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Dynamics of Household Consumption

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Discrete dark matter with light Dirac neutrinos

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We propose a new realization of light Dirac neutrino mass and dark matter (DM) within the framework of a non-Abelian discrete flavor symmetry based on A_4 group. In addition to A_4, we also consider a Z_2 and an unbroken global lepton number symmetry $U(1)_L$ to keep unwanted terms away while guaranteeing the Dirac nature of light neutrinos. The field content, their transformations, and flavon vacuum alignments are chosen in such a way that the type-I Dirac seesaw generates only one light Dirac neutrino mass while the other two masses arise from scotogenic contributions at one-loop. This leads to the Dirac scoto-seesaw framework, a generalization of the widely studied scoto-seesaw model to Dirac neutrinos. The symmetry breaking of A_4 leaves a remnant $\mathcal{Z}_2$ symmetry responsible for stabilizing DM. Dirac nature of light neutrinos introduces additional relativistic degrees of freedom $\Delta N_{\rm eff}$ within reach of cosmic microwave background experiments.

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I. INTRODUCTION

Origin of light neutrino mass and mixing [1] has been one of the longstanding puzzles in particle physics. While neutrinos remain massless within the framework of the standard model (SM) of particle physics, several beyond the standard model frameworks have been proposed to explain nonzero neutrino mass and mixing. Canonical seesaw frameworks [2–12] involve inclusion of heavy fields, which couple to the SM leptons. These seesaw mechanisms and several of their descendants predict Majorana light neutrino masses, which violate the lepton number by two units. However, there has been no confirmation about the Majorana nature of light neutrinos with experiments searching for neutrinoless double beta decay (NDBD) continuing to report null results. While null results at NDBD experiments do not necessarily imply Dirac nature of light neutrinos, there has been growing interest in Dirac neutrino models of late. After a few initial attempts in this direction [13–16], several new proposals to realize sub-eV scale Dirac neutrino masses [17–55] have appeared recently. Most of these works, in addition to the inclusion of new fields, also consider new discrete or continuous symmetries in order to forbid unwanted terms in the Lagrangian. In the spirit of the Dirac seesaw for light neutrinos, such unwanted terms include the bare mass term of Majorana type for singlet right handed neutrinos (ν_R) and direct coupling of ν_R with the SM lepton and Higgs doublets.

Another observed phenomenon which can not be explained in the SM is the presence of dark matter (DM) in the Universe. Its presence is supported by astrophysical observations at different scales [56–58] together with cosmological experiments like PLANCK, WMAP predicting around 26.8% of the present Universe to be made up of DM [1,59]. While weakly interacting massive particle (WIMP) has been the most widely studied particle DM framework, null results at direct detection experiments [60] have also led to growing interest in alternative scenarios where DM is more feebly coupled to the SM, like the feebly interacting massive particle (FIMP). Recent reviews of WIMP and FIMP can be found in [61,62], respectively.

Motivated by this, we propose a new flavor symmetric origin of light Dirac neutrino mass and dark matter in this work. We consider the popular non-Abelian discrete flavor symmetry group of A_4 augmented with an additional discrete Z_2 and global lepton number $U(1)_L$ symmetries. The A_4 flavor symmetry gets spontaneously broken by flavon fields while generating light Dirac neutrino mass and mixing. For a review of non-Abelian discrete flavor symmetries and their consequences, see Refs. [63–67] and references therein. Unlike popular DM scenarios with additional stabilizing symmetries, here we have stable DM

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Decompositions of $P_m \odot P_n$ into Cycles, Paths and Claws

Jhandesh Pegu, Karam Ratan Singh and Laithun Boro*

ABSTRACT: In this article, we study and examine the decomposition of $P_m \odot P_n$ into C_n, P_m and $K_{1,3}$; where $P_m \odot P_n$ denotes the corona product graph of two paths P_m and P_n with $m + mn$ vertices and $m + m(n-1) + mn - 1$ edges. Specifically, we provide a thorough solution to the issue in the scenario when $m, n \geq 2$.

Key Words: Corona product of graph; decomposition of graph.

Contents

1. Introduction

A decomposition of a graph G is a collection of edge-disjoint subgraphs of $H_1, H_2, ..., H_r$, where each edge of G belongs to exactly one H_i. By placing conditions on the decomposition, multiple authors have explored various forms of decompositions and their accompanying properties. Every graph allows for a decomposition in which each subgraph H_i as a path, a cycle, a claw, and etc. It is clear that one of the obvious requirements for decomposition of G is that $\sum_{i=1}^{r} \alpha_i e(H_i) = e(G)$ exists. For ease of use, we refer to the equation $\sum_{i=1}^{r} \alpha_i e(H_i) = e(G)$ as a necessary sum condition.

In the past decade, the decomposition of graphs become an active area of research in graph theory. It is the most prominent area of research in graph theory and combinatorics and further, it has numerous applications in various fields such as networking, block designs, and bio-informatics, for instance, see [16,1,8,9] and the book [4] for a comprehensive overview of the G-decomposition of graphs. In the decomposition, researchers are particularly interested into k-cycles, for instance, see [5,6]. Recently, a good deal of interest has also been shown in decomposition into k-stars, for instance, see [7,11,18].

The corona product graph of two paths P_m and P_n with $m+mn$ vertices and $m+m(n-1)+mn-1$ edges is denoted by $P_m \odot P_n$, where m and n are any positive integers (cf [10,12]). A complete bipartite graph $K_{1,n}$ is known as an n-star, denoted by S_n. The tree is referred to as 'claw', and it serves as a representation of the complete bipartite graph $K_{1,3}$. A cycle of length n is referred to as an n-cycle and is symbolized by the symbol C_n. All the graphs we investigate here are finite and undirected, unless otherwise noted. The reader is directed to [3] for a glossary of common graph-theoretic terms, while [2,13,14,15] are references for studying the decomposition of graphs into paths, stars, and cycles. In this article, we study and determine the decomposition $D(P_m \odot P_n)$ of the corona product graph $P_m \odot P_n$ into cycles, paths and claws.

2. Decomposition of corona product graph $P_m \odot P_n$

Before, studying our results, we define the corona product of the graph as follows: The corona product graph of P_m and P_n are obtained by taking one copy of P_m and $|V(P_n)|$ copies of P_n and joining the $i-$th vertex of P_m to every vertex in the $i-$th copy of P_n, and the vertices are of the

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Spectrophotometric-based Estimation of Plant Chlorophyll Content using Smartphone

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Abstract. Estimation of plant chlorophyll concentration plays a major role in determining the health of a plant. Although many devices are available, the existing tools cannot be easily used for in-field estimation due to their sophistication and bulky nature. This work reports a new cost-efficient and portable sensing tool based on a spectrophotometric method for the estimation of chlorophyll content in rice plant leaves using a smartphone camera. Simple optical and electronic components are used for development of the sensing device and all the optical components are arranged in a 3D printed cradle that is attached to the smartphone camera. Based on the well-known complementary color theory and the RGB color model, the chlorophyll content in rice plant leaves has been estimated by the developed sensor and the obtained results are compared and validated with the standard method of chlorophyll estimation.

Keywords: Chlorophyll estimation, Smartphone, 3D printing, RGB color model.

1. Introduction

Rapid crop health monitoring is a common and helpful practice in agriculture and among food producers to maintain plant health, identify potential emerging diseases that could impact plant storage dynamics and crop production efficiency [1, 2]. Plant growth is commonly measured through determining the amount of chlorophyll in the leaves of the plants. It facilitates the conversion of solar energy into chemical energy required for plant growth. The overall effectiveness of the photosynthetic processes is impacted by a drop in total leaf chlorophyll concentration, which in turn impacts the plant's growth [3, 4]. Abiotic stress, nitrogen concentrations, calcium levels, leaf chlorophyll content, and other factors are some of the critical parameters that impact a plant's overall health. Furthermore, the amount of chlorophyll in plant leaves can be used to evaluate the existence of nitrogen content [5], biotic stress, and abiotic issues such light, dryness, and pigment that prevents herbicide damage in plants [6, 7]. Therefore, measuring the amount of chlorophyll in plants is important for tracking and controlling environmental and agricultural operations [8, 9].

Chlorophyll is located in a plant's chloroplasts, which are tiny structures in a plant's cells where photosynthesis takes place [10]. Chlorophyll a is the most abundant form of chlorophyll within photosynthetic organisms and, for the most part, gives plants their green color. However, there are other forms of chlorophyll, coded as b, c, and d, which augment the overall fluorescent

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REVITALIZING MANAS: THE ROLE OF MANAS MAOZIGENDRI ECO-TOURISM SOCIETY IN SUSTAINABLE DEVELOPMENT AND CONSERVATION

Dr. Sankhang Basumatary Asst. Prof. in Economics Salbari College

Abstract:
This article delves into the significant contributions of the Manas Maozigendri Eco-Tourism Society (MMES) in the sustainable development and conservation of the Manas region in Assam, India. Established in December 2003, MMES has played a pivotal role in fostering community participation, promoting eco-tourism, and preserving the rich biodiversity of the Manas Biosphere Reserve. The paper outlines the historical context of conservation efforts in Manas, dating back to its designation as a reserve forest in 1907 and subsequent recognition as a UNESCO World Heritage Site, Tiger Reserve, and Biosphere Reserve. Highlighting MMESs efforts in community awareness, wildlife protection, and eco-tourism, the article underscores the societys impact on socio-economic and educational development in the region. MMESs achievements, including numerous awards and recognitions, reflect its commitment to conserving Manas natural heritage while fostering sustainable livelihoods through eco-tourism.

Keywords: *Manas Maozigendri Eco-Tourism Society, Sustainable Development, Conservation Efforts, Community Awareness, Eco-Tourism Initiatives*

1.Introduction and Historical Background of MMES

The government in our country is viewing Non-Government Organisations (NGOs) not only as agencies that will help them to implement their programs, but also as partners shaping policy and programs. There are many NGOs in the country working in the field environmental protection conservation and social awareness. The objectives of this paper are –

1. To describe the different conservational and social awareness activities conducted by the MMES towards the sustainable development of Manas.
2. To study the role played by MMES in sustainable livelihood management through eco-tourism.

The Manas Maozigendri Eco-Tourism Society (MMES) is an NGOs established 13th December, 2003 in Baksa District of Assam. It is a community based Conservation and Eco-Tourism Society. It has become an associate organization of the Manas National Park.

The conservation of Manas started since 1905 when it was declared as the proposed Reserve Forest by the British Government. Since then the chronology of Manas are found as follows--

1907--- Manas Reserve Forest.
1928--- Manas Wildlife Sanctuary (360 sq.km.)
1973--- Declared as Tiger Reserve under Project Tiger (2837 sq. km.)
1985--- Declared as World Heritage Site (Natural) by UNESCO for universal conservation value.
1989--- Declared as Biosphere Reserve under Man and Biosphere programme of UNESCO (2837 sq.km.)
1990--- Declared as National Park (500 sq.km.)
2003--- Declared as Chirang-Ripu Elephant Reserve under Project Elephant (2600 sq. km.).

The Manas completed its centenary year in 2005. The forest authority continued the enforcement of forest law of the country. None of the government and NGOs mobilized community participation programme in the fringe areas of Manas for its protection. Since none of the authorities nor NGOs attempted the people living in fringe area of Manas people were ignorant about the importance of Manas and its conservational values. As a result the local people who were lured by some unscrupulous businessmen sitting in towns and cities started rampant poaching of wild animals and timber felling in most areas of Manas. In the mean time, local youth and the youth working in All Bodo Students Organisation (ABSU), and other elite organizations of Bodos under the lead of ABSU realized the need of community participation for the better protection of Manas. The dreams to protect Manas got strengthen with the successive settlement of the Bodos Political Movements with the State Government and the Central Government because the political settlement of Bodo movements diverted the attention

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Research Article

A Review: Importance of *Catharanthus roseus* in the treatment of Cancer

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Abstract: *Catharanthus roseus* , commonly known as Vinca rosea, an important medicinal plant and a member of the family Apocynaceae is well known for its medicinal properties and ornamental attributes [1]. *C. roseus*, one of the most valuable medicinal plant species has traditionally been used since many ages in the treatment of a number of diseases including cancer [4]. The plant has gathered increased attention over the recent years because of its rich varieties of phytochemicals having numerous biological activities such as anti-oxidant, anti-fungal, anti-diabetic and anti-cancerous property. Till now, 344 bioactive photochemical is isolated and identified from *Catharanthus roseus* [2]. Among the various secondary metabolites isolated from this plant, Vincristine and Vinblastine are remarkably the first plant-derived compounds with anti-cancerous property applied for clinical use. Various types of anti-cancerous agent extracted from Catharanthus roseus and their role in the treatment of cancer has been mainly focused in this review article.

Keywords- *Catharanthus roseus* , cancer, anti-cancerous, drugs, alkaloids, antioxidant, vincristine , vinblastine

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INTRODUCTION

Botanical Description

Catharanthus roseus is an annual evergreen, herbaceous, dicotyledonous ornamental flowering plant having medicinal importance, belonging to the family Apocyanaceae and grows about height of 1 meter. Leaves of these plants are 2.5 cm to 9 cm long and 1-3.5 cm broad, hairless, glossy and green in color and midrib is pale in color and shape is oval to oblong, petiole is short and they are appositively arranged in pairs. The flowers are pale pink, white, red and pink in color stems are usually green in color often permeated with red or pink [8].

This plant has gathered significant importance not only recently but from many ages, because of its effectiveness in the treatment of a number of diseases affecting the human population which may include diabetes, hypertension, asthma, blood pressure, constipation, menstrual problems and most importantly in the treatment of cancer, which is the topic mainly focused in this review article.

Chemical Constituents of *C. roseus* :

Despite the presence of numerous bioactive compounds of pharmacological significance including carbohydrates, flavonoids, tannins, saponins, glycosides, terpenes, proteins and phenols, alkaloids are considered to be the potentially active constituent of this plant. The plant of *C. roseus* contains more than 400 different alkaloids with its wide application in

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অসমৰ কৃষি উৎসৱমূলক গীতঃ এটি আলোচনা

Meena Kakati*

প্ৰাককথনঃ

অসম এখন কৃষি প্ৰধান ৰাজ্য। ইয়াত বসবাস কৰা বেছিসংখ্যক জাতি-জনগোষ্ঠীয়ে কৃষিৰ ওপৰত নিৰ্ভৰশীল। কৃষিজীৱি লোক হিচাপে অসমৰ সমাজখনে কৃষিভূমিক উৰ্ব্বৰা আৰু শস্য-শ্যামলা কৰি তুলিবৰ কাৰণে নানা জাতি-জনগোষ্ঠীয়ে বিভিন্ন কৃষি মূলীয় উৎসৱ-পাৰ্বণ কৰি আহিছে আৰু সেইবোৰত পৰম্পৰাগতভাবে গীত-মাতবো প্ৰচলন হৈ আছে।

অৱতৰণিকাঃ

অসমৰ লোকগীতবোৰ লোকসাহিত্যৰ এক অনুপম সম্পদ। কৃষিজীৱি সমাজখন জীয়াই থকাৰ একমাত্ৰ আহিলা হৈছে কৰ্ম সংস্কৃতি। সূক্ষ্মদৃষ্টিৰে চাবলৈ গলে এই কৰ্ম সংস্কৃতিৰ সৈতে জড়িত হৈ আছে যাদুমূলীয়া ধ্যান-ধাৰণা। ইয়াৰ পৰা সৃষ্টি হৈছে মন্ত্ৰ আৰু এই মন্ত্ৰবোৰেই এটা সময়ত কৰ্মমুখী মানুহৰ হৃদয় সংবাদী হৈ স্বতঃস্ফূৰ্তভাবে গীত হৈ পৰিল। কৰ্ম-সংস্কৃতিক সবল-সতেজ তথা প্ৰেৰণাদায়ক কৰাৰ নিমিত্তেই এই লোকগীত আৰু লোকনৃত্যৰ সৃষ্টি।

অসমৰ লোকগীতসমূহৰ বিভিন্ন দিশ অধ্যয়ন কৰিলে দেখা পোৱা যায় কৰ্ম বা শ্ৰমজীৱি মানুহে কৃষিৰ লগত জড়িত পূজা-পাতল, উৎসৱ-পাৰ্বণত বিভিন্ন গীত-মাত, প্ৰবাদ-প্ৰবচন আদিৰ প্ৰচলন কৰি আহিছে- যেনেকৈ অসমৰ কৃষি উৎসৱ অসমীয়াৰ বিহু, কনঘোষা, আৰু হুচৰি; মিচিং জনগোষ্ঠীৰ ঐনিঃতম, বড়ো জনগোষ্ঠীৰ বৈসাগু গীত, দেউৰী জনগোষ্ঠীৰ চাজেৱা গীত, সোনোৱাল কছাৰীসকলৰ হাইদাং গীত, তিয়া লালুং জনোগোষ্ঠীৰ ৰৱতৰ গীত উৰল টনা গীত, নামনি অসমত প্ৰচলিত নাঙেলী গীত ইত্যাদি গীতবোৰে কৃষিভূমি উৰ্ব্বৰা আৰু শস্য-শ্যামলা কৰি তুলিবৰ কাৰণে কৃষিমূলক বিভিন্ন উৎসৱ-পাৰ্বণ আৰু গীত মাতৰ প্ৰচলন কৰিলে। আমাৰ আলোচ্য বিষয়- 'অসমৰ কৃষিমূলক গীতঃ এটি আলোচনা' - শীৰ্ষক আলোচনা আগবঢ়াবলৈ যত্ন কৰা হ'ল।

বিহুগীতঃ

অসমৰ কৃষিজীৱি লোক সমাজে কৃষি ডৱাৰ উৰ্ব্বৰা শক্তি বঢ়াবৰ বাবে নানাধৰণৰ ঋতুকালীন উৎসৱ পালন কৰি আহিছে। তাৰে এটা উল্লেখযোগ্য উৎসৱ হ'ল বিহু। অসমত গ্ৰীষ্ম আৰু বৰ্ষা কালত প্ৰচুৰ পৰিমাণে বৰষুণ হয় কাৰণে বেছিভাগ শালি খেতি কৰাৰ পৰম্পৰাই প্ৰধান। পাহাৰীয়া অঞ্চলত ঝুম পদ্ধতিৰে খেতি কৰা হয়। সামগ্ৰিকভাবে অসমীয়া জাতিয়ে শালিখেতিক জীৱিকাৰ প্ৰধান উপাদন হিচাপে গ্ৰহণ কৰি বছৰৰ প্ৰথম মাহ বহাগৰ পৰাই অৰ্থাৎ গাঁৱৰ গধূলি লোকসকলে সকলোৱে মিলি আনন্দ উল্লাসেৰে চৈত্ৰ সংক্ৰান্তিৰ পৰাই বহাগ বিহু বা ৰঙালী বিহু পাতে। বহাগ বিহুৰ পিছৰপৰাই অসমৰ খেতিয়কসকলে খেতি পথাৰত নামে। অৰ্থাৎ কঠীয়া পাৰে, শালিতলী ৰুৱৰ বাবে মাটি ছাহ কৰিবলৈ লাগি যায়।

ৰুৱাতলীৰ শালি ধানৰ ৰুৱাবোৰে কাতি মাহত থোক মেলিবলৈ লয়। আহিণ মাহৰ শালিতলী ৰুৱা ডৱাৰ খেতিখিনি ভালদৰে থোক মেলি যাতে নদন-বদন হয় তাৰ কাৰণে খেতিৰ পথাৰত চাকি-বস্তি জ্বলায় আৰু ঘৰৰ লখিমীবোৰাৰীহঁতে শুভ্ৰ কাপোৰ পৰিধান কৰি পথাৰলৈ গৈ পথাৰৰ মাজত তামোল-পাণ, কল, পিঠা-গুৰি দি শৰাই দিয়ে। সেইদিনা তুলসী তলত চাকি দি ভঁৰাল ঘৰ, গোহালি ঘৰ আৰু পদুলি মুখত চাকি দিয়া হয়। কাতিমাহত ভঁৰালৰ ভাতমুঠি অভাৱ কাৰণে লোকসমাজ কঙাল হৈ পৰে। গতিকে এই কাতি বিহুক অনুষ্ঠপীয়াকৈ পতাৰ বাবে এই বিহুক কঙালী বিহু বোলে।

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*Asst. Prof. Salbari College.

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Problem and Prospect of Micro Entetprise in Rural Area and their Management

Dr. Gopesh Chandra Das*

ABSTRACT

Microenterprise which is also known as micro business, refers to a small business that employs few people. A microenterprise usually operates with fewer than 10 people and is started with a small amount of capital advanced from a bank or other organization. Most of the microenterprises are specialised in providing goods and services to their local region. Microenterprises collectively constitute a large portion of the economy and jobs. Microenterprises also add value to the local economy. They raise purchasing power, increase sales and also create jobs. One of the major objectives of the microenterprise is to promote trade and industries in an economically background area. As a result, it helps in the development of the economy. It helps in bringing the backward areas into the plan for national development. Microenterprises aim to encourage regional development.

Keyword: Microenterprise, economically, developed, background, area.

INTRODUCTION

A micro enterprise is a small business which sells goods and services to a local area or a local market. It employs less than 10 people generally and its geographical restricted. Typically, a micro enterprise starts with some form of funding known as micro-credit or micro finance.

e.g.- The grocery store in a area of locality that sells groceries, sometimes diary products and fruits and vegetables are the example of micro enterprise.

Micro enterprise usually a trademark of a developing country like India. There is a dearth jobs in the formal sector and micro enterprise aim to fill the gap. They help the economy by not only creating job but also lowering production cost, increasing purchasing power and providing convenience.

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অসমৰ দেৱদাসী নৃত্য পৰম্পৰা ঃ এক আলোচনা

ড° নিতুমণি দাস*

সাৰ ঃ

দেৱদাসী এবিধ মন্দিৰ নৃত্য। অসমৰ ডেৰগাঁৱৰ নেঘেৰিটিং দ'ল, তেজপুৰৰ হাটকেশ্বৰ শিৱমন্দিৰ, হাজোৰ হয়গ্ৰীৱ মন্দিৰ, বিশ্বনাথৰ বিশ্বনাথ মন্দিৰ, ডুবিৰ পৰিহৰেশ্বৰ দেৱালয় আদিত এই নৃত্যৰ প্ৰচলন আছিল। কিন্তু কোনো মন্দিৰতে দেৱদাসী নৃত্যৰ প্ৰচলন নাই। দেৱদাসীসকলৰ লগত কিছুমান লোকৰ অবৈধ সম্পৰ্ক হোৱাত পৰিৱেশ বিনষ্ট হোৱা বুলি ইংৰাজৰ ৰাজত্বৰ সময়ৰে পৰা এই নৃত্য বন্ধ কৰাৰ বাবে প্ৰচেষ্টা চলায়। ভাৰত স্বাধীন হোৱাত আইন কৰি এই নৃত্যটো অসম তথা গোটেই ভাৰতবৰ্ষতে বন্ধ কৰি দিয়া হয়। কিন্তু লুপ্ত হৈ ধৰা নৃত্যটোক পুনৰ জীয়াই তুলিবৰ চেষ্টা কৰে বজালীৰ শিল্পী ৰত্নকান্ত তালুকদাৰ, বিষ্ণুপ্ৰসাদ ৰাভা আদিয়ে তেওঁলোকে ডুবিৰ পৰিহৰেশ্বৰ দেৱালয়ত নচা দেৱদাসী নৃত্যৰ কিয়দংশ উদ্ধাৰ কৰে। এই অংশটোৱে এতিয়া দেৱদাসী নৃত্য হিচাপে নচা হয়। এই নৃত্যটো যদি বন্ধ নকৰি প্ৰসাৰিত কৰিলেহেঁতেন, ই 'ভাৰত নাট্যম' ৰে এক বিশেষ আসন লাভ কৰিলেহেঁতেন। ই এক পৰিৱেশ্য কলা ৰূপে প্ৰচলন হৈ আহে। এই নৃত্যটোক লৈ গভীৰত চৰ্চা কৰি প্ৰচাৰ আৰু প্ৰসাৰ কৰিলে ই ধ্ৰুপদী নৃত্যৰ শাৰীত স্থান পোৱাৰ যোগ্য।

প্ৰস্তাৱনা ঃ

দেৱদাসী নৃত্য এবিধ অন্যতম পৰিৱেশ্য কলা। এই নৃত্য পৰিৱেশন কৰা হৈছিল শিৱ তথা শিৱ সাধনাৰ সংগিক মন্দিৰবোৰত। সেয়ে দেৱদাসী নৃত্যক 'মন্দিৰ নৃত্য' ৰূপেও জনা যায়। এসময়ত 'ভাৰত নাট্যম' যিদৰে মন্দিৰৰ মাজতে আবদ্ধ নৃত্য আছিল, সেইদৰে দেৱদাসী নৃত্যও মন্দিৰৰ মাজতে আবদ্ধ থকা এবিধ নৃত্যকলা। দেৱদাসী শব্দৰ অৰ্থ হ'ল দেৱতাৰ দাসী। দেৱদাসীবোৰক দেৱতাৰ সেৱাৰ বাবে উচৰ্গা কৰা হয়। দেৱতাক সন্তুষ্ট কৰাৰ মানসেৰে মন্দিৰৰ বিগ্ৰহৰ সম্মুখত নৃত্য কৰে দেৱদাসীসকলে। দেৱদাসীসকলে নৃত্য-ভংগিমাৰে তুষ্ট কৰিব বিলা দেৱতাগৰাকী হ'ল শিৱ। শিৱ হ'ল দ্ৰাৱিড়সকলৰ দেৱতা। তদুপৰি অসমৰ প্ৰাচীন অধিবাসী কিৰাটসকলৰো অন্যতম দেৱতা শিৱ। শিৱ অনাৰ্য দেৱতা হ'লেও পৰৱৰ্তী কালত ই আৰ্য দেৱতাৰ শাৰীত স্থলাভিষিক্ত হ'ল।

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বিহগী কবি ৰঘুনাথ চৌধাৰী : এক চমু আলোচনা

Dr. Harish Das*

অসমৰ প্ৰথিতযশা কবি ৰঘুনাথ চৌধাৰীক সাধাৰণতে 'বিহগী কবি' বুলিয়ে জনা যায়। কাৰণ কবিজনাই তেওঁৰ কেইটিমান কবিতাত চৰাই জীৱনক কেন্দ্ৰ কৰিয়ে বিষয় বস্তু গঢ় দিছে। চৰাইৰ বিনন্দীয়া মাত আৰু সেই মাতৰ মাজত কবিয়ে অপূৰ্ব প্ৰেমৰস প্ৰকাশ হোৱা দেখিবলৈ পাইছে আৰু তেওঁৰ ভাৱ অনুসৰি মৰ্ত্ত্যবাসী মানৱৰ মাজত যেন প্ৰেম অমৃতৰ নিজৰা, অকৃত্ৰিম ভালপোৱা আদি স্পন্দনবোৰ প্ৰকাশ কৰিবলৈকে চৰাইবোৰৰ অগমন হৈছে। ৰঘুনাথ চৌধুৰীদেৱৰ উল্লেখযোগ্য চৰাই বিষয়ক কবিতাবোৰ হ'ল 'কেতেকী', 'দহিকতৰা', 'গোৱাহে এবাৰ প্ৰিয় বিহঙ্গিনী', আদি। কেতেকী চৰাইজনী কবিৰ অতিকে আপোন। কেতেকীক লৈয়েই এহাতে কবিয়ে যেনেকৈ এটা খণ্ড কবিতা ৰচনা কৰিছে, সেইদৰে কেতেকী চৰাইজনীক লৈ এখন কাব্যও ৰচনা কৰিছে। কবিয়ে 'কেতেকী' কাব্যত বৰ্ণনা কৰা অনুসৰি এই কেতেকীজনী ধৰাৰ বুকুত প্ৰেম-অমৃতৰ নিজৰা বোৱাবলৈ অহা এজনী স্বৰ্গৰ দেৱদূতী। কবিয়ে কিন্তু কাব্যখনৰ প্ৰথমতে অৰ্থব্যঞ্জক ভাষাত এই চৰাইজনী ক'ৰপৰা আহিছে, ক'লৈ যাবলৈ আহিছে আৰু কিয় অকলে অকলে ঘুৰি ফুৰিছে, সেই কথা কবিয়ে বুজি নোপোৱা বুলিয়ে কৈছে -----

ক'ৰপৰা তই আহিলি সোনাই
কোন দিশে যাৱ উৰি
কিয় বা ফুৰিছো দূ�ৰ দূ�ৰণিত
অকলই ঘূৰি ঘূৰি ?

ইয়াত কবিৰ অপৰিচিত সু�ৰটোৱে মূৰ্ত্ত হৈ উঠিছে। কবিয়ে চৰাইজনীক চিনি নাপায়; তাই ক'ৰপৰা বা উৰি আহিল, কোনদিশে বা উৰি যাব, সেই কথাও গম নাপায়। অথবা তাই দূ�ৰ-দূৰণিত কেলেই বা অকলে ঘূৰি ফুৰিছে সেই কথাও কবিয়ে নাজানে। ৰঘুনাথ চৌধাৰী ৰোমাণ্টিক যুগৰ এগৰাকী প্ৰথিতযশা কবি আছিল। ৰোমাণ্টিক কবিসকলে জনাতকৈ নজনাৰ ওপৰত বেছি গুৰুত্ব আৰোপ কৰিছিল। কাৰণ জনাৰ শেষ আছে, নজনাৰ শেষ নাই। সেইকাৰণে নজনা চৰাইজনীৰ কথালৈ কবিয়ে বিস্তৃতভাৱে কল্পনাৰ জাল মেলি দিছে। কেতেকীক লৈয়ে কবিয়ে মনৰ মাজত সোণৰ সংসাৰ ৰচনা কৰিছে। কবিয়ে দৈহিক মায়া জালৰ পৰা আতৰি আছিল। সেয়ে তেওঁৰ মৰম বা ভাল পোৱাবোৰ চৰাইৰ ওপৰতে অৰ্পণ কৰিছিল। কবিয়ে চৰাইৰ প্ৰতি নিজৰ ভাল পোৱা ভাৱ প্ৰকাশ কৰি তাতেই সন্তুষ্ট হৈ পৰিছিল। তেওঁ চৰাইবোৰৰ গাত মানৱীয় গুণ আৰোপ কৰিছিল আৰু সেইদৰে চৰাইৰ প্ৰতি আকৃষ্টহৈ পৰিছিল। কেতেকী চৰাইজনীৰ প্ৰতিও কবি সেইদৰেই আকৃষ্ট হৈ পৰিছিল।

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'ছনেট' কবিতা হিচাপে হিতেশ্বৰ বৰবৰুৱাৰ 'কবি' কবিতাটোৰ এক চমু আলোচনা

Dr. Harish Das*

অসমীয়া সাহিত্যত ৰোমাণ্টিক যুগৰ প্ৰথম তৰঙ্গৰ অন্যতম শ্ৰেষ্ঠ কবি হিতেশ্বৰ বৰবৰুৱা । এফালে যেনেদৰে বিশিষ্ট ঐতিহাসিক আনফালে তেনেদৰে অন্যতম সাৰ্থক ছনেট কবিতা ৰচক । হিতেশ্বৰ বৰবৰুৱাদেৱৰ বিশেষ কৃতিত্ব নিৰ্ভৰ কৰিছে ছনেটৰ ক্ষেত্ৰত । এওঁৰ লেখনিতেই ছেক্সপীয়েৰীয় আৰ্হিৰ ছনেটে পৰিপূৰ্ণতা লাভ কৰিছে । হিতেশ্বৰ বৰবৰুৱাৰ অসমীয়াত প্ৰথম ছনেটৰ পুথি 'মালচ' ১৯১৮ চনত প্ৰকাশিত । তেওঁৰ ১২৮টা চতুৰ্দ্দশপদী কবিতাৰ সমষ্টি 'মালচ' । সহৰহভাগ চনেট কবিতাই উষা', বাঁহী', আলোচনী আদি কাকতত প্ৰকাশিত হৈছে । কবি হিতেশ্বৰ বৰবৰুৱাৰ জীৱনৰ বিচিত্ৰ অভিজ্ঞতা, দুখ, সন্তাপ, হাহাকাৰ আদি ভাৱবোৰ 'মালচ' সংকলিত কবিতাবোৰত ফুটি ওলাইছে । 'মূৰত জুইৰ চৰু লৈ' জন্ম গ্ৰহণ কৰা কবিৰ বেদনা ভালকৈ উপলব্ধি কৰিব পাৰি । কবিয়ে নিজ পত্নী, পুত্ৰ, ভাতৃ-ভগ্নী আদি বহুতো আত্মীয়-স্বজনক অকালতেহেৰুৱাই শোকত ভাগি পৰিছিল । কবিয়ে শোকত শোকাভিভূত হৈ 'চন্দ্ৰ', 'শ্মশান', 'সান্ত্বনা', 'পোহৰ', 'আন্ধাৰ', আদি চনেট কবিতা ৰচনা কৰিছে । 'কবি', 'শেষভিক্ষা', 'কাণৰ থুৰীয়া', 'কবি' আদি বিভিন্ন বিষয়ৰ চতুৰ্দশপদী কবিতা ।

ছনেট কবিতা হৈছে একপ্ৰকাৰ ব্যক্তিনিষ্ঠ কবিতা । কবিয়ে ব্যক্তিগত ভাৱানুভূতিক কাব্যিক ৰূপত যেতিয়া প্ৰকাশ কৰে তেতিয়াই ব্যক্তিনিষ্ঠ কবিতাৰ জন্ম হয় । এই ব্যক্তিনিষ্ঠ কবিতাৰেই এটি উল্লেখযোগ্য ভাগ হ'ল ছনেট বা চতুৰ্দশপদী কবিতা । অসমীয়া সাহিত্যতো বঙলা সাহিত্যৰ দৰে ছনেটক চতুৰ্দশপদী কবিতা বুলিয়েই কোৱা হয় । এই শ্ৰেণীৰ কবিতা ইউৰোপীয় সাহিত্যৰ পৰা বঙলা সাহিত্যলৈ পোনতে আমদানি কৰে মাইকেল মধুসূদন দত্তই । অসমীয়া সাহিত্যত হেমচন্দ্ৰ গোস্বামী, পদ্মনাথ গোহাঞি বৰুৱা, হিতেশ্বৰ বৰবৰুৱা আদি মাত্ৰ কেইজনমান কবিয়েহে ছনেট ৰচনা কৰিছে । সেইকাৰণে ইউৰোপীয় মানদণ্ড অনুসৰি সাৰ্থক ছনেটৰ সংখ্যা আমাৰ ভাষাত তেনেই সীমিত ।

ছনেটৰ উৎপত্তিৰ স্থান হ'ল ইটালী । ইউৰোপীয়ান Sonnetto ৰ পৰা ইংৰাজী Sonnet শব্দটো অহা বুলি কোৱা হয় । Suono শব্দৰ অৰ্থ হৈছে মৃদু ধ্বনি । ই এক প্ৰকাৰ মন্ময় কবিতা । এটা সৰ্বত্ৰ অখণ্ড ভাৱ-কল্পনা বা অনুভূতি যেতিয়া ১৪টা অক্ষৰযুক্ত চতুৰ্দশ পুংক্তিত এটি বিশেষ ৰীতিত আত্মপ্ৰকাশ কৰে তাকেই ছনেট কবিতা বুলি কোৱা হয় । পোনতে ইটালিয়ান কবি পেত্ৰাৰ্কে চতুৰ্দশ শতিকাত ছনেট কবিতা লিখি প্ৰথম প্ৰচলন কৰে । চৈধ্যটা সমান পৰ্বৰ পুংক্তি বা চৰণেই ছনেটৰ একমাত্ৰ চৰিত্ৰ নহয় তাৰ লগতে অন্ত্যানুপ্ৰাসৰো ইয়াত এটা বিসিষ্ট পদ্ধতি আছে । পেত্ৰাৰ্কৰ ছনেটত কেৱল মাত্ৰ এই ৰীতি অনুযায়ী ছনেটত থকা চৈধ্যটা শাৰী দুই ভাগত বিভক্ত । প্ৰথম আঠ চৰণেৰে গঠিত অষ্টক (Octonet) আৰু দ্বিতীয় ছয় চৰণেৰে গঠিত ষটক(Sestet) বোলা হয় । অষ্টকৰ মিত্ৰবৰ্ণৰ মাত্ৰা সংকেত হ'ল কখ খক কখ খক আৰু ইয়াত অনুসৰণ কৰা ছয়টা চৰণেৰে গঠিত ষটকৰ মিত্ৰবৰ্ণৰ মাত্ৰা সংকেত হ'ল গঘ গঘ গঘ আকৌ স্পষ্টভাৱে লক্ষ্য কৰিলে দেখা যায় যে অষ্টক দুটাচতুষ্কত বিভক্ত আৰু ষষ্টটো দুটা ত্ৰিপাদিকাৰে বিন্যস্ত । প্ৰথম চতুষ্কটিত বিষয়বস্তুৰ প্ৰস্তাৱনা থাকে আৰু

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Socio-Economics Characteristics and Expenditure Pattern: A Study

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Abstract

Household consumption expenditure refers to the income that consumers spend on various goods and services. The way households spend their income indicates their behavior and how they distribute their finances among different options. These spending patterns differ across regions and are influenced by a complex mix of socio-economic, cultural, religious, psychological, and environmental factors. This paper aims to examine various socio-economic factors such as education level, occupation, family size, land holdings, asset value, and household income in determining consumption expenditures.

Key Words: Consumption, household size, income, asset holding.

Introduction:

Consumption marks the beginning of all human economic activities. It involves the direct and final use of goods and services to satisfy human wants. A household's consumption includes various durable and non-durable items. Key non-durable items are food grains, edible oils, milk, sugar, footwear, intoxicants, clothing, fuel and light, tea leaves, and many other daily necessities. Durable items include electric fans, refrigerators, televisions, radios, bicycles, vehicles, and cooking utensils. Other expenditures cover education, healthcare, transportation, telephone services, and entertainment.

Household expenditure on these durable and non-durable goods and services depends on their socio-economic characteristics and sources of income, whether inherited or earned by family members through physical and non-physical labor. The consumption patterns of rural households are influenced by many factors, including the value of assets, education level, occupation, family size, land holdings, and household income.

Objectives of the Study:

The primary objective of our study is to investigate the various socio-economic determinants of consumption expenditures among different social groups in the Jalah Revenue Circle of Baksa District, Assam. To achieve this objective, we will undertake the following activities:

a) Assess the socio-economic characteristics of the sample households in general

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ৰজনীকান্ত ৰৱদলৈৰ উপন্যাসত নাৰী চৰিত্ৰঃ

Meena Kakati*

অৱতৰণিকাঃ

অসমীয়া ভাষাত বুৰঞ্জীৰ আলমত উপন্যাস ৰচোঁতা ন-পুৰণি ঔপন্যাসিক সকলৰ মাজত ৰজনীকান্ত ৰৱদলৈ সৰ্বশ্ৰেষ্ঠ। 'অসমৰ স্কট' তথা 'উপন্যাস সম্ৰাট' নামেৰে খ্যাত ৰজনীকান্ত ৰৱদলৈৰ সমগ্ৰ ৰচনাত স্বদেশ আৰু স্বজাতিৰ প্ৰতি গভীৰ শ্ৰদ্ধা আৰু প্ৰেম বিৰাজমান। অসমৰ ভাষা-সাহিত্য, কলা-সংস্কৃতি, ধৰ্ম, মঠ-মন্দিৰ, লোকবিশ্বাস, লোকাচাৰ আদি সকলোতে তেওঁৰ আছিল আন্তৰিক প্ৰীতি। তেওঁৰ প্ৰত্যেকখন উপন্যাসতে সেইবোৰ কথা জীৱন্ত ৰূপত প্ৰতিফলিত হৈছে।

ৰজনীকান্ত ৰৱদলৈৰ অসমীয়া ভাষাত যুগুতোৱা ৰচনাৰাজি হৈছে- উপন্যাস, নাটক, প্ৰবন্ধ, গল্প, কবিতা, ভাষণ-বক্তৃতা, ব্যাখ্যাত্মক ৰচনা, পাঠ্য-পুথি আৰু চিঠি-পত্ৰাদি। ইয়াৰ উপৰিও জীৱনীমূলক, ভ্ৰমন বিষয়ক, অনুবাদমূলক, প্ৰত্নতত্ত্বমূলক আৰু শিক্ষামূলক ৰচনাৰদ্বাৰাও ৰৱদলৈৰ মূলক, প্ৰত্নতত্ত্বমূলক আৰু শিক্ষামূলক ৰচনাৰদ্বাৰাও ৰৱদলৈৰ ৰচনা সমৃদ্ধ আছিল।

অসমীয়া সাহিত্যত ৰজনীকান্ত ৰৱদলৈৰ সৰ্বোৎকৃষ্ট অৱদান হৈছে তেওঁৰ উপন্যাসৰাজি। ৰৱদলৈয়ে বংগদেশৰ ঔপন্যাসিক বংকিম চন্দ্ৰ চট্টোপাধ্যায় আৰু ইংৰাজী ঔপন্যাসিক চাৰ ওৱাল্টাৰ স্কটৰ আৰ্হিৰে ৰোমাঞ্চধৰ্মী এলানি উপন্যাস ৰচনা কৰি অসমীয়া উপন্যাসক এক মৰ্য্যাদাপূৰ্ণ স্থানত প্ৰতিষ্ঠা কৰিলে। ঘাইকৈ ইতিহাস আশ্ৰিত ঔপন্যাসিকজনৰ লেখক জীৱনৰ আৰম্ভ হৈছিল 'মিৰি-জীয়ৰী' সামাজিক উপন্যাসখনিৰে। ৰৱদলৈৰ উপন্যাসৰ বিশেষত্ব হ'ল- অসম আৰু অসমীয়াৰ জাতীয়তাবোধ। তেওঁৰ ৰচনাত অসমীয়া জাতিক মানৱ জাতিৰ কল্যানৰ কথা প্ৰকাশ কৰা দেখিবলৈ পোৱা যায়। সমুদ্ৰৰ দৰে বিশাল আৰু সুগভীৰ মানৱ জীৱনক কেন্দ্ৰ কৰি লেখকসকলে ৰচনা কৰা উপন্যাস সাহিত্যত নাৰী- পুৰুষ উভয় চৰিত্ৰক সহানুভূতিৰে অংকন কৰা দেখা যায়। ৰজনীকান্ত ৰৱদলৈও এইক্ষেত্ৰত সমধৰ্মী। তেওঁৰ উপন্যাসৰ তাৎপৰ্যপূৰ্ণ কথাটো হ'ল চৰিত্ৰ ৰূপায়ন। ৰজনীকান্ত ৰৱদলৈৰ সৰহসংখ্যক উপন্যাসেই নাৰীচৰিত্ৰ প্ৰধান। সেইবুলি পুৰুষ চৰিত্ৰই যে ক'তো প্ৰাধান্য পোৱা নাই এনেও নহয়। কিন্তু বেছিভাগ উপন্যাসতে নাৰীয়ে বৈশিষ্ট্যপূৰ্ণ প্ৰাধান্য লাভ কৰিবলৈ সক্ষম হৈছে। মনোমতী, ৰহদৈ-লিগিৰী, ৰঙ্গিলী, মিৰি-জীয়ৰী, তাম্ৰেশ্বৰীৰ মন্দিৰ আদি উপন্যাসত ক'তো কৃত্ৰিমতাৰ আঁচোৰ নপৰাকৈ অতি স্বাভাৱিক গতিধাৰাৰ মাজত প্ৰতিটো নাৰী চৰিত্ৰই ঠন ধৰি উঠিছে। এই সন্দৰ্ভত ৰজনীকান্ত ৰৱদলৈৰ উপন্যাসৰ কেইটামান প্ৰধান নাৰী চৰিত্ৰৰ বিষয়ে আলোচনা কৰিবলৈ যত্ন কৰা হ'ল।

ৰজনীকান্ত ৰৱদলৈৰ উপন্যাসত নাৰী চৰিত্ৰঃ

মিৰিজীয়ৰীঃ

বাস্তৱ কাহিনী আধাৰিত ৰজনীকান্ত ৰৱদলৈৰ 'মিৰি-জীয়ৰী' নিঃসন্দেহে এখন শ্ৰেষ্ঠ উপন্যাস। উপন্যাসখনিৰ নায়িকা পানেই এটি বৰ্ণময় চৰিত্ৰ। পানেইক কেন্দ্ৰ কৰিহে আন সকলোবোৰ চৰিত্ৰ সক্ৰিয় হৈ উঠিছে। ৰৱদলৈৰ উপন্যাসৰ অন্যতম আকৰ্ষণ এই নাৰী চৰিত্ৰ সমূহৰ ভিতৰত তুলনামূলক ভাৱে কিছু অনুজ্জ্বল হলেও এই চিৰিত্ৰটো বাস্তৱ সম্মতভাৱে এখন জনজাতীয় সমাজৰ পৰা বুটলি অনা বাবেই চৰিত্ৰটো কল্পনা নিৰ্ভৰ হোৱা নাই। সমাজৰ সাতামপুৰুষীয়া ৰীতি-নীতিক অগ্ৰাহ্য কৰি নায়িকা

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যতীন্দ্রনাথ দুৱৰাৰ 'সোণোৱালী দেশ' কবিতাত আধ্যাত্মিক দর্শন – এটি আলোচনা

Dr. Harish Das*

বনফুলৰ কবি যতীন্দ্রনাথ দুৱৰা অসমীয়া কবিতাৰ এটি ভোটা-তৰা । ১৮৯২ খ্ৰীষ্টাব্দত শিৱসাগৰত জন্মলাভ কৰা কবিজনাক দিখৌপৰীয়া কবি বুলিও কোৱা হয় । দুৱৰাৰ কাব্য জীৱনৰ পৃষ্ঠপোষক স্বৰূপ 'জোনাকী'ৰ প্ৰাণ চন্দ্রকুমাৰ আগৰৱালাই মৰমতে কবিক 'মদুকবি' বুলিছিল । 'বাঁহী' যুগৰ শ্ৰেষ্ঠ কবি আখ্যাৰে বিভূষিত দুৱাৰাৰ পথ-প্রদর্শক তথা দীক্ষা গুৰু হ'ল লক্ষ্মীনাথ বেজবৰুৱা । তদুপৰি আনন্দচন্দ্র আগৰৱালা, তৰুণ ৰাম ফুকন, মাধৱ বেজবৰুৱা আদিৰ প্রেৰণাই কবিতা ৰচনাত দুৱৰাক আগবঢ়াই নিছিল ।১

যতীন্দ্রনাথ দুৱৰা অসমীয়া সাহিত্যৰ এগৰাকী প্রসিদ্ধ গীতি-কবি। ৰোমাণ্টিক ভাৱাদর্শই গীতি কবিতাৰ পূর্ণ বিকাশ লাভ কৰে যতীন্দ্রনাথ দুৱৰাৰ হাতত । এওঁৰ কবিতা শ্যেলী, টেনিচন আৰু ওমৰ খায়ামৰ প্রভাৱ যথেষ্ট । দুৱৰাৰ প্রথম প্রকাশিত কবিতা পুথিখনেই হৈছে ওমৰ খায়ামৰ 'ৰুবায়ত' অসমীয়া অনুবাদ 'ওমৰ তীর্থ' (১৯২৫) । কবিতা সমুহ যদিও অনুবাদ কিন্তু প্রায়বোৰ কবিতাই মৌলিক কবিতাৰ দৰেই মধুৰ । খায়ামৰ নৈৰাশ্যজনিত দর্শন দুৱৰাৰ ওপৰত যথেষ্ট হ'লেও তেওঁৰ ভোগবাদী স্বৰূপ অনুপস্থিত । তদুপৰি ধর্মৰ প্রতি অনাস্থা, পাপ-পূণ্যৰ নতুন বিচাৰ আদি দুৱৰাৰ কবিতাত খায়ামৰ দৰে তীব্র নহয় । বৈজ্ঞানিক বিশ্লেষণ প্রথা, কবিৰ গভীৰ দৃষ্টি, দার্শনিকৰ জ্ঞান সকলো গোটাই লৈ সৃষ্টি তথ্যৰ গভীৰতম প্রদেশলৈ ওমৰে চাই দেখিলে তাৰ আদি আৰু অন্ত দুয়ো আন্ধাৰ, গভীৰ আন্ধাৰ মানৱ মনৰ অসীমৰ প্রতি ব্যর্থ অভিযান এয়ে ওমৰ আৰু ওমৰৰ অভিযানৰ ব্যর্থতাৰ কাৰুণ্যই তেওঁৰ মানৱ জাতিৰ প্রতি শ্রেষ্ঠ দান । 'অন্ধ নিয়তিৰ অন্ধ বিশ্বাসত চলা মানৱ জীৱনৰ ৰথ কোন মুহূর্তত বৈ যায় কোনেও নাজানে' । সেই বাবে কৈছে,--

ধৰা প্রিয়তম প্রাণৰ পিয়লা
জীৱন মদিৰা ভৰাই পিয়া,
অতীত ভবিষ্যত শোক-দুখ ভয়
আজিৰ ভাবনা উটাই দিয়া ।

কবিৰ মতে বর্তমানেই সঁচা । ভৱিষ্যত অন্ধকাৰ সদৃশ । তদুপৰি কোন ক'ৰ পৰা আহিছে, ক'লৈ যাব সেই কথা কোনেও নাজানে । সেই বাবে ভোগবাদী কবিয়ে কৈছে –

আজিয়েই দিয়া কালিলৈ কিয়
কোনে জানে মোৰ কালি কি হ'ব,
হাজাৰ হাজাৰ বছৰ বিয়পা
হয়তো অতীতে সামৰি থব ।

মিলনৰ সুৰ (১৯৫৮) চনত প্রকাশিত কবিতাৰ পুথি । পাৰস্যৰ প্রসিদ্ধ কবি হাফেজৰ চুফীতত্ত্বৰ প্রভাৱ দুৱৰাদেৱৰ কবিতাত পৰিছে । হাফেজৰ চূফী ৰহস্যবাদী ভাবনা তথা ভগৱৎ প্রেমৰ মধুৰ সুৰ দুৱৰাই অক্ষুন্ন

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কোচ-ৰাজবংশী জনগোষ্ঠীৰ লোকসংস্কৃতিত বাঁহ

Meena Kakati*

প্ৰাককথনঃ

অসম তথা উত্তৰ-পূৰ্বাঞ্চলৰ সংস্কৃতিত বাঁহৰ এক গুৰুত্বপূৰ্ণ ভূমিকা আছে। অসমৰ পশ্চিম অঞ্চলত বসবাস কৰা কোচ-ৰাজবংশীসকলৰ মাজতো বাঁহৰ ব্যবহাৰ তেনেই তাৎপৰ্যপূৰ্ণ। তেওঁলোকৰ দৈনন্দিন কামত ব্যবহাৰ্য সজুলিকে ধৰি বাঁহৰ চেচুৰে নৱজাতকৰ নাড়ী ছেদন কৰাৰ পৰা আৰম্ভ কৰি মৃতকৰ চিতা সজোৱালৈকে বাঁহৰ ব্যবহাৰ হৈ আহিছে। ৰাজবংশীসকলৰ মাজত বাঁহকেন্দ্ৰিক লোকাচাৰ, লোকবিশ্বাস, গীত-মাত, খণ্ডবাক্য, প্ৰবাদ-প্ৰবচন আদিতো বাঁহৰ ব্যবহাৰে এক বিশিষ্ট আসন অধিকাৰ কৰি আছে।

অৱতৰণিকাঃ

অসম তথা উত্তৰ-পূৰ্বাঞ্চলৰ লোকসংস্কৃতিত বাঁহৰ এক গুৰুত্বপূৰ্ণ ভূমিকা আছে। এই অঞ্চলৰ এনে এটা দিশ নাই য'ত বাঁহৰ ব্যবহাৰ নোহোৱাকৈ থকা নাই। অকল পৰম্পৰাগত জীৱনেই নহয়, আজিৰ আধুনিক জীৱন পৰিক্ৰমাতো বাঁহৰ ভূমিকা অতি তাৎপৰ্যপূৰ্ণ।

অসমৰ পশ্চিম অঞ্চলত বসবাস কৰা আৰু বৰ্ত্তমান গোটেই অসমৰ চুকে-কোনে সিচঁৰিত হৈ থকা কোচ-ৰাজবংশীসকলৰ মাজত বাঁহৰ বিচিত্ৰ ব্যবহাৰ পৰিলক্ষিত হয়। এই বিশাল এলেকাৰ সামাজিক আৰু সাংস্কৃতিক জীৱনত বাঁহে এক গুৰুত্বপূৰ্ণ ভূমিকা সুপ্ৰাচীন কালৰেপৰা অধিকাৰ কৰি আহিছে। ৰাজবংশীসকলৰ সাংস্কৃতিক জীৱনত বাঁহৰ ভূমিকা অতিকৈ গুৰুত্বপূৰ্ণ। তেওঁলোকে কেতিয়া বাঁহৰ ব্যবহাৰ আৰম্ভ কৰিছিল এই বিষয়ে সঠিককৈ কোনো তথ্য পোৱা নগলেও উত্তৰ-পূৰ্ব ভাৰতবৰ্ষত মংগোলীয় জনগোষ্ঠীৰ লোকসকলৰ লগতে যে বাঁহ আহিছিল এই বিষয়ে পণ্ডিতসকল একমত। মংগোলীয় জনগোষ্ঠীৰ লোক হিচাপে অতীজৰে পৰা বাঁহ ৰাজবংশী জনগোষ্ঠীৰ জীৱিকা আৰু অৰ্থনৈতিক জীৱনৰ লগত ওতঃপ্ৰোতভাবে জড়িত হৈ আছে। উত্তৰ বংগ আৰু এই অঞ্চলত নিবাস কৰা অন্যান্য জনগোষ্ঠীৰ লগতে কোচ-ৰাজবংশীসকলৰ সামাজিক জীৱনত বাঁহৰ ভূমিকা অপৰিসীম। তেওঁলোকে নৱজাতকৰ নাড়ীছেদন কৰাৰে পৰা আৰম্ভ কৰি মৃতকৰ চিতা সজোৱালৈকে বাঁহৰ ব্যবহাৰ কৰি আহিছে। আমাৰ আলোচ্য বিষয় 'কোচ-ৰাজবংশীসকলৰ লোকসংস্কৃতিত বাঁহ, শীৰ্ষক আলোচনাৰে বাঁহ তেওঁলোকৰ ধৰ্ম বিশ্বাস, আচাৰ-সংস্কাৰৰ লগত ঘনিষ্ঠভাবে জড়িত হৈ আছে তাৰে এটি আভাস দিবলৈ যত্ন কৰা হ'ল।

ৰাজবংশীসকলৰ ব্যৱহৃত বাঁহৰ পৰিচয়ঃ

কোচ-ৰাজবংশীসকলে তেওঁলোকৰ দৈনন্দিন ব্যবহাৰ্য কামত ভালেমান প্ৰজাতিৰ বাঁহ ব্যবহাৰ কৰে। সেইবোৰৰ ভিতৰত বৰ' বাঁহ (ভলুকা বাঁহ), মাকলা বাঁহ (মকাল বাহঁ), জাউতা বাঁহ (মকাল বাঁহৰদৰে, কেঁকোৱা বা বেঁকাবেকি), বিক বাঁহ (ঘন গাঁঠিযুক্ত সৰু বাঁহ আৰু কাঁইটীয়া), মুলি বাঁহ, নল বাঁহ (পাতল আৰু ফোপোলা), ককেয়া বাঁহ, মুলি বাঁহ, কীচ বাঁহ আৰু ঝাৰ বাঁহ। মুলি, কীচ আৰু ঝাৰ বাঁহ সাধাৰণতে সৰু সৰু ঘন গাঠিযুক্ত। ইয়াক বিশেষকৈ ঘৰৰ সৌন্দৰ্য বৰ্ধনৰ বাবে ব্যবহাৰ কৰা হয়।

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Chapter 35
Role of Selenium in Biofortification of Cereals

Uddipta Borthakur, Amit Kumar Pradhan, Nibedita Sarma, Sabnoor Yeasrin Jyoti, Sharmistha Sarma Kalita, Bikash Kundu, Junu Poudel, and Bhaben Tanti

Keywords Selenium · Biofortification · Hidden hunger · Micronutrient deficiency · Cereals

35.1 Introduction

Selenium (Se) is a vital trace element for the health of both animals and humans, crucial for sustaining immunity, endocrine function, and reproductive health. Jacob Berzelius, a Swedish chemist first identified selenium in 1817, and its biological importance was confirmed in the mid-20th century with the identification of its incorporation into glutathione peroxidase (GPx), a vital antioxidant enzyme that prevents oxidative damage in the cell (Steinbrenner et al. 2020). In addition to GPx, selenium is an essential part of numerous selenoproteins, with selenocysteine (SeCys) and

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Three Higgs-Doublet Dark Matter Model

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Abstract. In this work, we have explored a multi Higgs doublet framework where one of the lightest odd particles behaves as a dark matter (DM) candidate. Three sets of Standard Model-like Higgs doublets are considered, where two of them acquire some Vacuum Expectation Value (VEV) after Electroweak Symmetry Breaking (EWSB). These VEVs play a crucial role in generating mass for both charged and neutral fermions. On the other hand, the third Higgs doublet does not acquire any VEV due to the additional Z_4 symmetry. As a result, the lightest odd particle becomes a viable candidate for DM in our model. A large and new DM mass region in the parameter spaces is obtained due to the presence of other heavy particles.

1 Introduction

The extension of scalar sector considering three Higgs doublets is quite popular in literature [1]. The lightest neutral Z_4-odd Higgs doublet does not decay. Hence, it behaves as a potential candidate for the DM. The other two scalar doublets are playing a crucial role in explaining the neutrino masses, mixing angles, and baryon asymmetry of the Universe via leptogenesis [1]. All the theoretical and experimental constraints such as absolute stability, unitarity, Electroweak precision, LHC Higgs signal strength, and the DM relic density and direct detection are imposed and a viable parameter space is obtained.

The $SU(2)$ Higgs scalar doublets (as in Ref. [1]) in this model are conventionally expressed as, $\phi_1 = (H_1^+, \frac{(H_1+iA_1)}{\sqrt{2}})^T$, $\phi_2 = H_2^+, \frac{(H_2+iA_2)}{\sqrt{2}})^T$, $\phi_3 = (H_3^+, \frac{(H_3+iA_3)}{\sqrt{2}})^T$. The explicit expression of the minimization conditions for the potential, the mass eigenstates and the other particle contents can be found in [1].

2 Results and Conclusion

The DM mass, M_{H_3} is varied from 5 GeV to 1000 GeV and quartic coupling κ_L from -0.25 to 0.25, ΔM_{A_3} from 0 to 20 GeV. We also fixed $\Delta M_{H_3^\pm} = 100$ GeV to avoid the collider constraints [1]. The heavier Higgs masses are fixed at

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A Minimal Dark Matter Model with Vector Like Fermions

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Abstract. We study a simplest viable dark matter model with a $SU(2)$ real singlet scalar, vector-like singlet and a doublet lepton. We find a considerable enhancement in the allowed region of the scalar dark matter parameter space under the influence of the new Yukawa coupling. In particular, the Yukawa coupling associated with the fermion sector profoundly influences the dark matter parameter space, greatly enhancing the regions that comply with the current observed relic density of the Universe.

1 Introduction and Model Framework

The viable Dark Matter (DM) candidate in the extended singlet scalar model is the lightest Z_2-odd singlet scalar S. The detailed calculation can be found at [1]. The charge profile of the particle content under $SU(2) \times U(1)_Y \times Z_2$ are defined as $S(1, 0, -1)$, $F_D(2, -1, -1)$ and $E_S(1, -2, -1)$. The additional Lagrangian of the model read as,

$$\begin{aligned}\mathcal{L} == & \frac{1}{2}|\partial_\mu S|^2 - \frac{1}{2}kS^2\phi^2 - \frac{1}{4}m_S^2S^2 - \frac{\lambda_S}{4!}S^4 + \overline{F}_D\gamma^\mu D_\mu F_D + \overline{E}_S\gamma^\mu D_\mu E_S - M_{ND}\overline{F}_D F_D \\ & -M_{NS}\overline{E}_S E_S - Y_N\overline{F}_D\phi E_S - Y_{fi}\overline{L}_i F_D S + h.c., \end{aligned} \tag{1}$$

$\phi = (G^+, \frac{H+v+iG}{\sqrt{2}})^T$ is the SM Higgs doublet with vacuum expectation value $v = 246.221$ GeV. The masses of the Z_2-odd neutral fermion and scalar field are, $M_{X_1^0} = M_{ND}$, $M_S^2 = \frac{m_S^2+kv^2}{2}$ and $M_H^2 = 2\lambda v^2$. λ being the Standard Model Higgs quartic coupling [1]. Only the scalar fields S for $M_S < M_{E_1^\pm}$ can behave as a viable DM candidate. We keep $M_{E_2^\pm} = 1500$ GeV and $\cos\beta = 0.995$ fixed through out the analysis to satisfy experimental constraints as in Ref. [1].

2 Results and Discussion

As pointed out in the previous section, the viable DM candidate in this model is the lightest Z_2-odd singlet scalar S. The production mechanism of this DM candidate depends upon the Higgs portal couplings κ through s- and cross-channels

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Some Properties of the total graph of the ring $\mathbb{Z}_n \times \mathbb{Z}_m$

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Abstract: In this chapter, Let R be a commutative ring and $Z(R)$ be its set of zero divisors. The total graph of R, is the (undirected) graph with vertex set R, and for distinct $x, y \in R$ the vertices x and y are adjacent if and only if $x + y \in Z(R)$. In this chapter, we present the survey on the total graph of the ring $\mathbb{Z}_n \times \mathbb{Z}_m$ and we also obtained some new results of the total graph of the ring $\mathbb{Z}_n \times \mathbb{Z}_m$

Keywords: Total graph; r-partite; planarity; outerplanarity.

1. Introduction

Algebraic graph theory is the branch of mathematics which deals with graphs which are associated with various algebraic structures such as groups, rings, vector spaces etc. The concept of associating graphs with rings was first introduced by I. Beck in the year 1988. But Beck was only concerned about colorings. Beck defined the zero divisor graph of the ring R as the graph with R as the set of vertices and for distinct $x, y \in R$, x is adjacent to y if and only if $xy = 0$. D. F. Anderson and livingston [2] redefined the zero divisor graph in a slight different manner as compared to the one defined by Beck. They defined the zero divisor graph of R, now taking $Z(R) \setminus \{0\}$ as the set of vertices and for distinct $x, y \in R$, x is adjacent to y if and only if $xy = 0$, where $Z(R)$ denote the set of zero divisors of R. Recently, Anderson and Badawi [1] introduced the total graph of the ring R, denoted by $T_\Gamma(R)$ as the graph with R as the set of vertices and for distinct $u, v \in R$, u is adjacent to v if and only if $u + v = 0$. They studied some graphical parameters of this graph such as diameter and girth. In addition, they studied some special subgraphs of $T_\Gamma(R)$, and studied the total graph based on these subgraphs. Chelvam and Asir studied the total graph of the ring $\mathbb{Z}_n$, they obtained certain fundamental properties of this graph and computed its independent number and clique number. Dhorajia [6] studied certain fundamental properties of the total graph of the ring $\mathbb{Z}_n \times \mathbb{Z}_m$, such as independent number, clique number and traversibility property of $T_\Gamma(\mathbb{Z}_n \times \mathbb{Z}_m)$. Kharkongor et al [7] compute several topological indices of $T_\Gamma(\mathbb{Z}_n \times \mathbb{Z}_m)$.

About the Book:

This book, titled *Physics Frontiers (Volume-I)*, serves as a comprehensive compilation of research articles presented at the national conference "*Physics Frontiers-2024: Bridging Theories and Experiments*", held on 2 - 4 July 2024 hosted by Bhawanipur Anchalik College. It reflects the intellectual endeavors of participants who have contributed innovative ideas and significant advancements across a diverse range of topics within domains of physics and interdisciplinary sciences. Each article has undergone a rigorous peer-review process to ensure the highest standards of academic integrity and relevance. By capturing the essence of the conference's discussions and findings, this volume aims to act as a valuable resource for researchers, educators, and professionals seeking to explore contemporary trends and challenges in modern physics. Published under the auspices of the Assam Science Society, the book is a testament to the collaborative spirit and commitment to excellence that define the scientific community.

About Bhawanipur Anchalik College:

Bhawanipur Anchalik College, located in the picturesque landscape of lower Assam, is a beacon of educational excellence in the region. Established with the vision to empower students and uplift communities, the college has been a cornerstone of academic and holistic development since its inception. At Bhawanipur Anchalik College, there is a strong commitment to nurturing talent and fostering a spirit of inquiry. With dedicated faculty, state-of-the-art facilities, and a vibrant student body, the college offers a conducive environment for learning and personal growth. Its diverse range of academic programs caters to the varied interests and aspirations of students, equipping them with the knowledge and skills needed to succeed in an ever-evolving world. Beyond academics, Bhawanipur Anchalik College places significant emphasis on extracurricular activities, encouraging students to explore their passions and develop leadership qualities. Through sports, cultural events, and community outreach initiatives, students are inspired to harness their potential and make meaningful contributions to society.

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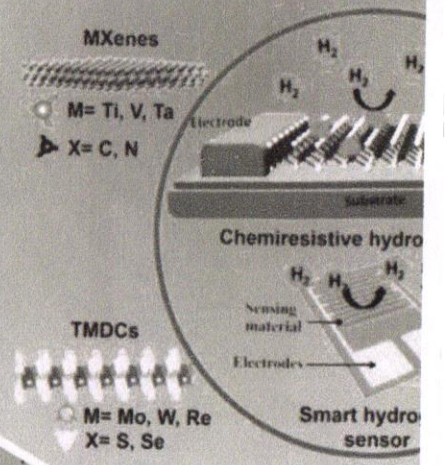

Application of Smartphone-based Sensing Tools for Analysis of Agricultural Soil Parameters

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***Abstract*—Soil is a thin layer of the earth's crust that serves as a suitable habitat for plant growth. Crop yield is mostly dependent on soil fertility when it comes to healthy plant growth and production. Therefore, soil is a fundamental resource that one needs to monitor carefully. Many techniques are available for determination of soil parameters like nutrient content, pH level etc. However, in many remote areas, the facilities that are needed for monitoring of these parameters are limited. In order to provide more accurate, portable, and affordable sensing systems, new smartphone-based sensing tools have been developed with the help of the emergence of smartphone technology. Herein, applications of smartphone-based sensing tools that utilize in-built smartphone sensors for detection and analysis of soil parameters have been discussed. This paper covers the design and working of various smartphone-based sensing systems for monitoring of soil parameters with reference to resource-constrained environments.**

***Keywords*—Smartphone, Sensing, Soil nutrient, Soil pH, Instrumentation.**

I. INTRODUCTION

Soil is described as a thin layer of the earth's crust that acts as a natural environment for plant development. When comes the case of healthy plants growth and production, it has been found that approximately 60% of crops yield depends on soil fertility [1]. Therefore soil is a fundamental resource that one needs to manage carefully. Soil fertility or quality is primarily determined by the soil's chemical, physical and biological properties. Soil's physical and biological properties such as its water content, the growth of other microorganisms etc. are visible to eyes but we can't see the chemical compositions such as its pH level and important nutrients like phosphorous, nitrogen, potassium and other metal elements present in the soil. The knowledge of exact type and quantity of fertilizers to be used in a specific farmland is very important as it prevents wastage of money on the unnecessary use of fertilizer in the agricultural land. The lack of knowledge of the soil nutrient content and over-fertilization in soil affects the eco-system of our environment in many ways [2–5].

More than 50% of India's total population is currently engaged directly or indirectly with agriculture [6]. However, a large section of people associated with this sector has no scientific knowledge for monitoring of soil quality of their paddy land. Various sensors such as conductivity measurement, optical and electrochemical-based sensors are commercially available; but it requires technical knowledge to handle these tools. Further, with the available sensing systems the field collected data cannot be shared and thus, immediate measures on controlling of the nutrients of an affected farmland cannot be taken. Although different governmental agencies have been established to assist farmers in various levels, such facilities are inadequate and still not available in many remote and interior areas of our country. Thus, a farmer from a remote place needs to put a great effort to get his soil quality checked from an expert usually available in the district or sub-divisional areas in many parts of our country. Many batch wise chemical techniques are available for determination of soil nutrients. However batch method consumes a long time, a large amount of chemicals and a bulky instrument like spectrophotometer is needed, however, it becomes expensive and difficult to be employed on the field. Nowadays, several commercial test kits are available for soil analysis but these devices only offer an approximation of the nutrient content (i.e., low, medium and high), thus, they are suitable for using as initial screening purposes only [7–10]. Hence, there is an urgent need for a simple, field-portable, user-friendly and relatively low-cost alternative approach using which a common farmer residing in the interior region can monitor the soil quality of his farmland.

On the other hand smartphones, equipped with sophisticated sensors and supported by powerful data processing capabilities, have become ubiquitous [11]. Leveraging these devices for soil analysis presents a transformative approach, providing critical insights into soil health, nutrient levels, moisture content, and other key parameters essential for effective crop management. This technology not only democratizes access to soil data but also integrates seamlessly with precision agriculture practices, enabling more efficient resource utilization and sustainable farming.

This paper explores the various smartphone-based sensing tools available for agricultural soil analysis, evaluating their accuracy, ease of use, and potential impact on agricultural practices. By examining different smartphone based soil sensing tools, the benefits and challenges associated with these technologies have been highlighted. The goal of this review work is to highlight the critical role that sensing devices based on smartphones can play in increasing sustainability and modern agriculture.

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Wish you best of luck.

Contents

METADYNAMICS : UNLOCKING RARE EVENTS IN MOLECULAR LANDSCAPES

Chintu Das
Institute of Technical and Macromolecular Chemistry (ITMC),
RWTH Aachen University, Germany

ABSTRACT :

Metadynamics is a one of the most efficient enhanced sampling techniques which helps to explore complex molecular energy landscape. With the help of Collective variable (CV), a history dependent bias is added along the defined CV to facilitate the exploration of rare events. By periodically adding the gaussian-shaped potential as bias, metadynamics helps the system to cross the high activation barrier and explore the whole phase space. Once all the possible events are explored, one can get the whole free energy surface (FES) for the system. The article provides a concise introduction to metadynamics, offering a summary of its key concepts and principles.

INTRODUCTION :

Atomistic simulation plays a key role in the field of chemistry, physics, biology and material science, to understand the dynamics of a variety of problems. It helps to understand the atomistic insight into the mechanics of different complex molecular process. And to achieve this goal high-performance computing (HPC) helps eminently. Although the immense growth of HPC and different molecular dynamics (MD) algorithm, still the study of rare events in which the free energy minima is separated by a large barrier, is major challenge in this field. The major limitation in such case is the timescale required to study such rare events. In such situation one single transition from one minima to

FUNCTIONAL MATERIALS FROM PEPTIDE BASED GELS

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1. INTRODUCTION:

Supramolecular self-assembly is a powerful approach for fabrication of sophisticated structures and materials from the "bottom up" approach. One of the most fascinating soft materials that are a result of this process is the development "gels". In 1926, Dorothy Jordan Lloyd, author of The Chemistry of the Proteins proposed this definition of gel: "*only one rule seems to hold for all gels and that is that they must be built up from two components, one which is a liquid at the temperature under consideration and the other which, the gelling substance proper, often spoken of as the gelator, is a solid. The gel itself has the mechanical properties of a solid, i.e. it can maintain its form under stress of its own weight and under any mechanical stress it shows the phenomenon of strain*" [1]. But, what actually is the general description of gel? Well, the simplest way to describe gels is: they are intermediate state of matter between solid and liquid states. Gels can be visualised easily as it does not flow when the containing tube of the gel is inverted and it stays stable, without falling apart for few minutes [2]. Gels are basically semi-solid aggregates which consist of two phases: a "liquid like" phase, that is the solvent and a "solid-like" network that entraps the liquid, thereby preventing its flow. The liquid can be aqueous or organic solvent and the solid is termed as the gelator. Mechanically, it behaves as a solid and it is viscoelastic in nature [3, 4].

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Wish you best of luck.

Contents

METADYNAMICS : UNLOCKING RARE EVENTS IN MOLECULAR LANDSCAPES

Chintu Das
Institute of Technical and Macromolecular Chemistry (ITMC),
RWTH Aachen University, Germany

ABSTRACT :

Metadynamics is a one of the most efficient enhanced sampling techniques which helps to explore complex molecular energy landscape. With the help of Collective variable (CV), a history dependent bias is added along the defined CV to facilitate the exploration of rare events. By periodically adding the gaussian-shaped potential as bias, metadynamics helps the system to cross the high activation barrier and explore the whole phase space. Once all the possible events are explored, one can get the whole free energy surface (FES) for the system. The article provides a concise introduction to metadynamics, offering a summary of its key concepts and principles.

INTRODUCTION :

Atomistic simulation plays a key role in the field of chemistry, physics, biology and material science, to understand the dynamics of a variety of problems. It helps to understand the atomistic insight into the mechanics of different complex molecular process. And to achieve this goal high-performance computing (HPC) helps eminently. Although the immense growth of HPC and different molecular dynamics (MD) algorithm, still the study of rare events in which the free energy minima is separated by a large barrier, is major challenge in this field. The major limitation in such case is the timescale required to study such rare events. In such situation one single transition from one minima to

INTERMOLECULAR INTERACTIONS ACTING AS A SUPRAMOLECULAR GLUE FOR DESIGNING DIFFERENT ORGANIC SOLID STATE FORMS

Dr.Trishna Rajbongshi
Assistant Professor, Department of Chemistry, Salbari College, Baksa, BTR, Assam-781318

ABSTRACT :

Intermolecular interactions are non-covalent interactions that are weaker in energy than the conventional covalent bonds. Despite of their weak nature, all these interactions are important for designing various supramolecular synthons in the field of crystal engineering. Crystal engineering focuses on synthesis of different organic solid state forms that are relevant to various fields of chemistry, physics, biology, materials and pharmaceutical science by using supramolecular synthon as the binding material. A systematic and brief overview of understanding of non-covalent intermolecular interactions and their importance in designing different organic solid-state forms by using supramolecular synthon has been provided in this chapter.

1.1 Supramolecular synthon in crystal engineering:

Crystal engineering involves construction of molecular solids based on the understanding of different intermolecular interactions.[1] The modern definition of *Crystal Engineering* was proposed by Gautam R. Desiraju in 1988 as "*the understanding of intermolecular interactions in the context of crystal packing and the utilization of such understanding in the design of new solids with desired physical and chemical properties*".[2,3] Supramolecular synthon in supramolecular synthesis is similar to the concept of molecular synthon in organic synthesis. They act as small repetitive structural units composed of molecular functionalities resulting in large network

structures.[4] Desiraju defined Supramolecular Synthon as "*structural units within supermolecules which can be formed and/ or assembled by known or conceivable synthetic operations involving intermolecular interactions*".[4] Few examples of supramolecular synthon observed in various organic molecules are shown in figure 1.1.

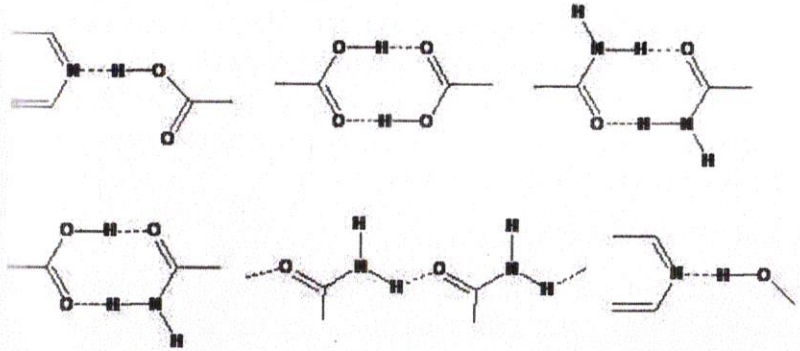

Figure 1.1 Different supramolecular synthons commonly observed in organic molecules.[5]

Supramolecular synthons can be classified into *homosynthons* and *heterosynthons* based on the presence of functional groups in the components. When the supramolecular synthon is formed between components with similar functional groups (COOH···COOH, $CONH_2$···$CONH_2$ etc.) it is termed as supramolecular homosynthon whereas if it forms between the components with different functional groups (COOH···pyridine, COOH···$CONH_2$, $CONH_2$···pyridine etc.) it is termed as supramolecular heterosynthon.[6]

A detailed description of all the intermolecular interactions involved in designing various supramolecular synthons are discussed in this chapter.

1.2. van der Waals interactions

The sum of all isotropic stabilizing and destabilizing interactions that arise from the attractive (dispersive) and repulsive forces between molecules are termed as van der Waals interactions. They are highly non-directional in nature. Dispersive interactions are dependent on

CHAPTER

18

Limitations and future perspectives of artificial intelligence in crop breeding and agriculture

Indrajit Kalita[1], *Sharmistha Sarma Kalita*[1,2], *Bhaben Tanti*[1] *and Sourav Bhattacharjee*[3]

[1]Department of Botany, Gauhati University, Guwahati, Assam, India [2]Department of Botany, Salbari College, Baksa, Assam, India [3]Department of Botany, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya Tulungia, Bongaigaon, Assam, India

OUTLINE

1. Introduction to intelligent farming or smart farming

Agriculture is a crucial sector globally, contributing significantly to both food production and gross domestic product (GDP), with a global GDP share of about 6.4% as of 2019. According to the latest projections by the Food and Agriculture Organization of the United States, an exponential increase in world population can lead to a surge in food demand by around 70% by 2050 (Shaikh et al., 2022). However, achieving the sustainable development goals, particularly ending hunger, may be challenging due to population growth and resource constraints. By 2030, meeting 40% of water needs could be difficult and up to 20% of agricultural land may degrade. To address these challenges, farmers must adopt more sustainable practices to enhance productivity while conserving resources. The agricultural sector is increasingly interested in leveraging new technologies, such as artificial intelligence (AI) and the Internet of Things (IoT), to optimize crop yields in response to unpredictable weather patterns and rising food consumption (Khan et al., 2022). The integration of AI and IoT in farm management, known as "smart

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IMPACT OF DROUGHT STRESS ON RICE CULTIVARS AND ITS ADAPTATION: A REVIEW

***Sharmistha Sarma Kalita*[1,2], *Bhaben Tanti*[1]**

[1]*Department of Botany, Gauhati University, Guwahati, Assam, India*

[2]*Department of Botany, Salbari College, Salbari, Assam, India*

ABSTRACT

Drought stress is a critical threat to rice (*Oryza sativa* L.) production, significantly affecting growth, yield, and quality. Rice cultivars adapt to drought through complex physiological and biochemical mechanisms, which vary widely across genotypes. Physiologically, drought-resistant cultivars manage water stress through enhanced root architecture, improved water use efficiency, and stomatal regulation, which helps in conserving water while balancing photosynthesis. Osmotic adjustment through the buildup of osmolytes like proline and soluble sugars supports cell turgor and stabilizes metabolic functions. Biochemically, drought stress triggers an increase in antioxidant defenses, including different types of enzymes such as superoxide dismutase and catalase to minimize damage from reactive oxygen species (ROS). Additionally, phytohormones such as abscisic acid (ABA) play a critical role in modulating stress responses, including stomatal behaviour and osmotic regulation. Drought-tolerant cultivars often exhibit higher levels of antioxidant activity, osmolyte accumulation, and ABA signalling, which collectively support their survival under limited water conditions. Identifying and integrating these adaptive traits through breeding programs offers promising pathways to develop resilient rice cultivars, essential for sustaining productivity in drought-prone areas. This review synthesizes bio-physiological adaptations in rice under water scarcity condition, highlighting strategies to enhance drought resilience in future cultivars.

KEYWORDS: Drought, Biochemical, Rice, Agriculture.

INTRODUCTION

Water scarcity negatively affect plant growth and productivity. Consequently, one of the primary objectives in crop breeding is to develop plants capable of thriving in drought conditions. A key selection criterion for this is water utilising capacity, which evaluates crop quality and performance in dry environments. Plants have evolved diverse physiological and molecular mechanisms to cope with the extreme conditions of the environment and utilize their resources more effective (Ahuja et al., 2010; Yamaguchi-Shinozaki and Shinozaki, 2006; Skirycz and Inze, 2010; Osakabe et al., 2011; Nishiyama et al., 2013). Drought, one of the most detrimental environmental factors, significantly hampers plant growth and reduces crop yields, making it the most damaging abiotic stressor for crop production. Recent breeding efforts have focused on identifying traditional rice varieties with natural drought resistance to develop drought-tolerant rice strains. Yet, the study of morphophysiological and biochemical bases underlying rice growth and yield in response to reproductive-stage drought has been far from complete (Tuberosa and Salvi, 2006), which has limited the progress of improvement.

Rice (*Oryza sativa* L.) is the main staple crop grown in the Northeast, covering the largest area of farmland in this region (Kuotsuo et al., 2014). The region produces approximately 5.5 million tons of rice annually, with an average yield of 1.57 tons per hectare-significantly below the national average of 2.08 tons per hectare (Pattanayak et al., 2006). Yield limitations are largely due to local abiotic

02
Chapter

Gene Regulation and Disease: The Significance of Epigenetics

Sharmistha Sarma Kalita[1], Indrajit Kalita[2]*
[1]Department of Botany, Salbari College, Salbari, Baksa 781318, Assam, India
[2]Department of Botany, Gauhati University, Guwahati 781014, Assam, India
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Abstract

By upregulating, downregulating or entirely silencing genes, epigenetic modifications such as DNA methylation, histone methylation and acetylation affect gene expression at the transcriptional level. Pathological dysregulation of epigenetic processes can result in the development of cancer, neurological problems, metabolic problems and cardiovascular disease. It is therefore very interesting from a clinical standpoint to find medications that block these epigenetic modifications. In this study, we provide an overview of the epigenetic processes linked to many illnesses and conditions, such as cancer, neurological disorders, metabolic and cardiovascular disorders. Understanding the particular epigenetic alterations linked to various kinds of illnesses makes it easier to create inhibitors that can be employed as epigenetic medications. The main groups of epigenetic medications now in use are covered in this overview, including those that suppress DNA methylation, correcting epigenetic alterations and treating disease through blocking medications, bromodomain inhibitors, histone acetyl transferase inhibitors, histone deacetylase inhibitors, protein methyltransferase inhibitors and histone methylation inhibitors.

Key words: *Epigenetics, Metabolic, Cancer, Gene expression and gene silencing*

Introduction

Epigenetics is a rapidly growing field that has revolutionized our understanding of gene regulation and its role in human diseases. However, it is now evident that

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Working of Parliamentary Democracy in India: *Successes, Challenges and Measures to Overcome*

–Mr. Durlov Kr. Baro
Asst. Prof., Dept. of Bodo
Salbari College

Abstract:

India, the world's largest democracy which operates under a parliamentary system has stood the test of time and evolving societal complexities. This article investigates into the intricate workings of India's parliamentary democracy, examining its historical origins, key features, functioning, and significance in shaping the nation's governance. From the role of the President to the functioning of the two houses of Parliament, this article provides a comprehensive overview of how India's parliamentary democracy functions, emphasizing its unique characteristics and its ability to accommodate diversity while ensuring effective governance.

Keywords: ***Investigate, intricate, cornerstone, Westminster, ceremonial head, summon, prorogue, checks and balance,***

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|| Inside the Book ||

राव सोलायनायनि जाहोन : मोनसे बिजिरनाय

–Sumitra Narzary
Assistant Professor
Salbari College, Salbari

राव :

गोसानि सान्नायखौ गुबुननि सिगाडाव खुगाजों गारां बोनानै फोरमायथिनो हानायनो जाबाय राव। बेनिखायनो रावखौ फोरमायनायनि बिजों होननानैबो बुंनाय जायो। बुहुमनि गासै जिब जुनारफोरानो फोरमायलायनायनि गावबा गाव बिजों दं। नाथाय बिसोरनि गेजेराव सुबुं माहारिनि फोरमायलायनाय बिजोञनो गोजौआव जायगा मोनदों। मानसिया गावसोरनि गेजेराव साननाय, हनाय, गांनाय उखैनाय बायदिफोरखौ रावनि गेजेरजों फोरमायथियो। नाथाय जिब जुनारफोरा हाया। जिब जुनारा राव गोयैखायनो मानसिया जेरैबादि गोजोन रायजो खुंनो हादों नाथाय बिसोर हायाखै। बिसोरहा राव गोयैखायनो गावनि गोसानि जौसिनथार मासियाव दोनदों। बेनिखायनो राव होननानै बुञेब्ला सुबुं माहारिनि फोरमायलायनाय बिजोंखौसो थोंजोडै मिथिनाय जायो।

रावनि बुंफुरलु :

रावनि सायाव गोबां राव बिगियानगिरिफोरा बायदि बुंफुरलु होदों। बेफोर बुंफुरलुफोराव रावनि सोमोन्दै रोखा गियान मोननो हायो।

(1) "A language is a system of arbitrary vocal symbols by which members of a social group co-operate & interact" - Sturtevant.

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बर आरो असमीया रावनि मुंराइनि सायाव रुजुनाय

Sumitra Narzary*

बर' आरो असमीया मोननैबो रावानो गुबुन गुबुन राव फोलेरनिफ्राय जोनोम मोननाय राव। बर' रावा Sino-Tibetan राव फोलेरनि तिब्बत बार्मान हान्जानिफ्राय फैनाय राव आरो असमीया रावा गाहायै इण्ड इउर'पियान राव फोलेरनिफ्राय फैनाय राव। मोननै रावानो गुबुन गुबुन राव फोलेरनिफ्राय जोनोम मोननाय रावब्लाबो बे मोननै रावखौ बुंग्रा मानसिफोरा खाथि थालायनायनि जाहोनाव बिसोरनि गेजेराव माखासे होलाय लालाय सोमजिदों। बेनिखायनो मोननैबो रावनि गेजेराव गोबां गोरोबनाय आरो गोरोबलायिखौ नुनो मोननाय जायो। गाहायाव मोननैबो रावनि मुंराइनि सायावल' रुजुनानै गोरोबनाय आरो गोरोबलायिखौ सावरायनाय जाबाय।

सरासनस्रायै मुंमानि जायगायाव जाय जयो बेनो मुंराइ। मुंमा सोदोबनि गले गले गाबब्रिनायखौ गैया खालामनो थाखाय रावाव मुंराइ बाहायनायखौ नुनो मोननाय जायो। बर' आरो असमीया मोननैबो रावआव मुंराइखौ मोन स्नि बाहागोआव बोखावना दिन्थिनो हागौ।

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2. थावनि दिन्थिग्रा मुंराइ
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गाहायाव मोननैबो रावनि मुंराइखौ बिदिन्थिजों रुजुलांनाय जाबाय

1. सुबुं दिन्थिग्रा मुंराइ : बर' आरो असमीया मोननैबो रावआवनो सुबुं दिन्थिग्रा मुंराइखौ सानरायनि बिथिंनिफ्राय मोननै आरो सुबुंसाइनि बिथिंनिफ्राय मोनथाम बाहागोआव राननो हागौ जैरै-

बर'

सुबुंसाय	से सानराय	बां सानराय
सेथि सुबुंसाय	आं	जों

*Assistant Professor, Salbari College, Assam.

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|| Inside the Book ||

Problems and Prospects of Village Council Development Committee (VCDC) in Bodoland Territorial Council

–Hiren Baro,
Assistant Professor
Dept. of Political Science
Salbari College

Abstract: *This paper examines the problems and prospects of the Village Council Development Committee (VCDC) in the context of the Bodoland Territorial Council (BTC). The VCDC is a vital institution in the decentralized governance system of BTC, responsible for local development planning and implementation. However, several challenges hinder the effective functioning of VCDCs, including financial constraints, lack of capacity and awareness, political interference, and inadequate participation. Despite these challenges, VCDCs offer promising prospects for grassroots democracy, sustainable development, and community*

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Unitary or Federal; which form of government is suitable for India? – An analysis

– ***Mr. Mantu Baro,***
Asst.Prof. & HOD,
Dept.of Political Science
Salbari college

Abstract: The choice between a unitary and federal form of government is a crucial decision for any nation, determining the distribution of powers and responsibilities between the central and regional entities. In the case of India, a diverse and complex nation with diverse cultures, languages, and socio-economic disparities, the question of which form of government is more suitable becomes especially pertinent. This article delves into an in-depth analysis of both the unitary and federal systems of governance, evaluating their applicability to the Indian context and considering the historical, cultural, administrative, and constitutional dimensions. By examining the benefits and challenges of each system, this article aims to provide a comprehensive perspective on the most suitable form of