts of *Phylanthus niruri* increases significantly ($p< 0.05$) from concentration 0.5 mg to 3 mg/ml and the IC50 obtained was 2.17mg/ml. The antimicrobial activity of methanolic extracts of *Phylanthus niruri* (5mg/ml) shows highest activity against *Listeria monocytogenes* ATCC 11918 and *Shigella flexneri* ATCC 12022 based on the zone of inhibition(mm).

Conclusion: The antioxidant activity of methanolic leaf extracts of *Phylanthus niruri* shows increased in their antioxidant activity with increased concentrations whereas it shows significant antibacterial activity against *Listeria monocytogenes* and *Shigella flexneri.*

Key words: Antioxidant; Antibacterial; *Phylanthus niruri*, Zone of inhibition

IBSD - SFE - 46

Role of wild banana pseudostems in socio-economic development, livelihood support and traditional medicine in Manipur

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Manipur falls between two biodiversity hotspots regions, the Eastern Himalayas and the Indo-Burma. A number of wild edible plants are available in the valley and hills are harvested, sold in the local market and consumed. Banana, locally known as “Laphu” (Manipuri) is one of the wild edible plants where the pseudostem (young stems of the plant) is extensively harvested, sold and consumed. It is one of the important bioresources for socio-economic development and livelihood support in the state. A recent survey in 11 districts of the state revealed presence of 23 types of banana pseudostems being sold for consumption in the local markets. Six types of pseudostems were recorded from Imphal West district followed by 5 types in Senapati district. The market rate varied from a minimum of Rs. 10 to 40 per pseudostem or bundle. One of the wild varieties called “Ching Laphu” (Hill Banana) from Kamjong district is most harvested and sold in bulk amount for Rs. 5000 per small truck (about 500 pseudostems). Banana pseudostems are very tasty and used in preparation of various special recipes such as eromba (boiled and crushed with potato), singju (green salad), fry/cooking with fish, bora (fried with gram flour), etc. Recently, the banana pseudostems have been used as one of the important sources of food during the COVID-19 lockdown periods in Manipur. A few of the pseudostems are also used for treatment and management of certain human diseases and ailments like for easing of constipation, dysentery, cholera, stomach-ache, for increasing lactation in breast feeding mothers, etc. The ash of the burned pseudostem of a local type “Changbi” is used as alkali (baking) for preparing “utti thongba” (pea seed curry) as well as for cleaning cloths as detergent. It is concluded that the banana pseudostem plays a key role in socio-economic development and livelihood of ethnic communities in the state. Further study on nutritional values and impact of harvesting on wild populations of the most exploited species may help in value addition and conservation of wild banana in the long term.

Keywords: Banana pseudostem, Laphu, Manipur, Nutrition, Socio-economic development

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Metabolite analysis and *in-vitro* α-glucosidase inhibitory potential *Luffa acutangula* (L.) Roxb (ridge gourd)

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Background: *Luffa acutangula* (L.) Roxb (ridge gourd) is commercially grown for its unripe fruits as a vegetable.It is widely used in the traditional Indian medicinal system to treat various health conditions. The plant has been used in jaundice, diabetes, hemorrhoids, dysentery, headache, ringworm infection, and leprosy. More than 50 chemical compounds have been isolated from a plant which mainly comprises flavonoids, anthraquinones, proteins, fatty acids, saponin, triterpene, volatile components, and other phytoconstituents. Crude extract of plant and its isolated compounds possess broad pharmacological activities such as antidiabetic, hepatoprotective, antiulcer, anticancer, immunomodulatory, antihyperlipidemic, antioxidant, antimicrobial, CNS depressant, analgesic and anti-inflammatory.

Aims/Objectives: In this study *Luffa acutangula* (L.) Roxb (ridge gourd) under Cucurbitaceae family was studied for metabolite analysis and their significant alpha-glucosidase inhibitory activity.

Methods: *Luffa acutangula* (L.) Roxb (ridge gourd) plant was selected**.** The fruits of *L. acutangula* were cut into small pieces and shade dried. The dried material was subjected to grind into coarse powder followed by the extraction by soxhlet apparatus with methanol and water (hydro alcohol). Then, the filtrates were collected and concentrated in a rotary vacuum evaporator at a temperature of 40–45 °C. After this, the extracts were lyophilized and stored in air-tight containers for further use. Standardization of the hydro alcoholic extract of the plant was performed through HPTLC using chlorogenic acid as marker compound.

Result: The results indicated the IC_{50} value of *Luffa acutangula* (L.) Roxb (ridge gourd) in the range of 3.60 ± 0.50 mg/ml whereas the IC_{50} value of Acarbose was found at 2.25±0.58 mg/ml.

Conclusion: Thus this study was able to establish the α-glucosidase inhibitory potential of *Luffa acutangula* (L.) Roxb (ridge gourd) which have potential lead to treat hyperglycemia related disorders.

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Anticancer effect of 'Compound X' and its synergistic effect to enhanced the therapeutic potential of chemotherapeutic drug 'Cisplatin'.

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Background: Clinical use of chemotherapeutic drug, cisplatin is limited by its toxic side effects and clinical effectiveness of drug resistance. Therefore, efforts continue for the discovery of novel combination therapies with cisplatin, to increase efficacy and reduce its toxicity. Here, we screened 16 medicinal plant extracts from Northeast part of India and found that leaf extract of *Zanthoxylum armatum* DC. (ZALE) induced cytotoxicity and enhanced the efficiency of chemotherapeutic drugs. The bioassay-guided purification of ZALE, led to the identification of three compounds (Compound X, Y and Z).

Results: The cell viability were assayed by CellTiter 96 Aqueous assay (IC_{50} of 22 µM). Compound X induced apoptosis forming apoptotic nuclei was analysed by fluorescence microscopy. Compound X shows synergistic interaction with cisplatin was determined by Jin's formula ($Q > 1.15$). Flow cytometry was used to investigate the effect on cell cycle progression which leads to massive S phase arrest. Expressions of apoptosis-related proteins were analysed by western blotting. Immunoblot analysis showed enhanced caspase-3 activation and PARP cleavage when treated in combination, suggesting the activation of apoptotic pathway.

Conclusion: Compound X induced apoptosis and inhibit the proliferation of cancer cells in a synergistic manner with cisplatin, which may open a new therapeutic window for the novel anti-cancer treatment.

Keywords: *Zanthoxylum armatum*, apoptosis, caspase-3, cisplatin, PARP.

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Characterisation of antibacterial activity of Lactic acid bacteria from fermented passion fruit beverages

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Lactic acid bacteria (LAB) have wide applications in food, cosmetic and medicine industries due to being Generally Recognised as Safe (GRAS) and multitude of therapeutic and functional properties. The present study aims for the characterisation of antibacterial activity of LAB which was isolated from fermented passion fruit beverages. Two strains of Lactic acid bacteria were isolated and identified by 16srRNA DNA sequencing as Pediococcus pentosaceus RB30W and Lactobacillus plantarum RB30Y. They exhibited broad spectrum antibacterial activity against Escherichia coli ATCC 25922, Staphyococcus aureus ATCC b11632, Shigella flexneri ATCC 12022, Escherichia coli ATCC 25922, Pseudomonas aeruginosa ATCC 15442, Bacillus cereus MTCC 430, Listeria monocytogenes ATCC 11918, Klebsiella pneumoniae ATCC 4352, Enterococcus faecium ATCC 35667 from the cell free Supernatant (CFS) of Pediococcus pentosaceus RB30W and Lactobacillus plantarum RB30Y based on zone of inhibition by agar well diffusion method.

Keywords: Generally Recognised as Safe; Lactic acid bacteria; *Lactobacillus plantarum*; *Pediococcus pentosaceus*

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A Comparative pharmacognostic study of A*sparagus racemosus* collected from wild and cultivated habitat

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Background: As we know, at different intervals of time there has been great variation in physical and chemical behaviour of plant leads to contrasting variation in different active constituents present in that particular plant. So, the present study will be helpful in identification of best quality *Asparagus racemosus* roots with good phytochemical yield. **Objective:** To perform comparative, pharmacognostical, phytochemical and chromatographic evaluation of *Asparagus racemosus* roots collected from wild and cultivated habitat. **Material and methods:** It includes the collection of *Asparagus racemosus* roots at different time intervals and its authentication, comparative physicochemical evaluation, extraction of raw materials, quantitative estimation of phytoconstituents, chromatographic evaluation, and quantification of identified marker using different chromatographic technique. **Results:** In the study, various physicochemical parameters were evaluated which were found to be within the prescribed limits of WHO guidelines. From the phytochemical evaluations, it was revealed that the samples collected from wild habitate showed higher quantity of phytoconstituents as compared to other samples. The chromatographic fingerprinting analysis of all four samples revealed the presence of maximum number of phytoconstituents in sample from wild, which was followed by sample collected at 9 month. The HPLC quantification of shatavarin *4* demonstrated a higher quantity of the markers in sample from wild habitate followed by sample collected at 9 months. **Conclusion:** From the overall study, it may be concluded that, the root sample from wild habitate showed better composition of phytoconstituents compared to samples collected at different time intervals (6 month, 9 month, 2 years).

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Drug resistance pattern of *E-coli* and *Klebsiella pneumonia* isolated from clinical samples (Central Referral Hospital, Sikkim): a cause of concern in today's era.

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Background and objectives: Multi drug resistant *E-coli* and *Klebsiella pneumoniae* are among the members of *Enterobacteriaceae* causing high mortality in critical patients. These pathogens are increasingly reported in the past few decades which are the major cause of concern in hospital as well as community settings.

Methods: Four hundred non repetitive *Enterobacteriaceae* clinical isolates were collected from the Central Referral Hospital, SMIMS, Sikkim, North-East India. All the isolates were put up for identification and antibiotic susceptibility tests were performed on the identified isolates of *E-coli* and *Klebsiella Pneumoniae* according to Clinical and Laboratory Standard Institute (CLSI) guidelines.

Result: Out of the total of 400 members of *Enterobacteriaceae* isolates, *E. coli* (n = 283) 70.8% was the majority pathogen isolated, followed by *Klebsiella pneumoniae* (n=88) 22.0%. Cephalosporins and aminoglycosides resistance were seen slightly higher in *K. pneumoniae* (45%-73%) and (26%-30%) than *E. coli* which showed (25%-70%) and (9%-25%) respectively. Majority of the isolates showed Carbapenem resistance in *K. Pneumoniae* (28%-32%) followed by *E. coli* (7%-8%). fluoroquinolones resistance was more in *E. coli* (65%-76%) than *K. Pneumoniae* (56%-60%). , as high as 17% of colistin resistance has been seen in *K. Pneumoniae* (17%) than *E. coli* (3%)

Interpretation and conclusion: The present study showed that most of the *E-coli* and *Klebsiella pneumonia* conferred resistance to cephalosporins and carbapenems classes of antibiotics and also resistance to colistin which is a major cause of worry. Therefore, R&D of new classes of antibiotics is the need of the hour to reduce the burden of diseases and to have access to effective therapeutic options against infections.

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De novo whole genome sequencing and proteomic analysis of antimicrobial peptides from *Paenibacillus peoriae* IBSD35, an endophytic bacterium isolated from traditionally used medicinal plant *Millettia pachycarpa* Bentham.

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Introduction: The increasing pervasiveness of antimicrobial resistance has posed a major health concern worldwide and the addition of new antimicrobial agent is diminishing due to overexploitation of microbial resources and prolong unprofitable research. There is necessity to look for alternative sources and strategies to identify novel antimicrobial agents. Lately, many important secondary metabolites have been reported from endophytes of medicinal plants, and they are a potential source of novel biological products and genetic diversity. Antimicrobial peptide is one of a promising bio-molecule, and hundreds of them have been isolated from different tissues and organisms.

Methodology: Endophyte was isolated from *Millettia pachycarpa* Bentham using surface stirelization method and its antimicrobial activity was tested against *Staphylococcus aureus* ATCC 25923*, Escherichia coli* ATCC25922*,* and *Candida albicans* ATCC10231 by cut well agar diffusion bioassay. Its extra-cellular antimicrobial peptides were enriched by chromaatography from fermentation broth. The and its activity was checked by gel-overlay bioassay and the antimicrobial peptide was sequenced using LC-MS.

Results and Conclusion: Purification fold in lyophilized RP-HPLC preparation is 151.72 starting from the initial fermentation broth. The antimicrobial protein total yield was 0.05%. The potency of antimicrobial metabolite ranged from 1818.18 to 275862.06 (AU/mg). the antimicrobial peptide sequence biochemical properties were enumerated using proteomics tools. Moreover, the bioactive endophyte genomes was sequenced for molecular identification and analysed to predict or link its metablomes. Therefore, combining different genomic and proteomic results obtained from a potential genome associated with medicinal plant will uncover understanding of biological processes to find novel biological agents.

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Evaluation of Phytochemical analysis of *Prunus* species from Mao, Manipur.

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Northeastern India is a region which belongs to the Indo-Burma Biodiversity Hotspot and contributes several crop plants including 25% of total edibles crops. The genus *Prunus*, belonging to the Rosaceae family comprises of about 430 species of deciduous and evergreen trees and shrubs with several members that are economically important for its ethnomedicinal value. The study includes the phytochemical analysis of secondary metabolites from edible species of *Prunus* genus viz *Prunus cerasoides, Prunus napaulensis*. The phytochemicals were extracted from the leaves and fruits of the samples using different solvents namely chloroform, methanol and water. The extracts of the leaves and fruits were obtained by exhaustive extraction for 24 hours in a shaker using different solvents. The qualitative phytochemical screening confirmed the presence of different group of chemical constituents such as alkaloids, terpenes, glycosides, flavonoids. The result indicates that our plant samples could be a useful source for natural antioxidants as the ingestion of natural antioxidants could account for the treatment of various chronic diseases such as diabetes, cancer and cardiovascular diseases.

Keywords: *Prunus*, Rosaceae, Phytochemical Analysis, Manipur

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Characterisation of antibacterial activity of Lactic acid bacteria from

fermented passion fruit beverages

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Lactic acid bacteria (LAB) have wide applications in food, cosmetic and medicine industries due to being Generally Recognised as Safe (GRAS) and multitude of therapeutic and functional properties. The present study aims for the characterisation of antibacterial activity of LAB which was isolated from fermented passion fruit beverages. Two strains of Lactic acid bacteria were isolated and identified by 16srRNA DNA sequencing as *Pediococcus pentosaceus* RB30W and *Lactobacillus plantarum* RB30Y. They exhibited broad spectrum antibacterial activity against *Escherichia coli* ATCC 25922, *Staphyococcus aureus* ATCC b11632, *Shigella flexneri* ATCC 12022, *Escherichia coli ATCC* 25922, *Pseudomonas aeruginosa* ATCC 15442, *Bacillus cereus* MTCC 430, *Listeria monocytogenes* ATCC 11918, *Klebsiella pneumoniae* ATCC 4352, *Enterococcus faecium* ATCC 35667 from the cell free Supernatant (CFS) of *Pediococcus pentosaceus* RB30W and *Lactobacillus plantarum* RB30Y based on zone of inhibition by agar well diffusion method.

Keywords: Generally Recognised as Safe; Lactic acid bacteria; *Lactobacillus plantarum; Pediococcus pentosaceus*

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