

GEO-SPATIAL TECHNOLOGIES IN RURAL DEVELOPMENT



Editors

Dr. A. Simhachalam

Dr. R. Murugesan



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EMERGING TRENDS IN LIFE SCIENCE RESEARCH



Dr Laishram Joymati Devi is serving as Associate Professor in Zoology at D.M. College of Science, Imphal, Manipur for the last ten years. She got her Ph.D. in the year 2003 from Manipur University. Her area of specialization is parasitology and nematode management. She has completed many minor and major research projects. She has contributed and presented many research articles in reputed international and national Journals. She has also published books, book chapters and actively participated in teaching, research works, attending seminar, workshops, conferences and also organized state level seminars. She received Post Doctoral Research Award under U.G.C. She is a life Member of Indian Journal of Nematology, Annals of Plant Protection Sciences, Indian Agricultural Research Institute (IARI) and Indian Institute of Horticultural Research (IIHR).



Dr. Athokpam Pinokiyo is a seasoned researcher with more than 20 years in the field of Taxonomy (Angiosperms and lichens), biodiversity and conservation biology. She has published more than 40 research papers in peer reviewed national and international Journals of repute. Dr. Pinokiyo has the distinction of publishing the first book on **Foliicolous lichens of India** in the year 2014, edited a seminar proceeding on Biodiversity in the year 2014. She is also an active member of Research Committee of D. M. College of Science, Imphal, Manipur. She has been teaching Angiosperm Taxonomy and Ethnobotany to the students of Post Graduate (M.Sc.Botany) since 2010 and is an Assistant Professor in the Department of Botany, D.M. College of Science, Imphal West.



Dr. Oinam Dwijamani Singh is serving as an Associate Professor in the Department of Zoology, Ghanapriya Women's College, Imphal, Manipur. He obtained his Master Degree from Manipur University, and awarded Ph.D. degree in the year 1994 from Manipur University. His field of specialization is Entomology. He also takes special interest on Insect-Plant interaction and Taxonomy. He has contributed research papers and book chapters in reputed International and National Journals. He has attended a number of International and National seminars, workshops, conferences and also presented research papers.

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Dr. Okram Chanu Monorama, Associate Professor of Zoology at Manipur College, Manipur. Was awarded M. Phil. and Ph.D. degree from Manipur University under the supervision of Professor B. Prasad, Department of Life Sciences. Her specialization is entomology. She has published book and many research papers in International and National journals. She has participated many International, National and State level seminars, workshops, conferences and also presented many papers. She is a life member of Indian Science Congress Association.



Dr. Mairembam Suresh Singh is an Associate Professor of Zoology in the Ghanapriya Women's College Imphal, Manipur. He obtained his Master Degree from Aligarh Muslim University, Aligarh and his Doctoral Degree (Ph.D.) from Gauhati University, Guwahati. His areas of specialization are Entomology and Biodiversity. He has published many research papers in International and National Journals. He has organized and attended many International and National level seminar, workshops and conferences. He is a recipient of State Appreciation Award, 2021 under Department of University and Higher Education, Government of Manipur. He is a Life Member of Indian Science Congress Association.

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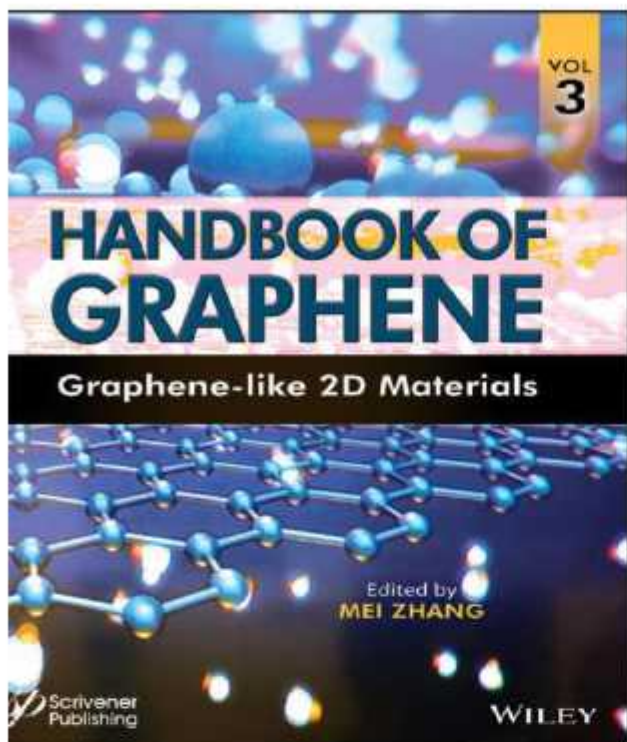
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Nanoelectronic Application of Graphyne and Its Structural Derivatives

Barnali Bhattacharya¹, N. Bodamani Singh² and Utpal Sarkar^{1*}

¹Department of Physics, Azim Premji University, Bidar, India
²Department of Physics, Jagadgur University, Jagadgur, India

Abstract

The present study is committed to investigate the electronic and magnetic properties of graphyne and its structural derivatives namely graphyne nanotube (GNT) and bilayer graphyne. The graphyne nanotube (GNT) is obtained by rolling up graphyne sheet and the pattern of rolling decides its diameter. Electronic structures and properties of zigzag (zGNT) and armchair (aGNT) GNT with $n = 2-5$ are investigated and found to be dominated by their chirality rather than their parent planar structure. Oscillatory behavior of the band gap with increasing diameter is observed. Two graphyne layers are stacked keeping one on top of the other, to form bilayer graphyne. Different stacking modes are investigated and in the most stable configuration, the hexagonal ring of one layer is attached on the top of the original void of other layer, just as in bulk graphyne. Pristine graphyne and its structural derivatives are semiconductor with direct band gap. We propose a method to modulate the electronic and magnetic properties where boron and nitrogen are doped in various doping sites with different concentrations. Due to the presence of 6 or 8 or 10 boron/nitrogen at different sites, the conducting property of graphyne changes to metal or to large band gap semiconductor depending on substitution type (single or multiple dopant). Only boron or nitrogen doped graphyne behaves as metal, while BN codoping enlarges the band gap. Besides, BN codoping preserves the non-magnetic nature of pristine graphyne irrespective of the doping site, while only boron atom at chain site introduces spin polarization which increases with doping concentration. Substantial 10% doping in graphyne nanotube and bilayer graphyne provides a way to modulate the band gap of the systems. The band gap shows a significant dependency on the substitution sites and concentration. These findings serve as new insights to utilize these doped structures in various electronic applications. Analysis of the partial density of states (PDOS) provides information about the contribution of each orbital of each constituent.

Keywords: Density functional theory, graphyne, electronic structure

5.1 Introduction

The revolution in low dimensional nanomaterials can be established by mentioning the successive discovery of zero dimensional (0D) fullerenes [1, 2], one-dimensional (1D) carbon nanotubes [3] (CNT), and two-dimensional (2D) graphene sheets [4, 5] since their discovery.

*Corresponding author: utpalb@azimpreji.edu.in



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Department of Environmental Studies, PGDAV College, University of Delhi, New Delhi, India

JOÃO PAULO BASSIN

Chemical Engineering Program, COPPE, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

SANCHAYITA RAJKHOWA

Department of Chemistry, The Assam Royal Global University, Guwahati, Assam, India

CHAUDHERY MUSTANSAR HUSSAIN

*Department of Chemistry and Environment Science, The New Jersey Institute of Technology,
Newark, NJ, United States*

RAMESH ORAON

Department of Nanoscience and Technology, Central University of Jharkhand, Ranchi, India



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Municipal water treatment with special emphasis on biosorption and nanoparticles

Bindiya Aribam¹, Boynaoton Konthoujam¹, Pardeep Singh² and Binota Thokchom¹

¹Department of Forestry and Environmental Science, Manipur University, Imphal, India

²Department of Environmental Studies, PGDAV College, University of Delhi, New Delhi, India

2.1 Introduction

The availability of fresh water is one of the most significant criteria regarding sustainable development in contemporary society (Shiklomanov & Balonishnikova, 2003). About 3.6 billion people are facing clean water scarcity. There is a belief that by 2050, more than half of the global population will suffer water scarcity for at least a month each year (Boretti & Rosa, 2019). Rapid urbanization and industrialization increase the quantity of municipal wastewater. For example, on average, a person in developing countries generates 30–70 mm³ of wastewater in a day (Edokpayi et al., 2017). Besides, more than 38 million liters of wastewater is generated in a day in the urban centers of India (Kamyotra & Bhardwaj, 2011).

In many developing countries, treatment facilities sometimes do not exist and some produce ill-treated effluents. As a result, huge volumes of untreated and ill-treated effluent are ending in the freshwater courses (Edokpayi et al., 2017). The per day capacity of Municipal wastewater treatment is only around 11,787 million that is only 31% of the total wastewater generated by major urban areas of the country. As per the CPCB India, 231 sewage treatment plants out of 269 reported functional which is 21% of the present sewage generation. The remaining untreated sewage is directly disposed of into the rivers and lakes resulting in pollution of rivers and lakes in the country (Kamyotra & Bhardwaj,

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Binota Thokchom, Pengpeng Qiu
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Edited by

Binota Thokchom

*Centre for Nanotechnology, Indian Institute of Technology,
Guwahati, India; Department of Forestry and Environmental Science,
Manipur University, Imphal, India*

Pengpeng Qiu

*State Key Laboratory for Modification of Chemical Fibers and Polymer
Materials, College of Materials Science and Engineering,
Donghua University, Shanghai, P.R. China*

Pardeep Singh

*Department of Environmental Studies, PGDAV College,
University of Delhi, New Delhi, India*

Parameswar K. Iyer

*Department of Chemistry and Centre for Nanotechnology,
Indian Institute of Technology Guwahati, Guwahati, India*



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Water, arsenic, and climate change

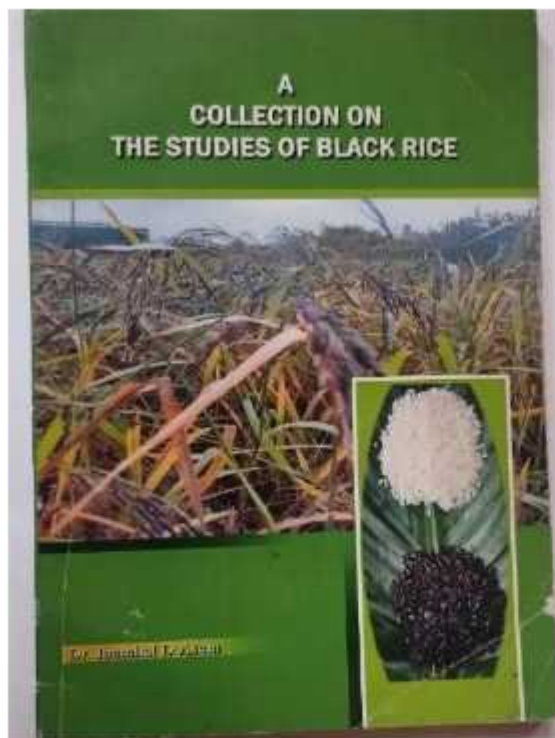
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Department of Forestry and Environmental Science, Manipur University, Imphal, India

8.1 Introduction

Arsenic is the 20th most abundant element present naturally in the geosphere. It occurs in four oxidation states. Trivalent-arsenite [As(III)] and pentavalent-arsenate [As(V)] are the common and most toxic inorganic arsenic species present in various hydrological system. It occurs in both the oxidizing and reducing environments (Jones, 2007). Arsenic is released in the ecosystem through natural and human activities. Weathering of arsenic bearing rocks and parent materials converts arsenical sulfides to more toxic inorganic forms (Mandal and Suzuki, 2002; Brown and Ross, 2002). Prolonged exposures (5–10 years) to arsenic can result in fatal human health disorders. Skin pigmentation, psychological disturbance, genetic disorder, internal organ cancers, etc. represent the major diseases due to arsenic poisoning. The permissible limit for drinking water as standardized by World Health Organization (WHO) is 10 $\mu\text{g/L}$ and at present, more than 100 million peoples around the world are chronically exposed to it (Singh and Ghosh, 2012; Ravenscroft et al., 2009; Shankar et al., 2014). The presence of an arsenic compound in marine environment is also a major concern. It is documented that marine organisms feeding on the algal metabolites may have high chances for the presence of arsenosugars (Francesconi and Edmonds, 1996). Arsenobetaine was the first arsenic compound identified in the marine animals like *Panulirus cygnus* and American lobster *Homarus americanus* (Edmonds et al., 1977; Edmonds and Francesconi, 1981).

Groundwater reserves of various countries such as Bangladesh, India, China, Mexico, Taiwan, Vietnam, Chile, and Argentina have also been reported to contain high amount of toxic arsenic forms (Bhattacharya and Ghosh, 2015). The consumption of arsenic-contaminated drinking water in Bangladesh symbolized the incidence of the world's largest mass poisoning in the anthropological records (Smith et al., 2000). In India, the first case of groundwater arsenic poisoning was revealed in 1983 from the eastern part of the country (West Bengal). More than 60% of the major health concern in West Bengal is related to arsenic-contaminated drinking water supplies (Chakraborty et al., 2001; Das et al., 2008; Biswas, 2019). The second-largest source of arsenic exposure is diet. Arsenic concentration



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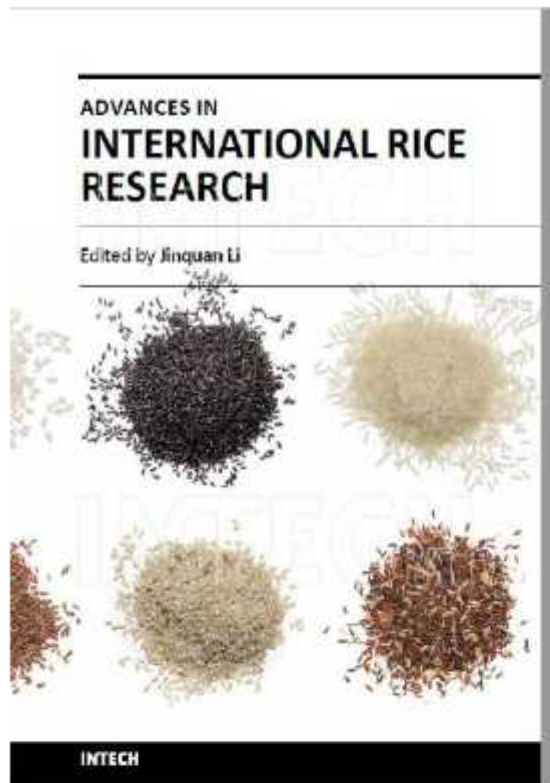
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Contributors

André Andrade, Germany; Conceição Giovan Thales, José M. S. Pereira, Gustavo Macedo Tejed, Leandro Galon, Martheus Martins, Cristian Rossi, Delimita Mancini, Volante Sbrana, Shalissa Perrett, Dayra Okonogi, Min Huang, Shuangli Shen, Jiana Chen, Fengbo Cao, Ligeng Jiang, Yingbin Zou, Changsheng Jiang, Da-Gin Lin, Issayuki Fujita, Mirza Hasanuzzaman, Kamrun Nahar, Ansur Rahman, Md. Shahadat Hossain, Jubayer-Al-Mahmud, Toqeer Vikar, Dharminder Shaha, Mawel Carlo Aquino, Bernini Okofua, Inara Lúci Mesquita, Derman Cansino, Nalinyah Sorliano, Isaqueiré T. Silva, Maria A. S. Reis, Jimmy Lamo, Pangirayi Tongona, Du Muxia, Simon Mando, Geoffrey Chaga, Ameli Odon, Ana Paula Santos, Liliana Ferreira, Sebastião Revesco, Duarte Figueiredo, Christoph Reinhardt, Nelson Salvo, Maria Margarida Oliveira, Bemhal Asem

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The Deep Purple Color and the Scent are Two Great Qualities of the Black Scented Rice (Chakhao) of Manipur

Bemhal Devi Asem, Rajkumar Imotomba and Pranab M. Mazumder

Additional information is available at the end of the chapter

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Abstract

Specialty rice varieties with unique properties such as unique color, flavor, aroma and nutritional qualities are increasingly in demand other than the traditional white rice varieties. Black rice has various nutritional properties with high anthocyanin content and the anthocyanin antioxidants are very important in preventing various diseases. Black scented rice of Manipur which are commonly known as Chakhao are deep purple colored and scented, and are very nutritious as well. Two Chakhao cultivars, Chakha Aonla and Chakha Anakh, were shown to have high anthocyanin and phenolic content and strong antioxidant activity. The main anthocyanins of Chakha Aonla are delphinidin-3-glucoside, delphinidin-3-rutinoside, malvidin-3-glucoside and cyanidin-3-glucoside and those of Chakha Anakh are delphinidin-3-glucoside, delphinidin-3-rutinoside and cyanidin-3-glucoside. By GC-MS analysis, a mass mixture of 28 volatile compounds from Chakha Aonla and 11 volatile compounds from Chakha Anakh were found to be responsible for creating the aroma. Among the volatile compounds, volatile esters, compounds, heterocyclics and alcohols were found to be most abundant in Chakha Aonla and 31 compounds, 10 terpenoids (2) and heterocyclics and alcohols were in Chakha Anakh.

Keywords: black scented rice, Chakha rice, Manipur, anthocyanins, nutritional properties, flavor (scent) active compounds

1. Introduction

Rice is the staple food for over half of the world's population. Rice cultivation provides employment for over one billion people directly or indirectly. Besides traditional white or



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ANTI-INFECTIVE AGENTS

Editors:

K. Tamreihao
Saikat Mukherjee
Debanada S. Ningthoujam

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CHAPTER 8**Leprosy: Clinical / Diagnostic Features and Current Status of Anti-leprosy Drugs****Khullakpam Shaheen[†], Ibemhal D. Asem and Debananda Singh Ningthoujam***Advanced Level State Biotech Hub, Microbial Biotechnology Research Laboratory (MBRL), Department of Biochemistry, Manipur University, Canchipur, Imphal, Manipur 795003, India*

Abstract: Leprosy, also called Hansen's disease, is known since ancient times. It is a curable, slow, progressive lifelong contagious disease, caused by an intracellular, rod shaped, aerobic, slow growing bacterium *Mycobacterium leprae*. Leprosy affects the skin, peripheral nerves, and mucosal portion of upper tract of respiration and may also affect any organs. Leprosy is not critically contagious. Early diagnosis and treatments prevent nerve involvement, which is considered to be the hallmark of leprosy. Its diagnosis is carried out from a number of distinct clinical presentations which should be complemented by skin bacilloscopy and histopathology. Highly effective MDT (multidrug therapy) is used as medications which aim to eliminate the causal organism.

CHAPTER 11**The Use of Medicinal Plants in Treatment of Malaria****Ibemhal D. Asem[†], Khullakpam Shaheen and Debananda S. Ningthoujam***Department of Biochemistry, Manipur University, Imphal, Manipur-795003, India*

Abstract: Malaria is an infectious disease. Many anti-malarial drugs have been introduced to eliminate malaria. Earlier the major antimalarial drugs were natural products but in due course synthetic drugs have replaced them. Pursuing multiple strategies is needed for discovering new drugs for malaria. Global International Centers of Excellence for Malaria Research (ICEMR) network is conducting many research. The research activities include clinical studies for assessing antimalarial drug efficacies, drug susceptibilities of parasite isolates and determining resistance-mediating parasite polymorphisms. There are several approaches for the discovery of new drugs. The approaches should also focus on low cost and novel therapies. Currently, the available drugs are optimized in many ways using combination therapy and the discovery of compounds from plants. This chapter focuses on the available antimalarial medications, including both synthetic and natural products. The present chapter also highlights indigenous medicinal plants, which can be potentially used for the development of antimalarial drugs.

Jyoti Prakash Tamang Editor

Ethnic Fermented Foods and Beverages of India: Science History and Culture

Springer

Editor
Jyoti Prakash Tamang
School of Sciences, Department of Microbiology
Sikkim University
Gangtok, Sikkim, India

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Ethnic Fermented Foods and Alcoholic Beverages of Manipur

14

Wahengbam Romi, Anand Thangjam, Santosh Kelsam, Ibemhal D. Asem, Debananda S. Ningthoujam, and Kumaraswamy Jeyaram

Abstract

Manipur is characterized by its rich culture, indigenous food habits, and diverse population of over 10 different tribal and non-tribal ethnic communities. The major non-tribal Meitei community resides in the valley areas, while the Jaintia and Kukli-Chin-Mizo tribes inhabit the hilly regions. Different ethnic communities have their unique food habits. Rice is their staple food and is consumed with fresh or boiled vegetables, fish, and meat with a variety of fermented foods. Ethnic fermented foods form an intrinsic part of the traditional diet system and the cultural integrity of all ethnic communities. These fermented products are unique in terms of the substrate used, the traditional indigenous knowledge of preparation, and the culinary practices. Ethnic fermented foods of Manipur are fermented bamboo shoots (*zangol*), *apom* (*matu/angim/angim*), *waban*, *thantlang*, *shochin*, *thantlangkong*, *ramthlang*, fermented fish (*ngari*), *hemaik*, *ubimghoi*, fermented soybean (*thawjair*, *thawcham*, *chaba*, *bekeleba*, *thawoi*), fermented mung bean (*thawchawng*, *chawdel*, *chawng*, *wakawaba*, *gawng*, *awabai*), fermented soybean seed (*chaba*), fermented mungbean/soybean seed (*thawjair*), fermented lentil seed (*zangthangchaba*), fermented milk

W. Romi (✉)
Lita Singma District, Institute of Advanced Study in Science and Technology (IASST),
Gowahati, Assam, India

A. Thangjam
AICTE-P on Post-Harvest Engineering, Technology, Directorate of Research, Central
Agricultural University, Imphal, Manipur, India

S. Kelsam
Advanced Level Institutional District Hub, Mokok College, Imphal, Manipur, India

I. D. Asem - D. S. Ningthoujam
Department of Biotechnology, Manipal University, Imphal, Manipur, India

R. Jeyaram
Institute of Biotechnology and Sustainable Development (IBSD), Alway, Mizoram, India

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Kshetrimayum Devendra Singh, Chingangbam Ningthilsana, Moirangthem Govind, Nandeibam Lalit Singh, Roshni Kharibam, Lakshmibala Kshetri, Priscilla Karam, Laishram Pinky, Pushpa Maimom, Ningthoujam Dhana Devi, Dayabati Sagapam, Phurailatpam Harideva Sharma

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Meitei Religion and Ecological Thoughts and Practices in Manipur

— *Nameirakpam Jacquelyn*

The State of Manipur forms a part of the North Eastern region of India which consists of eight states, namely Assam, Nagaland, Manipur, Tripura, Arunachal Pradesh, Mizoram, Meghalaya and Sikkim. Manipur was a Princely State until the invasion by the British at the Anglo Manipur War of 1891, and the Kingdom got its independence in 1947. It had merged to the Indian Union during the reign of King Bodhachandra after signing the Merger Agreement on 12th September 1949 in Shillong.

Three distinct Communities inhabit the State of Manipur namely the Nagas, the Kukis and the Meiteis. The Meiteis are the dominant community having its own language and a script known as Meitei Mayek. A brief genealogy of the emergence of a unified Meitei Nation would be necessary for understanding the societal set up of the Meiteis. Before the emergence of a unified Meitei Nation under Nongda Lairen Pakhangba, the Meitei Nation consisted of seven distinct clans which were autonomous. The seven clans or lineages were Ningthouja, Luwang, Angom, Khuman, Moirang, Kha Nganba and Sarang Leishangthem. The establishment of the Meitei Kingdom at Kangla under Nongda Lairen Pakhangba was an event of great historical importance in the evolution of the Meitei Kingdom of Manipur. The rise of the Kingdom was an outcome of the struggle between various ethnic groups and clan chiefdoms in the valley. The Khabas were a powerful tribe who ruled at Kangla before the rise of Nongda Lairen Pakhangba. The leader of the Khabas, Khaba Nongchenba

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Contemporary Social Issues: Social Anthropological Inquiries

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ETHNO-MEDICAL MODEL OF REPRODUCTIVE ILLNESS

Pebam Krishnakumari & M.C. Arunkumar

Introduction

Illness represents the personal, interpersonal and cultural reactions to disease and or discomfort. It is shaped by cultural factors governing perception, labelling explanation, and valuation of the discomforting experience, processes embedded in a complex family, social and cultural nexus. It is the meaning that women give to health and refers to a person's perception and experiences of certain socially disvalued status. Because illness experience is an intimate part of social systems of meaning and rules for behaviour, it is strongly influenced by culture: it is, as we shall see, culturally constructed (Kleinman, Eisenberg and Good, 1978).

Perception of existence of a disease is not just the simple recognition of physical symptom but it become significant only when it is identified as an illness, a physiological malfunctioning that is seen to threaten the individual and his society. Societies define illness in different fashions and symptoms that are accepted as evidence of illness in one society may be totally ignored in another (Kleinman, 1980). Thus, illness is related to physical symptoms and situations in a network of meanings, there is an exigency to recognise and understand the process of production of health from their perspective for any realistic and comprehensive effort to improve health conditions of a

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SOCIAL ANTHROPOLOGICAL INQUIRIES

Edited by
Rangya Gachui

Contemporary Social Issues
Social Anthropological Inquiries

Rangya Gachui

KLANZLE

Contemporary social issue is an undesirable condition that people believe should be corrected. Social issues are the general factors that affect and damage society. There are varieties of methods people use to combat social issues. Some people donate or share their time, money, energy or other resources. In this book many scholars had explored different social issues the society is going through in today's generation. It is divided under three sections Section one: Social issues in social context, the second, social issues in cultural milieu, the third, understanding Development issues.

The total sixteen papers, penned by different scholars on various burning social issues, will delight and enlighten one and all concerned.



Dr. Rangya Gachui is currently working as Assistant Professor, Department of Anthropology, Visva-Bharati Santiniketan. She obtained her Master Degree from North Eastern Hill University, Shillong. Her Ph.D. degree from Manipur University. Dr. Gachui has conducted Research and documented on five Tribes of Manipur. She has seven Research Papers, articles and Chapters in Books and Journal, and she has also presented sixteen papers at various seminars and conferences.



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Nongmaithem Suraj Kumar



Sub Editors

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Bond of Co-Existence between Nature and Humans in Aribam Chitreshwar Sharma's *Tharoshangbi*

— *Nongmaithem Suraj Kumar & Sushmita Yumnam*

Aribam Chitreshwar Sharma was born on January 05, 1939 at Khongmal Mangjil Imphal East. His parent's names were Shri Aribam Angoubi Sharma and Aribam ongi Chinta Devi. He retired from Directorate of industries Manipur arts and crafts as supervisor. Being brought up in a poor family, during the early stage of his life, the author sold cigarettes, matchbox and locally made Manipuri sweets. He was a brilliant student but he could not complete his matriculation due to the condition of his family. His childhood dream was to become a supervisor of arts and craft. He was a great painter too. In 1968, he published his first novel "Leibaklei". Together with his literary friend they established "Sahitya Sabha" which lasted for 10 years. In 1989, he was given State Sahitya Academy Award for his compilation of short story "*Lupthakhraba Hinao*". In 1991, he was given Sahitya Academy Award for his work "*Tharoshangbi*".

Tharoshangbi is a novel talk about the scenic beauty of the Loktak Lake. It also talks about how the people nearby depend on Loktak for their survival. The lake became source of income for the people. The novel also deals with the comparative study of village life and city life. It also talks about the beauties of nature (especially Loktak, and its surroundings). In the opening part of the novel, the author beautifully describes the scenic beauties of the



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Value Placed on Education: Differential preference for Higher Education to Meitei Girls and Boys in Manipur

– *Shougrakpam Umabati Devi*

Introduction

Education is one of the basic sources of empowerment in all human societies. Education is the social institution responsible for the systematic transmission of knowledge, skills, and cultural value within a formally organized structure. This research summarizes to find out the value placed on education in terms of preference for higher education to girls and boys in Manipur. The study looks into the value of Meitei women towards education. The study analyses the intergenerational changes from paternal grandmothers /maternal grandmothers to mothers and daughters towards value placed on Education. The findings of the study explored that to what extent there is differential preference for higher education to girls and boys in Manipur. The purpose of this research is to explore how education has empowered women to lead their lives independently. This work is based on both primary and secondary sources of data. Primary data includes observation, interview and case studies. The research results are analyzed in SPSS on both quantitative and qualitative approaches using a purposive sampling method.