3.3.2 Number of research papers per teachers in the Journals notified on UGC website during the year

List of research papers per teachers in the Journals notified on UGC website during the year

RAMANANDA COLLEGE

BISHNUPUR * BANKURA
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Mob:- 6297976619
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From : Principal
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Number of research papers per teachers in the Journals notified on UGC website during the year

Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal
Rabindra Sannidhyadhanya Nirmalkumari Mahalanabish	Binapani Ghosh	Bengali	Ajker Jodhan	2020	0871-5819	
Analokito Mondirer Iotijhyo-Joypur	Arna Mukhopadhyay	Bengali	Ebong Mohuya	2021	NA	UGC-CARE
In silico analysis reveals interrelation of enriched pathways and genes in type 1 diabetes	Saubashya Sur	Botany	Immunogenetics	2020	0093-7711	https://www.scopus.com/sourceid/22271
A Genetic Variation of Lipopolysaccharide Binding Protein Affects the Inflammatory Response and Is Associated with Improved Outcome during Sepsis	Oliver Kumpf, Kathleen Gurtler, Saubashya Sur, Monalisa Parvin, Lena-Karoline Zerbe, Jana K. Eckert Alexander N. R. Weber, Djin-Ye Oh, Linn Lundvall, Lutz Hamann, and Ralf R. Schumann	Botany	Immunohorizons	2021	2573-7732	https://pubmed.ncbi.nlm.nih.gov/34921059/
Understanding the nature and dynamics of Mycobacterium ulcerans cytochrome P450 monooxygenases (CYPs) – a bioinformatics approach	Saubashya Sur	Botany	Acta Biologica Szegediensis	2021	1.6E+07	https://www.scopus.com/sourceid/87723
Interaction of TLR4 and TLR8 in the Innate Immune Response against Mycobacterium Tuberculosis	Shruthi Thada, Gabor L. Horvath, Mario M. Müller, Nickel Dittrich, Melanie L. Conrad, Saubashya Sur, Abid Hussain, Karin Pelka, Suman Latha Gaddam, Eicke Latz, Hortense Slevogt, Ralf R. Schumann, and Sanne Burkert	Botany	International journal of Molecular Sciences	2021	1422-0067	https://www.scopus.com/sourceid/25879?origin=resultslist
Effect of Arsenic on Growth and Cell Division in Root Tip Cells of (Allium sativum L.)	Soumik Chatterjee & Sabyasachi Chatterjee	Botany	Asian Journal of Emerging Research	2021	2663-4988	https://ajer.scione.com/cms/about.php?id=journal
Structure and Electronic Effects from Mn and Nb Co-doping for Low Band Gap BaTiO3 Ferroelectrics	Soham Mukherjee, Dibya Phuyal, Carlo U. Segre, Shyamashis Das, Olof Karis, Tomas Edvinsson, and Håkan Rensmo	Chemistry	The Journal of Physical Chemistry C	2021	1932-7447	https://www.scopus.com/sourceid/5200153123
Evidence on the Non-linear Effect of Large Ownership on the Enterprise Value of Indian Manufacturing Firms	Apu Manna, Tarak Nath Sahu and Krishna Dayal Pandey	Commerce	Vision: The Journal of Business Perspective	2021	0972-2629	https://journals.sagepub.com/metrics/VIS (https://doi.org/10.1177/0972629209840017)

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From : Principal
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ECOLINGUISTICS : ISSUES AND CONCERNS	Narendra Ranjan Malas	English	Mukt Shabd Journal	2021	2347-3150	https://ugccare.unipune.ac.in/Apps1/User/WebA/ViewDetails?JournalId=101002785&flag=Search
The Voice of Reason: Archbishop Abbot on the Essex Divorce Case	Somnath Basu	English	Critical Imprints	2020	2319-4774	
"Sense of Place and Sense of Planet": Local-Planetary Experiences of Climate Change in Barbara Kingsolver's Flight Behavior	Sonam Jalan	English	Rupkatha Journal on Interdisciplinary Studies in Humanities	2020	0975-2935	DOI: 10.21659/rupkatha.v12n5.rioc1s10n5
Will Nature Nurture the World of Female Protagonist?: Telescoping the Role of Nature As a Post-colonial Subject Within the Ambit of Doris Lessing's The Grass is Singing	Subhendu Biswas	English	New Literaria	2020	2582-7375	
Screening the Tracing and Stressing of Gerontology :A Study of Lord Alfred Tennyson's *Tithonus*	Subhendu Biswas	English	Interface	2021		
Online Learning in the Time of COVID-19	Ajit Debnath	History	Shodh Sarita	2020	2348-2397	https://ugccare.unipune.ac.in/Apps1/User/WebA/SearchList
The Sufferings and Nightmare of the Migrant Workers in India during the Pandemic of COVID-19	Ajit Debnath	History	Shodh Sanchar Bulletin	2020	2229-3620	https://ugccare.unipune.ac.in/Apps1/User/WebA/SearchList
Design of multistability of chaotic systems via self and cross coupling	MA. Khan, J.Sarkar, G. Mahapatra & SD Jabeen	Mathematics	The European Physical Journal Plus	2021	2190-5444	https://www.scopus.com/sourceid/21100201754?origin=resultslist
Spatiotemporal synchronization of diffusively coupled modified logistic map under complex network	MA. Khan, D. Maity & SD Jabeen	Mathematics	Proceeding NASA-Physical Science-A	2021	0369-8203	https://www.scopus.com/sourceid/5200152621

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Anti-synchronization phenomenon of discrete chaotic maps using linear transformation	MA. Khan, HP Mazumdar & SD Jabeen	Mathematics	Journal of Information and optimization Sciences	2020	2169-0103	https://mjl.clarivate.com:/search-results?issn=0252-2667&hide_exact_match_fl=true&utm_source=mjl&utm_medium=share-by-link&utm_campaign=journal-profile-share-this-journal
A comparative study on selected fitness variables of tribal Handball and volley ball players.	Deepak Kumar Singh	Physical Education	Indian journal of Physical Education, Sports & Applied Sciences	2021	2229-550X (p) 2455-0175 (O)	https://sportscientistsviews.com/old/2021/06/comparative-study-selected-fitness-variables-tribal-handball-volleyball-players/
A novel design of frequency encoded multiplexer and demultiplexer systems using reflected semiconductor optical amplifier with simulative verification	Surajit Bosu and Baibaswata Bhattacharjee	Physics	Journal of Optics	2021	0974-6900 (Electronic), 0972-8821(print)	https://www.scopus.com/sourceid/12185?origin=resultslist
Investigation of doping effect on electrical conduction mechanism and Li+ ion insertion/extraction in ZnO-XV_2O_5 {X=5% and 10%} electrode for superior energy storage application	Himadri Sekhar Tripathi, Moumin Rudra, Rajesh Mukherjee, Alo Dutta, T. P. Sinha	Physics	Solid State Communications	2021	0038-1098	https://www.scopus.com/sourceid/29886?origin=resultslist
Emergence of chaos and controlled photon transfer in a cavity-QED network	Amit Dey and Manas Kulkarni	Physics	Physical Review Research (Rapid Communications)	2020	2643-1564	https://mjl.clarivate.com:/search-results?issn=2643-1564&hide_exact_match_fl=true&utm_source=mjl&utm_medium=share-by-link&utm_campaign=journal-profile-share-this-journal
Quantum signatures of chaos in a cavity-QED-based stimulated Raman adiabatic passage	Amit Dey	Physics	Physical Review A	2021	2460-9934	https://www.scopus.com/sourceid/21100874237

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Medicinal and Therapeutic Benefits of *Catharanthus roseus* Linn (Apocyanaceae): An Updated Review	Subhankari Prasad Chakraborty & Rudrani Mukherjee	Physiology	European Journal of Biomedical and Pharmaceutical Sciences	2021	2349-8870	
Impact of Probiotics, Prebiotics and Synbiotics in Maintaining Gastrointestinal Microbiota: An Updated Review	Subhankari Prasad Chakraborty	Physiology	European Journal of Pharmaceutical and Medical Research	2021	2394-3211	
The psychological basis of Hindu Education	Soma Bhattacharya	Sanskrit	Innovation The Research Concept	2021	2456-5474	
Bhakti Sadhana and Bhaktitatva	Soma Bhattacharya	Sanskrit	Anthology,	2021	2456-4397	
Aryans- A Survey	Soma Bhattacharya	Sanskrit	Innovation The Research Concept	2021	2456-5474	
Puranas and Vedic practices in ancient Bengal	Soma Bhattacharya	Sanskrit	Innovation The Research Concept	2021	2456-5474	
Biographies of wives in Pos-Vedic India	Soma Bhattacharya	Sanskrit	Anthology,	2021	2456-4397	
Bellamya bengalensis: A review on its ecological importance, nutritional values and ethno medicinal importance	Anindita Bar	Zoology	European Journal of Pharmaceutical and medical research	2020	2394-3211	https://www.researchgate.net/publication/344451067_BELLAMYA_BENGALENSIS_A_REVIEW_ON_ITS_ECOLOGICAL_IMPORTANCE_NUTRITIONAL_VALUES_AND_ETHNO_MEDICINAL_IMPORTANCE
Covid 19 lockdown and the diversity of reptiles, birds and mammals: A home point study from Bankura Municipality, West Bengal	Anindita Bar	Zoology	Asian Journal of Current Research	2021	2456-804X	https://www.ikprress.org/index.php/AJOCR/article/view/6373
The Effect of " Hookah Water" on Haematological Parameters in Common Toad	Prakash Kumar Santra	Zoology	Asian Resonance	2021	P: ISSN 0976-8602 E: ISSN 2349-9443	http://www.socialresearchfoundation.com/upoadreserchpapers/1/409/2102060547181st%20prakash%20kumar%20santra.pdf

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The Effect of Cigarette Smoking on Micronucleus Frequencies in the Peripheral Blood Lymphocytes & Buccal Epithelial Cells of Smokers in Bankura District, West Bengal	Prakash Kumar Santra	Zoology	Periodic Research	2021	P: ISSN 2231-0045 E:ISSN 2349-9435	http://www.socialresearchfoundation.com/upoadreserchpapers/2/414/2103261119321st%20prakash%20kumar%20santra%2013760.pdf

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Supporting Document

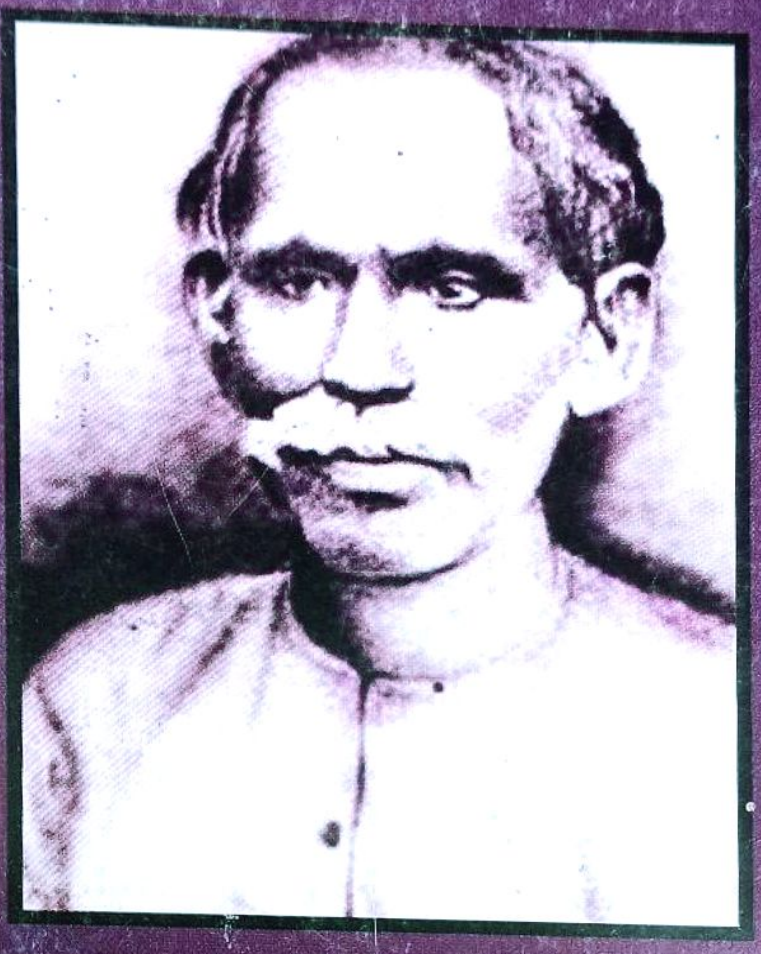
MS. BINAPANI GHOSH

রূপনারায়ণপুর বর্ধমান থেকে প্রকাশিত দ্বিমাসিক পত্রিকা

আজকের

যোগন

মন যোগায় না, মন জাগায়



৩৭ বর্ষ ◆ ৫ম সংখ্যা
শারদ ১৪২৭
ভাদ্র - আশ্বিন, ১৪২৭ ◆ সেপ্টেম্বর - অক্টোবর, ২০২০

আজকের যোধন

(বর্ধমান জেলা লিটল ম্যাগাজিন সংঘের সদস্য)
এবং UGC অনুমোদিত তালিকাভুক্ত

অন্যতম সেরা লিটল ম্যাগাজিন
৩৭ বর্ষ, ৫ম সংখ্যা
সেপ্টেম্বর - অক্টোবর, ২০২০
ভাদ্র - আশ্বিন, ১৪২৭

সূচিপত্র

রবীন্দ্রসান্নিধ্যধন্যা নির্মলকুমারী মহলানবিশ

বীণাপাণি ঘোষ

নির্মলকুমারী (মৈত্র) মহলানবিশের জন্ম ১৯০০ খ্রিস্টাব্দে। তাঁর আদরের ডাকনাম ছিল রানী। পিতা হেরম্বচন্দ্র মৈত্র ছিলেন কলকাতা সিটি কলেজের অধ্যাপক, পরে স্বনামধন্য অধ্যক্ষ। তাঁর পৈত্রিক নিবাস ছিল বর্তমান বাংলাদেশের কুষ্টিয়ার নিকটবর্তী খোরসা থানার অন্তর্গত হিজলাবট গ্রামে। রানীর দাদা অশোক অক্সফোর্ড বিশ্ববিদ্যালয় থেকে ব্যারিস্টারি পাশ করে দেশে ফেরেন। তিনি তখনকার বিখ্যাত চলচ্চিত্রাভিনেত্রী কাননদেবীকে বিবাহ করেন। পিতার তীব্র অমত থাকায় পিতার মৃত্যুর পর অশোক বিবাহ করেন। রানী ও তাঁর স্বামী এ বিবাহ যেমন মেনে নিয়েছিলেন তেমনি বিবাহের পর অশান্তি ক্রমশ তীব্র হতে থাকায় কানন ডিভোর্স চাইলে সেখানেও তাঁরা কাননকে সহযোগিতা করেন।

প্রশান্তচন্দ্র মহলানবিশ (২৯জুন,১৮৯৩-২৮জুন,১৯৭২) ছিলেন পদার্থবিদ্যার অধ্যাপক, বিখ্যাত পরিসংখ্যানবিদ। বিশ্বভারতীর প্রথম জয়েন্ট সেক্রেটারি হিসেবে ১০বছর কাজ করেছিলেন তিনি। রবীন্দ্রনাথের আদর্শে ও জীবনদর্শনে অনুপ্রাণিত হয়ে তিনি মানুষের কল্যানে রাশিবিজ্ঞানকে ব্যবহার করতে চেয়েছিলেন। এই কারণেই তিনি ইন্ডিয়ান স্ট্যাটিস্টিক্যাল ইন্সটিটিউট গড়ে তোলেন। 'রাশিবিজ্ঞান' পরিভাষাটি রবীন্দ্রনাথের সৃষ্টি। প্রশান্তচন্দ্র মহলানবিশের পিতামহ গুরুচরণ মহলানবিশ ছিলেন সাধারণ ব্রাহ্মসমাজের প্রতিষ্ঠাতা এবং মহর্ষি দেবেন্দ্রনাথের ঘনিষ্ঠ। ছোটবেলা থেকেই পিতামহর হাত ধরে জোড়াসাঁকোর বাড়িতে ব্রাহ্ম ধর্মের অনুষ্ঠানে যোগ দিতে যেতেন প্রশান্তচন্দ্র। ব্রাহ্মসমাজের এক অনুষ্ঠানেই নির্মলকুমারী তথা রানী মহালানবিশের সঙ্গে প্রথম দেখা হয় তাঁর। দীর্ঘদিনের প্রেম বিবাহে পরিণতি লাভ করার পথে দুই পরিবারই বাধা হয়ে দাঁড়ায়। শেষ পর্যন্ত প্রশান্তচন্দ্র মহলানবিশের মামা ডাঃ নীলরতন সরকারের বাড়িতে তাঁর অভিভাবকত্বে ১৫ই ফাল্গুন, ১৩২৯ বঙ্গাব্দ, মঙ্গলবার, শুক্লা একাদশী তিথি, ২৭ফেব্রুয়ারি, ১৯২৩খ্রিঃ রাত ৯.৩০এ রবীন্দ্রনাথ ও আরো ৭জনের উপস্থিতিতে তাঁদের বিবাহ হয়। বিবাহে পৌরোহিত্য করেন ব্রাহ্মসমাজের অন্যতম আচার্য সতীশচন্দ্র চক্রবর্তী।[১] 'বসন্ত' নাটকটির অভিনয় সেরে রবীন্দ্রনাথ, দিনেন্দ্রনাথ, ক্ষিতিমোহন সেন, অমিতা সেন, সুপ্রভা রায়, সাহানা দেবী প্রমুখকে সাথে নিয়ে বিয়েতে যোগ দেন। বিবাহের পর 'এ কি লাবণ্যে পূর্ণ প্রাণ' গানটি গেয়েছিলেন দিনেন্দ্রনাথ। অনেকগুলি বসন্তের গান গাওয়া হয়েছিল সেদিন। রবীন্দ্রনাথ গাইতে লাগলেন 'এতদিন যে বসে ছিলাম', 'ও আমার চাঁদের আলো' ইত্যাদি

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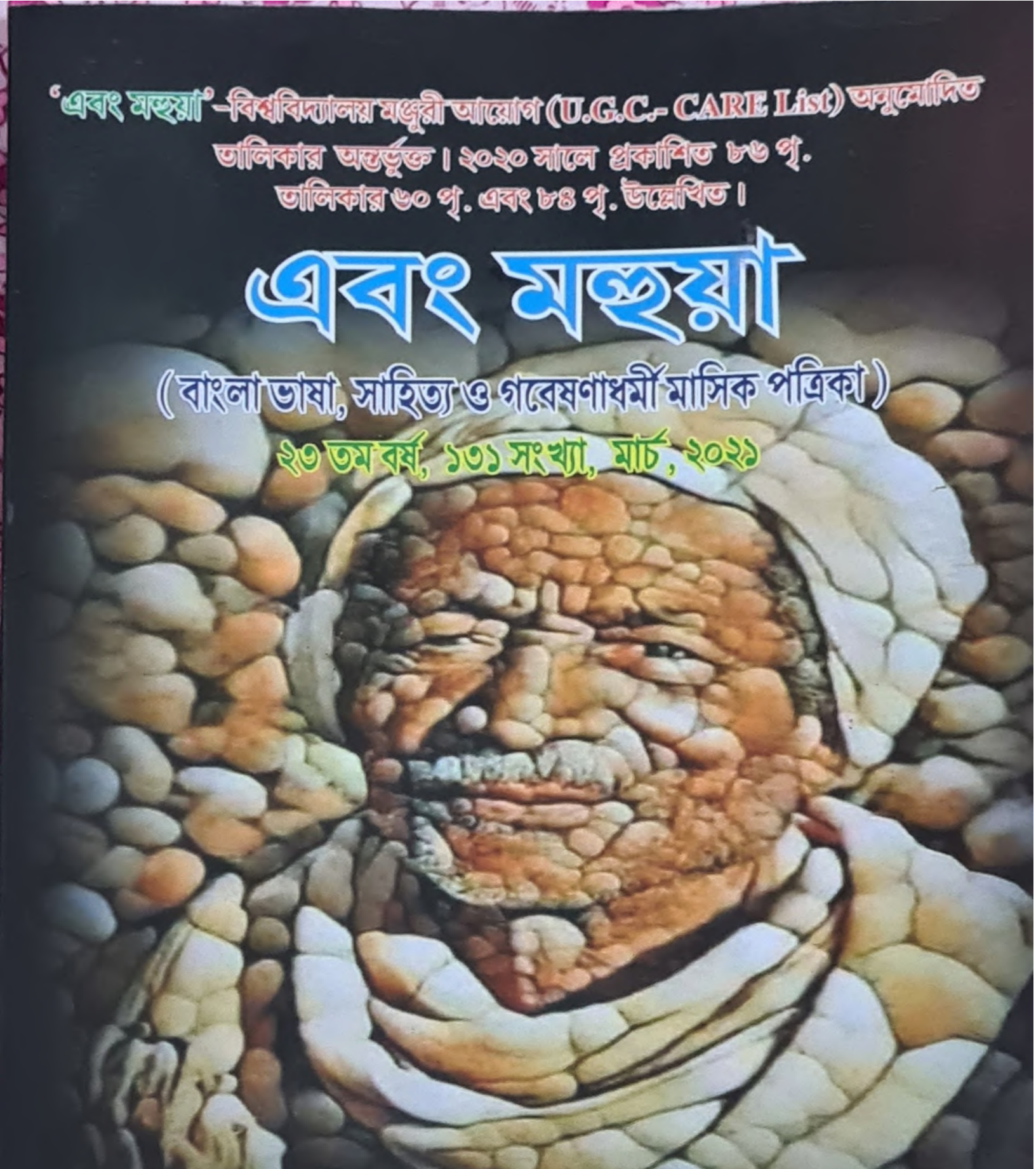
MS. ARNA MUKHOPADHYAY

'এবং মহুয়া' -বিশ্ববিদ্যালয় মঞ্জুরী আয়োগ (U.G.C.- CARE List) অনুমোদিত
তালিকার অন্তর্ভুক্ত। ২০২০ সালে প্রকাশিত ৮৬ পৃ.
তালিকার ৬০ পৃ. এবং ৮৪ পৃ. উল্লেখিত।

এবং মহুয়া

(বাংলা ভাষা, সাহিত্য ও গবেষণাধর্মী মাসিক পত্রিকা)

২৩ তম বর্ষ, ১৩১ সংখ্যা, মার্চ, ২০২১



সম্পাদক
ডা. মদনমোহন বেরা

কে.কে. প্রকাশন
গোলকুঁয়াচক, মেদিনীপুর, প.বঙ্গ।

অনালোকিত মন্দিরের ঐতিহ্য-জয়পুর

আরনা মুখোপাধ্যায়

সংক্ষিপ্তসার :

বাঁকুড়া জেলার জয়পুর ব্লকের অন্তর্গত গ্রামগুলির হারিয়ে যাওয়া মন্দিরের ঐতিহ্যকে সকলের কাছে তুলে ধরা এই আলোচনার মুখ্য বিষয়, এই নান্দনিক ঐতিহ্য গুলি তৎকালীন সমাজ জীবন ও একই সঙ্গে মানব মনের অগ্রগতির অন্যতম অধ্যায় হিসাবে চিহ্নিত হতে পারে। এই মন্দির গাত্রের নিদর্শনগুলি খুবই মূল্যবান। প্রাচীনকালে বর্হিশত্রুর দ্বারা ক্ষতিগ্রস্ত হলেও বর্তমানে আমাদের উদাসীনতার ফলে আরও বেশি করে অবলুপ্তির পথে চলে গিয়েছে, এগুলির প্রতি সচেতন দৃষ্টি প্রদর্শন করলে তবেই সম্ভব হবে বিভিন্ন রাজার রাজত্বকাল, সমাজ ব্যবস্থা, মানুষের জীবন যাত্রার স্পষ্ট চিত্ররূপ পাওয়ার।

কুঞ্জিশব্দ :

অনালোকিত, উপেক্ষিত, মন্দির-দেবগৃহ, ঐতিহ্য পরম্পরায় চলে আসে এমন চিন্তা, জয়পুর ব্লক।

মূল বিষয় :

প্রকৃতির আদিতে তাকে ঘিরে ছিলো জলাভূমি ও হাজারো বনাঞ্চল। সভ্যতার আলোতে আলোকিত হয়ে সভ্য মানুষ সেই জলাভূমি ও বনাঞ্চলের বুক চিরে স্থাপন করেছে বসবাসযোগ্য ভূমি, নগর, বন্দর, প্রকাশ করেছে তার কীর্তিকে নানান ঐতিহ্য ও সংস্কৃতির মধ্যে দিয়ে, বিভিন্ন যুগে আবির্ভাব ঘটেছে বিভিন্ন প্রতিভাধর মানুষের, তাদের প্রতিভা সৃষ্টিকে করেছে ঐতিহ্যশালী। যুগের উন্নতিতে সৃষ্টার মানসিকতার উন্নতির ফলে সৃষ্টিতে ও এসেছে অভিনবত্ব, সৃষ্টা তার সৃষ্টির মধ্যেই প্রকাশ করেছে তার কীর্তিকে, কীর্তিগুলির মধ্যে দিয়ে সভ্যতার ছাপ স্পষ্ট, কোন যুগের সমাজ, অর্থনীতি ও রাজনীতি ব্যবস্থাকে জানতে হলে অবশ্যই জানতে হবে সেই যুগের সৃষ্টি বা ঐতিহ্যকে।

'জীবনে মরণে নিখিল ভুবনে
যখনি যেখানে লবে,
চিরজনমের পরিচিত ও হে

DR. SAUBASHYA SUR

Immunogenetics
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ORIGINAL ARTICLE

In silico analysis reveals interrelation of enriched pathways and genes in type 1 diabetes

Saubashya Sur[1]

Received: 8 July 2020 / Accepted: 25 August 2020

Abstract

Type 1 diabetes (T1D) is a multifactorial, polygenic complex autoimmune disease damaging pancreatic islet β cells. Numerous genes linked to T1D have been discovered through genetical studies, GWAS and polymorphisms. Most genetical studies focused on independent genes while others overemphasized on SNPs. Here, a collective analysis of documented T1D-associated genes was performed using bioinformatics tools. Enriched biological pathways, functions, enrichment clustering, networks and interactomes were analysed. Besides, meta-analyses of T1D-associated genes and T1D-related genes from SNPs were investigated to find common genes, pathways, enrichment and interrelationships. Notable enriched pathways comprised of cytokine-mediated signalling, cytokine production, interferon gamma production, myeloid leukocyte activation, activation of immune response, lymphocyte activation, adaptive immune response, Th17 cell differentiation etc. Enrichment analysis of T1D-associated genes emphasized the role of immune-linked machineries in metabolism, disease progression and aetiology of type 1 diabetes. Interactome analysis revealed overrepresentation of T1D-associated genes compared with T1D-related genes from SNPs. MCODE components highlighted the significance of pathways linked to vitamin D metabolism, signalling by interleukins, toll-like receptors, chemokines, PD-1, NOTCH, antigen processes etc. About 153 genes from MCODE complexes representing enriched pathways of T1D-associated genes and T1D-related genes from SNPs play a crucial role and may be important for further investigations. The information may be valuable for designing precision medicine–based therapeutics.

Keywords Type 1 diabetes · Genes · Enrichment pathways · Immune response · Protein-protein interactions

Introduction

Diabetes is known to affect more than 463 million people on a global scale (Saeedi et al. 2019). Type 1 diabetes (T1D) is an auto-immune disorder manifested by the destruction of insulin-producing pancreatic β cells (Mehers and Gillespie 2008; Sun et al. 2019). In T1D, pancreatic islets are specifically attacked by the host immune system thereby forcing a life-long requisite for exogenous insulin in the patients (Mehers and Gillespie 2008; Pociot 2017). T1D is an evolving common chronic disease in adults and children with increasing annual incidence of 3–4% (Pociot 2017; Pillay et al. 2015). Epidemiological studies indicated that Caucasoid populations, especially in Northern Europe (Scandinavians), have the highest incidence of T1D while Asians and South Americans have the lowest (Mehers and Gillespie 2008). It has been revealed that about half a million children are suffering from T1D (Pociot 2017). Decades of research have demonstrated that T1D is a multigenic and multifactorial disease (Cordell and Todd 1995), with genetic susceptibility (Concannon et al. 2005), patient exposures, environmental factors and microbiota playing crucial roles (Sun et al. 2019; Guo et al. 2006; Rewers and Ludvigsson 2016). A number of complexities linked to T1D, viz. kidney, eye, neurological, cardiovascular disorders (Mehers and Gillespie 2008) and different types of cancer (Sona et al. 2018), highlight the need to develop improved therapeutics.

Although the development of T1D is influenced by various factors like ethnicity, age and environmental exposures (Guo et al. 2006), genetic susceptibility plays a stronger role compared with others, owing to the incidence of high-risk

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ImmunoHorizons

RESEARCH ARTICLE

Innate Immunity

A Genetic Variation of Lipopolysaccharide Binding Protein Affects the Inflammatory Response and Is Associated with Improved Outcome during Sepsis

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ABSTRACT

LPS binding protein (LBP) is an important innate sensor of microbial cell wall structures. Frequent functionally relevant mutations exist and have been linked to influence susceptibility to and course of bacterial infections. We examined functional properties of a single nucleotide polymorphism resulting in an exchange of phenylalanine to leucine at position 436 of LBP (rs2232618) and compared the frequent variant of the molecule with the rare one in ligand binding experiments. We then stimulated RAW cells with bacterial ligands in the presence of serum obtained from individuals with different LBP genotypes. We, furthermore, determined the potential effects of structural changes in the molecule by in silico modeling. Finally, we analyzed 363 surgical patients for this genetic variant and examined incidence and course of sepsis following surgery. We found that binding of LBP to bacterial ligands was reduced, and stimulation of RAW cells resulted in an increased release of TNF when adding serum from individuals carrying the F436L variant as compared with normal LBP. In silico analysis revealed structural changes of LBP, potentially explaining some of the effects observed for the LBP variant. Finally, patients carrying the F436L variant were found to be similarly susceptible for sepsis. However, we observed a more favorable course of severe infections in this cohort. Our findings reveal new insights into LPS recognition and the subsequent activation of the innate immune system brought about by LBP. The identification of a genetic variant of LBP influencing the course of sepsis may help to stratify individuals at risk and thus reduce clinical complications of patients. *ImmunoHorizons*, 2021, 5: 972–982.

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R.R.S and O.K. designed and supervised the studies; L.-K.Z., K.G., J.K.E., and L.L. conducted the in vitro experiments; D.-Y.O. established the healthy control cohort; L.H. performed and interpreted the genetic analyses; S.S., M.P., and A.N.R.W. performed in silico analysis; O.K., R.R.S., and S.S. analyzed the data; O.K. and R.R.S wrote the manuscript; and all authors edited the manuscript.

[1]O.K. and K.G. contributed equally to this manuscript.

Abbreviations used in this article: CI, confidence interval; ICU, intensive care unit; ID, identifier; LBP, LPS binding protein; OR, odds ratio; PDB, Protein Data Bank; Phe, phenylalanine; PLTP, phospholipid transfer protein; SNP, single nucleotide polymorphism.

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ARTICLE

Understanding the nature and dynamics of *Mycobacterium ulcerans* cytochrome P450 monooxygenases (CYPs) – a bioinformatics approach

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ABSTRACT Cytochrome P450 monooxygenases (CYPs or P450s) are catalytically versatile hemoproteins, associated with drug metabolism, substrate utilization and pathogenesis. *Mycobacterium ulcerans* is a human pathogen causing Buruli ulcer. The study intended to investigate frequency and diversity of CYPs from *M. ulcerans* strains, understand the pan-CYPome clustering patterns and interconnection of CYPs using bioinformatics tools. *M. ulcerans* strains demonstrated the presence of 261 CYPs categorized into 35 families and 38 subfamilies. CYP138, CYP140, CYP189 and CYP125 were the flourishing families. Around, 20 CYP families and 20 subfamilies were conserved. Flourishing and conserved CYP families/subfamilies were associated with lipid metabolism, substrate utilization etc. CYP140 had a role in pathogenesis. CYP279 was the least dominant family. CYP135, CYP183, CYP190, CYP271 and CYP276 were diagnostic markers for *M. ulcerans* subsp. *shinshuense* strain ATCC 33728 and *M. ulcerans* strain P7741. The pan-CYPome specified that *M. ulcerans* is evolving by gaining CYPs. CYP centric clustering revealed diversity and resemblances among *M. ulcerans* strains. More diverse nature of the *M. ulcerans* strain Harvey could be attributed to its larger size and geographical location. Co-occurrence network demonstrated mutual associations amongst substantial number of CYP families/subfamilies. This work provided comprehensive understanding of previously unexplored CYPs from *M. ulcerans*. **Acta Biol Szeged 65(1):93-103 (2021)**

KEY WORDS

clustering
CYP identification
cytochrome P450 monooxygenases
co-occurrence network
Mycobacterium ulcerans

ARTICLE INFORMATION

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Introduction

Hemoproteins like cytochrome P450 monooxygenases (CYPs) are universally present among all the living kingdoms (Kweon et al. 2020). The accessibility of large number of plants, animal and bacterial genomes in the public databases during last 20 years have resulted in the documentation of numerous cytochrome P450 monooxygenases. These hemo-thiolate enzymes first discovered in 1962, have been known to be vital for the evolution of different organisms (Nelson 2013). Phylogenetic studies on cytochrome P450 monooxygenases have highlighted that CYP51 is an ancient P450 which gave rise to the contemporary CYPs (Yoshida et al. 2000; Nelson 1999). CYP51 remained conserved across prokaryotes and eukaryotes (Parvez et al. 2016). Cytochrome P450 monooxygenases are associated with several biochemical reactions (Coon 2005) and form an indispensable part of an organism's primary and secondary metabolism (Parvez et al. 2016). Researches on the CYPs from bacteria have revealed their intricate structure function relationships (Parvez et al. 2016). Multiple lines of evidence have demonstrated the role of bacterial CYPs in drug metabolism and pathogenesis (Kweon et al. 2020; Furge and Guengerich 2006; Brezna et al. 2006). Bacterial CYPs are also known to be biotechnologically important (McLean et al. 2015).

Non-tuberculous mycobacteria dwell in varied environments and are responsible for nosocomial infections in immunocompromised and vulnerable persons (Ahmed et al. 2020). *Mycobacterium ulcerans* is a non-tuberculous mycobacterium responsible for a severe skin disease called Buruli ulcer (BU) (Ohtsuka et al. 2013). It has been a common infectious disease in Ivory Coast, Ghana, Benin, Democratic Republic of Congo and Uganda (van der Werf et al. 1999). However, a number of infections has been reported from aquatic environments in Japan (Luo et al. 2015), Australia (O' Brien et al. 2019), China, certain regions of Central and South America (Merritt et al. 2010). Anthropogenic activities have been one of the reasons behind the emergence *M. ulcerans* (Zingue et al. 2018). It initiates inflammation by attacking the skin, subcutaneous fat cells (Merritt et al. 2010) and secretes mycolactone toxin (Liu et al. 2019) during Buruli ulcer.

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Article

Interaction of TLR4 and TLR8 in the Innate Immune Response against Mycobacterium Tuberculosis

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Abstract: The interaction and crosstalk of Toll-like receptors (TLRs) is an established pathway in which the innate immune system recognises and fights pathogens. In a single nucleotide polymorphisms (SNP) analysis of an Indian cohort, we found evidence for both TLR4-399T and TRL8-1A conveying increased susceptibility towards tuberculosis (TB) in an interdependent manner, even though there is no established TLR4 ligand present in *Mycobacterium tuberculosis* (Mtb), which is the causative pathogen of TB. Docking studies revealed that TLR4 and TLR8 can build a heterodimer, allowing interaction with TLR8 ligands. The conformational change of TLR4-399T might impair this interaction. With immunoprecipitation and mass spectrometry, we precipitated TLR4 with TLR8-targeted antibodies, indicating heterodimerisation. Confocal microscopy confirmed a high co-localisation frequency of TLR4 and TLR8 that further increased upon TLR8 stimulation. The heterodimerisation of TLR4 and TLR8 led to an induction of IL12p40, NF-κB, and IRF3. TLR4-399T in interaction with TLR8 induced an increased NF-κB response as compared to TLR4-399C, which was potentially caused by an alteration of subsequent immunological pathways involving type I IFNs. In summary, we present evidence that the heterodimerisation of TLR4 and TLR8 at the endosome is involved in Mtb recognition via TLR8 ligands, such as microbial RNA, which induces a Th1 response. These findings may lead to novel targets for therapeutic interventions and vaccine development regarding TB.

Keywords: TLR4; TLR8; tuberculosis; SNP analysis; heterodimerisation

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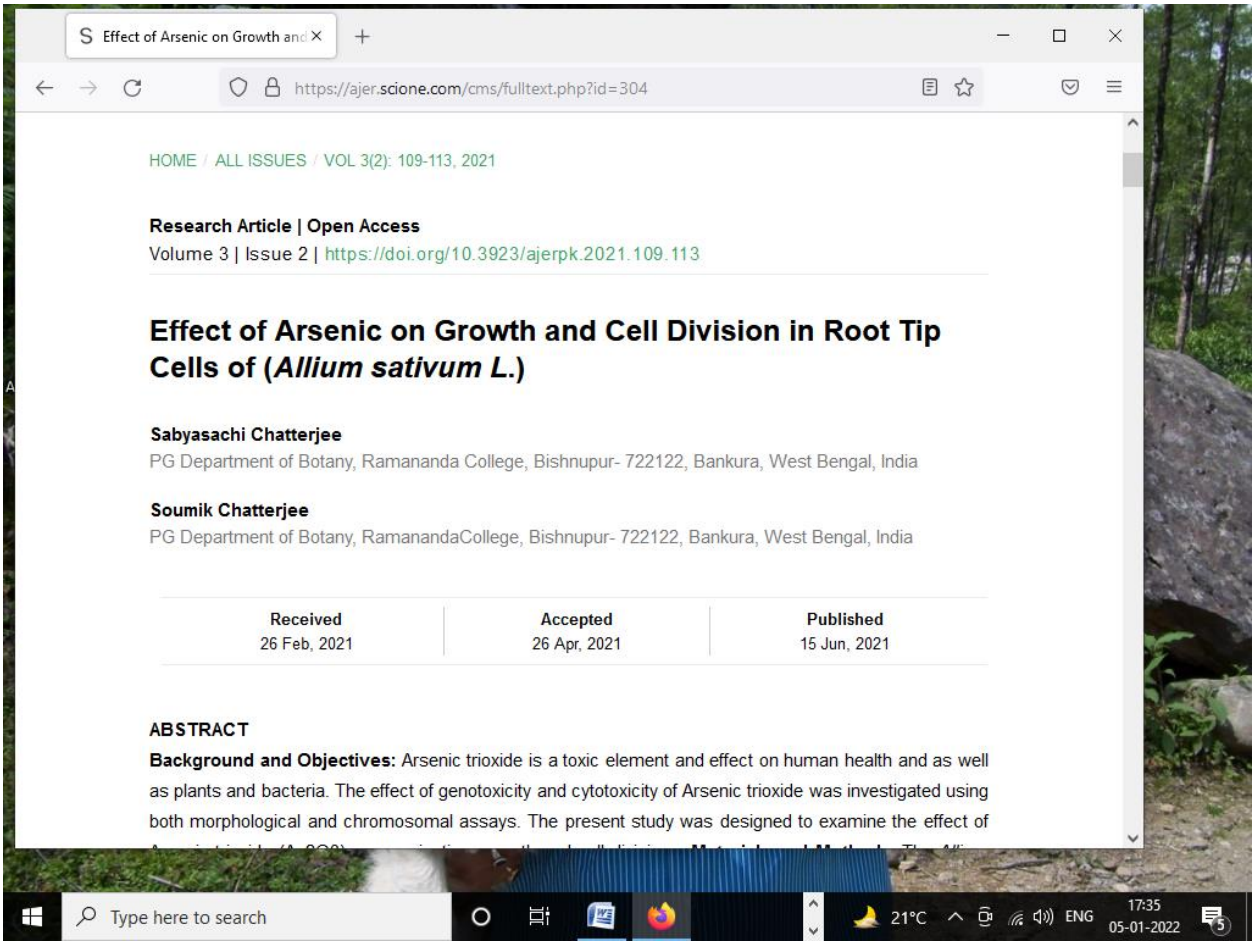
1. Introduction

The recognition of potentially pathogenic microorganisms followed by an inflammatory response of the host is regulated by the immediate reaction of the innate immune

DR. SABYASACHI CHATTERJEE



Research Article | Open Access
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Effect of Arsenic on Growth and Cell Division in Root Tip Cells of (*Allium sativum L.*)

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ABSTRACT

Background and Objectives: Arsenic trioxide is a toxic element and effect on human health and as well as plants and bacteria. The effect of genotoxicity and cytotoxicity of Arsenic trioxide was investigated using both morphological and chromosomal assays. The present study was designed to examine the effect of

DR. SHYAMASHIS DAS

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Article

Structure and Electronic Effects from Mn and Nb Co-doping for Low Band Gap $BaTiO_3$ Ferroelectrics

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Soham Mukherjee,* Dibya Phuyal, Carlo U. Segre, Shyamashis Das, Olof Karis, Tomas Edvinsson, and Håkan Rensmo*

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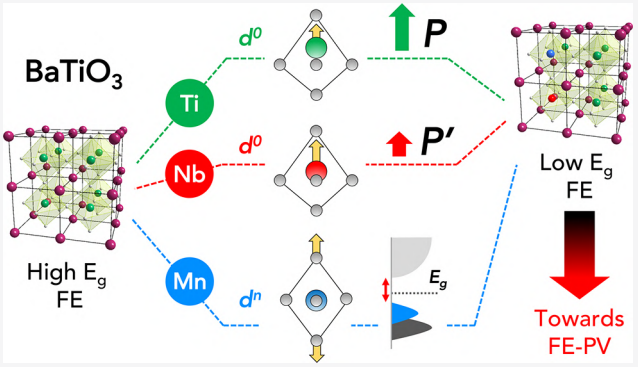
ABSTRACT: We have investigated the doping-induced local structural and electronic effects in the recently developed low band gap room temperature ferroelectric Mn−Nb co-doped $BaTiO_3$. Experimental and theoretical Raman spectroscopies are utilized to quantify the Ti off-centering, identified to be the intrinsic origin of ferroelectricity in these systems. Mn and Nb exhibit contrasting doping behaviors that have remarkable effects on $BaTiO_3$ functionality. Jahn−Teller distorted Mn^{3+} is primarily associated with lowering of the bulk band gap, while charge-compensating Nb^{5+} off-centers within the O_6 octahedra, creating a polar mode that stabilizes the ferroelectric ground state. The charge neutral aliovalent Mn^{3+}−Nb^{5+} pair effectively couples to the inherent ferroelectric instability of the $BaTiO_3$ lattice, restoring some spontaneous polarization lost by doping Mn^{3+} (d^4) ions at Ti^{4+} (d^0) sites.



INTRODUCTION

Research on ferroelectric materials has come a long way since the discovery of the perovskite oxide $BaTiO_3$ as a ferroelectric in 1946,[1] finding a wide array of applications[2,3] in the modern age such as capacitors,[4,5] actuators,[6] sensors,[7,8] waveguide modulators,[9,10] and ferroelectric memories.[11] Ferroelectrics typically exhibit high dielectric constants and carry spontaneous lattice polarization (P) that can be reversed by using an external electric field greater than the coercive field. This intrinsic polarization can be utilized to sustain efficient separation of photogenerated electron−hole pairs, thereby generating a steady-state photocurrent. The high electric field in ferroelectrics is capable of producing above band gap voltages,[12] with controllable voltage output.[13] This fundamental advantage over conventional p−n junctions explains the tremendous interest in ferroelectric photovoltaics.[14−17]

In the classical ferroelectric $BaTiO_3$, the lowest unoccupied energy states (3d) of d^0 ion Ti^{4+} strongly hybridize with O 2p states, thus largely driving the ferroelectric distortion.[18] The Ti^{4+} ion off-centers from its centrosymmetric position in the unit cell, resulting in large inherent polarization (P = 24.1 $\mu C/cm^2$). In addition to such a high P value, $BaTiO_3$ exhibits a rich structural phase diagram, high chemical stability, and wide doping tunability of the perovskite structure ABO_3 which provides an ideal framework for tuning and exploring multifunctionalities.[19−22] However, the biggest challenge in realizing $BaTiO_3$ ferroelectrics as photovoltaics stems from its typically large bulk band gap (3.2 eV) which limits its access mostly to the UV range, as commonly observed[23,24] for all d^0-ferroelectric perovskites (e.g., $KNbO_3$ and $BaZrO_3$). This is primarily due to the requirement of partial d-occupancy on the B-site cation to reduce the optical band gap that tends to remove the ferroelectric distortion, eventually stabilizing the prototypical high-symmetry phase.[25−27] Work on improving overall performance focuses mainly on narrowing the band gap through modification in compositions and the connection between polar order and photovoltaic effect.[15] Band gap engineering via chemical substitution such as A-site La-doped $BiFeO_3$[15] and B-site Cr-doped in $BiFeO_3$ has shown remarkable overall efficiencies of nearly 8%.[24] Another route is to make solid solutions such as $[KNbO_3]_{1-x}[BaNi_{1/2}Nb_{1/2}O_{3-\delta}]_x$ which show a wide tunability with enhanced photovoltaic properties under visible light.[16] Furthermore, the

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DR. APU MANNA

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Evidence on the Non-linear Effect of Large Ownership on the Enterprise Value of Indian Manufacturing Firms

Krishna Dayal Pandey, Tarak Nath Sahu, Apu Manna

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Abstract

The study advances the existing literature on corporate finance and governance by establishing a non-linear effect of large ownership on the enterprise value of Indian manufacturing firms. The study employs both static and dynamic panel models on a set of panel data consisting of 112 Indian manufacturing firms. The study establishes a U-shaped relationship between large ownership and enterprise value of the sampled firms. Large promoters until 34% of ownership are found to exert a negative effect on enterprise value which signifies expropriation effect along with poor alignment of interest with the firms. However, for ownership concentration by promoters after the said threshold, the effect is found to be positive signifying improved alignment of interests, efficient monitoring and disciplining of managerial opportunistic behaviour. Based on the findings, the study suggests the Indian

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MR. SOMNATH BASU

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Contents

The Voice of Reason: Archbishop Abbot on the Essex Divorce Case

SOMNATH BASU

Speaking truth to power is a practice that has often landed speakers in trouble, and, in the early modern period, with its profusion of monarchs believing themselves to be divinely anointed to rule, a courtier or functionary who asserted a viewpoint opposed to that of the monarch was almost certain to incur severe consequences ranging from the loss of favour to the loss of life.

Under these circumstances, it is remarkable that George Abbot, who was Archbishop of Canterbury for the greater part of the reign of King James I of England (he served from 1611 to 1633, therefore also holding that position after Charles I ascended the throne), respectfully but firmly opposed the divorce of Frances Howard from her husband Robert Devereux, the 3rd Earl of Essex, on the grounds of impotency, because the divorce was something that James I avidly encouraged because he had agreed to let Howard marry his current favourite Robert Carr, who was later created Earl of Somerset.

This essay will examine the correspondence between James I and Archbishop Abbot on this matter, in order to demonstrate how Abbot attempted a rational inquiry (as far as rationality went in that period) into a subject that was widely believed in by virtually every social class in England at that time, and also how his language negotiates his political obligations to James I and his own position as an arbiter.

In 1613, Frances Howard (later known as Frances Carr), petitioned for an annulment of her marriage to Robert Devereux, the 3rd Earl of Essex, to whom she had been married in 1604, when she was fourteen years old. The grounds for claiming the annulment was the non-consummation of the marriage, with Howard claiming that her

MS. SONAM JALAN

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"Sense of Place and Sense of Planet": Local-Planetary Experiences of Climate Change in Barbara Kingsolver's *Flight Behavior*

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Abstract
Climate change has become a harsh reality of our present times. It is happening here, there, and everywhere unbound by the spatial and temporal dimensions. The vacillating impact of such a global crisis equally demands multiple and concurrent scales in order to accurately comprehend the complexity of the problem. Borrowing the title of my paper from Ursula K. Heise's book, *Sense of Place and Sense of Planet: The Environmental Imagination of the Global*, where she proposes the concept of 'eco-cosmopolitanism', this article aims at reflecting upon the globalization of the present ecocatastrophes, musing upon the local (the experiences of the working class people) and the global scale (Unnatural Migration and thereby extinction of the Monarch Butterflies) impact of the climate crisis. Ursula K. Heise believes that the 'deterritorialization' of the local knowledge is not always detrimental rather can open up new avenues into ecological consciousness. Giving consideration to a deterritorialised environmental vision my paper will fall back on Barbara Kingsolver's *Flight Behavior*- a novel dealing with the eco-apocalypse, climate change and global warming. In providing a deeply humane account of the working people's response to the local effects of the global crisis along with a poignant account of the impact on a planetary scale- the Migration of the Monarch Butterflies and their extinction, Kingsolver in this novel contextualizes the micro-geographically bounded human experience and memory within the larger context of the global Anthropocene thereby calling for a 'sense of planet' along with a 'sense of place'- which get along with each other.

Keywords: Climate change, Eco-cosmopolitanism, Monarch Butterflies, Global warming, Anthropocene

Introduction

> Why did the one spectacular thing in her life have to be a sickness of nature?
> (Kingsolver, 2012, p. 205)

Barbara Kingsolver's *Flight Behavior* is one of the major works in the climate fiction genre with its pronounced description of the terrible ecological consequences of our carbon economy that reckons a global consciousness by continuously engaging its readers with the human and non-human victims of the anthropogenic climate change. The incidents in the novel involuntarily transport the readers from witnessing the climate crisis on a local scale to a broader global scale challenging Tim Clark's notion of 'scale effects' that "in relation to climate change are confusing because they take the easy, daily equations of moral and political accounting and drop into them both a zero and an infinity"(Clark, 2012). Clark appears to be highly skeptical about the accuracy of scales in measuring the effects of environmental problems as "what is self-evident

MR. SUBHENDU BISWAS

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Will Nature Nurture the World of Female Protagonist?: Telescoping the Role of Nature As a Post-colonial Subject Within the Ambit of Doris Lessing's *The Grass is Singing*

Subhendu Biswas

Abstract

The spirit of Post colonialism or post colonial identity influenced by anti colonial attitude suggests the unbinding of the psychological fetters of Western thought and ideas defined by the spirit of colonialism. In Doris Lessing's *The Grass is Singing* the phenomenon of Nature or Natural World of Rhodesian district is charged with the spirit of Post colonial stance as if through its anti colonial mission. In this novel Nature very purposefully appears to stand and speak out through its own actions for the 'Black' natives in Southern Rhodesia against a ruthless, inhumane colonial 'master' like Mary Turner. As the story progresses gradually Nature takes hold of Mary's life and turns the latter from a stubborn, obstinate 'master' to something mere insubstantial non entity through the process of her gradual psychic disintegration and disillusionment which are ultimately extinguished only through her death (murder) at the hand of a 'Black' Native Moses in the Natural surroundings of Rhodesian district. In this way the murder of Mary by Moses may be regarded as the revenge taken by Nature itself through its own agent like the 'Black' Native Moses and thereby restores the Rights and Space/Place of the indigenous people of Southern Rhodesia in its proper shape.

Keywords: Post-colonialism, Anti Colonial, Nature, Colonial Master, Black Native.

Bill Ashcroft in *The Empire Writes Back: Theory and Practice in Post Colonial Literatures* opines: "[M]ore than three quarters of the people living of the world today have had their lives shaped by the experience of colonialism" (Ashcroft et al. 1989, 2017). The study of colonialism is the study of imperialist expansion of the Europeans into different parts of the world during the last four hundred years with a snobbish ideology of racial superiority. There always exists historically a dividing line between the colonisers and the colonised. However, it is no doubt necessary to decipher the 'Discourse' of colonialism in order to specify the history of torture of the colonised at the hands of the so called civilised colonisers. *Oxford* English Dictionary (1989, as cited in Loomba, 2015) has defined colonialism as:

> [A] settlement in a new country …a body of people who settle in a new locality, forming a community subject to or connected with their parent state; the community so formed, consisting of the original settlers and their descendants and successors, as long as the connection with the parent state is kept up. (p.19)

Interface

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Screening the Tracing and Stressing of Gerontology: A Study of Lord Alfred Tennyson's *Tithonus*

Subhendu Biswas[1]

Abstract:

The term 'gerontolgy' basically suggests the study of old age. The phenomenon of gerontology reflects a universal approach. The concept and study of biological gerontology is not a newer one for the human world, while the study of socio-psychological gerontology is a comparatively newer field. The study of socio-psychological gerontology can be further analysed in a better way through one socio-psychological theoretical approach – disengagement theory, which telescopes old age in negative terms. There are a lot of older persons throughout the world who are in solidarity with the limelight of this negatively connoted disengagement theory and they are greater in numbers as compared with the psychologically positive bent of older persons of the entire world. The perspective of disengagement theory can be perceived in a more refined way through the domain of literature which ultimately reflects and reinforces our society. Lord Alfred Tennyson through his titular character Tithonus in his poem has framed the concept of disengagement theory in a more concrete way.

Keywords: gerontology, universal approach, disengagement theory, domain of literature, Tithonus.

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DR. MOHAMMAD ALI KHAN

Design of multistability of chaotic systems via self and cross coupling

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Authors: Mohammad Ali Khan, Gopal Mahapatra, Jayanta Kumar Sarkar, Syeda Darakhshan Jabeen

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Regular Article

Design of multistability of chaotic systems via self and cross coupling

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Abstract In this paper, we proposed general coupling conditions to the error dynamics of coupled dynamical systems for realizing multistability. The basic mechanism to propose multistability is to design partial synchronization of states between the coupled system and use to find some initial condition-dependent constants of motion. Here, we propose that i number of state variables are completely synchronized, and the remaining j number of state variables of two coupled systems are in constant difference to obtain multistable behaviour, where $1 \preceq i, j \preceq m-1$ and $i+j=m$. We interpret our scheme for coupled chaotic Lorenz, Rossler, and Van der Pol–Duffing oscillators. Further, we establish numerical simulation results with a bifurcation diagram, phase diagram, and maximum Lyapunov exponent to show the desired results of our schemes.

1 Introduction

Multistability is the existence of many stable states in dynamical systems for a set of parameters, and their control has tremendous significance in nonlinear science. Multistability has arisen in a large number of areas in science, namely population dynamics [1–3], climate dynamics [4,5], physical systems [6–8], chemical systems [9–11], and neurosciences [12,13], respectively. Multistability is often found in dissipative system [14–16] and coupled systems [17,18]. In the coupled systems, coupling conditions play an essential role in realizing multistability. The dynamics of multistability are highly sensitive to initial conditions due to the different coexistence attractors. In generalized multistability, coexistence of many non-trivial attractors like limit cycles, chaotic attractors is necessary. But there exist infinitely many stable attractors in the system for extreme multistability. For designing extreme multistability, Sun et al. [19] first proposed the multistable system. They observed that the existence of extreme multistability depends on varieties of initial conditions. Complete synchronization of different

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Spatiotemporal Synchronization of Diffusively Coupled Modified Logistic Map Under Complex Network

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RESEARCH ARTICLE

Spatiotemporal Synchronization of Diffusively Coupled Modified Logistic Map Under Complex Network

Mohammad Ali Khan[1] · Debjani Maity[2] · Syeda Darakhshan Jabeen[3]

Received: 2 August 2017 / Revised: 2 February 2019 / Accepted: 2 December 2020

Abstract We study spatiotemporal synchronization under complex network of diffusively coupled chaotic modified logistic map. In modified logistic map a new parameter is introduced such that nonlinear term is in fractional power. The complex network is dynamic whose coupling connections change stochastically in time. Here we investigate the spatiotemporal dynamics of coupled modified logistic maps whose coupling connections are rewired randomly, and we determine (1) the effects of variation of newly induced parameter β, (2) the effects of variation of low and high rewiring probability, (3) the effects of variation of growth rate r and (4) the effects of variation of different randomness and linear stability analysis of the synchronized steady-state solution. We have calculated analytically the critical coupling coefficient for the transition to spatiotemporal regularity of the lattice. The analytical results match well with the numerical simulation results. The variation of the basin size with respect to coupling strength and rewiring probability with various randomness and coupling is plotted. The simulation results do not change significantly with the variation of lattice sizes.

Keywords Modified logistic map (MLM) · Coupled map lattice (CML) · Spatiotemporal synchronization (SS)

1 Introduction

Since the synchronization of dynamical systems observed by Pecora and Carroll [1], chaos has become a topic of great interest of science and engineering. Different types of synchronization have been proposed. Shooshtari et al. [2] discussed identical synchronization of nonautonomous unified chaotic system with continuous periodic switch. Generalized synchronization for delay and nondelay chaotic systems discussed by Tarai et al. [3, 4]. Phase synchronization control of complex networks of Lagrangian system on adaptic digraphs has been observed by Chung et al. [5]. Wang et al. [6] also analysed module-phase synchronization in hyperchaotic complex Lorenz system after modified complex projection. Khan and Poria [7] and Bao and Cao [8] described projective synchronization of bidirectional coupled chaotic systems and fractional-order memristor-based neural networks. Anti-synchronization of different types of chaotic systems is discussed by Al-Sawalha and Noorani [9] and Sing et al. [10], respectively. Adaptive lag synchronization for uncertain complex dynamical network observed by Ji et al. [11] and also Hung et al. [12] discussed finite-time lag synchronization of delayed neural network. Synchronization of coupled map lattice (CML) of chaotic maps has been hellaciously examined. CMLs were introduced in a simple model holding the essential features of nonlinear dynamics of extended systems involving many individual units [13].

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Anti-synchronization phenomenon of discrete chaotic maps using linear transformations

Authors Mohammad Ali Khan, Himadri Pai Mazumdar, Syeda Darakhshan Jabeen

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Anti-synchronization phenomenon of discrete chaotic maps using linear transformations

Mohammad Ali Khan , Himadri Pai Mazumdar & Syeda Darakhshan Jabeen

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A COMPARATIVE STUDY ON SELECTED FITNESS VARIABLES OF TRIBAL HANDBALL AND VOLLEYBALL PLAYERS

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ABSTRACT

Sports by their very nature an enjoyable, challenging, all absorbing and require a certain amount of skill and physical condition in order of human values. Ball games is one of the most popular of all the common games and sports. Handball is very fast by its nature and demands a high level of specific fitness. It is game of constant actions and requires continuous adaptations to the changing situation by the team as well as by individual players. Volleyball has a requirement for great deal of planned program to highly trained teams. The purpose of the study was to compare the selected fitness variables between tribal Handball and Volleyball players of Bankura district. Forty (40) male student players of Gobinda Prasad Mahavidyalaya and Ramananda College (20 Handball and 20 volleyball players) were selected as subjects. The average age of the subject was 19.2 years. The performance variables such as speed, strength, agility and cardiorespiratory endurance were measured with a standard test. Product moment correlation was used to established reliability. t-test was used in order to find out the significant differences between the selected variables of Handball and Volleyball players. The significant differences were observed at 0.05 level in speed, leg explosive strength, agility and cardiorespiratory endurance. No significant difference was seen in Arm and shoulder strength.

Keywords: Speed, Strength, Agility, Cardio respiratory, Variables.

DR. BAIBASWATA BHATTACHARJEE

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RESEARCH ARTICLE

A novel design of frequency encoded multiplexer and demultiplexer systems using reflected semiconductor optical amplifier with simulative verification

Surajit Bosu[1] · **Baibaswata Bhattacharjee**[2]

Received: 28 August 2020 / Accepted: 10 May 2021

Abstract In this modern era, optical technology is used for high-speed processing because photon carries information instead of an electron. In signal processing, multiplexing and demultiplexing are the most valuable component. In this communication, designs of frequency encoded 2:1 multiplexer and 1:2 demultiplexer with the use of Reflective Semiconductor Optical Amplifier and add/drop multiplexer are devised. These proposed designs work at high-speed due to the high speed switching property of reflective semiconductor optical amplifier. In the multiplexing and demultiplexing system, coded data signals and coded control signals are the most important issues. Here, frequency encoding is opted because frequency is unaltered after reflection, refraction, absorption, etc., and it gives a very good response for long-distance transmission of processed data. The operation of devised designs has also been verified through MATLAB Simulink (R2018a) software.

Keywords Multiplexer · Demultiplexer · Frequency encoding technique · Reflected semiconductor optical amplifier · Add/drop multiplexer

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Introduction

In this modern era of communication networks, optics plays a major role in the information processing system. In optical networking, multiplexer and demultiplexer are key parts [1]. When one output is needed from many input system, then a multiplexer is used. A demultiplexer is reverse to the multiplexer. It has one input and gives more than one output. 2:1 multiplexer is a combinational logic circuit with two input data signals, one output signal, and one control signal. 2:1 multiplexer has two data inputs X_1, X_2, one control input 'A' and one output is 'Y' which expresses as $Y = X_1\bar{A} + X_2A$. If control input 'A' is changed to '0' or '1', then any desired input data X_1, X_2 get at the output end. For control signal A = 0, the input X_1 is transmitted at the output i.e., $Y = X_1$ and if A=1 input X_2 is transmitted at the output i.e., $Y = X_2$. Demultiplexer has only one input, many outputs, and one or more than one control signal. By changing the control signal 'A', 'X' can be routed to one of the outputs Y_1 and Y_2. If A= 0, then output $Y_1 = X\bar{A}$ and for A=1 the output is $Y_2 = XA$. For optical processing, different types of encoding processes are available such as intensity encoding [2], polarization encoding [3], phase encoding [4], frequency encoding [5–7], hybrid encoding [8], spatial encoding [9], etc. In the optical communication network, high-speed wave division multiplexing (WDM) [10] and time-division multiplexing (TDM) [11, 12] need high-speed optical switches along with a high on/off contrast ratio and ability to cascade. Advanced optical devices like add/drop multiplexer (ADM) can be obtained from such high-speed optical switches. The reflective semiconductor optical amplifier (RSOA) is the choice for such high-speed switches.

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Investigation of doping effect on electrical conduction mechanism and Li+ ion insertion/extraction in ZnO-XV_2O_5 {X=5% and 10%} electrode for superior energy storage application

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ABSTRACT

In an effort to enhance the electrical conductivity and electrochemical charge storage capacity of pure ZnO, the multivalent V_2O_5 is doped with different percentage by solid-state synthesis procedure with low annealing temperature. The materials are characterized by the X-ray diffraction (XRD) and the Fourier Transform Infrared Spectroscopy (FTIR). The XRD pattern reveals hexagonal wurtzite structure with preferred orientation along (101) plane. Three secondary phases $Zn_3(VO_4)_2$, $Zn_4V_2O_9$ and ZnV_3O_8 appear after V_2O_5 doping. The vibrational bending and stretching modes are identified by the Fourier Transform Infrared Spectroscopy (FTIR). The temperature dependent electrical conduction mechanism of ZnO–V_2O_5 (ZNV) varistor ceramic materials is studied by ac impedance spectra analysis. The effect of doping on the electrical conductivity formalism was well discussed. By Nearest Neighbor hopping (NNH) model, it is shown that activation energy of ZnO gradually decreased from 0.28 eV to 0.21 eV by introducing V_2O_5. The electrochemical properties of as prepared ZNV electrodes are investigated by Cyclic voltammetry (CV), Galavanostatic charge-discharge (GCD) and Electrochemical Impedance Spectra (EIS) analysis. In 1 M Li_2SO_4 electrolyte the ZnO–10%V_2O_5 (ZNV10) shows maximum specific capacitance 447 F/g at current density 1 A/g. The cyclic stability of pure ZnO, ZnO-5% V_2O_5 (ZNV5) and ZnO–10%V_2O_5 (ZNV10) are tested for 1000 cycles. The capacity retention ratio of pure ZnO increases from 68% to 88% after 10% V_2O_5 doping. The charge storage mechanism of ZNV10 is demonstrated by Faradaic adsorption/desorption through the redox charge transfer process. This work may provide a new scope for further development of pseudocapacitor electrode for high performance supercapacitor.

1. Introduction

Recently, the studies of transition metal oxides (TMO) continue to be of interest because of their tremendous semiconducting behavior and potential applicability to the electronic device [1–5]. These semiconducting properties of the materials fundamentally arise from existence of unpaired 3 d^1 electron hopping between transition metal (TM) ions when the TMO exists two or more valence states e.g transition from V^{4+} to V^{5+} [6-7]. Since unpaired electrons induce polarization around the TM ions and the electrical conduction mechanism can be described by poloronic model [1]. ZnO based varistors are extensively used as a protective component against the surge current attack to the electronic circuit in electronic devices due to their extraordinary nonlinear behavior, high stability and large current holding capability. In fast emerging technologies, the binary TMO, ZnO and V_2O_5 are used as piezoelectric, thermochromic, electrochromic and electrochemical device application. Previously many research groups have worked on ferromagnetism [8-9], microwave mobile application [10-11], photo detector [12–14], solar cell [13], gas sensor [15], UV resistive coating and non ohmic applications [16] by using ZnO–V_2O_5 (ZNV) composite. Again, Vanadium Pentoxide (V_2O_5) is a promising material for Lithium ion intercalation host due to its layer structure. It can provide multiple layers to intercalate cations or anions between adjacent layers [17–19]. Electrical energy is stored by chemical reactions in the form of chemical energy during de-intercalation process; again, chemical energy is released in the form of electricity during intercalation [17]. These

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DR. AMIT DEY

Rapid Communications

Emergence of chaos and controlled photon transfer in a cavity-QED network

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We develop optimal protocols for efficient photon transfer in a cavity-QED network. This is executed through stimulated Raman adiabatic passage scheme where time-varying inductive or capacitive couplings (with carefully chosen sweep rate) play a key role. We work in a regime where the semiclassical limit is valid, and we investigate the dynamical chaos caused by the light-matter coupling. We show that this plays a crucial role in estimating the lower bound on the sweep rate for ensuring efficient photon transfer. We present Hermitian as well as an open quantum system extension of the model. Without loss of generality, we study the three cavity and four cavity cases and our results can be adapted to larger networks. Our analysis is also significant in designing transport protocols aimed for nonlinear open quantum systems, in general.

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Introduction. High-precision controllability of cavity-QED (c-QED) systems and the potential of fabricating artificial lattices [1–4] highlights c-QED systems as an important component of quantum network [5–10]. The accessibility of a wide range of light-matter interaction (nonlinearity) signify its relevance for simulating strongly correlated systems [11–14] and demonstrate various phases, such as localization-delocalization [15–17], superfluid-Mott insulator [11,13,18–21] phases. Interesting and important phenomena, such as qubit state preparation, photon-assisted transfer [5,7,22,23], and various quantum correlation measures [23–25], to name a few, have also been recently investigated.

Population transport through a nonlinear network [such as multimode Bose-Hubbard (BH) systems] results in intricate physics of various types of instabilities [26,27]. Apart from energetic instability [27] due to nonlinear eigenstates (of the problem in the semiclassical limit), chaos can play major role in determining transfer efficiency [26]. Therefore, a judicious control of system parameters is crucial to tackle such sensitive physical processes. Nonlinear stimulated Raman adiabatic passage (STIRAP) consisting of interacting atomic Bose-Einstein (BEC) condensates has been analyzed semiclassically [26] as well as in a quantum many-body framework [28], and the role of various instabilities has been investigated theoretically. It has been shown that the adiabatic conditions for such processes get modified due to the emergence of chaos [26]. Another platform to investigate nonlinearity is a c-QED lattice. This platform precisely implements the Jaynes-Cummings nonlinearity which is very different from the BH nonlinearity in atomic BEC. In addition to this, a dispersive regime of a c-QED can mimic the BH nonlinearity (Kerr type). Therefore, a c-QED lattice, being an efficient quantum simulator, demands an extensive analysis of nonlinear transport. Chaotic signature in systems where a single cavity is involved [29–33] has been investigated, and such systems can be considered to be a good testing bed for quantum-classical correspondence [30] of chaos. In a linear trimer of cavities [34], control of nondirected (unlike the STIRAP scheme) single-photon transfer is proposed by tuning the ratio of intercavity tunnelings in ultrastrong light-matter coupling regime. Although nonlinear contribution is studied for adiabatic light passage in terms of excitation power dependence [35], to the best of our knowledge, role of chaos in these optical processes remained elusive so far. The Jaynes-Cummings interaction-induced nonlinearity is exploited in coupled c-QED systems, and delocalized-localized phases have already been realized [15–17]. Furthermore, driven-dissipative preparation of exotic steady states in extended cavity systems paved the avenue of controlling photon propagation in scaled-up architectures [15]. Therefore, a deeper understanding of aspects of nonlinear dynamics (such as efficient photon transfer) of these systems will significantly add to the existing control strategies, and it is much needed to open up myriad of technological applications [22]. Developing such protocols warrants a deep understanding of nonlinear systems and, subsequently, bringing in important notions (for, e.g., chaos) can play a paramount role in engineering the systems to ensure efficient transfer.

In this Rapid Communication, we investigate a c-QED-based STIRAP and show that dynamical chaos sets the lower bound for the sweep rate (which quantifies how fast one tunes the coupling strength), resulting in efficient photon transfer. Without loss of generality, we study the case of three and four cavities, and by efficient photon transfer, we mean, a nearly 100%, transfer of photons from the first cavity to the last cavity with almost no occupation of the intermediate cavities during the time evolution. Quantifying chaos by the Lyapunov exponent (LE) in the semiclassical limit, we make a connection with the sweep rate. This sets the

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Quantum signatures of chaos in a cavity-QED-based stimulated Raman adiabatic passage

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Nonlinear stimulated Raman adiabatic passage (STIRAP) is a fascinating physical process that dynamically explores chaotic and nonchaotic phases. In a recent paper [A. Dey and M. Kulkarni, Phys. Rev. Res. **2**, 042004(R) (2020)], such a phenomenon is realized in a cavity-QED platform. There, the emergence of chaos and its impact on STIRAP efficiency are mainly demonstrated in the semiclassical limit. In the present paper we treat the problem in a fully quantum many-body framework. With the aim of extracting quantum signatures of a classically chaotic system, it is shown that an out-of-time-ordered correlator (OTOC) measure precisely captures chaotic and nonchaotic features of the system. The prediction by OTOC is in precise matching with classical chaos quantified by Lyapunov exponent analysis. Furthermore, it is shown that the quantum route corresponding to the semiclassical followed state encounters a dip in single-particle purity within the chaotic phase, depicting a consequence of chaos. A dynamics through the chaotic phase is associated with spreading of the many-body quantum state and an irreversible increase in the number of participating adiabatic eigenstates.

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I. INTRODUCTION

A cavity-QED (c-QED) system is an interesting platform that holds immense potential of implementing quantum networks [1–6], quantum information processing and communication [1,7–9], efficient quantum simulators for many-body systems [10–13], etc. The light-matter interaction in a cavity-QED offers Jaynes-Cummings (JC)-like [14–16] and Bose-Hubbard-like [17] nonlinearities at various regimes of parameters. Such nonlinear features result in exciting novel phenomena such as photon self-trapping [14,15,18], nonlinear transport [19,20], and chaos [16,21–23].

Chaos, in classical systems, is well defined as the sensitivity to the initial condition and the exponential divergence of trajectories (with slightly different initial conditions) with time. However, the nature of manifestation, mechanisms, and diagnostics of chaos in the quantum counterpart of classically chaotic systems is relatively less established and is an active area of research. Equilibration of closed quantum systems is a fundamentally important open question and it can be a consequence of chaos in their classical counterparts [24,25]. Quantum chaos also delves into the deep connections among localization of quantum-mechanical wave functions, quantum-classical transitions, and decoherence mechanisms [26], and deals with irreversibility in quantum systems with few degrees of freedom [27]. Therefore, understanding such features in complex quantum systems and their correspondence with classical counterparts demands a thorough theoretical and experimental investigation. A number of platforms have explored the quantum characteristics of classically chaotic systems. Some of them are optical realizations of kicked harmonic oscillators [28], ultracold atoms [29–31], atom-optics realization [32], and cavity-QED setups [23,33,34].

While the sensitivity to initial conditions for classical systems is quantified by Lyapunov exponent (LE) analysis, the corresponding quantum systems usually reflect integrability via level spacing statistics of eigenvalue spectra [35,36], participation number of eigenstates [22,37], the out-of-time-ordered correlator (OTOC) [38,39], etc. OTOC measures the dispersion of information (initially localized with a few degrees of freedom) to an exponentially large number of degrees of freedom, thereby resulting in an apparent loss of local quantum information and distribution of correlation throughout the entire system [40–42]. This so-called scrambling of quantum information is considered to be an efficient diagnostic of many-body quantum chaos [33,34,43–47]. Furthermore, OTOC is shown to be a very reliable measure of quantum chaos compared to traditional level spacing statistics measurement [48]. The practical measurement of OTOC is quite challenging due to the need of back evolution during measurement [43] and has been achieved in a limited number of systems [45–47]. Therefore, seeking efficient strategies [43] and physical systems with high-precision controllability is imperative.

Stimulated Raman adiabatic passage (STIRAP) is a process of remarkable utility and has been exploited in fields such as atomic population transfer, optical applications, state preparation and state transfer for quantum information processing, and many more [49,50]. The presence of "dark states" connecting only terminal nodes of a network facilitates a robust adiabatic transfer which is immune to dissipation originating from intermediate nodes [49,50]. STIRAP for many-particle systems with interparticle interactions can be treated efficiently in the classical mean-field approximated framework. The dynamics of field amplitudes (describing node populations) is described by the nonlinear Schrödinger

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MEDICINAL AND THERAPEUTIC BENEFITS OF *CATHARANTHUS ROSEUS* LINN (*APOCYANACEAE*): AN UPDATED REVIEW

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ABSTRACT
Ayurveda is the Indian traditional system of medicine which focuses on the potentiality of medical plants which are a rich source of compounds for the development of clinically useful therapeutic agents. *Catharanthus roseus*, a well recognized evergreen plant in Ayurveda, found in many tropical and subtropical regions around the World, is cultivated as an ornamental plant almost throughout the tropical world. It is abundantly naturalised in many regions, particularly in arid coastal locations. The flowers of this plant may vary in colour from pink to purple and leaves are arranged in opposite pairs. It produces nearly 130 alkaloids mainly ajmalcine, vinceine, resperine, vincristine, vinblastine and raubasin. Vincristine and vinblastine are used for the treatment of various types of cancer such as Hodgkin's disease, breast cancer, skin cancer and lymphoblastic leukemia. It has many pharmacological properties such as anti-oxidant, anti-microbial, anti-diabetic, wound healing, anti-ulcer, hypotensive, antidiarrhoeal, hypolipidemic and memory enhancement. Alkaloids are one of major phytochemicals responsible for its anti-cancer properties followed by phenolic compounds such as flavonoids. It is an endangered species and need to be conserved using techniques like micropropagation. It has high medicinal values which need to be explored extensively. The purpose of the current study was to document updated data about traditional uses, isolated bioactive compounds and pharmacological activities of *C. roseus*.

KEYWORDS: Medicinal plants, *Catharanthus roseus*, phytochemicals, vinblastine, pharmacological activities.

1. INTRODUCTION
Medicinal plants have a long history of usage in traditional medicine as these are high rich source of many potent and powerful drugs (Srivastava et al., 1996). Since pre-historic era, medicinal plants are being used to treat human diseases. In recent times, 80% of the world population especially in developing countries uses medicinal plants as a source of medicines from one generation to another (Hashim et al., 2010). Ethno-botanical information and the uses of medicinal plants are useful in the conservation of traditional cultures, biodiversity, community health care and drug development (Ajaib et al., 2010). The whole medicinal plant, or its different parts such as leaf, stem, bark, root, flower, seed, etc, or their secondary product such as gum, resins, and latex are used as folk recipes (Khan et al., 2011). Medicinal plants interacts with the human body directly or indirectly by its active chemical constituents which are absorbed into the blood; circulate through blood stream; and influence the blood stream to derive the required benefits (Kolasani et al., 2011). Now-a-days, the development of drug resistant human pathogens to commonly and traditionally used drugs has highlighted the searching of a new drug; and medicinal plant research has been focussed to achieve this aim. Screening of medicinal plants for active phytochemicals is important for finding potential new drugs for therapeutic uses (Retna and Ethalsha, 2013).

Catharanthus roseus Linn. (Madagascar periwinkle), a medicinal plant, also known as *Vinca rosea*, *Ammocallis rosea* and *Lochnera rosea* belongs to the family of Apocynaceae. Cape Periwinkle, Rose Periwinkle, Rosy Periwinkle and Old Maid are other English names which are occasionally used for this plant (Jaleel et al., 2006). *Catharanthus roseus* (*C. roseus*) exhibits various pharmacological activities due to presence of abundant useful alkaloids and active phytoconstituents. It has been used as traditional medicine for the treatment of a wide range of ailments worldwide such as diabetes, blood pressure, asthma, constipation, cancer and menstrual problems (Singh et al., 2001). Vinblastine and vincristine, two powerful anticancer molecules, belonging to the group of terpenoid-indole alkaloids (TIAs) are isolated from *C. roseus*. Due to their unique mode of action and effectiveness, these compounds have been extensively used for the treatment and cure of thousands of patients since last 40 years (Kulkarni et al.,

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IMPACT OF PROBIOTICS, PREBIOTICS AND SYNBIOTICS IN MAINTAINING GASTROINTESTINAL MICROBIOTA: AN UPDATED REVIEW

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ABSTRACT

The human gastrointestinal (GI) tract is colonised by a complex ecosystem of commensal microorganisms. Intestinal bacteria undergo a synbiotic co-evolution along with their host. Beneficial intestinal bacteria have various important functions such as production of various nutrients for their host, prevention of infections caused by intestinal pathogens, and modulation of normal immunological response. Modification of the intestinal microbiota is required in order to achieve, restore, and maintain favourable balance in the GI ecosystem. The activity of GI microorganisms is necessary for the improvement of health condition of the host. Probiotics have become a popular approach for managing digestive and immune health and are being recommended more frequently as effective therapeutic interventions by medical professionals. Probiotics are live microorganisms that promote health benefits upon consumption, but prebiotics are nondigestible food ingredients that selectively stimulate the growth of beneficial microorganisms in the GI tract. The introduction of probiotics, prebiotics, or synbiotics into human diet is favourable for the intestinal microbiota. They may be consumed in the form of raw vegetables and fruit, fermented pickles, or dairy products. Another source may be pharmaceutical formulas and functional food. This paper provides a review of available information and summarizes the current knowledge on the source, selection criteria, beneficial action and mechanism of action of probiotics, prebiotics, and synbiotics on human health.

KEYWORDS: Probiotic bacteria, prebiotics, synbiotics, human health, gut microbiota, clinical benefit.

1. INTRODUCTION

Nowadays, the increasing evidence not only suggest that the composition and metabolic effects of the gastrointestinal (GI) microflora are key importance for human health but also these are seems to exert important effects on systemic metabolism and immune functions. In the world of highly processed food, particular attention is drawn to the composition and safety of consumed products. The quality of food is very important because of the problem of food poisoning, obesity, allergy, cardiovascular diseases, and cancer-the plague of the 21st century (Hollingsworth, 1997). Considerable efforts have been made by dietary to influence the intestinal microbiota so that the health of the host is beneficially affected. Consumer's belief that certain foods can exhibit health benefits has resulted in the coining of the term functional foods. Functional food is described as nutrients that are separated from their established nutritional functions (Duggan et al., 2002). Functional food comprises of some bacterial strains and products of plant and animal origin containing physiologically active compounds which are beneficial for human health and reducing the risk of chronic diseases (Grajek et al., 2005).

Probiotics are defined as "live microbial food ingredients that are beneficial to health when administered in adequate amounts" (Hill et al., 2014); prebiotics are defined as "non-digestible food components that beneficially affect the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon, that have the potential to improve host health", and synbiotics are defined as "mixtures of probiotics and prebiotics that beneficially affect the host by improving the survival and implantation of live microbial dietary supplements in the GI tract" (Diplock et al., 1999). These definitions were issued by a consensus panel convened by the International Scientific Association of Probiotics and Prebiotics (ISAPP), which met to discuss the modern relevance of the 2001 Food and Agriculture Organization (FAO)/World Health Organization (WHO) definition of probiotics (FAO & WHO 2001). This review paper was highlighted on current knowledge of the source, selection criteria, beneficial action and mechanism of action of probiotics, prebiotics, and synbiotics on human health.

2. Probiotics

The word "probiotic" comes from the Greek word "pro bios" which means "for life"; completely opposite term

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The Psychological Basis of Hindu Education

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Abstract

The psychological basis of Hindu Education is rather of a technical nature. It contributes a critical discussion of the educational programme of the growing child upto the dawn of puberty. The importance of the physical atmosphere on the purity of the mind of the growing child is discussed. It is clear from the records extant that the parents in ancient India took a scientific care for the health and diet of the prospective mother, the foetus and the child. This wise line of conduct on the part of the guardians of the household is distinctly referred to by Megasthenes in the fourth century before Christian era.

Keywords: Ancient, Psychological, Nursing, Child, Education, Caraka Susruta Etc.

Introduction

The ancient Hindus knew that the mental and physical traits are hereditary and as the best means of preserving these they recomended the selection of brides of superior intelligence, born in a family with rich hereditary stock. An ideal environment facilitates of the mind, a poor environment retards them. The parents in ancient India took a scientific care for the health and diet of the prospective mother, the foetus and the child. The prospective mother used to be provided with a special diet and a suitably healthy house. During the pre school period, the young infants and the little children of both sexes used to spend their time in sence and motor activities especially under the direction of the trained nurses. Instruction of children through playful activities is recommended by Garura Purana. It is evident that the educators of ancient India took into account the problem of providing an ideal programme for the education of the children before they were fit to go to school.

Objective of the Study

The ancient Hindus took care of the child in its embryonic stage. Immediately after birth, the new-born infant was handed over to the charge of a duly qualified nurse, especially trained for the purpose. This, however did not happen all on a sudden: it was a thing of slow growth. Nursing does not figure as a profession during the Rigvedic period, when the mothers were the nurses of their own children. In course of time, however especially during the time of Buddha, nursing came to be recognized as a distinct profession. It was also during this period that the practice of rearing children became complex, demanding from the nurses the knowledge of a specialist. Then nursing was practically elevated to the status of a science. Special qualifications were naturally demanded of the nurse, both personal and professional, such as efficiency in taking care of children and maturity of years.

In plain English, the nurse, in the ideal, is to be thoroughly fit for the noble profession she means to adopt, by reason of qualifications due to birth, education, physical, mental, and moral excellencies.

Susruta prescribes the following qualifications for a nurse: "For the healthy growth of the child a wet-nurse should be selected from among the matrons of its own caste (Varṇa), and possessed of the following necessary qualifications. She should be of middle stature, neither too old nor too young (middle aged), of sound health, of good character....

She should be of respectable parentage and consequently possessed of many good qualities. In a word, the nurse should come of a very respectable family, and she should possess the hereditary traits mentioned above. Over and above, the nurse should enjoy sound health and should be free from disease or mental fatigue. The following extract lends further support to our contention: "A child should not be allowed to take the breast of a hungry, aggrieved, fatigued, too thin, too corpulent

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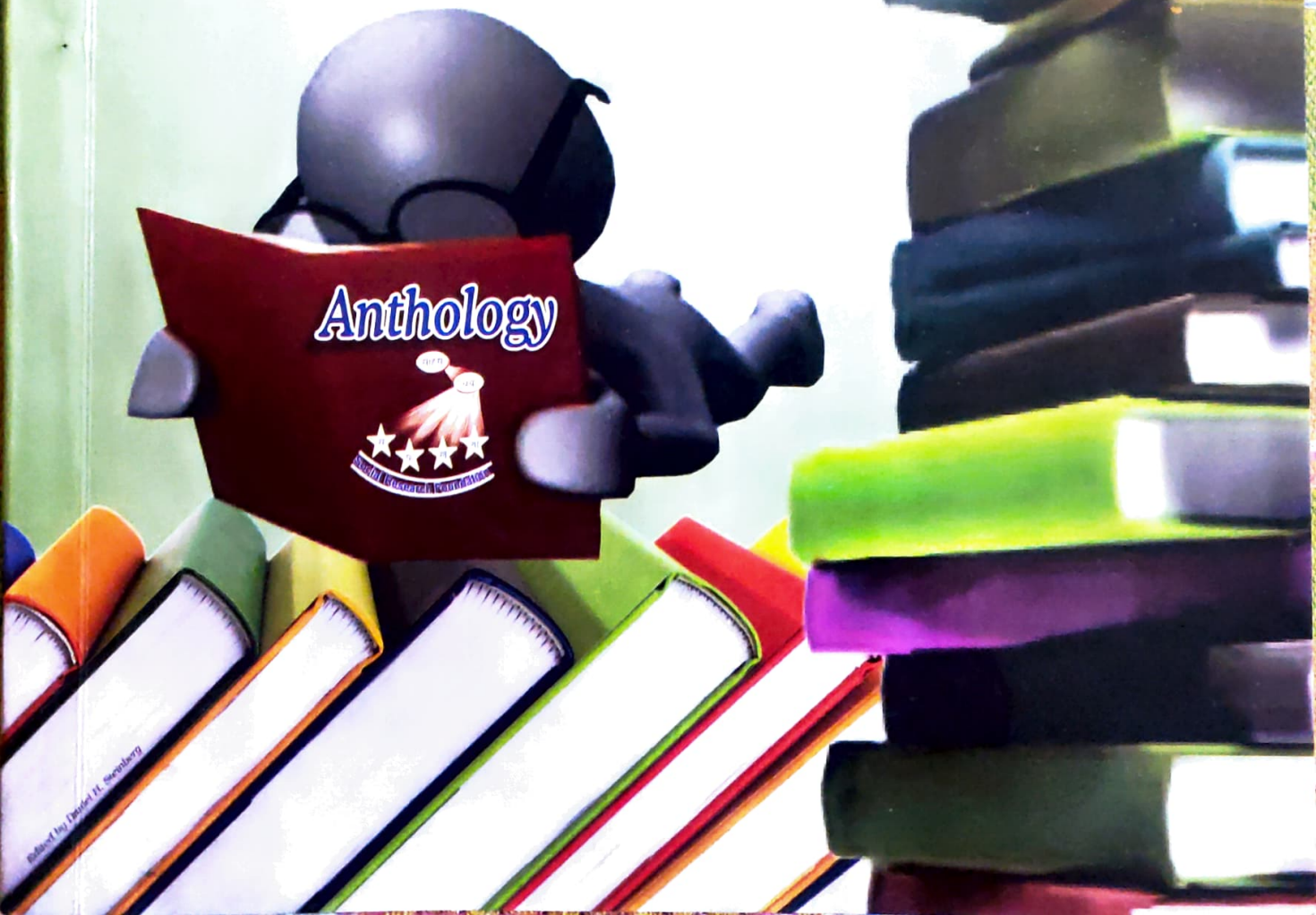

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Bhakti Sadhana and Bhaktitatva

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Abstract

In fact, spiritual philosophy and Rasa Sastra are considered to be different. Ramanuja, the predecessor of Sri Chaitanyadev, Nimbarka, whose Acharyas have reviewed the basic tenets of Vaishnavism from a philosophical point of view. Shri Sanatan Goswami explained in Vaishnavtoshini teeka of Shrimad Bhagwat says that Madhabendra Puri was the first to introduce devotion in the world. Without this, perhaps, Chaitanyadev was inspired and turned the devotional devotion of the Purvacharyas into Bhaktirasa. The Vaishnava Acharyas who followed Sri Chaitanyadev combined the sadhanangarupa and rasarupa of devotion. However, Sri Chaitanyadev was not the original promoter of Vaishnavism ("It is a mistake to think of Chaitanya in any sense of the originator of Vaisnavism in Bengal" - M T. Kennedy, The Chaitanya content). Dr. Sri Sushil Kumar De said - "Some are of opinion that the advent of the Karnātas in Bengal with the Cediprince Karnadeva introduced the Srimadbhāgavata emotionalism, which had its most probable origin in Southern India". Though devotion is one and the same in nature, yet it is manifested in different ways. Devotion is the only way to spiritual success. The lover- loving family is not bound by the shackles. Devotion is accepted as paramapurusartha.

Keywords: Bhakti, Rasa, Gaudiya Vaishnava, Sri Chaitanya, Meeksha, Advaita, Prem, Upanishad etc.

Introduction

India is a devout country. The fact that it is easy to attain God through devotion alone has been repeatedly expressed in various ways in the poetry of the poet, in the music of the Baul, in the philosophy of the philosopher. It is not possible to say with certainty when devotion first appeared. In the Mahabharata, the devotionalism of many is due to the deprivation of the white island history, i.e. the indication of the connection with the West. Seems to be influenced by religion. According to Dr. Dinesh Chandra Sarkar, the influence of non-Aryan religion on devotionalism is obvious, but it is worth noting that devotionalism was prevalent in India during the reign of Emperor Ashok. Panini's "Basudevarjunavang Boon" (4/3/98) formula means that the words 'Basudev and Arjuna' are derived from the suffix 'Basudevaka and Arjuna'. Thus it can be assumed that devotionalism was prevalent in India before the advent of Christ. In this context, Professor Hemchandra Roychowdhury is noteworthy. So devotionalism is the self-creation of Indian thinkers, it has no effect on non-Indians. The ancient source of devotion is the mantras of the Rigveda because it echoes the human affection and love relationship with the deity. Which is the main element of devotion? The contribution of Upanishads to the rise of devotion is undeniable. Respected Bhandarkar considers this to be the main cause of devotion.

The first use of the word bhakti is a mantra of Shwetasvatarapanishad -

"Yasya debe para bhakti yatha debe tatha gurau
tasyaite kathita hyartha prakasante mahatman".

The glory of Bhagavatprasad has been glorified in several Upanishads like Kath, Mundak, Shwetasvatara etc. In Upanishads like Kaibalya, Gopaltapani etc., devotion is said to be the main way to attain God. Bhaktitattva Purana evolved in the Mahabharata and reached its peak in the Srimadbhagavad Gita. The influence of Haribhakti has been highlighted through various narratives in the Harivansh. Devotion has been beautifully analyzed in the Puranas of Kurma, Garur, Brahmavaivarta, Vishnu, Padma, etc. The seeds of

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Abstract

If you don't know the past, you can't know the present. We are the inheritors of an ancient civilization. According to Indian theorists Maxmueller, Wheeler, Piaget, etc., the earth culture of India is the culture of a distinct human group. Indra destroyed the Harappan civilization and settled in Panchanadi. Later there were clashes with the locals who were described as slaves or bandits. The Vedas were composed by the Aryans in the early fifteenth century AD. But there are many inconsistencies in this argument. Many researchers think that Aryans are not aliens. Slaves are not a separate group of people. So far archaeological research has not been able to discover any of their primitive habitats. This controversial top FCic will be briefly discussed in the present article.

Keywords: Aryans, Maxmueller, Rigveda, Harappa Mohenjodaro, Saraswati.

Introduction

In the past, at the dawn of Indian civilization and culture, the Vedas were the direction of the pervading sea of human beings. According to European scholars such as Maxmueller, the Vedas are the earliest poetry of mankind, the first history of human faith, human religion, human civilization, especially Aryan Religion, Aryan faith, Aryan thought. Now the question is who are the Aryans? According to Niruktakar- Arya> Arya. Arya- God or Lord. Aryan means 'Tatputra'. Those who follow the religion introduced. It has been said in Amarkoshe - "Mahakul: Kulinarya: Sabhyasajjan: Sadhab".

Nowhere in the Rigveda are the non-Aryans described as a different race, the Aryans, The Dasa, The Dasyu were all castes. In the Brahmana texts like Taittiriya, Shatapatha, etc., the word Aryan is not racist, but religious. It has been said in Rigveda - 'Krinwanto Vishwamaryam'. If Aryans were a different race then how can everyone in the world be Aryan? This division was based on merit and deed. According to Panini, the word 'Aryan' means Husband and Lord. Apart from Vedic literature, the ancient Puranas, Ramayana, Mahabharata (Kururaja Duryodhana called himself anarya in order not to protect Siddhartha's request; Draupadi also called the Kauravas anarya); There are many references to 'Aryan' words in Buddhist-Jain scriptures, Jataka, ancient Sanskrit poetry. In Avesta, the worshipers of "Ahuramazda" are also called Aryans. Puranas are a treasure trove of historical information, legends and narratives of ancient India. The story of 49 Aryan kings is narrated from Sayambhub Manu by the Prachetas. They ruled for about 2114 years. Sayambhub Manu created himself. So the Aryans have been living in India since time immemorial. There is no indication in Vedic literature that there was an expedition from the West to India in prehistoric times. The word Aryan means evil. According to Pali Tikakar, a reformed, anthropomorphic person who has four qualities is Aryan. In the Buddhist hymns, the one who used to settle for less, the real saint, is called 'Aryan'. 'Bhadantasa Aaya Bhuta Rakhita' was found in Bharahut Buddhist inscriptions in India. Dr. Badua explained- 'To the Buddhists, Arya is the person who is not a slave to his Ripur, Deshachar, Tradition, unproved doctrine and lives self-consciously. According to Encyclopaedia Britanika, the word Aryan means 'Noble'.

Objective of the Study

So where was the original home of the Aryans? 'This Doctrine, the primitive abode of Central Asia', was first introduced in 1820 by J. G. Rhodes. A prominent branch of the Aryan language group from a primitive settlement in the corner of South Asia by Maxmueller around 1500 BC, those who entered India, known as Sanskrit speakers, completed the composition in less than 300 years. This view was unanimously accepted by many European scholars. But the point to think about is that the Aryans

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Innovation The Research Concept

Puranas and Vedic Practices in Ancient Bengal

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Abstract

The addition of literature to history is intensive. A review of the ancient literary Vedas of India reveals wonderful signs of the exaltation of Indian wisdom and wisdom. But the Vedas were religious and did not belong to the public. The Puranas were later composed in protest of this. If you want to know the complete history of a nation, not only in terms of religion, you need information on various political, social, economic, military and other issues. All that important information is hidden in the Puranic literature. The Brahmanical literature Vedas employed in JajanJajan, the masses carrying the society and the literature of the Kshatriya sect are Puranas. Attempts have been made to underline the contribution of Bengali-speaking creative Manisha in mythology and Vedic practice in the light of customary historical information.

Keywords: History, Vedas, Puranas, Dr.Hazra, Bengal,

Introduction

It is almost impossible to determine when Aryan civilization spread in Bangladesh. AitareyaAranya is the first to mention a tribe called 'Banga'. Historian Ramesh Chandra Majumdar thinks that Aryan civilization influenced Bengal between the sixth and fourth centuries BC. Greek and Latin elements are especially helpful in determining the boundaries of ancient Bengal. Many geographical information of ancient India and Bengal is available from the works of Megasthenes, Periplus, Ptolemy, Virgil, Cartias, Pliny etc. From all these writings it is known that most of present day Bengal was known as 'Gangaridai'. Gangaridai included: Banga, Suhma, Pundra, Samatata, Harikela, Karnasuvarna, Gaur, Barindra or Barindri, Radha or Radha. The present West Bengal included Suhm, Radha and Karnasuvarna. With Bengal, Samatata, Harikela was present-day East Bengal. To understand the literature of a country, one needs to have a thorough idea about the historical condition of that country. The materials required to retrieve the historical information of ancient Bengal are very few. On the basis of a little information, I am trying to present a little history of Puranas and Vedic practices in ancient Bengal.

Aim of the Study

In ancient times, India was divided into many parts. There was one Magadha in each king's assembly. The Magadhas knew the genealogy and deeds of their respective lords. What we mean by state historiyan was the Magadhas. Special sectarian figures called Sutas were the proponents of the Puranas. They collected contemporary histories from the Magadhas of different countries. If a Magadha hid a fault about his lord, the Sutas would correct it. For this reason, the Sutas have been called truthful in many places. The Sutas knew the genealogy of all the kings. Held in antiquity

Prominent personalities and sages from different countries used to be invited to the big yajnas. The sutas used to come to the yajna and read the collected details. It was the work of a class of sages to record this mythical story. Traditional Sutakahini was known as Purana by the sages. The mythologist wanted his written archetype to be enriched by new events and to survive until the end of time. They resorted to an indestructible refuge to protect the Puranas from the clutches of time. The sages of the Puranas saw that the religious intellect of man is eternal. As long as there are people on earth, he will take refuge in one religion or another. The main miracle of religion. So the sages of the Puranas did not simply reveal the mythological details but gave it a religious form. As a result, the exaggerated and supernatural context in the Puranas is considered to be the real and Puranic theology. Many astrological, scientific, philosophical, poetic and grammatical texts have disappeared in the course of time. But

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Biographies of Wives in Post-Vedic India

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Abstract

If we want to know the condition of women in ancient India, we have to look at the ancient literature. In the Vedic age, women were given dignity and rights in educational, freedom and religion. Afterwards all their rights were taken away and they were thrown to suffer. Pictures of that life's suffering and humiliation are also found in later literatures.

Keywords: Women, Ved, Taittiriya, Samhita, Upanishad, Yajnavalkya, Usha.

Introduction

We find in our ancient literature, directly or indirectly, pictures of the customs, education system, social system and multifaceted aspects of human life of any country. Home paintings of ancient India are found in Vedic literature. In the first level of Rigveda, women were relatively independent. Marriage was not as necessary for him as it was later. There the woman herself could choose her own life partner - "Swayam Sa Mitrang Banute Jane Chit". But later she was confined to the inner city of her husband's house. It is said in Vasishta Dharmasutra -

"pitarakshatikaumare, bhartarakshatijaubane
Rakshanti sthabireputrah
Na stri swatantryamarhati."

In the Rigveda, there is a description of Usha - "Uso jati Swasvarasya Patni" meaning Usha, the wife of Surya, is going before her husband.

But that idea gradually shrinks and we see in the Brihadaranyak Upanishad "pating ba anu jaya" means the wife is behind of his husband. In Satpatha Brahman we find "StriyaPunsoanubartmanoBhabuka" means that a woman should be a follower of a man.

Objective of the Study

After words women's educational and all freedom have been curtailed, her only need in the world is to be a mother and of course give birth to a son. The answer to why men and women are called offenders is found in the Taittiriya Samhita - 'unless he gets married and the prosect comes,the man is incomplete until he gets married and has children.' In other words, the urgent need to give birth to a child man and woman's beterhalf, not by any mental or social definition. It is said in all the mantras of marriage that the wife will always be the follower of the husband in thought and action. Nowhere is it said that the wife also has something to say and the husband has to be favorable to her. In Shatapatha Brahman there is a 'beautiful bride who falls in love with her husband', that is, the acceptance of a wife is only in the light of temporary beauty. It is said in the Kathak Sanhita that a woman seduces her husband at night and takes him to Siddhi. Therefore, it has been instructed in the Apastamba Dharmasutra ---- "Naring na Hridayena prarthayet" that is, a woman should not pray with her heart, but there is no obstacle to indulgence. In the Brihadaranyaka Upanishads the sage Yajnabalkya says ---

- 'If she refuses to satisfy his desire he will first give her a gift and then try to make her a product. If she disagrees with that, he will beat him with his hand or with a stick and bring her under his control.' So, ignoring the fact that the wife also has a mind and a sense of respect, the society and the scriptures have handed over her for the exemption of free torture to the husband. The bridge has been completely deprived of education. No vocational training, no property, no rights to her father's and husband's wealth. The divorced woman had no choice but to prostitute herself or to be a slave, she had to be under her husband just to survive.

On the other hand, the right of the husband to have sexual intercourse was recognized in the society. In Satpatha Brahman it is said- "Ekasya punso bahvo jaya bhavanti" meaning one man has many wives

MS. ANINDITA BAR

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BELLAMYA BENGALENSIS: A REVIEW ON ITS ECOLOGICAL IMPORTANCE, NUTRITIONAL VALUES AND ETHNO MEDICINAL IMPORTANCE

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ABSTRACT

Bellamya bengalensis (Lamarck, 1822) is a fresh water edible snail, distributed throughout Asia and Africa. The snail's flesh part is widely used in ethno medicine as well as food. It has a very high protein content which is even greater than some common fish and red meat group. It plays an important role in fresh water ecosystem. It has been traditionally used in the treatment of various human ailments like chronic gastric disorders, arthritis, joint pain, rheumatism, controlling blood pressure, asthma, rickets, calcium metabolism, nervousness, giddiness and has been recommended for the treatment of cardiovascular diseases, conjunctivitis, night blindness, diarrhoea. *In vivo* and *in vitro* studies have provided the support against traditional demands of the snail as anti-inflammatory, immune booster, anti-microbial, anti-oxidative, anti-hypersensitive uses. However, further studies are required to define the active chemical compositions and to validate its clinical utilisation for human uses. This review provides an overview of ecological importance, nutritional values and traditional applications, current knowledge on *Bellamya bengalensis*.

KEYWORDS: Freshwater snail, Drug development, Ethno medicine, Bioindicator species, Nutritional values

1. INTRODUCTION

From immemorial times *Bellamya bengalensis* is being used as food mainly by the tribal people. The ethnic races from the North East Indian states like Manipur, Mizoram, Tripura, West Bengal, Bihar, Jharkhand etc. use it as food as well as medicine. This snail along with other fresh water molluscs play a vital role in the economy and tradition of west Bengal in India by serving as a food of more than 80% families.[5] The lower market price and availability has made it a good source of protein for the poor villagers and ethnic people. Not only that, from the monetary point of view, it has a much cheaper market rate than fish and red meat groups. By selling this commodity a lots of people can able to earn their daily livelihood, because beside its good edible value & medicinal value, it also act as a cheap source of protein.[14][15] It also has a great ecological importance. This review work aims to discuss on the ecological importance, nutritional and ethno medicinal values of *Bellamya bengalensis*.

2. DISTRIBUTION

Distributed all over the Asia and Africa.

3. ZOOLOGICAL CLASSIFICATION

Bellamya is a genus of freshwater snails, It is the type genus of the subfamily Bellamyinae.[1]

Taxonomic position

Kingdom: Animalia
Class: Gastropoda
Sub-class: Prosobranchia
Order: Mesogastropoda
Family: Viviparidae
Sub-family: Bellamyinae
Genus: Bellamya
Species: B. Bengalensis (Lamarck)

4. SALIENT FEATURES

Bellamya bengalensis is a fresh water mollusc. Its body is covered with shell. The shell is oval as a whole. The upper part of the shell is slightly conoidal rather than conical. The aperture is sub-circular and has a narrow black margin. The colouration varies considerably, but it is never very brightly coloured. The ground colour is greenish and opaque. The operculum is moderately thin and of a deep brownish colour. The vivipaerid (mystery-snail) females are equipped with a uterus in which they gestate the eggs until they become juvenile snails hence called viviparous.[19]

5. HABITAT

It is a freshwater dwelling snail. It is found in almost all types of lowland water bodies, mainly stagnant water and low saline water resources such as rivers, streams, lakes, ponds, wetlands, polluted roadside marshes & ditches,

paddy fields, etc. Can tolerate a maximum salinity of 0.2mg/l.[2]

6. ECOLOGICAL IMPORTANCE

B. bengalensis is an important component of fresh water ecosystem. It acts as secondary consumer by consuming the planktons as well as producer for the carnivorous aquatic species. This animal performs biofiltration during feeding of microorganism and planktons.[21] It plays the role of bioindicator species for a large number of ecological parameters.[16] Their population density has a positive correlation with the temperature, TDS, electric conductivity and salinity. On the other hand pH, hardness, secchi transparency shows a negative correlation with the population density.[19][20] Thermal stress greatly impacts the physiological functioning and growth patterns of *B. Bengalensis*.[17] HSP70 (Heat Shock Protein), SOD (Superoxide Dismutage) perform as biomarker in heat stress.[16][23] Hence, this species can play a key role for freshwater ecosystem in present climate change and global warming context.

namely India, Bangladesh, Taiwan, Philippines and Thailand.[10] *B. bengalensis* has an admirable demand to the people of all the economic classes, more particularly to poor and tribal communities of rural and semi urban areas. The comparatively low cost of this snail has made it a good source of protein to the lower income group people. Not only protein it content a considerable amount of carbohydrate and fat also.[5]

Table 1: Protein content analysis according to Kjeldahl procedure (AOCS, 1991) of *B. bengalensis* and other edible molluscs, some fish and meat.[3][4]

Item name	Protein content (% dry weight)
Molluscs	
B. bengalensis	48.65 ± 0.85%
Pila globosa	8.27 %
Melania tuberculata	12.36 %
Lamellidens marginalis	6.46 %
Anisus convexiusculus	12.92 %
Helix	8.64 %

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COVID 19 LOCKDOWN AND THE DIVERSITY OF REPTILES, BIRDS AND MAMMALS: A HOME POINT STUDY FROM BANKURA MUNICIPALITY, WEST BENGAL

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AUTHOR'S CONTRIBUTION
The sole author designed, analysed, interpreted and prepared the manuscript.

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Original Research Article

ABSTRACT

Reptiles, birds and mammals are the natural gene pool which contributes to the biodiversity of an area. The current study is aimed to prepare a baseline checklist of reptiles, birds, and mammal's species from the home point. The COVID 19 lockdown situation provides a great opportunity to design such study. The lower level of water and air pollution, decrease in human interference gives a breathing space for wild life. The study was conducted for a period of six months (from May to October, 2020), which includes pre monsoon, monsoon and post monsoon periods. From this study 71 species of birds from 35 families was documented. Among them insectivorous is the largest group (36.6%). According to the residential status of the birds 83% are residential birds, 8.5% are local migrants and rest 8.5 % are winter migrants. This study has also identifies 9 wild mammals species of 7 families. 10 reptile species of 6 families were observed and among them two are deadly poisonous (Common krait, Indian cobra). A rapid urbanization and construction is now become a threat for these birds and animals. More environmental awareness, plantation of more fruiting plants is needed to maintain the biodiversity of this area.

Keywords: Pandemic; SARS-COV 2; biodiversity; environmental pollution; snakes.

1. INTRODUCTION

Almost the entire world is being challenged by the pandemic zoonosis identified as Corona virus disease (COVID- 19). It is a novel zoonotic corona virus, SARS-CoV-2, that causes severe respiratory symptoms. SARS-CoV-2 was first isolated in China, during December 2019, and its rapid subsequent spread has enormously affected people's daily lives and public health systems [1]. The majority of countries around the world have decided to take it as National emergency and impose lockdown to maintain social distancing [1]. Until and unless an effective vaccine is there lockdown is the only possible way to maintain social distancing and to reduce the spread of the virus [2]. This lockdown has a great positive impact on certain environmental parameters [3]. Air, water and noise pollution decreases to a considerable level during this lockdown period [4,5]. Few describe it as "anthropause" and few told that "nature just regains its space" [1]. This restriction of human activities and confinement of human gives a space to animal and birds [3]. The increased activity and spotting of birds and animals world wide, support the information [6].

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This lockdown situation provide a great opportunity to conduct a home point study of birds, reptiles, mammal's diversity, and their habit, habitat, mating, nesting and parenting behavior [7]. The diversity and availability of reptiles, birds and mammals differ greatly with variation in topography, and the environmental factors like altitudes, landscapes, climates, vegetation, availability of food and water, etc [7,8]. As the state West Bengal has a great altitudinal geographical and climatic variation it houses a large number and variety of flora and fauna [9]. The study site is a semi urban area of Bankura municipality under Bankura district, West Bengal. Bankura district also has rich biodiversity as the district has dense forest range, rivers, and rocky hills like diverse landscape. The western part of the district is the lower edge of Chota Nagpur plateau [10]. The highest point of the district is Biharinath hill (451 m) [10]. The study point named Panchbaga is about 48 kilometre away from Jaypur forest, 60 kilometre away from Sutan forest and 19 kilometre away from Susunia hill of the district.

1.1 Aims and Objectives

The study has two main objectives. The first and foremost important objective is to prepare a baseline wildlife diversity. So this study aims to prepare a list of birds, mammals and reptiles of this area. The second objective is to study the effect of lockdown period, on birds and animal population, when pollution is reportedly low, human intervention is limited.

2. MATERIALS AND METHODS

2.1 Materials

A. Olympus 10X50 DPS I binocular.
B. Olympus SP-565UZ camera.
C. Observation data sheet.
D. Birds of the Indian Subcontinent –Richard Grimmett, Carol Inskipp, Tim Inskipp.
E. The book of Indian Birds-Salim Ali.
F. Indian Mammals, a field guide-Vivek Menon.

2.2 Methods

2.2.1 Study area

The study area is located in Bankura municipality town at ward number-24, West Bengal, India. Name of the area, where the home point is located, is Panchbaga. The geographical location of the study

MR. PRAKASH KUMAR SANTRA

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The Effect of "Hookah Water" on Haematological Parameters in Common Toad

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Abstract

This study aimed to investigate the effect of Hookah Water (HW) on haematological parameters of Common Toad.Sixteen adult individuals of both sexes of common Toad were randomly assigned to four groups (n=4). The control group was exposed to room temperature and the experimental groups were exposed to HW injected intraperitonially at the rate of 4cc/100gms of the body weight. Animals were sacrificed after 1,3,7 and 15 days following the treatment. For control series, the test animals were treated with water used by the HW smoker and were sacrificed after the same intervals as in treated series. After specific duration of exposure toads were anaesthetized with ether, the blood was collected by puncturing the heart. Immediately the smear was prepared and was dried in air for staining. The results showed that RBC count were significantly higher in HW injecting rats than the control group ($P < 0.001$). We found that WBC counts insignificantly increased ($P < 0.39$) but platelets count insignificantly decreased ($P < 0.13$) in HW injected toads compared with control group.The findings may help to raise awareness of tobacco smokers about the potential toxicities of Hookah Water; likewise, the results can be used by physicians and public health officials in tobacco prevention programs.

Keywords: Haematological Parameters, Health, Smoke, Hookah Water, Genotoxic, Cytotoxic.

Introduction

Tobacco is a commercial product obtained from dried and processed leaves of *Nicotiana tabacum* plant that is widely cultivated and grown in many countries around the world. According to the data of World Health organization (WHO), there are about 2.4 billion people worldwide that have consumed tobacco in the forms of smoking, chewing and snuffing. WHO also estimates that tobacco-related deaths will increase gradually and expected to one billion deaths during the 21st century.

Hookah Water (HW) is a classical device used for tobacco smoking attached with water bowl. The HW usage has a history about 400 years with the different names like as a shisha, narghile, hookah chillum and arghile. HW is often linked with social activity where two or more people may share the same pipe. In some cultures, children may smoke with their parents. It is estimated that approximately 100 million people use HW or tobacco smoke throughout the world. Due to the lack of awareness, there is a viewpoint in different cultures that HW is less dangerous than cigarette, so its prevalence is increasing, particularly among adolescent and young adults. This increasing trend can be attributed to the popular beliefs that the smoke is "filtered" by the water where harmful effect is believed to be reduced by the so-called "filtering" process. However the research findings highlight that HW smoking carries similar or higher risks than other forms of tobacco exposure. The research studies also indicate that HW has led to increase the risk of infectious diseases, cardiovascular disease, pulmonary illness, cancers and low foetal birth weight in pregnant women. The hematologic index alterations are used as physiological markers of organ and tissue damage. Therefore, the various pharmacological actions of nicotine and other materials led to change the status of hematologic and haemostatic parameters.

Objective of the Study

Several mutagenic agents are used for micro-nucleus test. Tobacco is one of the most dreadful mutagenic chemical. It contains many

P: ISSN No. 2231-0045 RNI No. UPBIL/2012/55438 VOL.-9, ISSUE-5 February -2021
E: ISSN No. 2349-9435 Periodic Research

The Effects of Cigarette Smoking on Micronucleus Frequencies in the Peripheral Blood Lymphocytes & Buccal Epithelial Cells of Smokers in Bankura Disrtict, West Bengal

Paper Submission: 30/01/2021, Date of Acceptance: 24/02/2021, Date of Publication: 25/02/2021

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Abstract

The genotoxic damage that Tobacco smoke produces was evaluated using the micronucleus assay from the peripheral blood lymphocyte & Buccal epithelial cells of smokers in Bankura district, West Bengal. About 45 years before Schmid and Maier (1976), Schmid(1976) convincingly demonstrated in mouse that MN test is one of the reliable bioassays to detect the genotoxic potential of environmental agents. Several testing protocols for detecting the mutagenic potentials of odd agents are in use, of which Micronucleus test (MNT) has been claimed to be an acceptable short term screening method. MN are small chromatin containing bodies arising from chromosome fragments that were not incorporated into daughter nuclei following mitosis. MN form only in dividing cells in the case of erythropoiesis in erythroblasts. The newly formed erythrocytes which are formed by extrusion of nuclei from erythrocytes still contain rRNA and are called polychromatic erythrocytes (PCEs), only the PCEs will gave micronuclei. We concluded that the higher frequency of micronuclei directly associated with the decrease of efficiency of DNA repair and increase of genomic instability. Micronucleus assay in the buccal cell is sensitive, practical, inexpensive method for monitoring genetic damage in human. Further researches are needed not only for count micronuclei but also to capture the frequency of apoptosis and necrosis cells to detect the further evaluation of cellular and tissue level biological damage.

Keywords: Buccal Cells, Micronucleus Assay, Genotoxicity, Smoking

Introduction

Tobacco is reported to contain more than 60 genotoxic chemicals and radionuclide's, which promote various types of cancers and cardiovascular diseases, myocardial infarction, cerebral vascular diseases, chronic obstructive pulmonary disease and emphysema (Levitz et al., 2004). The consumption of tobacco products either for smoking or for chewing is found to be associated with oral tissue neoplasia. Over 80 % oral cancer patients are tobacco users (Johnson et al., 2001). Among other carcinogenic chemicals present in tobacco, tar plays important role to increase the risk of diseases. The risk is enhancing in the developing nations because the cigarettes sold in these countries, usually contain higher tar content leading to a potential increase in tobacco related diseases in these regions (Nichter and Cartwrigh, 1991). The United States Centre for Disease Control and Prevention (US CDCP) described tobacco use as a single most important preventable risk to human health and an important cause for premature death worldwide (US CDCP, 2010).For the early detection of tobacco induced diseases, certain biomarkers are identified by the researchers. The frequency of chromosomal aberration and micronuclei (MN) frequency assay are considered as effective biomarkers. One of the best techniques for studying the effects of cigarette smoking, on the genetic stability in human cells is the micronucleus assay (Nersesyan et al., 2006). Micronucleus is an oval cytoplasmic chromatin mass in the extra nuclear vicinity. It originates from abnormal mitosis. It consists of eccentric chromosome or chromatic fragments or whole