



IMPACT

A Collection of Multidisciplinary Articles



Edited by

Dr. Chitrita Banerjee
Dr. Jayati Das
Dr. Illora Sen



IMPACT
A Collection of Multidisciplinary Articles

Edited by
Dr. Chitrita Banerjee
Dr. Jayati Das, Dr. Illora Sen



Shri Shikshayatan College



Som Publishing

IMPACT

A Collection of Multidisciplinary Articles

IMPACT

A Collection of Multidisciplinary Articles

Edited by

Dr. Chitrita Banerjee

Dr. Jayati Das

Dr. Illora Sen



Som Publishing

IMPACT : A Collection of Multidisciplinary Articles

Chief Editor

Dr. Papiya Chaudhury

editors

Dr. Chitrita Banerjee

Dr. Jayati Das

Dr. Illora Sen

Editorial Board

Dr. Malini Mukherjee, Dr. Agnita Kundu,
Dr. Suchhanda Ghosh, Dr. Kajal Gandhi, Baidehi Mukherjee,
Dr. Shahin Nasrin, Dr. Subhadeep Ghosh

First Published :

November, 2024

ISBN : 978-93-92332-70-8

© Shri Shikshayatan College, Kolkata

Cover Design :

Debahati Bhattacharyya

Published by **SOM PUBLISHING**

21, Kanai Dhar Lane , Kolkata 700 012

Ph - 9330843618

Email : *sompublishing16@gmail.com*

collaborate with

Shri Shikshayatan College,

11 Lord Sinha Road, Kolkata 700071

Printer:

Maa Shitala Printing Works

13, Shashibhusan Dey Street, Kolkata 700012

Price : 425.00

Dedicated to
All Faculty Members and Students,
of Shri Shikshayatan College, Kolkata

Foreword

It is with great pleasure that I introduce this 2nd edition of IMPACT – a collection of research-based articles, showcasing the intellectual endeavors of our students and faculty members. This publication, initiated by the Central Research Committee of Shri Shikshayatan College, represents the culmination of critical analysis and innovative thinking.

IMPACT is a testimony of the institution's commitment to foster a culture of academic excellence, interdisciplinary collaboration, and knowledge dissemination. The articles demonstrate the diversity and depth of studies conducted on a variety of issues across various disciplines, address complex problems, propose solutions and provide valuable insights.

I congratulate and thank all those whose dedication and expertise have made this publication possible.

I hope this publication will continue to ignite new ideas, inspire next generation of researchers and thinkers and contribute to the advancement of knowledge

20th November, 2024

Chief Editor
Dr. Papiya Chaudhury
Teacher-in-charge
Shri Shikshayatan College

Editorial

This is the second edition of the ISBN publication of the Central Research Committee, Shri Shikshayatan College, Kolkata. The publication is a compilation of multidisciplinary articles by Faculty members, students of the college along with a few invited ones.

The prime focus is to encourage and promote research in diverse domains by Faculty members along with generating research aptitude amongst students.

We aim to publish original and review articles based on research findings with academic merit portraying social, cultural and scientific relevance.

We are thankful to all authors for their valuable contributions and grateful to our college authority and Teacher –in–charge Madam for their consent and cooperation .

20th November, 2024

Editors

Dr. Chitrita Banerjee
Dr. Jayati Das
Dr. Illora Sen

Contents

Recollecting The Missing Memories : A Study of Rithy Panh's Image Manquante

Aishwarya Bhutoria || 1 - 12

Application of CRISPR-CAS9 genome editing in enhancement of salinity tolerance in Rice

Anasua Das, Oisi Konar

Disha Chakraborty, Trishita Saha || 13 - 23

The Essence of Rasa in Girish Karnad's play *The Fire and the Rain*

Barsha Mandal & Deepanjan Halder || 24 - 35

অমৃত প্রীতম : অনুভবে উচ্চারণে

চিত্রিতা বন্দ্যোপাধ্যায় || 36 - 43

Politics of Narrative: The Counterfactual in 'Historical' Memory

Debolina Guha Thakurta || 44 - 57

রবীন্দ্রনাথ এবং বাঙালির নৃত্য পরম্পরা

দিশারী মুখার্জি || 58 - 66

Webcomics in India as a Platform: Identity, Selfhood and Disability

Divyani Sharma || 67 - 81

Petrified Legume Woods from the Neogene of Bengal Basin with remark on Distribution and Paleoenvironment

Dr. Illora Sen || 82 - 93

**Cricket in Films: Ideas of Nation and Nationalism from
Field to Screen**

Mayukh Lahiri || 94 – 104

**Antioxidative and anticarcinogenic activities of green algal
Polysaccharides**

Priyanka Mukherjee, Priya K Gopal

Santanu Paul, Ruma Pal || 105 – 123

**Perception and Contribution of Indian Citizens in
Conserving Environment on which all life depends**

Sagufta Sahin, Saikat Kumar Basu || 124 – 137

**Decolonising ‘Masculine’-‘Feminine’ Binaries : Analysing
Woolf’s Social Thought on Gender, War and Androgyny
in Selected Fiction**

Shruti Dugar, Baidehi Mukherjee || 138 – 150

**An analysis and critical appraisal of the works of
Bankimchandra Chattopadhyay and Rabindranath Tagore
in the 18th and the 19th Century**

Sohini Sarkar, Baidehi Mukherjee || 151 – 158

Gond Art- Its Origin and Distinct Features

Somdutta Roy || 159 – 163

**PHYTOCHEMICAL AND PHARMACOLOGICAL
ACTIVITIES of *Andrographis*: A REVIEW**

Suchhanda Ghosh, Raikamal Pal || 164 – 184

চলচ্চিত্রে ব্যবহৃত রবীন্দ্রসঙ্গীতের বিশুদ্ধতা

সুরাঙ্গনা গুপ্ত || 185 – 188

**Navigating the Environmental Costs of Urban
Development: The Case of Kolkata’s Eastern Metropolitan
Bypass**

Vareeja Ratna, Debosmita Ghosh, Shreya Saha, Adrija De,
Ankita Banerjee, Tirsha Biswas,

Dr Jayati Das || 189 – 209

**An Overview on the Trajectory of Women's
Entrepreneurship in India**

Vidhi Banka, Ashu Pugalia

Kavitha Sundararajan || 210 - 236

About the Author || 237

Recollecting The Missing Memories : A Study of Rithy Panh's Image Manquante

Aishwarya Bhutoria*

Abstract :

Rithy Panh, director of the internationally recognized documentary film *L'Image manquante* (The Missing Picture), is a victim/survivor of the atrocities inflicted on the people of Cambodia on the entry of Khmer Rouge army into Phnom Penh on April 17, 1975. The next few years were marked by systematized murder and the concomitant horrors perpetuated by the murderous regime. The documentary revisits and recreates the life-altering event which still permeates the Cambodian society. This paper explores the myriad facets of trauma- individual-collective, real-imagined, remembered-unremembered and its representation in the form of clay statuettes. The clay figurines despite their innate immobility as well as silence are oscillating between the individual (and collective) faded memories and the film's fabricated setting. The visual narrative creates a counter-memory which comprises silenced histories and muffled screams. The account of the troubled histories conjured from eroded and erased evidences bear witness to a repressed but returning past and make space for it in the history of this period. Panh employs his camera to present the country's past marred by a delayed recognition of the genocide which encapsulates his own traumatizing life.

Keywords : counter-memory, film, genocide, memory, trauma.

*Guest Faculty, Department of English, Shri Shikshayatan College, Kolkata

A political film should unearth what it invented and so I make this picture, I look at it, I cherish it, I hold it in my hand like a beloved face this missing picture I now hand over to you so that it never cease to seek us out (Panh 1:32:27-1:32:56)

The unsettled traumatic histories present the challenge of denial of representation underscoring the unspeakability and unrepresentability of trauma. The endeavour to narrate the traumatic experience disregards temporal linearity and the fragmented timeline vindicates Janet Pierre's concept of converting the traumatic memory, with its unconscious repetition of the past, into a narrative memory which chronicles the past. Joshua Hirsch elucidates a significant characteristic of films representing trauma, it is the rejection of the "classical realist forms of film narration traditionally used to provide a sense of mastery over the past" (3). This concretizes the idea that the past cannot be quelled which is manifested in the film through the encroachment of the past on the present and the confusion between chronological timelines. The presentation of trauma through the clay figurines break the realist convention and the trauma becomes disembodied.

Panh's presentation corroborates Sutton's comment that trauma is "not only the retarded effect of an external accident but also something in excess of that original accident, the sense that the effects of the accident exceed, symptomatically and temporarily, the accident itself" (390). This concurred with Cathy Caruth's statement that the traumatized "carry an impossible history within them, or they become themselves the symptom of a history that they cannot entirely possess". (5)

Rithy Panh, director of *The Missing Picture* (L'Image manquante), is himself a victim/survivor of the atrocities inflicted on the people of Cambodia on the entry of Khmer Rouge army into Phnom (Capital of Cambodia) on April 17, 1975. The next

few years were marked by systematized murder and the concomitant horrors perpetuated by these murderous regime. The documentary revisits and recreates the life-altering events that occurred between 1975-79. Panh realized that the situation created a distinct generational experience that needs space to be explored.

Khmer Rouge established their control over the capital city of Cambodia and exerted absolute control over people's existence, identity and memory. They denied people the possession of their past and as Ben Kiernan in his "Introduction" to *Children of Cambodia's Killing Fields: Memoirs by Survivors*, "A World Turned Upside Down", states they were coerced to transform their dress, language, family structure, and actions. They redefined the accepted norms and sought to form a new society without memory. Kiernan underlines the transformation by mentioning the contrast between the pre-revolutionary language where the word 'kruosaa' meant family, however under the Khmer Rouge it came to mean spouse and excluded the children as an integral part of the family unit. Thus, under their self-professed laws children belonged not to their parents but to the Khmer Rouge's ruling organization. Philip Short underscores Pol Pot's regime and its radical changes as-

Pol's aim was to plunge the country into an inferno of revolutionary change where, certainly, old ideas and those who refused to abandon them would perish in the flames, but from which Cambodia itself would emerge, strengthened and purified, as a paragon of communist virtue. The goal was not to destroy but to transmute (288)

Khmer Rouge's plan to violently acquire and erase the history of several thousands of people did not reach fruition as the memory of the lost past continued to haunt the Cambodians. Their objective was the establishment of an idealized land an "imagined geography" or "geopolitical vision" (Tyler et al, 1286) The population displaced

from Phnom Penh were coerced to re-locate to camps in the countryside where the process of transformation would take place.

The Khmer Rouge's beleaguering and debilitating presence could be felt, even after their expulsion from authority, in the form of the ineradicable impression that their hostility left on the Cambodian psyche. Their attempt at disseminating a sole narrative of the event decelerated the official recognition of the troubled histories and in several of his documentaries, for instance, *Site 2* (1989), *Bophana, une tragédie cambodgienne* (1996), and *S-21: la machine de mort Khmère rouge* (*S-21: The Khmer Rouge Death Machine*, 2003) and *The Missing Picture* (2013) Panh has aimed at providing a structure to the thousands of incoherent narratives.

The past is often re-visited and re-imagined thereby creating the possibility for (re)collecting, (re)witnessing, (re)writing and forwarding the legacy of trauma. Panh through *The Missing Picture* aims to, as Annette Hamilton states, create a "cinema of witness" (8) and this is an attempt to restore the unrecalled voices. Panh revisits the spaces and people that were transformed in an attempt to unravel the terrors and atrocities faced during an officially unrecognized genocide. He employs his camera to present the country's past which encapsulates his own traumatizing life. The director turns the camera onto himself and this entails the issues of reviving the repressed hauntings. The Khmer Rouge had efficiently destroyed any source of information or evidence and irretrievably altered the physical space therefore in the absence of corroborative testimony Panh himself is distanced from his life before the onslaught. He had been an integral part of the Cambodian population that was displaced by the Khmer Rouge in order to create their self-professed utopia. *The Missing Picture* is taking into consideration the fact that its director is himself an exiled man attempting to bridge an unbridgeable gulf between the temporal spaces.

Suzanne Kaplan, in her study of child survivors of traumatic events, employs the word "generational collapse" (97) to highlight the agonizing experiences of those children who underwent trauma during their formative years. The overwhelming experience causes a dissociation from the previous generation and its memories. The traumatization of children leads to losing the connection to history, culture, and traditions which are passed down between generations. This interruption leads to complex recurring ramifications of trauma that continues to haunt the child and they encounter issues regarding identity formation and expression. The lost history has been expressed in the space that had suppressed it. Panh is playing with and questioning the personal and collective narratives that shape each other and the country's history and memory.

In *The Missing Picture*, Panh employs an alternative way to approach and represent the past which perpetually returns to haunt the present. He uses fantasy to provide a means to reconstruct the past and underline its influence on the present where the retelling of the past happens. In order to emphasize the ambiguities (in the absence of recorded history) he creates a world which is an amalgamation of the imaginary and the real.

The absence of testimony and records from the period facilitates Panh's use of fantasy to recollect, represent and recount the past. In this process he controverts the official records of the Khmer Rouge incursion. The employment of fantasy ensures the reduction of the inflated reputation of Khmer Rouge's narrative and creates space for the counter-memory which is replete with silenced histories and muffled screams. The premeditated suppression gets tackled by Michel Foucault's concept of counter-memory where he interrogates the veracity of history as the absolute knowledge and creates a pluralistic space and claim on the past. The mainstream dominant record of history according to the political requirements is invalidated while accentuating the idea of multiplicity of shared

experiences (geographical, political, ideological, generational) and its influence on the personal memories. This can be traced in Maurice Halbwachs' discussion on the role of social groups in perpetuating their "collective" pasts. (25) His ideas highlight that individual memory is always connected to the collective memory.

The documentary film comprises images of the past constructed or extracted by Panh from old film footage, photographs and excerpts from his other films. He resorts to three-dimensional representation with clay statuettes (miniature figures) and objects set against the backdrop of a turbulent Phnom Penh. The figurines are a simulation therefore blur the demarcation between real and imaginary, true and false. The voiceover narration is written by Panh, delivered in French by Randal Douc while the English version is narrated by Jean-Baptiste Phou, it serves as a pseudo-testimony in the film. This has raised the question of credibility of an oral account from a young mind impaired by trauma. The clay figurines despite their innate immobility as well as silence are oscillating between the individual (and collective) faded memories and the film's fabricated setting.

Rithy Panh as a middle-aged man realized that the situation, which his adolescent self had sustained, created a distinct generational experience that needs space to be explored. The film focuses on the restorative potential of artistic expression however, it refuses the idea of reconciliation and instead adopts the style of a quest for personal closure. Panh visualizes the relics of trauma while emphasizing the difficulties of dealing with memory and objectivity. The visual narrative is fragmented and cyclical in nature refusing the possibility of coherence and chronology in traumatizing experience.

The clay figurines (handcrafted and hand painted) present the perpetuation of the trauma of violence. They are the means for the viewers to visualize the acutely distressing events and even in their

inanimate existence they are the representatives of the suffering Cambodian population. As they are simulations they are representing a past that is mediated through the present.

As a child Panh had crafted several animal figurines and this act of returning to a childhood memory of leisurely activity in order to bring to fruition an adult's profession can be seen as a contrast between the life before and after the regime. Leshu Torchin, in *Creating the Witness: Documenting Genocide on Film, Video, and the Internet*, states that the adult Panh's evocation of a memory from his childhood is now blighted by the "earth of a place that holds the bones of the lost and from which many of the survivors were exiled" (37). She also remarks that the "clay figures embody two challenges of representation: the one that occurs when the magnitude of history (and its horrors) defies contained expression and the one that addresses a still-current experience of trauma that requires integration into a personal narrative." (37)

The statuettes are the size of the sculptor's palm. They are the protagonists employed to present the contemporaneous situation however, they are inanimate and immobile objects which populate the constructed spaces that are created through photographs, dioramas and archival footage. They aid in the acceptance of the fact that though the past is resurrected it remains irretrievable.

"Panh rejects documentary naturalism as a style that requires the posture of complete revelation and the production of a spectacle that risks producing a more complacent viewer. Such a viewer would enjoy the certitude of knowledge and emotional satisfaction, rather than experience the distance and difficulties embedded in a project of reclamation that is more process than statement." (Torchin 37). This becomes evident in the use of faded photographs that are incapable of disclosing much information highlighting the interstices in recollected past. Panh dexterously uses empty spaces with quotidian items lying unattended and food left on the table unserved

in the wake of Khmer Rouge's incursion. He uses rail coaches to portray the situation of displacement and a coerced journey to the countryside away from the capital city. The black and white footage show these statuettes being shifted to labour camps and the narrator remarks "Phnom Penh's deportation is a missing picture". (Panh 00:39:23-00:40:28) The undocumented experiences are unveiled. The troubled histories which were conveniently erased are being recorded through the figurines which also demonstrate the dehumanization and emotional regression of the human sufferers.

The intertwining of the collective memories with the personal memory raises certain complexities. Panh's memory explicitly records his home and the labour camps however, under the vagaries of time these places have transformed to become unrecognizable. The space of the house has undergone several usage like a gambling den, a karaoke bar, and a brothel. The childhood was lost and thereby the essence of home is lost, the narrator declares that the place has become "voided, torn from its history" and this gives the site of trauma a voice of its own. Panh recreates his home simultaneous to this statement with all its details and necessary markers and fills it with joyous, content figurines to illustrate with certitude that he remembers the past that continues to be a part of his identity.

Panh depicts children playing in the garden with their laughter echoing in the backdrop however, in another sequence he presents the viewers with the fact that he had witnessed these children dying. The images and spaces that reflect contentment, tranquility and felicity are constantly fading into the background underlining that these places and emotions are mere spectres conjured from the director's memory. He exhibits a scene where the Khmer Rouge's soldier enters this blissful home with a gun thereby juxtaposing the archival footage and the recreated space. The pristine premises is sabotaged by the brutal forces.

A scene delineates the idea of defiance and assertion when a figurine is shown dressed in bright orange shirt with yellow polka dots, a negation of the Khmer Rouge's edict of an all-black uniform (which the other figurines donned). This is the representative of young Panh shown sitting on a hammock, Panh's disobedience is physical and against the imposed homogenizing of the Khmer Rouge. His figurine stands out and is noncompliant in his appearance and words. He is articulating and narrating stories to the silenced comrades. In the contemporary situation of voicelessness the narrator describes how the young Panh is creating space for sharing fantasies. This could be seen as a sign of hope and power, the desire to never succumb to the malignant or the privileged position. Fantasy thus, forms an integral part of protest providing a means to face vicious reality and to create an alternate reality which furnishes a way of survival and the ability to create a counter narrative.

Panh portrays the several deaths that he had witnessed, death of his nephews and his father due to involuntary and voluntary starving respectively. He shows a figurine flying in the sky representing his desire to survive and escape the atrocities being inflicted on them. He collocates a photograph of a healthy child from the pre-incursion period with the tormenting tale of the dead figurines denoting his famished nephews and niece. He presents the death of his father as an act of resistance and can only provide a funeral of words to him. The narrator states the father's opinion- "many resisted many in silence....sometimes silence is a scream" (Panh 1:30:31-1:30:47)

Dauge-Roth in the study of films based on genocide states the conflict between the subjectivity of remembering and experiencing the past and the objective nature of the camera recording the experiences. The essay states-

the personalized history through which we are invited to reflect on the genocide's History rests upon an arrangement of images and

plot according to a particular set of themes and issues, which not only represent a memorialization of the past but also a deliberate positioning within the present ...[the films] put forward a version of history that both conditions what is judged to be worthy of memory and determines....the possibility of readability. (170-171)

K. Ruhorahoza, the director of *Grey Matter*, another film based on genocide, in conversation with Noosim Naimasiah states that the absence of chronological narration creates space for the simultaneous existence of memory, enactment and the lived experiences where this simultaneity indicates “the temporality of pain and the multiple realms it occupies”. (Warscapes)

The *Missing Picture* highlights the anguish which is concealed deep within the crevices and fills in the apertures in Cambodia’s collective history by revisiting Panh’s own past and his memories of the country’s past. In the film the past negotiates with the present as it narrates Panh’s experience and survival of the Khmer Rouge as well as his present experience of living with those memories. As Nicki Hitchcott in her research on genocide survivors had commented that the survivor of a traumatic event is not capable of processing and possessing the past instead he is possessed by it. She further elucidates that, though a trauma survivors often attempts to unremember, believing that the memory would fade away, the memories return anyway in the form of nightmares that need to be addressed. The images of the aftermath of the genocide were available, but their journey to the public domain was impeded. The images that are imprinted on the collective memory were photographs that came to public attention via the proliferation of international documentary and fiction films about similar genocidal events across the globe.

In 1979, when the Vietnamese army overthrew the Khmer Rouge regime causing the retreat of the despotic power they

continued to be an absent–presence in Cambodia. The people could not escape the cycle of their recent past's harrowing experience which persisted in their consciousness and continued to control their lives completely overshadowing their memories of the pre–Khmer Rouge existence. This created a lack of continuity in life due to a dissociation from the past, the fragmented life histories create a fracture which causes a child or an adolescent to become rathe–ripe (prematurely developed) and their biological age or chronological growth is thwarted. The young survivor thus becomes incapable of assimilating the inundating traumatic event and is emotionally encumbered.

Panh produced this film while living in France and this displacement and emotional distance provides a depth to his portrayal of yearning for his home. In recounting his return to the site of the past, Panh is recording the story of its loss. The troubled histories, troubled spaces, initial expulsion, being orphaned and a permanent displacement has left Rithy Panh embittered and compels him to narrate the sufferings of several traumatized souls that remained unrecorded in history. Though there still exists the haze of uncertainty shrouding this tumultuous period, Panh's attempt creates a new spaces for narrating individual and collective memory of the trauma. This returns the agency that was lost providing an opportunity to heal and to find more pictures that continue to remain missing from Cambodia's past.

“of course I haven't found the missing picture I looked for it in vain” (Panh 1:32:18–1:32:26)

Bibliography :

Caruth, Cathy. “Introduction.” *Trauma: Explorations in Memory*. Johns Hopkins University Press, 1995, pp. 3–12.

- Dauge-Roth, Alexandre. *Writing and Filming the Genocide: Dismembering and Remembering Traumatic History*. Lexington Books, 2010.
- Halbwachs, M. *On Collective Memory* (Heritage of Sociology Series). Translated by L. A. Coser, University of Chicago Press, 1992.
- Hamilton, Annette. "Witness and Recuperation: Cambodia's New Documentary Cinema." *Concentric: Literary and Cultural Studies*, vol 39, no. 1, 2013, pp. 7-30.
- Hirsch, Joshua. *After Image: Film, Trauma and the Holocaust*. Temple University Press, 2004.
- Kaplan, S. *Children in Genocide: Extreme Traumatization and Affect Regulation*. The International Psychoanalytical Association, 2008.
- L'image manquante* (The Missing Picture). Directed by Rithy Panh, Catherine Dussart Productions, 2013.
- Naimasiah, Noosim. "In Conversation with Kivu Ruhorahoza." *Warscapes*. <http://www.warscapes.com/conversations/conversation-kivu-ruhorahoza>. Accessed 26 March 2024.
- Short, Philip. *Pol Pot: The History of a Nightmare*. John Murray Publishers, 2004.
- Sutton, Paul. "Afterwardsness in Film." *Journal for Cultural Research*, vol. 8, no. 3, 2004, pp. 385-405. doi:10.1080/1479758042000265000.
- Torchin, Leshu. *Creating the Witness: Documenting Genocide on Film, Video, and the Internet*. University of Minnesota Press, 2012.
- Tyler, James A., et al. "Nature, Poetry, and Public Pedagogy: The Poetic Geographies of the Khmer Rouge." *Annals of the Association of American Geographers*, vol. 105, no. 6, 2015, pp. 1285-1299.

Application of CRISPR–CAS9 genome editing in enhancement of salinity tolerance in Rice

Anasua Das^{1*}

Oisi Konar¹

Disha Chakraborty¹

Trishita Saha¹

Abstract :

Salinity, an important abiotic stress significantly affects the yield of rice plants, thus posing a major threat to food security globally. The most eco-friendly and sustainable solution to this rising problem is to breed stress-tolerant rice varieties. Recently, genome-editing technologies have been employed to create genetically superior varieties of rice plants. CRISPR/Cas9 genome editing technology have great potential to develop crop varieties with enhanced tolerance against abiotic stresses. The technique is being effectively used for targeted gene editing to enhance salinity tolerance in rice. In this review, we discussed the various applications of CRISPR/Cas9 for salinity tolerance in rice plants.

Keywords: abiotic stress, genome editing, salinity tolerant rice plants

^{1*}Assistant Professor, Department of Botany, Shri Shikshayatan College, Kolkata 700071; anasudas@yahoo.com

¹Semester VI, Department of Botany, Shri Shikshayatan College.

*Corresponding author

Introduction:

Rice is a significant cereal crop that accounts for the staple food for more than half of the world's population. It is the major source of carbohydrates for most Asians. A typical milled rice grain is mainly composed of up to 80%–90% starch, with an average of 6%–8% protein and some trace amounts of dietary fiber.

It is estimated that the world's population can rise to 8.5 billion by 2030, and about a 25% increase in rice production would be required to meet the global food demand by then. Rice is highly sensitive to climate change. Severe drought, heat, salinity, cold, deviation in precipitation pattern, increasing diseases, and insect pest attacks have serious effects on rice yield and nutritional quality. Thus, as a major food crop, new climate-smart rice cultivars are being developed that can withstand changing climatic conditions to feed the ever-growing human population. New plant breeding technologies, especially gene editing, could be an effective alternative to conventional plant breeding technologies that can help to end hunger and ensure global food security.

Salinity: an alarming abiotic stress

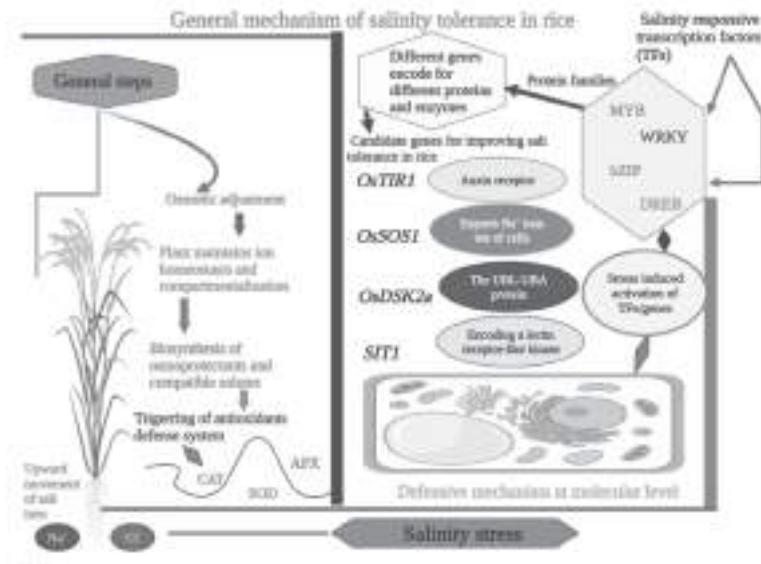
Abiotic stresses such as drought, heat, cold, salt, and metals are the major challenges that negatively affect agroecological conditions and agricultural production. Such abiotic factors lead to several changes at the plant's morphological, physiological, biochemical, and molecular levels, resulting in low yield and production losses globally. Among these abiotic stresses, salinity poses one of the major threats to crop production because most crop plants cannot grow under a high concentration of salt. Over 400 million hectares of land throughout the world have been affected by salinity.

Rice has been categorized on the list of salt-sensitive crop, and salinity limits production at the maturity stage. Rice seed germination is one of the main traits affected by salinity stress, which causes poor seedling growth. Salinity stress affects plant height and tillers per plant, reduces dry matter yield, impairs rice growth and production, and leads to complete yield loss depending on its

concentration and genotype. Phenolic and flavonoid contents, sugar contents, pigments, and enzymatic activity are strongly affected by salinity stress in rice. High salinity levels in the soil limit the water and nutrient uptake by plants, leading to hyperosmotic stress. Salt stress causes an imbalance between cytosolic-free sodium and potassium ions. This imbalance leads to ion toxicity in the cell. Salinity-related sodium ion toxicity leads to increased production of reactive oxygen species (ROS). ROS production hampers plant productivity due to DNA damage, protein denaturation, lipid peroxidation, and impaired enzyme activity.

Mechanisms of Salt Tolerance in Rice :

Salinity tolerance in rice is controlled through a complex and interacting network of multiple genes. The mechanisms of salinity tolerance include ion exclusion, tissue tolerance, and osmotic tolerance or adjustment. The ion exclusion involves the exclusion of toxic salt ions (Na^+ and Cl^-) from roots and prevents their uncontrollable concentration in the leaves. The osmotic tolerance mechanism is controlled by a signaling network and is triggered before ion accumulation. Tissue tolerance involves Na^+ sequestration in the vacuole and the production of solutes and enzymes capable of detoxifying ROS. The genes involved in the tolerance mechanism are OsNHX, OsSOS1 (Na^+/H^+ antiporters), OsTPC1 (Ca^{2+} permeable network), OsCLC1 (Cl^- network), and OsNRT1. The genetic dissection of salt-tolerant regions using the QTL mapping technique allows the identification of genomic regions involved in salinity tolerance and ensures the effective introgression of candidate genes through marker-assisted selection (MAS).



Activation of different salt-responsive TFs and genes

Figure adapted from Molecular tools, potential frontiers for enhancing salinity tolerance in rice: A critical review and future perspectives, *Frontiers in Plant Science*; vol. 13.

CRISPR-Cas Genome Editing :

The CRISPR-Cas9 (Clustered Regularly Interspaced Palindromic Repeats-CRISPR-associated Protein9) system is a modern, robust, and efficient genome editing technology that can generate targeted genetic changes in crop plants without introducing foreign DNA, a major controversy in the acceptance of genetically modified organisms (GMOs) developed through transgenic breeding methods.

The CRISPR/Cas9 system is a prokaryotic RNA-mediated adaptive immune system in bacteria and archaea that protects against phages and other foreign genetic elements. 50% of bacterial genomes and almost 90% of sequenced archaea contain CRISPR-Clustered Regularly Interspaced Short Palindromic Repeats. The CRISPR array possesses serial repeats of 24–50 bp long sequences that are

separated by evenly sized rare sequences named spacers. Spacers are short DNA sequences obtained from exogenous pathogens. CRISPR and Cas proteins together form the CRISPR/Cas system. Two classes of CRISPR/Cas systems based on Cas proteins were identified: class I and class II. Each class is subdivided into three types. Class 1 has type I, type III and type IV and class 2 has type II, V and type VI.

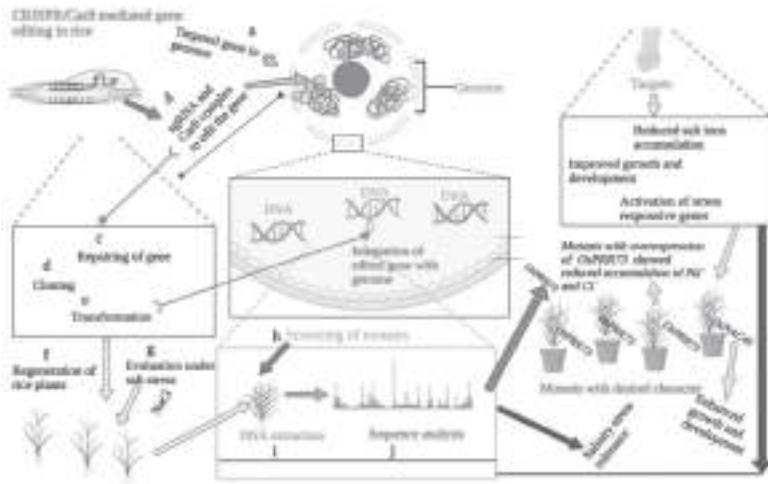
The type II CRISPR/Cas system adopted from *Streptococcus pyogenes* has been widely used as a CRISPR/Cas9 genome editing tool.

The CRISPR-Cas9 action mechanism :

In Stage I (Adaptation), the spacer is modified due to the integration of the protospacer, generating a new spacer. A protospacer is a genetic sequence of invaders that assembles into a spacer. Cas9 endonuclease identifies the Protospacer Adjacent Motif (PAM) region and produces functional spacers.

In Stage II (Expression and Maturation), spacer sequences are integrated into the CRISPR array, leading to the transcription of pre-CRISPR RNA (crRNA) into mature crRNA. The leading sequence of the CRISPR loci located upstream of the CRISPR region acts as a promoter.

In Stage III (Interference), Cas9 endonuclease binds to the CRISPR DNA region. Cas9, along with sgRNA, identifies the target DNA. The single-guide RNA (sgRNA) comprises crRNA and transactivating CRISPR RNA (tracrRNA). sgRNA guides Cas9 to the site where invader DNA and sgRNA bind. Cas9 initiates cleavage upon activation by melting the bases of the target DNA. CRISPR/Cas9 is efficient in the precise cleavage of DNA. These precise cuts ensure the elimination of unwanted genes and the insertion of desired genes in plants.



CRISPR/Cas9-mediated gene editing in rice

Figure adapted from Molecular tools, potential frontiers for enhancing salinity tolerance in rice: A critical review and future prospective; *Frontiers in Plant Science*; vol13.

Application of CRISPR/Cas9 for salinity tolerance in rice:

The CRISPR/Cas9 gene-editing technique has been effectively used for targeted gene editing to enhance salinity tolerance in rice. The mutant rice plant with the edited *OsRR22* gene, which controls the salinity tolerance in rice, showed considerable differences in plant height and total fresh weight. Gene *OsDST*, edited by CRISPR/Cas9, showed significant improvement in salinity tolerance in the indica elite cultivar. Different transcription factors have been edited to enhance salinity tolerance in rice. *OsbHLH024* gene mutants showed an increase in shoot weight and chlorophyll contents, a considerable improvement in antioxidant activity, and a reduced level of ROS. The *OsmiR535* gene mutant showed enhanced resistance to NaCl in mutants (Yue et al., 2020). CRISPR/Cas9-mediated circle RNA loci (circRNA) deletion can

increase salinity tolerance in rice. Mutant Os05circ02465 showed increased salinity tolerance during the seedling stage. Genes like OsPRR73 involved in sodium homeostasis are key targets for CRISPR/Cas9 to mediate plant growth under salinity stress. The CRISPR/Cas9-mediated mutants of OsPRR73 showed significant improvement in salinity tolerance by reducing cellular Na⁺ accumulation. The osRR9 and osRR10 double mutants could modify the expression of multiple genes and be functionally differentiated to control stress responses. The osgi-101 mutant developed by CRISPR/Cas9 is salt-tolerant. The rice gene OsMPT3 is an important osmotic regulatory factor that enhances salinity tolerance. CRISPR/Cas9-mediated mutagenesis of OsMPT3 revealed that this gene modulates adenosine triphosphate (ATP) synthesis, reduces ion accumulation, and increases salinity tolerance. Members of TFs families play a key role in responding to salinity stress in rice. Overexpression of OsNAC3 reduces salt accumulation and increases salinity tolerance in rice. CRISPR/Cas9-mediated mutagenesis of BEAR1 exhibited significant changes in rice under salt stress. BEAR1 expression is induced by salinity stress and is dominantly expressed in the root, seedling stage, and spikelet. BEAR1 enhanced salinity tolerance in rice by regulating the expression of salt-responsive genes and ion transport. BG3 is involved in the synthesis of purine permease and is responsible for the transport of cytokinin hormone. Studies showed that BG3 mutants were hypersensitive to salinity stress, and mutants with overexpression of BG3 exhibited improved tolerance to salinity stress and large grain sizes. Heterotrimeric G proteins are involved in regulating stress responses in plants. CRISPR-Cas9-based null mutations in G protein-encoding genes (*gs3* and *dep1*) induced salinity tolerance. In open stomata 2 (*ossst*) mutants, a lowering of K⁺ concentration and improved morphological growth have been observed. CRISPR-Cas9-based disruption of the violaxanthin deepoxidase (OsVDE) gene has improved salinity tolerance, followed by an increased ABA level, a higher survival rate, and stomatal closure. Soil surface rooting 1 (OsqSOR1) gene is a homolog to deep rooting 1 (AtDRO1) gene that controls shallow root growth angle. One bp substitution in the 3rd exon of

the OsqSOR1 gene caused premature truncation and produced soil surface roots, which improve salinity tolerance. Likely, double mutants of the extra-large GTP-binding protein (*osxlg1/osxlg4*) genes also increased root length, which led to improved salinity tolerance. The use of the latest Cas9 variants, like Cas10, 12, and 13, may have higher efficiency than Cas9. In the future, the use of prime editing (PE) and base editing (BE) systems will ensure the incredible success of gene editing for salinity tolerance in rice.

Conclusion :

Rice is a major staple food for around 50% of the world population, mainly in Asian countries. Rice responds to salt stress by adopting morphological, physiological, and biochemical mechanisms. The plant maintains ion homeostasis, reduces the Na⁺/Cl⁻ ratio, and scavenges ROS in the cell by various mechanisms. The genetic mechanism of salinity stress tolerance is complex and needs further study. Molecular breeding approaches are more advantageous compared to conventional techniques. The efficacy of salt breeding can be enhanced by genome editing methods. Furthermore, the production of rice in extreme environmental conditions is also possible. The CRISPR/Cas9-based genome editing system offers many avenues for scientists to modify the sequence of interest in the plant genome. The CRISPR/Cas9 genome editing system has been widespread in the plant science field within the past few years and has been utilized in many studies to improve cereal crops. In the future, this technology may help researchers develop tolerance against multiple abiotic and biotic stresses simultaneously in order to save time and resources.

References :

- 3000 Rice Genomic Project (2014). The 3,000 rice genomes project. *Gigascience* 3:7. doi: 10.1186/2047-217X-3-7
- Alam, M. S., Kong, J., Tao, R., Ahmed, T., Alamin, M., Alotaibi, S. S., et al. (2022). CRISPR/Cas9 mediated knockout of the OsbHLH024 transcription factor improves salt stress resistance in rice (*Oryza sativa* L.). *Plan. Theory* 11: 1184.

- Amirjani, M. R. (2011). Effect of salinity stress on growth, sugar content, pigments and enzyme activity of rice. *Int. J. Bot.* 7, 73–81. doi: 10.3923/ijb.2011.73.81
- Ali, U., Shar, T., Ahmad, R., Khatoon, M., Khaskheli, M. A., Laghari, A. H., et al. (2021). Salinity stress—a threat to rice production breeding strategies to develop salinity tolerance in plants. *Meh. J. Sci. Tech.* 1, 13–17.
- Almeida, D. M., Gregorio, G. B., Oliveira, M. M., and Saibo, N. J. (2017). Five novel transcription factors as potential regulators of OsNHX1 gene expression in a salt tolerant rice genotype. *Plant Mol. Biol.* 93, 61–77. doi: 10.1007/s11103-016-0547-7
- Campbell, M. T., Bandillo, N., Al Shiblawi, F. R. A., Sharma, S., Liu, K., Du, Q., et al. (2017). Allelic variants of OsHKT1; 1 underlie the divergence between indica and japonica subspecies of rice (*Oryza sativa*) for root sodium content. *PLoS Genet.* 13:e1006823. doi: 10.1371/journal.pgen.1006823
- Channa, G. S., Mahar, A. R., Memon, A. H., Bhagat, M. A., Saand, M. A., Mirbahar, A. A., et al. (2021). Effect of salinity on emergence and early growth stages of aromatic and non-aromatic Rice (*Oryza sativa* L.) genotypes. *Biol. Sci.-PJSIR* 64, 64–74. doi: 10.52763/PJSIR.BIOL.SCI.64.1.2021.64.74
- Chapagain, S., Singh, L., Garcia, R., Pruthi, R., Concepcion, J., Coronejo, S., et al. (2021). “Molecular breeding for improving salinity tolerance in rice: recent progress and future prospects,” in *Molecular Breeding for Rice Abiotic Stress Tolerance and Nutritional Quality*. eds. A. H. Mohammad, H. Anwar, H. Lutful, M. I. Khandakar, K. Arvind and H. Robert (John Wiley & Sons Ltd.), 26–52.
- Chen, H.-C., Chien, T.-C., Chen, T.-Y., Chiang, M.-H., Lai, M.-H., and Chang, M.-C. (2021a). Overexpression of a novel ERF-X-type transcription factor, OsERF106MZ, reduces shoot growth and tolerance to salinity stress in rice. *Rice* 14, 1–18. doi: 10.1186/s12284-021-00525-5
- Chen, T., Shabala, S., Niu, Y., Chen, Z.-H., Shabala, L., Meinke, H., et al. (2021b). Molecular mechanisms of salinity tolerance in rice. *Crop J.* 9, 506–520. doi: 10.1016/j.cj.2021.03.005
- Dai, L., Li, P., Li, Q., Leng, Y., Zeng, D., and Qian, Q. (2022). Integrated multiomics perspective to strengthen the understanding of salt tolerance in rice. *Int. J. M. Sci.* 23:5236. doi: 10.3390/ijms23095236
- Fan, Y., Zhang, F., and Xie, J. (2022). Overexpression of miR5505 enhanced drought and salt resistance in rice (*Oryza sativa*). bioRxivdoi: 10.1101/2022.01.13.476146 [Epub ahead of preprint].

- Haque, M. A., Rafii, M. Y., Yusoff, M. M., Ali, N. S., Yusuff, O., Datta, D. R., et al. (2021). Advanced breeding strategies and future perspectives of salinity tolerance in rice. *Agronomy* 11:1631. doi: 10.3390/agronomy11081631
- Jiang, D., Zhou, L., Chen, W., Ye, N., Xia, J., and Zhuang, C. (2019). Overexpression of a microRNA-targeted NAC transcription factor improves drought and salt tolerance in rice via ABA-mediated pathways. *Rice* 12, 1–11. doi: 10.1186/s12284-019-0334-6
- Khan, M., Kamal, S., Saeed, M., and Iqbal, J. (2016). Quantitative trait locus mapping for salt tolerance at maturity stage in indica rice using replicated F2 population. *Braz. J. Bot.* 39, 641–650. doi: 10.1007/s40415-016-0272-0
- Le, T. D., Gathignol, F., Vu, H. T., Nguyen, K. L., Tran, L. H., Vu, H. T. T., et al. (2021). Genome-wide association mapping of salinity tolerance at the seedling stage in a panel of Vietnamese landraces reveals new valuable QTLs for salinity stress tolerance breeding in rice. *Plan. Theory* 10:1088. doi: 10.3390/plants10061088
- Liu, X., Xie, X., Zheng, C., Wei, L., Li, X., Jin, Y., et al. (2022c). RNAi-mediated suppression of the abscisic acid catabolism gene *OsABA8ox1* increases abscisic acid content and tolerance to saline-alkaline stress in rice (*Oryza sativa* L.). *Crop J.* 10, 354–367. doi: 10.1016/j.cj.2021.06.01
- Moin, M., Saha, A., Bakshi, A., Madhav, M., and Kirti, P. (2021). Constitutive expression of ribosomal protein L6 modulates salt tolerance in rice transgenic plants. *Gene* 789:145670. doi: 10.1016/j.gene.2021.145670
- Nazir, R., Mandal, S., Mitra, S., Ghorai, M., Das, N., Jha, N. K., et al. (2022). Clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated genome-editing toolkit to enhance salt stress tolerance in rice and wheat. *Physiol. Plant.* 174:e13642. doi: 10.1111/ppl.13642
- Nutan, K. K., Singla-Pareek, S. L., and Pareek, A. (2020). The Saltol QTL-localized transcription factor *OsGATA8* plays an important role in stress tolerance and seed development in Arabidopsis and rice. *J. Exp. Bot.* 71, 684–698. doi: 10.1093/jxb/erz368
- Rasheed, A., Hassan, M. U., Aamer, M., Batool, M., Sheng, F., Ziming, W., et al. (2020d). A critical review on the improvement of drought stress tolerance in rice (*Oryza sativa* L.). *Notulae Bot. HortiAgrobot. Cluj-Nap.* 48, 1756–1788. doi: 10.15835/nbha48412128
- Rasheed A, Li H, Nawaz M, Mahmood A, Hassan MU, Shah AN, Hussain F, Azmat S, Gillani SFA, Majeed Y, Qari SH and Wu Z (2022) Molecular tools, potential frontiers for enhancing salinity tolerance in rice: A critical review and future prospective. *Front. Plant Sci.* 13:966749. doi: 10.3389/fpls.2022.966749

- Santosh Kumar, V., Verma, R. K., Yadav, S. K., Yadav, P., Watts, A., Rao, M., et al. (2020). CRISPR-Cas9 mediated genome editing of drought and salt tolerance (OsDST) gene in indica mega rice cultivar MTU1010. *Physiol. Mol. Biol. Plants* 26, 1099–1110. doi: 10.1007/s12298-020-00819-w
- Wei, H., Wang, X., He, Y., Xu, H., and Wang, L. (2021). Clock component OsPRR73 positively regulates rice salt tolerance by modulating OsHKT2; 1-mediated sodium homeostasis. *EMBO J.* 40:e105086. doi: 10.15252/embj.202010 5086
- Wu, J., Yu, C., Hunag, L., Wu, M., Liu, B., Liu, Y., et al. (2020). Overexpression of MADS-box transcription factor OsMADS25 enhances salt stress tolerance in Rice and Arabidopsis. *Plant Growth Reg.* 90, 163–171. doi: 10.1007/s10725-019-00539-6
- Xu, N., Chu, Y., Chen, H., Li, X., Wu, Q., Jin, L., et al. (2018). Rice transcription factor OsMADS25 modulates root growth and confers salinity tolerance via the ABA-mediated regulatory pathway and ROS scavenging. *PLoS Genet.* 14:e1007662. doi: 10.1371/journal.pgen.1007662
- Yuan, L., Zhang, L., Wei, X., Wang, R., Li, N., Chen, G., et al. (2022). Quantitative trait locus mapping of salt tolerance in wild rice *Oryzalongistaminata*. *Int. J. Mol. Sci.* 23:2379. doi: 10.3390/ijms23042379
- Zegeye, W. A., Tsegaw, M., Zhang, Y., and Cao, L. (2022). CRISPR-based genome editing: advancements and opportunities for Rice improvement. *Int. J. Mol. Sci.* 23:4454. doi: 10.3390/ijms23084454
- Zhang, A., Liu, Y., Wang, F., Li, T., Chen, Z., Kong, D., et al. (2019a). Enhanced rice salinity tolerance via CRISPR/Cas9-targeted mutagenesis of the OsRR22 gene. *Mol. Breed.* 39, 1–10. doi: 10.1007/s11032-019-0954-y
- Zhou, J., Yuan, M., Zhao, Y., Quan, Q., Yu, D., Yang, H., et al. (2021). Efficient deletion of multiple circle RNA loci by CRISPR-Cas9 reveals Os06circ02797 as a putative sponge for OsMIR408 in rice. *Plant Biotech. J.* 19, 1240–1252. doi: 10.1111/pbi.13544

The Essence of Rasa in Girish Karnad's play *The Fire and the Rain*

Barsha Mandal*

Deepanjan Halder**

Abstract :

Girish Karnad's play *The Fire and the Rain* is a translation of his play originally written in Kannada titled *Agni Mattu Male*. Karnad's primary story of the brothers Paravasu and Arvasu was inspired by the story of "Fruitless Penance" from C. Rajagopalachari's translation of the epic, *Mahabharat*. While narrating the lesser known stories about two sages, Raibhya and Bharadwaja including that of lord Indra and Vritra of the *Mahabharat*, Karnad incorporates various elements from the *Natyashastra* like the mask, the writer, the director, stage directions and so on. This research paper attempts to analyze the play *The Fire and the Rain* using the *Rasa Theory* propounded in the *Natyashastra*. 'Rasa', according to Bharat Muni in his book *Natyaveda*, is known as the sentiments that are aroused in the audience by the culmination of determinants (*Vibhava*), consequents (*Anubhava*) and transitory states (*Vibhavacari-bhava*).

Keywords: Myth, mythology, yajana, sacrifice, rasa, *Mahabharat*, *Natyashastra*, *Purusharthas*, drama, translation.

***Research Schoalr, University of Calcutta, Shri Shikshayatan College.

Introduction:

This paper attempts to analyze the use of Rasa Theory as promulgated by Bharat Muni in the *Natyashastra*, also known as *Natya Veda* which comprises of all the theories to be used while performing a drama. Initially meant for the sole purpose of entertainment, the distinctive form of performing arts called drama saw its development and emergence through the influence of the Western Theatre. Girish Karnad wrote his play in English called *The Fire and the Rain*, which was originally written in Kannada as *Agni Mattu Male*. With a change in the original ending of the story that occurs in *Vana Parva* (Forest Canto) of *Mahabharata* Karnad tries to explore the complexities of human emotions entangled in complex relationships.

The Original Myth of Yavakri :

Karnad's play *The Fire and The Rain* is primarily based on the mythology that appears in the epic *Mahabharata* as Yavakri's penance in chapters 135–38. Karnad was inspired by the translation of the *Mahabharata* by C. Rajagopalachari who included the lesser known stories in his translation of the greatest epic in four hundred pages. The story comprises the element of jealousy in the beginning that formulates the succeeding events in the life of a sage's son named Yavakri. The story that followed was about two sages named Bharadwaja and Raibhya, known to be good friends. Though in good terms, each of them practiced different paths. While Raibhya was a learned man living with his two sons Arvasu and Parvasu, Bharadwaj concentrated on his ascetic paths. Yavakri, son of Bharadwaja, upon realizing that his father is not given the respect that he deserves, ascended to the forest to follow arduous ascetic practices to gain knowledge directly from the gods. Indra, the lord of the gods upon witnessing this and enlightened Yavakri that knowledge cannot be gained through ascetic practices alone rather one must undergo the guidance of a good teacher to gain knowledge and become learned. Regardless of what Indra said, Yavakri was determined to sacrifice each limb of his body to the fire if he is not

given his boon of knowledge. Eventually he was granted his wish but Yavakri was warned by his father about his demise if he did not use his gift rightfully. Meanwhile drunk with lust, he violated the daughter-in-law of rishi Raibhya. Hearing this Raibhya was engulfed with anger and he tore off one hair to give birth to a rakshasa and another into another copy of his daughter-in-law. Through them Yavakri received his fatal fate. In the meantime, Bhardwaj unable to accept his son's death and he cursed Raibhya that he would be killed by his own son and later upon realizing his mistake he sacrificed himself in the fire. Thus, Parvasu committed fratricide whereas blaming the murder on his younger brother Arvasu. The story ends on a good note where Arvasu prays for everyone to come alive and is granted the same.

The Concept of Rasa :

The Indian concept of Rasa connotes the aesthetic flavor of music, literature and art. If translated, it literally means 'juice', 'essence' or 'taste' which gives rise to emotions among the audience and readers that are indescribable. The different flavors of the 'rasa' are skillfully crafted by the writer but those only fulfill their purpose when relished and experienced by the audience (*rasika*: art lover). The process includes the usage of aesthetic musical, artistic and literary methods for the evocation of emotions among the sensitive spectators. 'Bhava' or the state of mind is responsible for the creation of 'rasa' within an individual.

'Rasa' was initially a physiological term which literally referred to the physical experience of taste. The word can be traced back to the ancient medical literature where it implied the six tastes namely- acid, bitter, insipid, salty, sweet and astringent. These six types of tastes reflect upon the six bodily humors which are associated to their respective physical experiences.

The sixth chapter of Natyashastra by Bharat Muni (Sanskrit: Natyashastra) deals with the exposition of rasa through the means of performing arts. Natyashastra (estimated to be penned down in the first millennium) further inspired the work Bhasya

(commentaries and reviews) by the Kashmiri Shaivite Philosopher, Abhinavagupta, during 1000 CE. He emphasizes on the unmasking of the rasas through Indian dramas, which highlights the aesthetic traditions that revolves around the culture and rituals of India. According to the treatise, the appurtenant effect left by the performing arts is indeed entertainment, but was not intended to be the primary goal. The purpose was to transcend the audience into an incommensurable reality, often difficult to express in words. That reality would consist of bliss and ecstasy, filled with wonder and therefore, magnify the recognition of its own consciousness, reflecting on the spirituality and morality simultaneously. This consciousness reflects the spectator's own consciousness, therefore, the form of art acts as a mirror.

Bharat Muni elucidates in *Natyashastra* about how the expressions (caused by bhava) of the actor gives rise to the evocation of 'rasa'. The treatise of dramaturgy initially talked about the nine types of 'rasas' namely- Sringaram (attractiveness, love), Hasyam (mirth, laughter), Karunam (compassion), Bibhatsyam (disgust), Bhayanakam (horror), Veerum (bravery) and Adbhutham (amazement). The ninth rasa, Santam (peace), was the later addition by the later authors and altogether came to be known as the 'Navarasa'.

The working principle of 'rasa' can be comprehended better using Longinus's concept of Sublimity, which emphasizes on the effect of a lofty passage of transporting its reader. According to the Greek Philosopher, the sublime effect of a literary work should be its pivotal theme.

RASA IN THEATRE :

Rasa's Role in Sanskrit Theatre

The word 'rasa' is essential to know in the context of emotions felt by a highly sensitive person and to comprehend the subtle difference between the emotion that is felt in theatre and the same emotions felt in actual life. The most relatable emotions experienced by the audience are fear and pity, but in theatre they are enjoyed whereas,

in real life, they are irritating and annoying. Ancient Indian aesthetics resolved this problem long ago and came to a conclusion, that the audience relishes the different emotions from the actor's portrayal as he imitates them from real life experiences. Hence, the difference between the emotions in the real life experiences and the portrayal of the same emotions on stage enables the audience to enjoy those sensations indirectly. The entire psychological process can be termed as 'rasa'.

According to Praveen Jivan Chaudhury, emotions that are felt in life are sensations and experiences that are felt uninterrupted. Often not informed by thought, these emotions are passively and blindly undergone. But when entertained by drama, they are deciphered, contemplated and given a thought. Hence, they are revealed to the mind which while experiencing them, overlooks them because of a significant reason. When the audience go through the same emotions as in real life when portrayed by the actors on stage, they indirectly face their underlying emotions and enjoy them as something symbolic to their real life experiences. However, they tend to enjoy them as they take those portrayed emotions as symbols for their real experiences, charged with important underlying meanings.

Three distinct phenomena are responsible to bring the permanent mental states (nine rasas) in real life: the causes, the effects and the concomitant elements. The causes are the mental images and the facts which generate the state, the effects are the noticeable reactions by those mental images and the naturally associated elements are the additional mental disturbances that take place along with the state.

According to the etymological myth of the Natyashastra, Indian theatre does not derive from a particular ritualistic or textual Vedic element, but from the entirety of the Vedic matter, of which the very substance of the theatre is constituted. The Rig Veda, the Sama Veda, the Yajur Veda and the Atharva Veda provided Brahma with text (pathya), song (gita), acting (abhinaya) and the eight aesthetic sentiments (rasa) respectively. That is why theatre created by Brahmah is often given the status of the fifth Veda and also

known as the Natyaveda. Based on one's analysis of the compound Tatpurusa or Karmadharaya, Natyaveda can be constructed as the 'Veda about the theatre' or as 'the theatre as Veda'. The theatre that is Veda intends to educate like the 'Veda' and possibly even better.

Rasa's Role in Modern Day Theatre

Indian theatre along with the motive of experiencing it has changed to a great extent over time. The metamorphosis took place with the change in social structure, social systems, social issues and numerous foreign influences while its motive remained the same as the effect of Natya is only possible to be created with the help of 'Ras Nispatti'. Therefore, the effectiveness of theatre can only be comprehended and studied by dissecting the concept of 'Ras Nispatti'. According to Ayurveda, the Ras Nispatti plays a very vital role in an individual's mental health as it enables the person to get rid of his/her suppressed emotions which he/she avoids to face. Theatre hence, becomes a medium to reflect a person's thought in an indirect manner so that he/she can go through and at the same time, enjoy the sensations without trying to escape, thus, releasing the buried emotions.

The modern day theatres are highly inspired from the western theatre when it comes to plot and performing techniques. However, the techniques practiced in the ancient Indian theatre has percolated down and made their way in the modern Indian theatre where they have beautifully amalgamated themselves with the western influence, therefore, giving birth to a very king of a performing technique. Playwrights like Michael Madhusudan Dutta, Jyotirindranath Tagore, Rabindranath Tagore, Girish Ghosh, Mahesh Dattani, Girish Karnad, Badal Sircar, Vijay Tendulkar, Utpal Dutta, and many more have created a splendid technique of presenting and performing a play by deriving the rasa theory from both their Indian theatrical ancestry and the plot structure from its western counterparts to serve their amalgamation to not only entertain, but also to educate the audience, which was the main motto of Natyaveda.

INDIAN ENGLISH THEATRE VS THE EARLY THEATRE :

The Early Theatre

According to the Indian Mythology, the divine knowledge of Natya (drama) was bestowed upon the shoulders of Bharata, the founder of the Bharatvarsh, by the Hindu deities. The mythic founder in return wrote down a treatise on drama and performing arts (Natyashastra), which because of its ability to spread knowledge like the other four Vedas, also came to be regarded as the fifth Veda. Then he passed down the responsibility to his one hundred sons of more effective dissemination of the treatise, which ultimately gave rise to the Sanskrit drama. The most significant work in Sanskrit drama that needs to be stated is Kalidas's Avijnanamshakuntalam, which describes the mythological story of the birth of Bharata followed by all of its derivatives. Religion plays a crucial role in the Sanskrit Theatre as Hinduism proves to be the fibre of the ancient Indian drama. In the early theatre, the plays usually revolved around the Gods, heroic kings and royal sages and their class distinction was made significant by the usage of Sanskrit in plot and poetry.

Ashtadhyayee, the well-known work of the Sanskrit grammarian, Panini, which was composed circa the 4th Century BC, acknowledges many ancient Indian dramatic works and performers. Patanjali's Mahabhashya, a commentary on this very work mentions the conditions of the performers' families and that of the producers along with plays such as Balibandhan and Kamsavadha. Kautilya's Arthashastra also carries references to dances, musical instruments, performances, music and about people who earned their living from theatre. Sariputta Prakarana by the Buddhist playwright and poet, Ashvaghosa of the 3rd century BC, also throws limelight such many plays. Natyashastra upholds plays like Amritamanthana, Devasurasangrama and Tripuradaha, which deals with the origin of Indian drama with respect to the Hindu mythology.

The ancient Indian dramatic works always depicted various mental states, ideas, sensations, aspirations, desires, weaknesses and strengths, basic social and moral questions along with individual

predicaments through the fascinating image of the political, social, cultural and economic life of the ancient times.

The Modern Indian-English Theatre

When it comes to the modern Indian theatre, the English influence is prominent as the English theatre and plays had a huge role in the revival of theatre in India. Most of these English educated Indian playwrights fused the English culture with the ancient Sanskrit plays which gave rise to a new kind of plays, which attracted the elite English and Indian audience. This ultimately gave rise to the influential Bengali Theatre, the Marathi Theatre, and the Parsi Theatre, which were to leave a huge impact on the present Indian Theatre. Playwrights like Krishnan Mohan Bannerjee, Rishi Aurobindo Ghosh, Sarath Kumar Ghosh, Girish Ghosh, wrote plays like *The Persecuted*, *Vasavdutta* and many more, *Kedarnath*, *Chaitanyalila* respectively, during the period when India was made to confront the Sanskrit as well as the Western theatrical influence. Playwrights like Jyotirindranath Thakur and Rabindranath Thakur translated many western plays along with many Sanskrit plays, thus bombarding the audience with the amalgamation of two completely different cultures. Jyotirindranath Thakur translated plays like *Mrichhakatika*, *Abhijananshakuntalam* along with Shakespeare's *Julius Ceasar* which highlights the characteristics of the plays performed during that era, deriving from both the cultures.

This, further influenced playwrights like Utpal Dutta, Badal Sircar, Vijay Tendulkar, Girish Karnad, Mahesh Dattani, Habib Tanvir and many more, who took inspiration from both the Greek and the Sanskrit Theatres and plays, and incorporated their style to highlight their plot persistence in the present world.

The Use of Rasa in the Play

Girish Karnad wrote *The Fire and the Rain* together with altered dramatic elements like *Vibhava*, *Anubhava*, *Vyabharibhava*, *Sthayibhava*, and sentiments to produce a rich and immersive theatrical experience. Karnad digressed from the original myth of *Yavakri* to present a different ending of the play without the expected ending. The essential role in the plot development and

the emotional traits of the characters are conveyed by Vibhava meaning some stimuli that centers to the understanding of emotions and experiences in a drama. The tale of two brothers who were the sons of Raibhya were modelled to enact the play along with the modified ending prescribed by Karnad to enrich the audience with the working of the rasa theory. Two major crimes committed in the play were fratricide and patricide that encircled the development of the plot. Karnad skillfully depicts Anubhava, through the character of Parvasu, the elder brother of Arvasu. Arvasu loved Nittilai, the daughter of a poor man, the daughter-in-law of Brahmin Raibhya committed adultery with Yavakri while Arvasu was filled with the poison of fame above everything that he even murdered his own father and proposed false accusation of the same on Arvasu.

For instance, Vyabharibhava, which refers to the Buddhist concept of recollection of the Buddha's virtuous qualities, the direct use of it is not seen in the play however it can be visualized through the qualities of Arvasu when he is faced with the moral dilemma of whether to let his lover be reborn or let the Brahma Rakshasa attain freedom. As is seen in the play he chooses to let the Brahma Rakshasa leave after which the rain falls and the story ends. Likewise, Sthayibhava, a major emotion in the Rasa Theory, is developed by a number of minor feelings known as Vyabharibhavas. In the play, The Fire and the Rain, the Sthayibhava could refer to the overall emotion evoked by the comparison of the all-inclusive celestial expression to a display of Krishna's energy through the mention of agni and rain. It should be noted that the words fire and agni though synonymous have separate connotations in the play. The term fire used by Karnad is to represent the sacrificial fire which is pure and holy often connoted agni and is used in performing sacrificial rites or yajana. The manifestation of Sthayibhava could be seen through the vivid depiction of Krishna's power, as illustrated by the presence of agni (sacrificial fire) and rain, and the resulting feelings of energy, transformation, destruction, nourishment, and growth evoked in the audience. Thus the portrayal of several emotions like anger, fear, longing and love produces a resultant effect that evokes the

rasa in the audience. Parvasu was engulfed with anger when he knew about the performance of a play with his brother Arvasu acting as the main actor. Here one might also note the working of fear within Parvasu who was always on edge about the exposure of his patricide in front of the king. Parvasu, whose emotional mechanism was to a certain extent doubtful, later walks into the sacrificial fire and immolates himself. He always longed for his father's acceptance but could never achieve it which instigated all his decisions in the play. Similarly, the king and the others longed for rain and prosperity projecting the multifaceted nature of humans. Karnad therefore, constructs a rich tapestry of emotions using the rasa theory functioning through the different characters where each of them undergoes a separate and collective emotional development.

Conclusion :

To justify the above mentioned statements, it is to be observed that the Purushatras as the four ethical goals of human existence: dharma (spiritual sphere), artha (political and economic power), kama (sexual or aesthetic gratification), moksha (release from the cycle of births and deaths). All these work accordingly in the play despite the deliberate transgression of Karnad from the original story. The balance between the cosmic forces and the nature explores the play's thematic journey and acts as the backdrop of the play to present a detailed study of human characters with a special emphasis on their emotional side. The summative conclusion therefore states that the stories incorporated in play *The Fire and the Rain* by Girish Karnad with his deliberate modification of including play within a play highlights the significance of sentiments as mentioned in the *Natyashastra*.

Works Cited :

1. Adhikary, Anushua. "PROBING THE STINT OF RASA: NATYA?ASTRA AND FORMS OF ARTS". *EPR International Journal of Research and Development (IJRD)*. Volume: 7 | Issue: 1 |

2. Adhikary, N. M. (2014). *Theory and Practice of Communication – Bharat Muni*. Bhopal: Makhanlal Chaturvedi National University of Journalism and Communication.
3. Arjunwadkar, K. S. "The Rasa Theory and the Darsanas." *Annals of the Bhandarkar Oriental Research Institute*, vol. 65, no. 1, 1984, pp. 81–100. <https://www.jstor.org/stable/41693108>.
4. Awasthi, S. (2001). *Performance Tradition in India*. New Delhi: National Book Trust.
5. Batra, Shakti. (2011). *Girish Karnad: The Fire and The Rain*. Delhi: Surjeet Publication
6. Chattopadhyay, Subhayu. "Stage, Society and Stricture: Bengali Theatre, 1800–1876." (2014). *Vidyasagar University Journal of History Vol.2 2013–14*. <http://inet.vidyasagar.ac.in:8080/jspui/bitstream/123456789/1819/1/11.%20Subhayu%20Chattopadhyay.pdf>.
7. Dace, Wallace. "The Concept of "Rasa" in Sanskrit Dramatic Theory." *The Johns Hopkins University Press*. Vol. 15, No. 3, Oct., 1963. <http://www.jstor.org/stable/3204783>. 8. Datta, Amaresh, and Sahitya Akademi. "Category Archives: Poets and Playwrights." MAY 23, 2020. <http://mahavidya.ca/category/hindu-arts-architecture-and-culture/poets/>
9. Deshpande, G. (1989). *Abhinavagupta*. Delhi: Sahitya Akademi
10. Henderson, Ashanti. "In the classical period, plays centered on the gods, royal sages and heroic kings, —their high-caste denoted by the usage of Sanskrit and poetry—who act out their fates, which, despite." (2014).
11. Mehta, Tarla. *Sanskrit Play Production in Ancient India*. Motilal Banarasidass, 1995.
12. Palsaniya, Kaluram. "Revisiting Gender Historiography in the Specific Context of Shudraka's *Mrcchakatika*."
13. Prakash, H. S. (2007). *Traditional Theatres*. New Delhi: Wisdom Tree.
14. Sharma, Nirmala. "Catharsis and Rasa: The Intersecting Theories." *ISIRJLE*. Vol. 7, Issue. 1. February, 2016. <http://www.researchscholar.co.in/downloads/11-mrs.--nirmala-sharma.pdf>.

15. Sinha, Kanhaiya Kumar. JArs Artium: An International Refereed Research Journal of English Studies and Culture ISSN (Print): 2319-7889 • ISSN (Online): 2395-2423 Vol. 10, January 2022 Pp. 10-24 <https://www.arsartium.org> January 2022. <https://doi.org/10.36713/epra9435>

অমৃত প্রীতম : অনুভবে উচ্চারণে

চিত্রিতা বন্দ্যোপাধ্যায়*

জীবন অভিজ্ঞতার নির্মাণ সাহিত্যে— সাহিত্যের ‘প্রতি নির্মাণ’ জীবনে। অমৃত প্রীতমের লেখায় যাপন এবং সৃষ্টির পারস্পরিকতা। আত্মজীবনী মূলক লেখা ‘রসীদী টিকট’, তাঁর দীর্ঘ পথচলার উপলব্ধি— সাহিত্যে জীবনে, নির্মাণ ‘প্রতিনির্মাণ’-এর প্রাপ্তি স্বীকার, হয়তো বা এই শিরোনামে মলাটবন্দি। ‘রসীদী টিকট’-এর প্রচ্ছদে অমৃতার কথায়, ‘জন্মগী জানে কেসী কিতাব হৈ’, জিসকা ইবারত অক্ষর-অক্ষর বনতী হৈ ঔর ফির অক্ষর-অক্ষর টুটতী বিখরতী ঔর বদলতী...’ যাপিত এক-একটি মুহূর্তের মতো একটু একটু করে জমে ওঠা শব্দ সত্য ভেঙে টুকরো হয়ে ছড়িয়ে পড়ে, বদলে যায় জীবন। চেতনার দীর্ঘ যাত্রার শেষে গন্তব্য আসে— ফেলে আসা জীবনের সমস্ত শঙ্কা, প্রতিটা সকালের হতাশা, দুপুরের অস্থিরতা, সন্ধ্যার ঔদাসীন্য আর ঘুমহীন রাতের দিকে ফিরে তাকাবার সামর্থ্য তৈরি হয়। ছোটবেলায় সূর্য ডুবলেই মনে হতো, কি যেন হারিয়ে গেছে। আলোহীনতায় আবদ্ধ জীবন, সেই মহলের কোন দরজা নেই জানলা নেই, সিঁড়ি নেই আর শতাব্দী-পরম্পরা সেখানে যে পাকদণ্ডী তৈরি করেছে সেটা তাঁর চিন্তনের জন্য খুব সংকীর্ণ। জীবন একটা করে গ্রন্থি খুলে দিয়েছে, আবার নতুন গ্রন্থি পড়েছে কিন্তু এটাও সত্যি যে নিজের কাছে নিজের ছবিটা বদলায়নি।

জীবনে ভাবনায় উচ্চারণে চেনা কাঠামো, অভ্যাসের খাঁচাটাকে বারে বারেই ভেঙেছেন অমৃত প্রীতম। চড়াই উৎরাইয়ের লম্বা যাত্রায় নিজস্ব জীবনে গড়ে ওঠে একজন ‘আমি’, গড়নেই আবার তার নিজেকে অতিক্রম করা। স্মৃতিচারণ, সাক্ষাৎকার, চিঠিপত্রে, এভাবেই সাহিত্যিকার অমৃত প্রীতমের, ‘য়হ যথার্থ সে যথার্থ তক পহঁচনে কী প্রক্রিয়া হৈ’—‘যথার্থ’ থেকে ‘যথার্থ’-র দিকে এগিয়ে চলার খোঁজ। তাঁর নিজের কথায় এই চলাই একজন মানুষের প্রকৃত আত্মজীবনী, নিজস্ব কথা।

*বাংলা বিভাগ, শ্রীশিক্ষায়তন কলেজ, কলকাতা

বলেছেন, উপন্যাস গল্পে পাঠকের আগ্রহ কেন্দ্রিত থাকে কল্পিত চরিত্রকে ঘিরে কিন্তু ‘আত্মকথায়’ পাঠকের ভাবনা জুড়ে থাকে একজন পরিচিত মানুষ। এখানে লেখকের নিজের ঘরে পাঠকের আহ্বান, অনেক সঙ্কেচ-দ্বিধায় আর এটা তখনই সম্ভব, ‘জব লেখককা সাহস উসকে কিসী সচ কী অপেক্ষা কম ন হো। ইসমে কোঈ ছুট, মেহমান কা নহী, মেহবান কা অপনা অপমান হোতা হে’।^১ ১৯৬৫-তে নেওয়া এক সাক্ষাৎকারে দেবিন্দর অমৃতাকে নিজের জীবনের কথা লেখার অনুরোধ জানালে বলেছিলেন, গল্পে উপন্যাসে নিজের জীবনের কথা বলেছেন অনেকবার, সেটা তো খোলা বাগানের মতো যে কেউ আসতে পারে কিন্তু আত্মজীবনীর মধ্যে থাকে এক বিশেষ নিভৃতি। যেন একান্ত নিজের জন্য তৈরি করা বাড়ি, ‘ওঁর ফির একদিন লোগো কো বুলাকর ওয়হ বাড়ী দিখাঈ হো...’।^২ বাইরের পৃথিবী পৌঁছে গেল একান্ত নিজস্ব নিভৃতিতে। তখনও মনে হত নিজের কথা কোন সাহিত্য-রীতির আশ্রয় ছাড়া সরাসরি বললে ‘অন্তরমনের সৌরভ’ কোনো ভাবে হারিয়ে যেতে পারে। দেবিন্দর উত্তরে বলেছিলেন, অনুভব করার মতো মানুষ কমই থাকে কিন্তু তাদের জন্য কিছু মূল্য তো দিতে হবে— অমৃতার দ্বিধা ছিল তখনও নিজের কথা লেখায়। দেবিন্দর তাঁর জীবন ও সৃষ্টির ‘কুছ পরছাইয়াঁ’ ধরতে চেয়েছিলেন আলাপচারিতায়, যা রয়েছে ১৯৬৬ তে প্রকাশিত ‘কলম দা ভেদ’, কলমের রহস্য শিরোনামে অমৃতার প্রীতমের জীবন ও সাহিত্য নিয়ে লেখা বইটিতে। প্রায় দশ বছর পরে লেখা আত্মজীবনী মূলক গ্রন্থ ‘রসীদী টিকট’ (প্রথম প্রকাশ ১৯৭৬)-এর উৎসর্গ পত্রে অমৃতা বলেছেন, ‘পরছাইয়াঁ কো পকড়নে বলে! / ছাতী মে জলতী হুঈ আগ কী / পরছাঈ নহী হোতী... ‘হৃদয়ের গভীরে যে আশ্রয় জ্বলে, তার কোন প্রতিবিশ্ব হয়না— অন্তরের এই আশ্রয় থেকেই জন্ম নেয় সাহিত্য-শিল্প। লেখকের ভাবনায় একজন সৃষ্টিশীল মানুষ গ্রীক মিথোলজির ফিনিক্স পাখির মতো আত্মভস্ম থেকে বারে বারে নতুন জন্ম নেয়— প্রতিটি সৃষ্টির মধ্যে তাঁর পুনর্জন্ম। ‘রসীদী টিকট’-এর শুরুতে লেখকের প্রশ্ন কলম হাতে সেই দিনটি কি তার পুনর্জন্মের দিন। জীবনের কিছু সময়, টুকরো মুহূর্ত সময়ের কোলে জন্ম নিয়ে, সময়ের কবরেই হারিয়ে গিয়েছিল, সেগুলি তাঁর সামনে এসে দাঁড়িয়েছে কিভাবে। রুদ্ধ মুহূর্তগুলো কিভাবে ফিরে এলো। কিছুটা সময় পেরিয়ে একটা আপাত বিচ্ছিন্ন দূরত্বে দাঁড়িয়ে ফেলে আসা সময়কে দেখলে, গচ্ছিত থাকা বন্ধ দরজার চাবিগুলো অনেক সময়ে খুঁজে পাওয়া যায়, চাইলে পরে হয়তো বা নিজের মতো করে খুলে দেখাও যায়! হয়তো তখন আর তেমন সচেতনতা থাকে না সেগুলোর অস্তিত্ব সম্পর্কে, জীবন থাকতেও দেয়না— একটা গড়ে ওঠা মুহূর্তকে ভেঙে নতুন করে গড়ার দিকে তো এগিয়ে যেতেই হবে। সাংবাদিক রুমা শর্মা অমৃতার প্রীতমের কাছে জানতে চেয়েছিলেন ‘রসীদী টিকট’ কি তাঁর জীবনের প্রতিবিশ্ব বলে

গ্রহণ করা যেতে পারে? ঐ লেখা তাঁর জীবনের কতটা কাছের? উত্তরে অমৃতা বলেছিলেন— তিনি নিজে নিজের যতটা কাছের ঠিক ততটাই। ‘জিন্দেগী’ আর ‘কিতাব’, একই তাঁর কাছে— দুটোই অক্ষরে অক্ষরে গড়ে, আবার সেই অক্ষরই ভেঙে ছড়িয়ে পড়ে, বদলে যায়, আসে নতুন আখর। চেতনার লম্বা যাত্রা— অন্তর অনুভবের আখর আর কাগজে কলমের চিহ্ন, একসঙ্গেই চলতে থাকে। অন্তর বাহিরের সম্পর্ক, আদান প্রদানেই সত্যিকারের সৃষ্টি সম্ভব বলে মনে করতেন অমৃতা।

বিশ শতকের পাঞ্জাবী তথা ভারতীয় সাহিত্যে অত্যন্ত উল্লেখযোগ্য একটি নাম অমৃতা প্রীতম (১৯১৯- ২০০৫)। তাঁর সময় তাঁকে গ্রহণ করতে অস্বীকার করেছিল তার কিছু কারণ আছে, কিছু অপরাধও আছে সেই মেয়েটির। লাহোরের একটি পাঞ্জাবী মেয়ে, মাত্র ষোল বছর বয়সে (১৯৩৫) তার প্রথম কবিতার বই প্রকাশিত হয়— patriarchal bias টাকে সংশোধন করতে চেয়েছিলেন, জীবনে এবং সাহিত্যে। খুঁজতে চেয়েছিলেন গোটা মানুষের মানে— ১৯৩২-এ প্রকাশিত প্রেমেন্দ্র মিত্রের ‘প্রথমা’ কাব্যগ্রন্থের ‘মানে’ কবিতায় ছিল গোটা মানুষের খোঁজ, ‘মানুষের মানে চাই—/—গোটা মানুষের মানে। রক্ত, মাংস, হাড়, মেদ, মজ্জা/ ক্ষুধা, তৃষ্ণা, লোভ, কাম, হিংসা সমেত— / গোটা মানুষের মানে চাই’ — ১৯৮২ তে ‘কথাদেশ’ পত্রিকার সাক্ষাৎকারে অমৃতা প্রীতম ‘এক পুরে ইনডিবিজুঅল’, ‘এক পুরে আদমী’, ‘এক পুরী ঔরত’-এর কথা বলেছেন, ‘মেন হৈজ নট যট টেস্টেড দা কম্পনী অফ আ রীঅল য়ুমন, অভী তো উসনে দাসী দেখী হৈ, বেশ্যা দেখী হৈ যা গডেস (দেবী) দেখী হৈ।’^৩

‘অকেলাপন’- নিঃসঙ্গতা, নিজের সঙ্গে কাটানো মুহূর্তই তাঁকে লেখায় নিয়ে এসেছে বলে মনে করতেন লেখক। ‘কথাদেশ’ পত্রিকার সম্পাদক সুভাষ নাগপালকে বলেছেন, তাঁকে সবচেয়ে বেশি আন্দোলিত করেছে, ‘অকেলাপন’ এবং ‘দেশভাগ’। বলছেন, সৃষ্টি মুহূর্তে জীবের একাকীত্বের ভয়ও ছিল না, খুশিও ছিলনা — এটা অতীত ইতিহাস নয়, মিথ নয়, চিরকালের মানুষের ইতিহাস, তাঁরও...। ছোট থেকে তাঁর বাবাও চাইতেন অমৃতা লিখুন কিন্তু ধর্মবিষয়ক কবিতা— ‘কীর্তন সহিলে’ পাঠ, ঈশ্বর চিন্তায় তাঁর কৈশোরের শরীর মনকে সুরক্ষিত রাখতে চাইতেন। তখন থেকেই শুরু হয় অন্তরের প্রতিবাদ। বাবা যখন ঈশ্বরের কথা ভাবতে বলতেন, চোখ বন্ধ করে স্বপ্ন দেখতেন অমৃতা। তাঁকে যে অন্তরের নিদ্রিত দেবতাকে জাগাতে হবে, নানী বলতেন তাঁর জন্মস্বভূতে দেবতা নিদ্রিত ছিলেন। এক সাক্ষাৎকারে অমৃতাকে প্রশ্ন করা হয়েছিল, ‘বিরাসত’-এর গুরুত্ব কি তিনি স্বীকার করেন না। উত্তরে অমৃতা বলেছিলেন, ঐতিহ্য- উত্তরাধিকার তাঁর প্রিয় কিন্তু ‘মে’, ‘আমি’কে অস্বীকার করে নয়। পুরনো গাছের ছায়া থেকে নতুন গাছ জন্মায়, নিজের মতো করে— পুরনো

গাছের ছায়ায় নয়। তার প্রয়োজন হয় নিজস্ব আলো-বাতাস-জল, নতুন জীবনের জন্য। নতুন গাছ পুরনো গাছের অস্তিত্ব অস্বীকার করে না কিন্তু নিজের স্বতন্ত্র অস্তিত্ব নিয়ে ওর ছায়ায় বাড়তে পারে না, ঠিক তেমনই ‘বিরাসত’ তাঁর অস্তুরে উপলব্ধিতে আছে কিন্তু তাঁর অস্তিত্ব বিরাসতের ছায়ায় আবদ্ধ নয়, ‘আপনে হী বিচারো কী ধূপ ঔর পানী কো পীনা হৈ’ দেবতাদের ‘সাজিশ’-এ ঋষির তপোভঙ্গের মতো জীবন দেবতার যড়যন্ত্রেই যেন ষোল বছর বয়স তাঁর বাল্যসমাধি, ছেলেমানুষির কাল ভেঙে উপহার দিয়েছিল এক ধরণের অস্থিরতা, যা সারাজীবন বহন করেছেন— ‘অস্থিরতার শাপগ্রস্ত’ হওয়া জীবনের আশীর্বাদ বলে মনে করতেন অমৃত, ‘উস সাজিশ কো মৈ ঋণী হুঁ, কিঁউ কি উস সাজিশ কা সম্বন্ধ কেবল এক বর্ষ সে নহী থ, মেরী সারী উশ্ব সে হী।’^৪ দুটি স্বপ্নের কথা বলেছেন অমৃত প্রীতম, বারবার ফিরে আসতো— দেখতেন অনেক বড় এক দুর্গের মধ্যে সবাই তাকে বন্ধ করে। রেখেছে। বাইরে পাহারা, ভেতরে কোন দরজা নেই। পাথরের দেওয়ালে বারবার ব্যর্থ আঘাত করে, কোথাও কোন দরজা খুঁজে না পেয়ে স্বপ্নে মেয়েটি চেষ্টা করতে উড়ে যাবার। চেষ্টা করতে করতে মেয়েটি দেখতো পা ক্রমশ মাটি থেকে উড়তে উড়তে কেপ্লার দেওয়ালেরও ওপর উঠে যাচ্ছে। সামনে এসে যেত খোলা আকাশ, ‘সামনে আসমান আ যাতা হৈ। কিলে কা পহরা দেনে বালে ঘবরাএ হুএ হৈ, গুসসে মে বাঁহে হিলাতে হএ, পর মুঝ তক কিসী কা হাথ নহী পঁছচ সকতা।’ আর একটি স্বপ্নে অনেক মানুষের ভিড় তাড়া করছে তাঁকে, সমস্ত শক্তি নিয়ে দৌড়ছেন— ক্রমশ দূরত্ব কমছে, মনোবলও। আরও জোরে দৌড়ানোর চেষ্টা করছেন, সামনে ‘দরিয়া’ এসে পড়লো। পেছনের ভিড় খুব খুশি, কোথায় যাবে, রাস্তা নেই তো! তখন দরিয়াতেই নেমে পড়ল মেয়েটি, চলতে শুরু করলো— জল বইছে চারিদিকে কিন্তু আশ্রয় পেতে লাগলেন, ‘পানী বহতা রহতা হৈ, পর জৈসে উসমে ধরতী জৈসা সাহারা আ জাতা হৈ।’ —পৃথিবী পায়ের কঠিন স্পর্শ দেয়, ‘য়হ পানী নরম লগতা হৈ ঔর মৈ চলতী জাতী হুঁ’^৫— এক অনিঃশেষ চলা সারা জীবন ধরে।

বাবা যখন ধর্মবিষয়ক কবিতা লিখতে বলতেন, অমৃত কেবল জীবনের মুখ খুঁজে বেড়াতেন। ‘ষোল বছর’ তাঁর কাছে স্বপ্ন-আদর্শ ভালবাসার ‘মুখ’ খোঁজার সময়— সে ভালবাসা প্রিয় মানুষের জন্য হোক, মাতৃভূমির জন্য বা আদর্শের জন্য, ‘হসীন তসব্বুর, এক মহবুবকে মুঁহ কা হো, ইয়া ধরতী কে মুঁহ কা, ইসমে ফর্ক নহী পড়তা। ইয়হ মন সোলহবে বর্ষ কে সাথ মন কে তসব্বুর কা রিশা হৈ, ঔর মেরা ইয়হ রিশতা অভী তক কায়ম হৈ...।’^৬ তাঁর সমস্ত ভাবনার প্রকাশ লেখায়। সাহিত্য এবং জীবনের দীর্ঘ পথ চলায় ‘দেখী, সুনী ঔর বীতী ঘটনাএ’ ফিরে ফিরে এসেছে। ১৯৮২ তে ‘কথাদেশ’ পত্রিকার এক সাক্ষাৎকারে অমৃত প্রীতম সুভাষ নাগপালকে বলছেন,

একটা মোম বাতি খানিকটা আলো দিতে পারে, যতটা অংশ একটা শিখার পক্ষে আলোকিত করা সম্ভব কিন্তু সেই আলোর বৃত্ত পেরিয়ে যদি আর একটা মোমবাতি থাকে, তারপর আর একটা, আর একটা— তাহলেই তো ‘রোশনী ঢ্যতি জাএগী’। অমৃতা বলছেন, তাঁর লেখার মূল ভিত্তিই হলো, ‘যথার্থ’ যা আর ‘যথার্থ’ যা হবার কথা এটা স্পষ্ট করে দেওয়া— সেটাও তার মতে যথার্থর মধ্যেই পরে কিন্তু সেই যথার্থকে অন্তরে অনুভবে পেতে হবে। তারপরই তা আসতে পারে যাপনে উচ্চারণে। এভাবেই তো যথার্থর ক্ষেত্র বাড়বে, ‘ওয়হী যথার্থ বড়া হোতা জাতা হে’। বলছেন জীবনের টুকরো টুকরো ‘আমি’ নিয়ে এক পূর্ণ ‘আমি’র দিকে এগিয়ে চলাই জীবন, প্রকাশ। ‘মে কে আপনে সে বড়ে আপনে সে আগে ‘মে’ তক পছঁচনে কা সফর হে’— এভাবেই তো বৃত্তটা বড় হবে। বাস্তব থেকে একটু দূরে কল্পনা আর একটু পথ পেরোলেই চমৎকার আশ্চর্যের দেশ— এই দূরত্ব পার হয়েছেন অমৃতা জীবনের নানা বাঁকে, দূরত্ব পেরনোর মূল্য দিয়েছেন— বাইরের পৃথিবীতে, অন্তর অনুভবে।

অমৃতা প্রীতমের লেখায় ভাবনায় বারবার ফিরে আসছে উপন্যাসের চরিত্র আর বাস্তবে যাতায়াত— কখনও বাস্তব জীবন থেকে উঠে আসছে লেখা, আবার কখনও উপন্যাসের চরিত্র লেখককে নিজের মুখোমুখি দাঁড় করিয়ে দিচ্ছে, ভাবাচ্ছে। ‘রসীদী টিকট’ গ্রন্থে, চিঠিতে, সাক্ষাৎকারে এই চলাচল— চলতে চলতে প্রতি পদক্ষেপেই নিজেকে অতিক্রম করার চেষ্টা। একটা সময় মা না থাকা একলা মেয়েটার হাতে বাবা তুলে দিয়েছিলেন কলম কাগজ — ধর্মীয় বাতাবরণে জীবনের অন্য চাঞ্চল্যকে বেঁধে রাখার জন্য। আবার একটা সময় নিঃসঙ্গ জীবনের চরম এক একাকীত্বের সময় মনস্তত্ত্ববিদ যন্ত্রণা-পাওয়া মুহূর্তগুলো লিখে ফেলতে বলেছিলেন। কিন্তু অমৃতা তো চেয়েছিলেন নিজের এবং অন্যের মৌনতার গভীর স্তরগুলো স্পর্শ করতে— এক একটা মুহূর্ত তাই ভরে উঠেছে এক এক ধরণের উচ্চারণে। কখনও গভীর নিভৃত উচ্চারণ তাঁর নজম্-এ— সজ্জাদ চলে যাবার মুহূর্তে বা সাহিরকে হারিয়ে ফেলার সময়, ইমরোজের বোম্বাই যাবার খবর জানার পর বলা বিদেশী লেখকের গল্পে তো মিলে মিশে একাকার হয়ে গেছেন অমৃতা নিজেই। যন্ত্রণার নানা মুহূর্তে, একান্ত নিভৃত পল, কুস্তীর কর্ণকে পাবার ক্ষণে লেখা হচ্ছে নজম্ আর পাণ্ডবদের জন্মের স্বীকৃত মুহূর্তে নসর। নজম্-এ শব্দ ও নীরবতার নিবিড় সম্পর্ক, অমৃতা মনে করতেন ঠোঁটের- অনুভবের কম্পন ভাষা পায় কুস্তীর যন্ত্রণা-আনন্দ-শঙ্কায়। আর জমা বরফ যখন গলতে শুরু করে, ঐ জলস্রোত নসর হয়ে যায়। পাণ্ডবদের জন্ম স্বীকৃত, সামাজিক সম্মতিতে— কুস্তীর একান্ত নিজস্ব নয়। সৃষ্টির যন্ত্রণা তো একই শুধু পরিস্থিতি সামাজিক অবস্থান, প্রকাশের ভাষা বদলে দেয়। চেতনা অনুভবের বীজ

অঙ্কুরিত না হলে সব লেখাই মাটির খেলনার মতো ভঙ্গুর। ‘যাত্রী’ উপন্যাসের চরিত্র ‘সুন্দরা’ দেবতার পায়ে ফুল দিতে দিতে সেই রাশিকৃত ফুলের আড়াল দিয়ে দেবতার কাছে দাঁড়ানো প্রিয় মানুষটিকেই স্পর্শ করতে চায়। অমৃতার মনে হয় সুন্দরা তো তিনি নিজেই, দিনের পর দিন কবিতায় শব্দ জোড়েন, ‘ঔর চুপচাপ অপনে প্রিয় কে অস্তিত্ব কো ছুঁতী রহী’। বলছেন, ‘হাঁ ইস প্রকার কভী ইয়হ মালুম নহী হোতা কী চেতন ঔর অচেতন রচনা কর ঔর কথা রিল-মিল জাতী হৈ।’^৭

‘রসীদী টিকট’ এর ‘এক কবিতা’ শীর্ষক অংশে ‘পহচান’ কবিতা লেখার মুহূর্তটি লক্ষ্য করার— ‘চক নং ছত্তীস’ উপন্যাসটি লেখার প্রায় দশ বছর পর যখন ইংরেজি অনুবাদের প্রসঙ্গে আবার নতুন করে পড়লেন লেখাটা, মনে হলো ‘অলকা সিরফ অমৃতাতা...’ মনে হয়েছে নিজের সৃষ্ট প্রত্যেকটি চরিত্রই লেখকের নিজের অংশ, আবার তার মধ্যে একটা দূরত্বও থাকে। কিন্তু অলকার কথা পড়তে গিয়ে মনে হয়েছিল ‘ওয়হ দুরী কহী নহী হৈ’, — অলকাকে সম্বোধন করে একটি কবিতা লেখেন, ‘পহচান’— ‘কষ্ট হজার চাবিয়াঁ মেরে পাস থী / ঔর এক-এক চাবী এক-এক দরওয়াজে কো খোল দেতী থী/ দরওয়াজে কে অন্দর কিসী কী বৈঠক ভী হোতী থী / ঔর মোটে পর্দে মে লিপটা কিসী কা সোনে কা কমরা ভী / ঔর ঘরবালো কে দুঃখ/ জো উনকে হী হোতে থে, পর কিসী সময় মেরে ভী হোতে থে/ মেরে ছাতী কী পীড়া কী তরহ / পীড়া জো দিন কে সময় জাগুঁ তো, জাগ পড়তী থী, ঔর রাতকে সময় সপনো মে উতর জাতী থী/ পর ফির ভী/ ...’^৮ লেখকের কাছে থাকে সেই হাজারো চাবি, নিজের জীবন অনেক প্রকোষ্ঠের চাবিকাঠি—নানা ভাবে একটু একটু করে উন্মুক্ত হয় বিভিন্ন উচ্চারণে। দরজা গুলো যখন খুলতে থাকে অন্য সময়ে লেখকের মনে হয় যেন তারই কথা আবার সবটা তার নয়— পায়ের আগে থাকে একটা চিহ্নিত সীমা, লক্ষ্মণ রেখা। যার সাহায্যে কলমে উঠে আসা ঘর-মানুষ—তাদের যাপন-চোখের জল তাদেরকে দিয়েই ফিরে আসতে পারেন। যত লেখা ততো চাবি আর সেই চাবির অন্তরালে অজস্র ঘর, ‘হজারো হী ঘর, জো মেরে নহী, পর মেরে ভী থে,/ শায়দ ওয়ে কভী অব ভী হৈ’— যে ঘর বা তারই মতো ঘর লেখকেরই ছিল, কোনো কোনোটা হয়তো বা কিছুটা থেকেও গেছে। কবিতার শেষে বলছেন, অলকা চরিত্রের চাবিকাঠি যেন অন্য ছোঁয়া দিয়ে গেল— ঘরটা খুলে দেখলেন সেই পুরনো রক্ষা-রেখা, সেটা আর পায়ের সামনে নেই, পেছনে আর ফেরা যাবে না। অলকার ঘরে অলকা নয় আছেন লেখক নিজে। ‘পর আজ চাবী কা কৌতুক। মৈনে তেরে ঘর কো খোলা তো দেখা/ ওয়হ লক্ষ্মণ-রেখা মেরে পৈরো কে আগে নহী, পীছে হৈ / ঔর সামনে, তেরে সোনে কে কমরে মে, তু নহী, মৈঁ হুঁ...’^৯ নিজের বেদনা দিয়ে অন্যের ব্যথা খুঁজতে চেয়েছেন, ছুঁতে চেয়েছেন— সারাজীবন খুঁজছেন

ভালবাসার মুখ, প্রেমিকের মুখ, দেশের মুখ। কবিতা দিয়ে লেখা শুরু করে genre বদলে গদ্য লেখাতেই আগ্রহী হয়ে উঠলেন কেন— উত্তরে বোধহয় বলা যায়, নজম্ আর নসর অনুভবের চলাচলের দুই ভিন্ন প্রকাশ মাত্র, কুস্তীর যেমন কর্ণ আর পাণ্ডব।

কলম যখন চিস্তন আর সাধনার উচ্চারণ, সেখানে ঈশ্বরের জন্ম হয়, অমৃত্যু বিশ্বাস করতেন। ‘রসীদা টিকট’ সেই লেখকের উপলব্ধি, ‘লেখক কে রূপ মে ইয়হী মেরী উপলব্ধি হৈ...’ ঈশ্বরের জন্মকথা, টুকরো টুকরো ছবির কোলাজে ধরা দূরের জার্নি, যা শুধুই নিজেকে অতিক্রম করতে চায়। ১৯৬৬-এর মে মাস থেকে প্রায় তেত্রিশ বছর পাঞ্জাবী ভাষায় প্রকাশিত ‘নাগমণি’ পত্রিকার সম্পাদনা করেছেন অমৃত্যু প্রীতম। নিজের সঙ্গে আলাপচারিতায় উঠে আসা কিছু কথা, ‘নাগমণি’ পত্রিকার একটি সংখ্যার ‘কীমত ডেচ রূপয়া হৈ, সালানা ‘কীমত’ অটঠারহ রূপয়ে! মেরা মতলব হৈ, ‘নাগমণি’ মে হমেশা ‘কীমত’ শব্দ হী লিখা হোতা হৈ, জবকী দূসরী পত্রিকাএঁ ইসকে লিএ চন্দা শব্দ লিখতী হৈ।’^{১০} ‘কীমত’ আর ‘চন্দা’র মধ্যে পার্থক্য সম্পাদকের মতে, ‘ওয়হী জো কমাঈ কী রোটা ঔর দান কী রোটা মে হোতা হৈ’। নাগমণি স্বতন্ত্র অমৃত্যুর ভাবনায় আর অমৃত্যু প্রীতম পাঞ্জাবী তথা ভারতীয় সাহিত্যে এক নিয়ম ভাঙা ভিন্ন কণ্ঠস্বর। শারীরিক ভাবে তাঁর সমকালে থাকলেও মানসিকতায় অমৃত্যু ছিলেন পরবর্তী কোনো সময়ের সে কাল তখনও আসেনি, কবে আসবে তাও জানা ছিলনা। সেই শূন্যতারই উচ্চারণ হয়তো ‘বহুত সে সমকালীন হৈ, সিরফ মৈ— মেরা সমকালীন নহী।’ তাঁর সময় তাঁকে গ্রহণ করেনি আর অমৃত্যু নিজেও তাঁর সমকালীন হতে পারেন নি। তাই আমৃত্যু ‘জঙ্গ জারী’ ছিল, সংগ্রাম শেষ হয়নি। মনে পড়েছে হাজারীপ্রসাদ দ্বিবেদীর সেই উপন্যাসের কথা— রাজকন্যা সংগোপনে ভালবেসেছিল ঋষিপুত্রকে কিন্তু তার সখী নিভৃত অনুভবের সৌরভ পেল। রাজকুমারী বলল, সে সত্যিকারের কবি হয়ে উঠেছে বলেই খোঁজ পেয়েছে সেই নির্জনতার। কবি যে সৃষ্টির সমস্ত নিয়মকে বে-নিয়ম করে দেয়, অ-ব্যক্ত ধ্বনির ‘ইথার তরঙ্গ’ও অনুভব করতে পারে—যে নীরবতার ধ্বনি সে শুনেছে যদি অন্তরের গভীরে বাঁচিয়ে রাখতে পারে, তাহলে সে কবির থেকেও বড় হয়ে উঠবে। লেখকের আত্ম উপলব্ধির গভীরে নিহিত বেদনাবোধ ‘মৈ সিরফ লেখক বনী, লেখক সে বড়া নহী হো সকী’— মনের পরতে জমে থাকা সমস্ত আনন্দ বেদনা অশ্রুজল, সাঁপে দিয়েছেন কাগজে-অক্ষরে। রচনার, শব্দ নির্মাণের বিশেষ পল-মুহূর্ত গুলিও ধরে রেখেছেন স্মৃতিকথা- আলাপচারিতায়। অমৃত্যু প্রীতম মনে করতেন, একজন লেখকই ব্যক্তি অনুভবের গভীর নির্জনতা, ‘চুপ্তী কা ভাষা’ কে কথারূপ দিতে পারে— পায় সেই মৌনতার সুবাস কিন্তু যে গভীরতর অনুভবের জন্য শুধু শব্দহীন সংবেদন কাম্য, ‘জিহ্বে কেবল মৌন কী ভাষা হী নসীব হোনী চাহিএ’, তাকে অন্তরে লালন করতে

পারলে হয়ে ওঠা যায় লেখকের থেকেও বড়— নিজস্ব নিভৃতির সেই সীমা পেরনোর যন্ত্রণাবোধ এবং প্রকাশ ও নীরবতার অতৃপ্তি অমৃতা প্রীতমের লেখায়, উচ্চারণে, 'ইস দর্দ সে মেরে মর্ম মে কভী কভী বড়ী তেজ পীড়া উঠতী হৈ'। 'রসীদী টিকট' সেই 'কবি'র উপলব্ধি যে বারেবারে নিজের থেকে বড় হয়ে উঠতে চায়, নিজেকে অতিক্রম করতে না পারার যন্ত্রণা পায়— ছুঁতে চায় সেই অজাত সময়-যাপন, যা তাঁর একান্তই নিজের, তাঁর অন্তরতম'র সমকালীন।

তথ্যসূত্র

১. রসীদী টিকট, পৃ ১১৫। কিতাবঘর প্রকাশন, নঈ দিল্লী, ২০১৮।
২. মেরে সাক্ষাৎকার, পৃ ৯। সম্পাদক— অস্মা সলীম, শ্যাম সুশীল। কিতাবঘর প্রকাশন, নঈ দিল্লী। ২০০৮।
৩. মেরে সাক্ষাৎকার, পৃ ২৭
৪. রসীদী টিকট, পৃ ১৫
৫. পূর্বোক্ত
৬. রসীদী টিকট, পৃ ১৮
৭. রসীদী টিকট, পৃ ৯৮
৮. রসীদী টিকট, পৃ ১১১
৯. পূর্বোক্ত, পৃ ১১২
১০. জঙ্গ জারী হৈ, 'মৈ ঔর মৈ', পৃ ৬০। রাধাকৃষ্ণ প্রকাশন, নঈ দিল্লী। ১৯৭৮।

Politics of Narrative: The Counterfactual in ‘Historical’ Memory

Debolina Guha Thakurta*

Abstract :

History is often understood as a static body of information of the past derived from multiple sources by historians. It has been accepted as the knowledge base of the bygone era without contention and such is the enumeration of facts with certitude, that it is undeniable and incontestable. However, an inspection reveals this collection of historical data as a process of subjective selection by an equally limited set of people defined by their position in a certain space and time. Therefore, history is always already an unfinished presentation of facts that leaves crevices, which then are quarried to propose an alternative to the ‘reality’ that history supposedly presents. While science fiction involves phantasmagoria, it also promotes an alternative to history that is not factual but counterfactual, a counterintuitive to the generalisations. Such an engagement brings forth the critical discourse of memory that is both derivative of and corollary to history, to say the least. This paper, therefore, engages into a journey in the world of a fictional diarist, into the imaginary that offers a possibility – an altered history to one of the major political past that wreaked havoc not only physically but also psychologically. This would involve looking at history, alternate history through the lens of science fiction, a dynamic genre in itself while with a cursory reading of the dialectics of history and memory.

Keywords: alternate history, metahistory, science fiction, memory, emplotment

*Assistant Professor, Department of English, Shri Shikshayatan College, Kolkata.

The past is full of life, eager to irritate us, provoke and insult us, tempt us to destroy or repaint it. The only reason people want to be masters of the future is to change the past.

Milan Kundera

What is history? An echo of the past in the future; a reflex from the future on the past.

Victor Hugo

Introduction :

Science fiction and alternate history have a curious connection. Indeed, Andy Duncan in his essay on alternate history in *Cambridge Companion to Science Fiction*, writes, “Both science fiction and alternate history are literatures of change, of possibilities, of uncertainties” (Duncan 211). As a matter of fact, to trace the history of historical consciousness is to accept a certain particular mode of thought while thinkers like Foucault and Levi Strauss have expressed serious doubts about this singularity of ‘historical’ consciousness as a possible Western prejudice (White 2). The way we understand history, it comprises of data (information), of theoretical tools to explain this information collated and finally a narrative that would present these data with explanation in a certain sequence to establish the set of events that had happened in times past. While elucidating on historiography and historiographical styles, American historian Hayden White discusses about a poetic or linguistic paradigm, a ‘precritically accepted paradigm’ (White x) which he calls ‘metahistorical,’ an understructure that a historian often employs to decipher and postulate ‘what was really happening’ (White xi). This ‘metahistorical’ then constitutes an act of refiguration using four tropes of poetic language – metaphor, metonymy, synecdoche and irony – that White calls ‘tropological’ strategies to work upon ‘proper history,’ historical consciousness and historical knowledge. Curious to note that this process of collation or assimilation and presentation or interpretation, as historians use multiple interpretative strategies to presume the ‘reality,’ is not constant but

is perspectival in nature. This means there is not one single viewpoint to an event but diverse depending on the mode or style absorbed in the process – diachronic or synchronic or epistemological or aesthetic. These shifting tendencies can, perhaps, work as the key point toward locating and understanding alternate (alternative) history.

Hayden White in his study of the historical imagination of nineteenth century Europe identifies the difference between ‘history’ and ‘fiction.’ According to his study, a historian tries to find his ‘stories’ from a heap of events in a process that entails a three tier process of exclusion, stress and subordination while a fiction writer ‘invents’ his story (White 6). Interestingly, a historian’s ‘story-making’ is subject to what White calls a ‘motifical characterisation’ where events can be arranged and rearranged to constitute a narrative of a particular kind, that is to have an inaugural motif (beginning), a transitional motif (middle) and a terminating motif (end). This too is a process of ‘invention,’ a process of emplotment, in any historical operation to create a particular meaning or ‘explanation’ that is achieved through different modes. The ‘meaning creation’ exercise is a corollary to ‘invention’ that is seldom recognised. An alternate history, however, is primarily a work of fiction where history (fact) is changed for dramatic and ironic effect. What Andy Duncan clarifies is significant – “Often an alternate history dramatizes the moment of divergence from the historical record . . . Such a story or novel might seem at first to be a work of traditional historical fiction, in which invented characters and events are woven into the known tapestry of history...” (Duncan 209). This then offers a counter-narrative, a historical breakpoint where the author imagines a proposed change, a moment of divergence, fictionalising the fact, inventing characters and subsequent changes. Harry Turtledove, American author and critic, explicates this breakpoint in terms of both science fiction and alternate history – while science fiction brings change in either present or near future, alternate history tries to imagine a distant past only to examine its consequences that would affect the present (Duncan 211).

Science fiction, therefore, is counterfactual thought experiments that try to capture the chaotic nature of experiences. Thus, invention relays the process of emplotment in alternate history – fictional retelling of the factual that employs science fiction as a necessary ploy to redesign the narrative by shuffling the motific characterisation through a certain particular mechanism – time travel, time slip, time loop. Undeniably, time travel is the most frequently practised mechanism for rationalising alternate history. Time slip points to the 'parallel worlds' that might exist with different histories where characters travel across different timelines. Moreover, time loop constitutes a personal alternate history where the protagonist's life repeats itself through variations, a postmodern pastiche. To examine these ideas as either the building block to understand Satyajit Ray's science fiction stories, especially the ones of Professor Shonku, or to produce a counter-argument to the existing theoretical discourse is the objective of this paper. This engagement shall involve looking at two particular science fiction stories of the Professor Shonku series of Ray – *Professor Shanku o Frankenstein* (Professor Shanku and Frankenstein) and *Swarnaparnee* (The Golden Leaf) – that presumably borders on the concept of alternate history. The paper shall delve deeper to probe into the interstices between science fiction and the history that Ray tries to closely cogitate, rather alter, through his narrative that rests on the historical breakpoint which Turtledove refers to, a counterfactual account of the 'real' that goes further to provide an alternate history which again edges on the idea of fantasy or wish fulfilment, a utopic commitment. The outcome then is a critical engagement into multiple theoretical readings of science fiction, alternate history and utopia or fantasy, its aesthetic and epistemological nuances and connotations. This reminds me of Raymond Williams who, in one of his brief ideological critiques of the genre of science fiction, states that fiction is a kind of fact whose key substance is imaginary and that is what the fact of fiction is. In utopian fiction we often notice an externally altered world or a willed transformation which might not be 'realistic' but can offer an alternative. As Edward James elaborates in his essay on utopias and anti-utopias about how classic

utopia has undergone a metamorphosis within the field of science fiction. Therefore, and this will be sheer repetition, Ray enables an inquisitive reader to contemplate and critically engage with the plausible alternate histories, if it is at all an alternative, that the stories offer remaining well within the margins of science fiction while at the same time commits itself to a utopic altered 'reality' through a fictionalised account of characters from the realms of both imaginary and real. It will be equally interesting to note how this imaginary and real interact in these stories as a dialogue between history and memory. In order to situate the story within the historical context, it is imperative to revisit the history, especially that of the Holocaust and the War.

The Premise: Text and Context

This historical knowledge of the War and the Third Reich have been revisited by many historians and philosophers of history through their respective historiographical styles to interpret the past as either a process of ethnic cleansing or mass annihilation. While there was this boastful claim of the great Fuehrer Hitler about the Third Reich which would last for a thousand years, it could manage for only twelve years. However, into its short life was packed the most cataclysmic series of events. The ignominious defeat and the 1919 peace settlement (the Treaty of Versailles) played a pivotal role in the rise of the Third Reich in Germany and the consequent War in just 20 years after the First World War. The ruthless annihilation of an estimated 1.1 million, mostly Jews, in the gas chambers is immortalised in the minds of Holocaust survivors as well as others. The notoriety of Auschwitz-Birkenau and other extermination camps, now a memorial, have left a deep scar in the minds of not only Holocaust survivors but also others. The reaction to the malevolent perpetrators of anti-Semitic ruthless killings was repulsive. We as readers, therefore, experience a sense of fear and foreboding as we embark on a journey with the eccentric Professor Shonku to the den of General Göring, one of the confidantes in Hitler's camp, a neo-Nazi leader who is adamant on his anti-Semitic conviction, insolent and atrocious and spiteful. In Professor Shonku

o Frankenstein (Professor Shonku and Frankenstein), as the name suggests, Ray's indebtedness to the 19th century classic *Frankenstein: or The Modern Prometheus* written by Mary Shelley is evident. In fact, Ray tries to resituate Shelley's story within the fascist rule of Germany where the ghost of Nazism looms even after its fall. What Ray does is significant: he alters the Frankenstein formula to make it 'Frankenstein-Shonku' formula that would cure cancer specialist Dr Thomas Gillette. Ray, in this way, is able to replace the gothic horror of Shelley into a political horror of Nazi Germany. Moreover, he intrudes into the 1818 novel to re-create the formula sometime in 1920 or later (as Professor Trilokeshwar Shonku was born in 1912) and write a science fiction in 1965, a time travel of almost 150 years.

In the story, Shonku meets Baron Julius Frankenstein, the great grandson of Victor Frankenstein (the fictitious character in Mary Shelley's novel), a Jewish scientist, vulnerable as he is owing to his Jewish origin. While Shelley's interest premised on the 'fate' of the monstrous creature, Ray's preoccupation moved under two axes: on the one hand he tried to point towards the exclusionary principles of the Nazis and on the other was his intention to benefit human race by upgrading the scientific formula. The story's backdrop constitutes the human slaughter and the Gestapo, Ray's vehement protest against the blitzkrieg. As a matter of fact, Ray seems to be influenced by the idea of his 'penetroscope' (phutoscope) from Sukumar Ray's nonsense verse 'Bijnan Shikkya' (Knowledge of Science) which then later escalates to the 'chamber of inducement' or *mogoj dholai* in the film *Hirak Rajar Deshe*. Here too, Ray's obsession with the human brain is evident which finds its befitting culmination in the transposition of brains. If Thomas Mann's novella *The Transposed Heads* was a philosophical reaction against any axiomatic assumptions about mind/body conflict, then Ray's transmutation of brains is an alternative possibility of the distant past that could have affected the present. Shonku's experiments in the laboratory of the Frankenstein Castle revives Gillette which parallels the accidental death of Boris Aaronson, a Jewish professor of philosophy and a man of noble heart. The narrative then leads

us to the character of Hans Redel, one of the extremist leaders who, according to Frankenstein, is a growing terror for the people at Ingolstadt. The sudden death of Redel by thrombosis forces his accomplice to Professor Shonku and the latter, in his dire urge to save people from the malice and animosity of Redel's anti-Semitism, applies the wrong formula to make the situation right. Anti-Semitic Redel, once he wakes up after the surgery, becomes a pro-Jew; a staunch Nazi becomes anti-Hitler. Intriguing to find a strange homophonic semblance between Redel in the story and Hans-Ulrich Rudel (1916 – 1982), a member of German Luftwaffe, a ground attack pilot during World War II. An unrepentant Nazi, Rudel was credited to have destroyed 519 tanks and a Battleship apart from his other glorious feats of carnage in the war. Rudel surrendered in 1945 and immigrated to Latin America in 1948. He founded the Kameradenwerk (Comrades Work), a relief organisation for Nazi refugees. It was in 1953 that Rudel returned to West Germany as an extremist candidate for the German Reich Party (Deutsche Reich Partie). Ray's Redel was almost 40 years when he became the leader of neo-Nazi party, while the 37 years Rudel became the top leader in West Germany. Shonku's observation is noteworthy – “সে তো হিটলারপন্থী বলে শুনেছি। হিটলারের চিন্তাধারা আবার জনসাধারণের মধ্যে প্রচার করতে চেষ্টা করছে। একটি দলও গড়েছে বলে শুনেছি।” The turn of events occurs when Redel is treated only to become humane and compassionate, unlike his previous self. Though it is only a conjecture, the strange similarity with Rudel might as well be presumed as a historical breakpoint. The conventional process of emplotment as is found in any historical narrative that begins with a selective adoption of events to make up stories is altered in this case to usher in a 'possibility,' a 'change,' which is counterfactual and so fictional or imaginary. Nevertheless, to accept Williams' argument about fiction itself being the fact that is founded on the imaginary or fantastic which in a way is the necessary fact of any fiction, this fantastic probability finds a certain factual validation.

The blend of fact and fiction, precisely history and an imaginary alteration that provides a possibility is found in *Swarnaparnee* (The Golden Leaf), the last completed story of the Shonku series. Ray's

overt critique of the Nazi rule and their frail heroes with virile presence is well expressed in the projection of characters followed by the description of certain others who are explicitly referred to in the course of action. This story was published in a children's magazine (*Anandamela*) in Autumn 1990, pertinent in this context. The preceding year 1989 marked the golden jubilee of the German-Soviet Nonaggression Pact signed between Joseph Stalin and Adolf Hitler. The violation of this pact led to a great political turmoil that yielded sweeping change in world history vis-à-vis the ultimate defeat of the Nazis. 1989 also marked the year of the fall of the Berlin Wall. We find certain factual references as we refresh our knowledge. During the pleasant walking tour of the Hampstead Heath, Dorothy Saunders expresses her disgust towards the 'power-mad' Hitler and his accomplices – Göring, Goebbels, Himmler, Ribbentrop. As a matter of fact, the negotiation of nonaggression was between Joachim von Ribbentrop, then Nazi Foreign Minister, and the Soviet Foreign Minister Vyacheslav Molotov in which either parties agreed to a mutual understanding and a no-confrontation truce for the next ten years which could be extended to another five years. A politically informed intellectual like Ray seems to have deliberately chosen political figures from the Nazi party who were chiefly instrumental in perpetrating violence and torture, promoting anti-Semitism and the Holocaust. Goebbels was the initiator of the infamous Propaganda theory while Ribbentrop was the signatory of the Pact with the Soviet; Heinrich Himmler was among the highest officials of the Nazi paramilitary force and one of the primary architects of the Holocaust and Hermann Göring, initially the overseer of the Gestapo, became the commander-in-chief of the Luftwaffe. As readers we are constantly reminded of the darkness and gloom of the Holocaust. But as Shonku narrowly escapes from the lair of the Gestapo due to sheer over dosage of Miracurall (Shonku's 'miracle cure for all' pill made out of Swarnaparnee, that precious golden leaf procured from the interiors of forest), we are abjured from the imminent death to an imaginary life and liberation of the German Jew scholar Heinrich Steiner who shall now prepare to go to Paris. Ray does not plan death for the enemies as that

would taint the purpose of his story whose target readers were primarily children, but he craftily chooses 'death's second self' i.e. sleep as the characters fall into deep sleep – an apt treatment especially when Hitler's proposed 'cure' had conspired to annihilate millions considering them as impure non-Aryans. This is evident particularly when Norbert narrates the ruthless beating of his father Steiner by the Gestapo, once again testimony to the Nazi arrogance and pride. Ray at one point in the story almost brings in a paradox between strength and feebleness as General Göring regrets the limping Goebbels, Himmler suffering from hysteria and the Führer himself suffering from high blood pressure. Therefore, the concept of absolute power, sovereign pride and Aryan strength is not only impaired but also comes under critical scrutiny through the political metaphor.

Historicity/Textuality

Farah Mendelsohn in her essay on reading science fiction states that it is less a genre and more an ongoing discussion (Mendelsohn 1). Therefore, it seldom follows any structured outline or a conventional sequential development of the story. Rather, as more and more we read, we discover newer parameters that again are deconstructed or remoulded to give birth to other forms. There is, however, a sense of wonder that renders the emotional quotient to science fiction. This wonder sometimes generates a sense of disbelief when it borders on the fantastic. Indeed, the medicinal cure of Shonku is a 'miracle,' a wondrous discovery that cures all. This miraculous cure and equally extraordinary escape seems utopic yet generates a fulfilment of desire, of wishes especially when we come to know that Saunders had replaced Miracurall with sleeping pills; that the cruel Nazis find no cure to their sufferings pacifies the readers' heart. While Mary Shelley's *Frankenstein* is considered mostly as an anti-science fiction where the creature brings disaster to its creator, it did constitute its formative influence on imaginative fiction. Ray's skilful collation of the imaginary and the real in his story makes space for a change, a proposition of transposition that would bring peace to the cruelty upon common people. His method of emplotment goes beyond

the convention to adopt and adapt both fiction and fact into one singular narrative through time travel when Ray himself wishes to alight the time machine after almost one hundred and fifty years to alter the past and bring supposed peace. In fact, a passing idea to the naming of the character Thomas Gillette seems pertinent. Gillette was the founder of the safety razor sometime in 1901. The purpose of this razor is to shave off the 'needless,' prune the unnecessary. How subtle is the reference to the razor that Ray intended to obliterate that gratuitous violence of the Nazi regime becomes so metaphorical. For Shonku, it is revolutionary to bring in a major change in Redel. It is fact or truth for Shonku to experience the darkness of Nazism so closely while to Ray it is a proposition – had there been any such formula to rectify the past. Ray's metahistory lies in his subtle alteration through fiction and a parallel conscious reference to history or facts within fiction. The metaphorical and ironical nuances replete in the stories obliquely point to an 'alternate history' that wishes to change the past. The world of Shonku where he meets Göring, Redel, Frankenstein emerges as a perplexing space of fictional facts and factual fiction – characters traverse both real and imaginary spaces. The temporal and spatial nexus that is merged in these two selected short stories leave enough room for thought and speculation for readers.

Through the Memory Glass

While it is imperative to look at how science fiction challenges history or even as how history itself is ruptured by its exclusivity involving selective reading of the past which is then established as 'truth' which is never the whole but only the part, Ray's Professor Shonku series is a recording of events, rather experiences, fused with perception of the diarist Shonku himself. Therefore, as readers we not only encounter history through Shonku's diary but also memory through Ray's remembering the past, the Holocaust and his own understanding of the same projected through the mnemonic diary writing. Indeed, the word diary comes from Latin *diarium* (daily allowance) from Latin *dies* meaning day. Going by this etymology of the word and the use of the same in similar context

in Ben Jonson's *Volpone* (1605), we are reminded of Samuel Pepys's diary which is a remarkable record of London life among many other details. To consider Shonku's diary as one such record of events which has mostly direct references to Nazi leaders and the Gestapo is to point to its historical worth. However, Ray's execution of his own individual memory through 'fiction within fiction' narrative technique problematizes the politics of narrative making it a complex web of history and memory.

The politics of remembering entails an active reconciliation of past and present (Keightley 58). This remembering, therefore, is a process either governed or channelized through the collective or social or cultural. While collective memory is that active past which forms identities, cultural memory refers to memory shared outside formal historical discourse (Bosch 8) whereas other scholars of memory studies preferably use social memory as a general rubric for inquiry into various ways that past shapes us (Bosch 8). Instead of going deeper into the convolutions of memory studies, as readers, we oscillate between memory (Ray's reminiscing of past through Shonku's metaphor) on the one hand; on the other hand, it is Shonku and his diary that takes us through both autobiographical and historical memory which, for Ray comes as part of his collective memory. Diary writing often gives us a glimpse of history. Thus, as readers we dwell on the point of intersectionality of history and memory which then, perhaps, continue to shape our own cultural and social memory.

Inference

I am purposefully not using any concluding label to the last segment of this discussion keeping in with the genre that I have been trying to critique. That science fiction is evolving with time, so is the form and technique of writing alternate history and utopian fiction that enjoys a shared space and therefore involves itself into multiple negotiations. There is a spatial-temporal significance of these genres and their continuous dialogue through their porous boundaries involve scholars and literary enthusiasts alike in probing deeper into the narrative spaces to find meanings. In the words of the historian

E H Carr, 'The belief in a hard core of historical facts existing objectively and independently of the interpretation of the historian is a preposterous fallacy, but one which it is very hard to eradicate'. History, therefore, is not static as it is often presumed to be. Mr Gradgrind retorted in *Hard Times*, "What I want is Facts . . . Facts alone are wanted in life." Leopold von Ranke's pronouncement in the 1830s on the task of the historian, 'simply to show how it really was,' became almost incantatory for most historians and philosophers of history. Therefore, the conventional idea had been to accept history as a corpus of ascertained facts, which then is followed with interpretations (Carr 9). It is then mostly a process of presentation of facts according to the position of the subject, the spatial-temporal positionality constituting an important factor in ascribing history as it is. As Hayden White stated about 'invention,' that comes as one key component in this process of writing history. Indeed, Catherine Morland, while speaking on history, in *Northanger Abbey* deliberates on the same line – "I often think it odd that it should be so dull, for a great deal of it must be invention." This sheer fact-finding, selective in nature, and their arrangements have been the preoccupation of history but the dynamism lies in the aesthetics of presentation which is diverse. Often, history has been presented as simple eulogising of either facts, or situations or prominent figures. Science fiction tries to look at the fissures that selective history writing creates, generating possibilities of 'what if,' a scope for altered readings, utopic or otherwise. The Holocaust is one of those histories that had been revisited through myriad lenses to offer an alternative. Ray's fictional stories were a take on the Holocaust ravages but his visitation involved introspection through both fiction and fact, affected by his collective/cultural memory. Ray blends them with a finesse, intricate in its style and elusive in its meaning, utopic in its vision while plausible in its presentation.

Reference

1. Carr, E H. What is History, edited by R W Davies, Penguin Books, 1990.

2. Bosch, T.E. Memory Studies, A brief concept paper. University of Leeds, January 2016. https://eprints.whiterose.ac.uk/117289/1/Bosch%202016_Memory%20Studies.pdf
3. Duncan, Andy. “Alternate History.” *The Cambridge Companion to Science Fiction*, edited by Edward James and Farah Mendlesohn, Cambridge UP, 2003, pp. 209–218.
4. James, Edward. “Utopias and anti-utopias.” *The Cambridge Companion to Science Fiction*, edited by Edward James and Farah Mendlesohn, Cambridge UP, 2003, pp. 219–229.
5. Keightley, E. ‘Remembering Research: Memory and Methodology in the Social Sciences’. *International Journal of Social Research Methodology*. 2010. 13(1): 55–70.
6. Mendlesohn, Farah. “Introduction: reading science fiction.” *The Cambridge Companion to Science Fiction*, edited by Edward James and Farah Mendlesohn, Cambridge UP, 2003, pp. 1–14.
7. White, Hayden. *Metahistory: The Historical Imagination in Nineteenth-Century Europe*. John Hopkins UP, 1975.
8. Williams, Raymond, “Science Fiction”, *Science Fiction Studies*, Vol. 15, No. 3 (November 1988) URL: <https://www.jstor.org/stable/4239903>
9. সত্যজিত রায়, *শঙ্কু সমগ্র*, আনন্দ পাবলিশার্স, দশম মুদ্রণ ২০১১।

Bibliography

1. Bereit, Virginia F., “The Genre of Science Fiction”, *Elementary English*, Vol.46, No. 7 (November 1969), URL: <https://www.jstor.org/stable/41386588>
2. Carr, E H. *What is History*, edited by R W Davies, Penguin Books, 1990.
3. Cuddon, J.A., *The Penguin Dictionary of Literary Terms and Literary Theory*, Fifth Edition, Penguin Books, 2015
4. Goebbels, Joseph, “Will and Way”, *German propaganda Archive*, accessed August 22, 2018, 20:30hrs.
5. James, Edward and Farah Mendlesohn, editors. *The Cambridge Companion to Science Fiction*. CUP, 2003.
6. Keightley, E. ‘Remembering Research: Memory and Methodology in the Social Sciences’. *International Journal of Social Research Methodology*. 2010. 13(1).

7. Shirer, William L. *The Rise and Fall of the Third Reich*. New York, 1960.
8. White, Hayden. *Metahistory: The Historical Imagination in Nineteenth-Century Europe*. John Hopkins UP, 1975.
9. Williams, Raymond, "Science Fiction", *Science Fiction Studies*, Vol. 15, No. 3 (November 1988) URL: <https://www.jstor.org/stable/4239903>
10. সত্যজিত রায়, *শঙ্কু সমগ্র*, আনন্দ পাবলিশার্স, দশম মুদ্রণ ২০১১।
11. বুদ্ধদেব বসু, *সাহিত্য চর্চা*, দে'জ পাবলিশিং, অষ্টম সংস্করণ, জানুয়ারি ২০১৫।

রবীন্দ্রনাথ এবং বাঙালির নৃত্য পরম্পরা

দিশারী মুখার্জি *

নৃত্য মূলত নির্বাকের ভাষা। শব্দ নয়, কথা নয়, শারীরিক সঞ্চালন যেখানে ভাব প্রকাশ করে, সেখানেই জন্ম নেয় নৃত্যের ভাব ও ছন্দ। মানব সভ্যতার আদিম যুগ থেকেই ভাষা যখন ভাব প্রকাশের মাধ্যম হয়ে ওঠেনি, শব্দের নিখুঁত বুনন দিয়ে কথা বলতে শেখেনি মানুষ সেই আদিম মানুষ তার হাত-পা সঞ্চালন অর্থাৎ মুভমেন্টের মধ্য দিয়েই যোগাযোগ স্থাপন করেছে। তার আবেগকে সঞ্চারিত করেছে। সভ্যতার ক্রম অগ্রগতিতে এই মুভমেন্ট ছন্দ বদ্ধ হয়েছে, পরিশীলিত আকারে ক্রমশ নৃত্য ভঙ্গিমায় পরিণতি পেয়েছে।

ভারতীয় সংস্কৃতিতে নৃত্যের ব্যবহার, উপস্থাপনা প্রাচীন। বিশ্বের সৃষ্টি উৎস থেকে মানুষ যে ছন্দের ধারাকে নিজের ভিতর সঞ্চারিত করেছে সেই ধারাকে একবিংশ শতকে বাঙালি যথাযথ ভাবে আত্মস্থ করেছে রবীন্দ্রনাথের হাত ধরে। অভিনয় দর্পণে, অভিনয়ের চার প্রকার উপায়ের কথা উল্লেখ রয়েছে। আঙ্গিক, বাচিক আহাৰ্য ও সাত্ত্বিক— এই চারটি প্রকারের মধ্যে প্রথমটি অঙ্গ-প্রত্যঙ্গের বিভিন্ন সঞ্চালনের ফলে উৎপন্ন হয়। দ্বিতীয়টি মূলভাবটির ভাষাগত অনুকৃতির ফলে দর্শকের মনে সমভাবে ভাবের উদ্বেগ ঘটায়। বাচিক প্রক্রিয়াটি রবীন্দ্র নাটক উপস্থাপনায় বিশেষ ভাবে দেখা যায়। যখন কোন চরিত্র নিজেই কথা বলে গান গেয়ে অভিনয় করে তখন এই বাচিক দিকটি গুরুত্ব পায়। রবীন্দ্রনাথের নৃত্য পরিকল্পনায় এই বাচিক প্রকার থেকেই প্রথমে নৃত্য প্রকাশ পায়।

নৃত্য পরিবেশনের জন্য বাঙালির মানসিকতা প্রস্তুতি অথবা ভদ্র বাড়ীর ছেলে-মেয়ে নৃত্য পরিবেশন করবে/নাচ করবে এই ভাবনার ভিত্তি তৈরী করেছেন

*বাংলা বিভাগ, শ্রীশিক্ষায়তন কলেজ, কলকাতা

স্বয়ং রবীন্দ্রনাথ ঠাকুর। বাঙালির নব জাগরণের সময় অন্যান্য শিল্পকলা যথাযথ সম্মানের সাথে আত্মদানের পরিসর তৈরী করলেও, নৃত্যের জন্য সেই পরিসর ছিল না। ভারতের অন্যান্য প্রদেশের মতো বাংলার নিজস্ব শাস্ত্রীয় নৃত্য ছিল না। নৃত্য বা নাচ বললেই সেইসময় বাঙালির চোখে তখন খেমটা, বাইজী ইত্যাদি নাচের চটুল অঙ্গভঙ্গী ভেসে উঠত। যাত্রা থিয়েটারের মধ্যে নাচ করা অভিনেত্রীদের মনে পড়ে। এমন অবস্থায় বাঙালি সংস্কৃতিতে নৃত্যের অবস্থান নিকৃষ্ট হওয়াই হয়ত স্বাভাবিক ছিল। আর এই সময়েই ভারতবর্ষের বিভিন্ন প্রদেশ ঘুরে, বিশ্বের বিভিন্ন দেশ ঘুরে রবীন্দ্রনাথ তৈরী করলেন নৃত্য উপস্থাপনের যথাযথ পরিকাঠামো। তার গানের ভাবে প্রকাশ করতেই বাঙালি ‘ভদ্র ঘরের’ মেয়েরা প্রথম নৃত্য পরিবেশন করেছিল। কবি গুরু নৃত্য ভাবনা, নৃত্য নাট্য রচনা, তার উপস্থাপনা ইত্যাদির মধ্য দিয়ে বাঙালির নৃত্য পরম্পরার শিকড় অনুসন্ধানের চেষ্টা করবো আলোচ্য লেখায়।

১৮৯১ তে রবীন্দ্রনাথ বলছেন যে নৃত্য হলো অঙ্গভঙ্গির সৌন্দর্য, অঙ্গ ভঙ্গির কবিতা দেখিয়ে মনোহরণ করা।^(১) কবির নৃত্য ভাবনা ভাঙ্গা গড়ার মধ্য দিয়ে এগিয়ে চলেছে। গ্রহণ ও বর্জনের মধ্য দিয়ে তিনি নির্মাণ করতে চেয়েছেন এক গতিধারা, যা আবেগের প্রতিফলন করবে শরীরের ভাষায়।

সেই সময়কার অগ্রগণ্য পরিবার ঠাকুর বাড়িতে গান নাটক গীতিনাট্যের চর্চা থাকলেও প্রথমদিকে নাচ ব্যাপারটা একদমই ছিল না। বিলেত থেকে ফিরে এসে রবীন্দ্রনাথ গতানুগতিক নাট্যধারা থেকে নাটককে দিলেন মুক্তি। প্রাচ্য ও পাশ্চাত্যের রীতির সংমিশ্রণ ঘটিয়ে কবি গাঁথলেন গানের সূত্রে নাট্যের মালা। তিনি লিখলেন বাঙ্গালী প্রতিভা, আর এখান থেকেই তার নৃত্য ভাবনার বীজ বপন হয়েছিল। বিংশ শতকের শুরুতে কবিগুরু রবীন্দ্রনাথ ঠাকুরের হাত ধরেই অবিভক্ত বাংলাদেশে নৃত্য আন্দোলনের সূচনা।

১৮৮১ সালে বাঙ্গালী প্রতিভা থেকে শুরু করে ১৯৪১ সালে শ্যামা পর্যন্ত সময়ে নিরবিচ্ছিন্নভাবে তিনি বাংলা তথা ভারতীয় নৃত্যকে উৎকর্ষের এক চরম শিখরে নিয়ে যাওয়ার জন্য চেষ্টা করেছেন। বাঙ্গালী প্রতিভার যুগে নৃত্যভঙ্গির উন্মেষ ঘটেছিল, তারপরে কালমুগয়া, মায়ার খেলা, পেরিয়ে শারদোৎসব নাটক থেকে শুরু করে, রাজা, অচলায়তন, ফাধনী প্রভৃতি নাটকে তিনি স্বয়ং নৃত্য প্রদর্শন করেন এবং নির্দেশনা দিয়ে তার নৃত্য-চিন্তার স্বাক্ষর রেখেছেন। এরপর একে একে বসন্ত, শেষ বর্ষণ, নটীর পূজা, নাটরাজ-ঋতুরঙ্গশালা, সুন্দর, নবীন, শিশুতীর্থ, শাপমোচন, তাদের দেশের সৃষ্টির মধ্য দিয়ে শাস্তিনিকেতনে গড়ে তুলেছিলেন এক বিপুল নৃত্য আন্দোলন। তারপর খাঁটি নৃত্যনাট্য চিত্রাঙ্গদা, চন্দ্রালিকা, শ্যামা-তে এক পরিনত জাতীয় নৃত্যকলার প্রকাশ ঘটান। গুরুদেবের নৃত্য আন্দোলনের এই উদ্দেশ্য ছিল

তার গান যেমন সর্বশ্রেণীর মানুষের সুখে দুঃখে আনন্দে বেদনায় সহজ ও নির্মল ভাবাবেগ এনে দেয়, নাচও ঠিক সেভাবেই সমাজ যেন গ্রহণ করতে পারে। শিক্ষিত ভারতীয় সমাজের অনুশাসন অতিক্রম করে নাচের নব আন্দোলনের এই চেতনার জন্য আমরা এই প্রজন্ম ঋণী রবীন্দ্রনাথ ঠাকুরের কাছে। বিংশ শতকের প্রারম্ভে গুরুদেব প্রতিষ্ঠা করলেন শান্তিনিকেতন বিদ্যালয়, এখানে অন্যান্য বিদ্যার সঙ্গে ছাত্রদের মধ্যে গানের এবং নাটকের চর্চার প্রচলন শুরু করলেন, এবং একই সাথে গানের সঙ্গে অভিনয়কালে সকলকে নাচ করার জন্য তিনি উৎসাহিত করতেন। কিন্তু সে নাচ বিধিবদ্ধ নৃত্যশৈলী ছিল না। শান্তিনিকেতনে প্রথাগত নৃত্য শিক্ষকের আগমনের আগে পর্যন্ত গানের সঙ্গে নাচ শেখাতেন রবীন্দ্রনাথ নিজেই পরের যুগে এসে এই নাচকে ভাব নৃত্য বলা হত। পরবর্তী সময়ে শান্তিনিকেতনের নৃত্যে মণিপুরী রাস নৃত্য কথাকলি নৃত্য, এবং নৃত্যনাট্যের বিভিন্ন চরিত্রের গানের ভাবের প্রতি দৃষ্টি রেখে তথাকথিত ভারতনাট্যম নৃত্য, শ্রীলংকার ক্যাডি নাচ ইন্দোনেশিয়ার নাচ জাপানি নাচ বর্মার নাচ ইত্যাদি নৃত্য ভাবনার সংযুক্তি ঘটে।

ভারতীয় নৃত্যকলার ইতিহাসে বিশেষভাবে স্মরণীয় দিন, রবীন্দ্রনাথ ঠাকুর নির্দেশিত, গৌরী বসু পরিবেশিত নটীর পূজার প্রযোজনা। গৌরী দেবীর সেদিনের নৃত্যকলা ছিল শান্তিনিকেতনের পরবর্তী নৃত্য ধারার অন্যতম সোপান। নটীর পূজার প্রথম অভিনয় হয়েছিল শান্তিনিকেতনে ১৯২৬ সালে, এরপর রবীন্দ্রনাথ ইউরোপের পথে যাত্রা করেন ফিরে আসেন বছরেরই ডিসেম্বর মাসে। বিদেশ থেকে ফেরার পর শান্তিনিকেতনে নটীর পূজা অভিনয় সাফল্য উৎসাহিত হয়ে কলকাতার জোড়াসাঁকোর বাড়িতে আয়োজন করেন পরবর্তী অভিনয়। ১৯২৭ সালে কলকাতায় জোড়াসাঁকো ঠাকুরবাড়িতে অনুষ্ঠিত হয়েছিল নটীর পূজা। সেই প্রথম বাংলাদেশের নৃত্যকলার ইতিহাসে ভদ্র পরিবারের মেয়েরা সর্বসাধারণের সম্মুখে নৃত্য পরিবেশন করেছিলেন। নটীর পূজায় ভিক্ষু উপালি ছাড়া আর সব চরিত্রাই ছিল নারী চরিত্র। রবীন্দ্রনাথ করেছিলেন উপালি চরিত্রটি। প্রাচীন ভারতে যে নটীরা ছিল চিত্ত বিনোদনের পাত্র-পাত্রী সমাজের নিম্নস্তরের, রবীন্দ্রনাথ তাদের গৌরবোজ্জ্বল সাহিত্য মাঝে স্থান দিয়েছিলেন। নটীর নাচ কেমন হবে তা ব্যাখ্যা করে বুঝিয়ে দিয়েছিলেন স্বয়ং রবীন্দ্রনাথ। টানা উনিশ দিন রিহাসালের পর সম্পূর্ণ নৃত্যটি রচনা করেছিলেন গৌরী দেবী নিজেই তার মনের ভক্তি রসের ভাব দিয়ে। বিধি-নিষেধের বেড়া ভেঙে কবিগুরুর চেষ্টায় তার সৃষ্টিকে রূপ দেওয়ার জন্য তৈরি হয়ে গেল নাচের দল। নটীর পূজায় নিজের অভিনয় সম্পর্কে গৌরী দেবী এক সাক্ষাৎকারে বলেছেন, ‘কবি নিজে রিহাসালের সময় নতুন চরিত্রটি ব্যাখ্যা করে বুঝিয়ে দিতেন। সমবেত রিহাসাল ছাড়াও কবি আলাদাভাবে আমাকে নিয়ে এই ভূমিকার জন্য তৈরি করেছেন। কবি

সাধারণত নাচের তালিমের সময় থাকতেন না কিন্তু এই নাচ কেমন হবে সে ব্যাখ্যা করে বুঝিয়ে দিতেন।^(২)

এরপর শুধুমাত্র নাচের কথা ভেবেই রচনা করতে লাগলেন তিনি নৃত্য উপযোগী অনুষ্ঠান। নটীর পূজোর পর কবি তৈরী করেছিলেন এক নতুন সাধনা। কলকাতায় নটীর পূজা অভিনয়ের পরেই শাস্তিনিকেতনে ফিরে রবীন্দ্রনাথকে প্রস্তুতি নিতে হয়েছিল তৎকালীন আসন্ন দোল উৎসবের। প্রথমে ভেবেছিলেন ফাধনী নাটকটির অভিনয়ের কথা। সেই মতো মহড়াও শুরু হয়েছিল, কিন্তু শেষ পর্যন্ত সব চরিএর উপযোগী অভিনেতার অভাবে তা বন্ধ করে নৃত্য-সংগীতের একটি অনুষ্ঠান করবেন বলে স্থির করলেন কবি। নতুন করে ছয় ঋতুর গান ও কবিতা শুরু হল। সমগ্র রচনার দিকে ছয়টি ঋতু পর্যায় সাজিয়ে নাম দিলেন নটরাজ। তিনি মগ্ন হলেন মহাকাালের বিরাট নৃত্য ছন্দের যোগ সাধনকারী নটরাজের প্রতি। এই উপলক্ষেই তিনি সিদ্ধান্ত নিয়েছিলেন নটরাজের কাছে মুক্তির দীক্ষা নেবেন, শাস্তিদেব ঘোষ স্মৃতি চারণা করে বলছেন— ‘নটরাজের কাছে আত্মনিবেদন করে গুরুদেব বলেছিলেন আমি নটরাজের চেলা, নৃত্যের তালে তালে হে নটরাজ।’^(৩) এই গানটিকে আসন্ন বসন্তের অনুষ্ঠানের কার্যসূচির প্রথমে স্থান দিয়েছিলেন, গুরুত্বপূর্ণ নটরাজকে বিশেষভাবে বন্দনা করে ঋতুচক্রের গান ও কবিতার দ্বারা শুরু হয়েছিল মূল অনুষ্ঠান। নাচের প্রয়োজনে করি এই গানের চারটে স্তবকের তাল চার রকম করে দিলেন। ১৯২৭ সালে কলকাতায় ঋতুরঙ্গ অভিনীত হয় সেখানে নৃত্যের তালে তালে নাচটি পরিবেশিত হয়েছিল, যেখানে হে নটরাজ মণিপুরী নৃত্য এবং দক্ষিণের নৃত্যভঙ্গির সঙ্গে জাভা নৃত্যের প্রয়োগ ঘটেছিল।

এই পর্যায় আসলে রবীন্দ্র নৃত্যের পরিণত হওয়ার পর্যায়। এবার গল্পের শুরুতে ফিরে যাবো। রবীন্দ্রগীতি নাট্যের পর থেকে শারদোৎসবের আগে পর্যন্ত রবীন্দ্র সৃষ্টিতে নাচের কোনো ভূমিকা ছিলো না। এর পর থেকেই রবীন্দ্র নাটকে গানের প্রাধান্য থাকে, এবং সেই গানে নৃত্য সম্ভাবনার বীজ নিহিত থাকে। শারদোৎসবের প্রথম অভিনয় হয় ১৯০৮ সালে, পরবর্তী অভিনয় হয়েছিল ১৯২৬ সালে, বিশ্বভারতীর অর্থ সংগ্রহের উদ্দেশ্যে, কলকাতায় আলফ্রেড ও ম্যাডান থিয়েটারে। শারদোৎসবের আগে থেকেই তিনি নাটকের মঞ্চকে বাস্তব অনুকরণের থেকে মুক্ত করতে চাইছেন, সহজ সরল, ইঙ্গিতময় সাংকেতিক প্রকাশের মধ্য দিয়ে ভাব-আবেগকে পৌঁছে দিতে চাইছেন। বাল্মিকী প্রতিভা, কালমুগয়া, মায়ার খেলা, এরপর শারদোৎসব থেকে ফাধনী একটা পর্যায় (১৯১৬)। এরপর বসন্ত ও বর্ষামঙ্গল, নবীন, শিশুতীর্থের যুগ যেখানে শাস্তিনিকেতনের প্রথাগত নৃত্যের ধারা শুরু হয়।

রবীন্দ্রনাথ তখন নাচ কে শাস্তিনিকেতনে শিক্ষার অঙ্গ হিসেবে স্থান দিয়ে ফেলেছেন। দেশ-বিদেশ ঘুরে দেখে এসেছেন নানা ধরনের নাচ। তারই সংমিশ্রণে

শাস্তিনিকেতনের গড়তে চেয়েছিলেন এক নবীন মৌলিক নৃত্যধারা যা একান্তভাবে বাংলার একান্তভাবে ভারতীয়। এরকম নাচ আগে বাংলায় ছিল না। ১৯২০ সাল থেকে শাস্তিনিকেতনে প্রথাগত নৃত্যের সাথে সৃজনশীল নৃত্যের সংমিশ্রণে নতুন নৃত্য ধারা গড়ে উঠতে শুরু করল আর এই রীতিতেই কবি সৃষ্টি করলেন বর্ষামঙ্গল, শ্রাবণ গাঁথা, নটরাজ, বসন্ত। এই সময়েই কার্তিক মাসে বর্তমান বাংলাদেশের অন্তর্ভুক্ত সিলেট শহরে রবীন্দ্রনাথ গিয়েছিলেন সিলেটবাসীদের আমন্ত্রণে। সিলেটের কাছাকাছি এক গ্রামে মনিপুরী সমাজ থেকে কবিকে অভ্যর্থনা জানিয়েছিল, সেখানে তারা একটি মনিপুরী নৃত্য উপস্থাপন করেছিল। সেই নাচ দেখে তিনি স্থির করেছিলেন শাস্তিনিকেতনের বিদ্যালয়ে ছাত্রদের মনিপুরী নাচ শেখাবেন। কিন্তু দেশ ছেড়ে কোন মনিপুরী শিক্ষক শাস্তিনিকেতনে আসতে রাজি না হওয়ায় সিলেট থেকে ফেরার পথে রবীন্দ্রনাথ ত্রিপুরার মহারাজ বীরেন্দ্র কিশোর মানিক্যের আমন্ত্রণে আগরতলায় কদিনের জন্য আতিথ্য গ্রহণ করেন। আগরতলা শহরেও বহু মনিপুরীর বাস ছিল মহারাজকে তিনি তখন অনুরোধ করলেন শাস্তিনিকেতনের বিদ্যালয়ের ছাত্রদের জন্য। মহারাজ এই প্রস্তাবে উৎসাহিত হয়ে তার দরবার থেকে মনিপুরী নৃত্য শিক্ষক বুদ্ধিমন্ত সিংহকে পাঠালেন।

এই প্রথম শাস্তিনিকেতনের সাথে মনিপুরী নৃত্য শিক্ষকের সাথে পরিচয় হয়। বুদ্ধিমন্ত সিংহের নৃত্য শিক্ষক হিসেবে শাস্তিনিকেতনে যোগদানের মধ্য দিয়েই নৃত্য আন্দোলনের এক নতুন ধারা প্রবর্তিত হয়েছিল। এতদিন যে নাচ চলে আসছিল তা ছিল মূলত ভাব নৃত্য। এই প্রথম গানের সঙ্গে ছন্দ মিলিয়ে শুরু হয় অঙ্গ সঞ্চালন বুদ্ধিমন্ত সিংহের থেকে প্রথাগত তালিম নিয়ে শালিনিকেতনের ছাত্র ছাত্রীরা শুরু করে শাস্ত্রীয়নৃত্য। কিন্তু রবীন্দ্রনাথ প্রবর্তিত নৃত্য পুরোপুরি শাস্ত্রীয় রীতি মেনে চলেনি, গানের ভার অনুযায়ী অভিব্যক্তি ফুটিয়ে প্রকাশ করাকে প্রাধান্য দিয়েছেন। বুদ্ধিমন্ত সিংহকে নিয়ে এসে শাস্তিনিকেতনে যে শুধু ছেলেরাই নাচ শিখবে এটা রবীন্দ্রনাথ চান নি। শাস্তিনিকেতনের মেয়েরাও যাতে নৃত্যকলা চর্চা অভ্যাস করতে পারে সেই ইচ্ছাও তিনি জানিয়েছিলেন। কিন্তু সে যুগে সম্ভ্রান্ত ঘরের মেয়েরা নাচ শিখছে বা নাচ করছে এরকম রেওয়াজ ছিল না। অতএব কবিগুরু আরেকটি চিঠি লিখলেন ত্রিপুরার মহারাজকে। তিনি আবেদন জানালেন বুদ্ধিমন্ত সিংহের স্ত্রীকে যদি শাস্তিনিকেতনে আসার অনুমতি দেন তাহলে মেয়েরাও নাচ শিখতে পারবে। এই চিঠি বাঙালি মেয়েদের নাচ শেখায়নার প্রতি কবি গুরুর যে আগ্রহ তা সহজেই প্রকাশ করে। যদিও বুদ্ধিমন্ত সিংহ কিছুদিন শিক্ষাদানের পর গ্রীষ্মের ছুটি শেষে দেশে ফিরে যান। সেবারের মতো মনিপুরী নৃত্য শিক্ষার ক্লাস সেখানেই শেষ হল। এরপরেই কিছু গুজরাটি ও পার্শী পরিবার শাস্তিনিকেতনে আসে। রবীন্দ্রনাথ তাদের অনুরোধ করেন

ছাত্রীদের কাথিয়াবারের গরবা নাচ শেখানোর জন্য। শান্তিনিকেতনের ছাত্রীরা এই প্রথম নাচ শিখতে আরম্ভ করল। অতি গোপনে তাদের শিক্ষার কাজ চলতো। লোক নিন্দা, লোক লজ্জা এই চাপেই মূলত গোপনীয়তা রক্ষা করা হতো। এইভাবেই শুরু হয় পথ চলা। ১৯২৭ সালের ১২ই জুলাই কবি রওনা হন জাভা ভ্রমণের উদ্দেশ্যে। এখানে দ্বীপময় ভারতের অধিবাসীরা কবিকে নাচ গান দেখাবার ব্যবস্থা করেছিলেন। জাভানি নাচ দেখে কবি মুগ্ধ হয়ে গিয়েছিলেন। ১৯২৭ সালে, ৭ সেপ্টেম্বর জাভা যাত্রীর পত্রে রবীন্দ্রনাথ রথীন্দ্রনাথ ঠাকুরকে লিখেছিলেন—‘এখানে এদের প্রাণ যখন কথা কইতে চায় তখন সে নাচিয়ে তোলে। মেয়ে নাচে পুরুষ নাচে।... আসলে এরা গান গায় গলা দিয়ে নয়, সর্বাস্ব দিয়ে এদের নাচই যেন পদে পদে টানা সুরের মীর দেওয়া। আমাদের এবং ইউরোপে গীতাভিনয় আছে এদের দেশে নৃত্যাভিনয়।’^(৪) ভ্রমণ সেরে রবীন্দ্রনাথ এই বছর এই অক্টোবরের শেষে শান্তিনিকেতনে ফিরে আসেন। তিনি নটরাজকে ঋতুরঙ্গ নাম দিয়ে ডিসেম্বর মাসে কলকাতায় প্রদর্শন করবার জন্য প্রস্তুতি নিতে শুরু করেন। এই সময় মাদ্রাজের থিওসফিক, ল সোসাইটি থেকে একজন দক্ষিণ ভারতীয় যুবক আসছেন কলাভবনে চিত্রকলা শিখতে। তার নাম বাসুদেবন। তিনি এখানে আসার আগে নৃত্য চর্চা করতেন এই সংবাদে উৎসাহিত হয়ে নন্দলাল বসু তার নাচ দেখাবার জন্য আয়োজন করেন। তার পুরুষোচিত বলিষ্ঠ নৃত্য দেখে শান্তিনিকেতনবাসী মুগ্ধ হয়েছিল। বিদেশ থেকে ফিরে গুরুদেব দেখলেন সেই নাচ। স্থির করলেন কলকাতায় নটরাজের অনুষ্ঠানের সময় বাসুদেবনকে ব্যবহার করা হবে। নটরাজ ঋতুরঙ্গশালা ছিল রবীন্দ্র নৃত্যের একটি গুরুত্বপূর্ণ অধ্যায়। বাসুদেবনের হাত ধরেই শান্তিনিকেতনের ছাত্র-ছাত্রীদের কাছে পৌঁছেছিল দক্ষিণ ভারতীয় নৃত্যকলা। এই সময়ের মধ্যে বাংলায় বিশেষ করে কলকাতার শিক্ষিত সমাজের মেয়েদের মধ্যে শান্তিনিকেতনের রীতিতে নাচের প্রসার দেখা দিয়েছিল। এই সময়েই ১৯২৯ সালে কলকাতায় উদয় শঙ্করের আবির্ভাব ঘটে, এবং সুজনশীল নৃত্যধারার নতুন দিগন্তের সাথে বাঙালি তথা ভারতবাসীর পরিচয় ঘটে। ১৯৩১ সাল থেকে গুরুসদয় দত্ত শুরু করলেন লোকনৃত্যের আন্দোলন। বাংলার লোকনৃত্যের নতুন করে সম্প্রসারণ ঘটান তিনি, শুরু হয় ব্রতচারী নৃত্য অভ্যাস।

রবীন্দ্রনাথের হাত ধরে যে বাঙালি প্রথম নাচ করবে বলে মঞ্চ এসে দাঁড়ায়, সেই বাঙালির নৃত্য চর্চার প্রতি ক্রমশ আগ্রহ জন্মায়। রবীন্দ্রনৃত্য, উদয় শঙ্কর নৃত্য ধারা, গুরুসদয় দত্ত প্রবর্তিত ব্রতচারী নৃত্য ধারা ইত্যাদি বিভিন্ন ধরনের নৃত্য অভ্যাস নতুন এক যুগের সূচনা করেছিল।

১৯৩৬ সালের জানুয়ারি মাসে প্রতিমা দেবী স্থির করেন ‘চিত্রাঙ্গদা নৃত্যনাট্যের নৃত্য ও মুকাভিনয় করাবেন ছাত্রীদের দিয়ে। দ্বিতীয় সপ্তাহে মহড়া শুরু হয়। আর

‘চিত্রাঙ্গদা’ মঞ্চস্থ হয় ৮ ফাধন, ১৩৪২ কলকাতায়। ১১ মার্চ নিউ এম্পায়ার রঙ্গমঞ্চে চিত্রাঙ্গদার প্রথম অভিনয় হয়। ১৯৩৬ থেকে ১৯৩৮ সালের মধ্যে রবীন্দ্রনাথ ‘চিত্রাঙ্গদা’, ‘শ্যামা’ এবং পরবর্তীকালে ‘চণ্ডালিকা’ রচনা করেন। নৃত্যনাট্য ‘শ্যামা’তে প্রথমবারের মতো ভারতের চারটি ধ্রুপদী নৃত্যধারার সমন্বয় ঘটে। বঙ্গসেন চরিত্র রূপায়িত হয়েছিল ভরতনাট্যম ও কথাকলি নৃত্যধারায়, উত্তীয় কথক নৃত্যধারায়, প্রহরী কথাকলি নৃত্যধারায়, এবং শ্যামা চরিত্র মণিপুরি নৃত্যধারায়। অর্থাৎ শাস্তিনিকেতনে মিশ্র পদ্ধতির নৃত্যচর্চা ‘শ্যামা’ প্রযোজনার মাধ্যমে শুরু হয়। নৃত্যগুরু কেলু নায়ার ১৯৩৯-১৯৪০ সাল পর্যন্ত নিয়ামিত চিত্রাঙ্গদায় অর্জুনের ভূমিকায় কথাকলি নৃত্য ভঙ্গিমায়ে অভিনয় করেন। ১৯৩৬ থেকে ১৯৪০ সাল পর্যন্ত চার বছরে চিত্রাঙ্গদার অভিনয় হয়েছিল মোট চল্লিশ বার। ১৯৪০ সালের ১৭ ফেব্রুয়ারি শাস্তিনিকেতনে ‘চণ্ডালিকা’ অভিনীত হয় মহাত্মা গান্ধীকে দেখাবার জন্য। ‘চণ্ডালিকা’ প্রশংসিত হয়েছিল। ১৯৪১ সালের ৭ আগস্ট রবীন্দ্রনাথের প্রয়াণ-অবধি শাস্তিনিকেতনের প্রতিটি খত উৎসব, বসন্ত উৎসবসহ বিভিন্ন অনুষ্ঠানে নৃত্য ছিল প্রাধান্য আকর্ষণ। আজও সে চর্চা অব্যাহত রয়েছে। রবীন্দ্র-নৃত্যভাবনায় বহির্ভারতীয় প্রচ্ছন্ন ছাপ থাকলেও মূলত ভারতীয় ঐতিহ্যকে ধারণ করে। সেখানে ভারতীয় ধ্রুপদী নৃত্যের মতো কোনো সুনিয়ন্ত্রিত ব্যাকরণ মানা হয় না। তারপরও বিশ্বভারতী বিশ্ববিদ্যালয়ের নৃত্যকলা বিভাগ ভারতীয় তথা বাঙলার নৃত্যকলা উন্নয়নে বিশেষ ভূমিকা রেখে চলেছে। রবীন্দ্রনাথ নিজে পছন্দ করতেন ব্যালে, জাভা-বালির নাচ, শ্রীলঙ্কার ক্যান্ডি ও সিলেটের মণিপুরি নাচ। পাশ্চাত্য নাচ সম্পর্কে তাঁর অভিমত ছিল এরকম এই যে— ‘আধখানা ব্যায়াম, আধখানা নাচ, তার মধ্যে লক্ষ্যবস্তু, ঘুরপাক, আকাশকে লক্ষ্য করে লাগি ছোঁড়া, আবার জাপানের নাচকে বলেছেন—দেহভঙ্গির সংগীত।... ভঙ্গিবৈচিত্র্যের পরস্পরের মাঝখানে কোনো ফাঁক নেই... একসঙ্গে দুলাতে দুলাতে সৌন্দর্যের পুষ্পবৃষ্টি করেছে।’ তবে বাংলার নৃত্যকলা পশ্চিমা ব্যালে প্রভাবিত নয়। নিজস্ব পাঁচালী, যাত্রা, রাঁয়বেশে, খেমটা, বুমুর প্রভৃতি মৌলিক উপাদানে গঠিত বাংলার নাচ। ফলে প্রাচীন বাংলার নৃত্যরীতি পদাঙ্কনে ভাবানুগ এবং আনুষঙ্গিক বাদ্যযন্ত্রে লঘু দৃষ্টিভঙ্গি বর্জিত প্রয়োগ কলা। রবীন্দ্রনাথ তাঁর গীতিনাট্যের সুরশৈলীকে যথার্থ সামঞ্জস্য রেখে নৃত্যনাট্যের উপযোগ সৃষ্টি করেন। তারপরও শাস্তিনিকেতনের নৃত্যপদ্ধতি নির্দিষ্ট কোনো রীতি মেনে চলেনি। মণিপুরি, কথাকলি, ভরতনাট্যম, এলাহাবাদের কথক, জাভা-বালির নৃত্য, হাঙ্গেরির লোকনৃত্য, শ্রীলঙ্কার ক্যান্ডিনাচের এক সম্মেলক রূপ।

রবীন্দ্রনাথের নৃত্যকে যদি রবীন্দ্র রচনা অনুসারে কয়েকটি পর্যায় ভাগ করতে পারা যায় তাহলে বিষয়টা খানিক গোছানো যায়। এবং শাস্তিনিকেতনের

ছাত্র-ছাত্রীদের মধ্য দিয়ে নৃত্যকলার ক্রমে প্রকাশের ও বিকাশের ধরা ও উপলব্ধি করা যায়। যেমন—

প্রথম পর্যায় শারদোৎসব, রাজা, অচলায়তন, ফাধনী ইত্যাদি নাট্য রচনা হয়েছে এই পর্বে। শারদ উৎসব নাটকের গানগুলির সাথে ছেলেরা দল বেঁধে নাচ করেছিল তখনও কিন্তু শান্তিনিকেতনের প্রথাগত নাচ শুরু হয়নি। রাজা নাটকে ঠাকুরদার ভূমিকায় অভিনয় করেছেন রবীন্দ্রনাথ এবং এখানেও একটি নাচের দলের উল্লেখ পাওয়া যায়। অচলায়তন নাটকেও দাদা ঠাকুরের ভূমিকায় রবীন্দ্রনাথ অভিনয় করেন এখানেও নাচের প্রয়োগ ঘটে। ফাধনী নাটকেই বলা হয় যৌবনের জয়গান, রবীন্দ্রনাথ অন্ধ বাউল এর ভূমিকায় অভিনয় করেন এবং অপূর্ব নৃত্য পরিবেশন করেন। এই পর্যায় কে রবীন্দ্র নৃত্যের আদি পর্ব বলা যায় যেখানে রবীন্দ্রনাথের গানের ভিত্তিতেই নাচ করে ওঠে। এবং স্বয়ং রবীন্দ্রনাথ এই নৃত্য পরিচালনা করতেন, পরবর্তী সময়ে যা ভাব নৃত্য নামে পরিচিত হয়।

দ্বিতীয় পর্যায় প্রথাগত নৃত্য প্রশিক্ষণ শুরু হয় এই পর্যায়ে। ১৯২০ সালে মণিপুরী নৃত্য প্রশিক্ষণ-এর দ্বারা ভারতীয় নৃত্য শান্তিনিকেতনে প্রথম প্রকাশ পায়। গরবা নাচ শেখানোর শুরু এই সময়। বর্ষামঙ্গল, বসন্ত, শেষ বর্ষণ ইত্যাদি রচিত হয় এই সময়। এই পর্যায়ে নটীর পূজা কলকাতার জোড়াসাঁকোতে অনুষ্ঠিত হয় এবং প্রথম বাঙালি মধ্যবিত্ত তথাকথিত ভদ্র পরিবারের মহিলারা মঞ্চে নৃত্য পরিবেশন করেন। নন্দলাল বসুর কন্যা গৌরী দেবী মুখ্য ভূমিকায় ছিলেন। এ পর্যায়ে লেখা হয় নটরাজ, সুন্দর, নবীন ইত্যাদি রচনা। এই পর্যায়ে রবীন্দ্রনাথ গানের ভাব বুঝিয়ে নিজে নাচ করিয়ে দিয়ে অভিনয় করে সম্পূর্ণ রস শিল্পীদের অভিনয়ের ভেতর থেকে বের করে আনতেন। ইউরোপী আদর্শ তৈরি মডার্ন ড্যান্স শ্রীলংকার ক্যান্ডি নাচ সংযুক্ত হচ্ছে রবীন্দ্র নৃত্যে। লেখা হচ্ছে বুলন, শিশু তীর্থ, সাপমোচন। এই সময়ে শান্তিনিকেতনের ইতিহাসে প্রথম কথাকলি নাচের প্রবর্তন হয়। শিশুতীর্থ কবিতাটির মধ্য দিয়ে প্রথম কাহিনী বলার মধ্য দিয়ে নৃত্য রচনার রূপ দেওয়া হয়েছিল। ১৯৩১ সালে রবীন্দ্রনাথের ৭০ বছর জন্মজয়ন্তী উৎসবের আয়োজনে কবি নিজেই শুধুমাত্র ছাত্র-ছাত্রীদের নৃত্য পরিবেশনের জন্যই শাপমোচন কবিতাটি লিখেছিলেন। অর্থাৎ শুধুমাত্র নাচ করানোর জন্যই তিনি রচনা করলেন করিতা। এই পর্যায় আসলে বাঙালির নৃত্যকলার উন্মেষ পর্ব।

তৃতীয় পর্যায় এই পর্ব আসলে নৃত্যনাট্যের যুগ। রবীন্দ্র নৃত্য ধারার ক্রমবিকাশের শেষ ফসল রবীন্দ্র নৃত্যনাট্য। চিত্রাঙ্গদা চন্ডালিকা শ্যামা এই তিনটি মূলত পূর্ণাঙ্গ নৃত্যনাট্য। রবীন্দ্র নৃত্যনাট্যে আপাতভাবে একটি কাহিনী আছে কিন্তু এই কাহিনীর ভিতরেই থাকে জীবনের গভীর সত্যের রূপকথা। সে সত্য বিভিন্ন চরিত্রের মধ্য দিয়ে

নাটকীয় কাহিনীর সাথে যুক্ত হয়ে গানের মধ্য দিয়ে ভাব প্রকাশ করে। আর ইতিমধ্যে তিনি তো দেখিয়ে দিয়েছেন ভাব আবেগ তার গতি পায় নৃত্যের মধ্য দিয়ে, সুতরাং এই নৃত্যনাট্যগুলি সম্পূর্ণভাবেই কথা, কাহিনীর সাথে, গানের সাথে নৃত্য পরিবেশনের জন্যই প্রস্তুত হয়েছিল। এই তিনটি নৃত্যনাট্যের মূল বৈশিষ্ট্য হচ্ছে যে তার গানগুলি গদ্য ছন্দে কথ্য ভাষায় রচিত। চিত্রাঙ্গদায় আবার অনেক আবৃত্তির স্থান আছে যার সঙ্গে নৃত্য অভিনয় করতে হয়। এই নৃত্যনাট্যের মধ্য দিয়ে বিবিধ তালের সমন্বয় ঘটেছে। চন্ডালিকা রবীন্দ্রনাথের প্রথম নৃত্যনাট্য যা আগাগোড়া সুরে গাঁথা। সুরে সুরেই নাচ। এখানে কথা আবৃত্তির কোন অংশই নেই। ১৮৯২ তে কাব্য নাট্য রূপে লেখা চিত্রাঙ্গদা কবি কলপনার চলমান শিল্প রূপায়নের জন্যই প্রথম নৃত্যভিনয় হয় ১৯৩৬ সালে কলকাতার নিউ এম্পায়ার মঞ্চে। দীর্ঘ চুয়াল্লিশ বছরের ব্যবধান। এই দীর্ঘ সময় ধরে ভাঙা গড়ার মধ্য দিয়ে রবীন্দ্রনাথ বাঙালির নৃত্যের আঙ্গিকে প্রস্তুত করে দিয়েছেন।

এভাবেই রবীন্দ্রনাথের অনুপ্রেরণায় বাঙালির নৃত্য ধারার সূচনা হয়, এবং ক্রম পরিনতির দিকে এগিয়ে চলে।

সূত্র নির্দেশ

- ১) সঙ্গীত চিন্তা—রবীন্দ্রনাথ ঠাকুর
- ২) রঙ্গমঞ্চ ও রবীন্দ্রনাথ ও সমকালীন প্রতিক্রিয়া—রুদ্রপ্রসাদ চক্রবর্তী
- ৩) গুরুদেব রবীন্দ্রনাথ ও আধুনিক ভারতীয় নৃত্য—শান্তিদেব ঘোষ
- ৪) জাভা যাত্রীর পত্র—রবীন্দ্রনাথ ঠাকুর

সহায়ক গ্রন্থ

- ১) জীবন স্মৃতি—রবীন্দ্রনাথ ঠাকুর
- ২) সংগীত চিন্তা—রবীন্দ্রনাথ ঠাকুর
- ৩) নৃত্য—প্রতিমা দেবী
- ৪) গুরুদেব রবীন্দ্রনাথ ও আধুনিক ভারতীয় নৃত্য—শান্তিদেব ঘোষ
- ৫) নৃত্যকলা ও রবীন্দ্রনাথ—শান্তিদেব ঘোষ

Webcomics in India as a Platform: Identity, Selfhood and Disability

Divyani Sharma*

Abstract :

The online medium aids multiple voices to come to the fore and articulate their opinions, and among them, a considerable number of webcomics have become a tool to express their concerns regarding selfhood and identity. My paper's line of inquiry will be a number of Indian webcomics where the authors have utilised the realms of both digital and graphic to produce texts that are inherently associated with ideas of identity and selfhood. Aamir From Pluto, a webcomic by a writer with Asperger's on a popular social media application (Instagram) chooses to highlight issues of developmental disorder along with contemporary satire. Another webcomic that my paper would inspect is Stuti Mamen's Mameness, in which the author delves into her identities and beliefs of being an academic, an artist, and a person of tribal origin. Through these webcomics, the visual interacts with the textual, and the mode of self-expression becomes highly personal and fluid. The digital medium renders it accessible and mostly uncensored, where personal narratives of identity and the various concerns regarding selfhood become relatively easier to convey. My paper intends to chart how the online graphic narrative mode provides an immersive and highly personalised environment for authors of these narratives to convey ideas about identity and the representation of the same. I would also inspect how critical the role of the graphic mode is in

*Assistant Professor, Department of English, Shri Shikshayatan College, Kolkata.

the online medium and how it impacts readers' interaction with the text – whether the visual narratives extend themselves to a higher degree of comprehension and immersion. The formal language of the webcomics would also be acutely examined, as the two above-mentioned texts have contrasting styles -- extending a varied spectrum of visual representation of identities.

Keywords: Webcomics, Identity, Representation, Disability.

The realm of comics is relatively well-known, but with the advent of webcomics, it is imperative to define the genre-bending medium on the rise. Marianne Hicks describes webcomics as “comics produced primarily for the web rather than for print” (3). Halsband and Grimm are of the opinion that webcomics “exist within the larger world of digital comics, which can include digitized versions of analog comics and comics published as a supplement or counterpart to print materials” (120). According to Halsband and Grimm, webcomics can be of several types: they can be born-digital, i.e., with the entirety of creation and production, from writing, drawing, layout, to colouring, taking place in a digital environment, or they can be “traditionally hand-drawn and later scanned for editing and viewing on the web”, i.e., comics which are made using conventional print standards, which are then uploaded on the digital medium (121). Beyond their definition, webcomics have emerged as a powerful medium for self-expression and representation in the digital age. A form of art and storytelling, have gained significant popularity and influence in recent years due to the ease of online publishing and the accessibility of social media platforms.

Comics has evolved in manifold ways since its inception, not only in form, but also in content. The Golden Age of comics (1938–56) witnessed the rise of superheroes, mostly male, catering to a homogeneous readership which was targeted at a dominantly male demographic (Highsmith 202). During the course of its evolution,

comics have branched out, with many other genres emerging to broaden the scope and nature of the medium, including the medium of production and consumption as well. This paper will chart how in the post-pandemic era the web has provided a platform for comics creators for both exploration and expression of their identities, with a special focus on India.

In a country characterized by its rich cultural diversity and complex social dynamics, webcomics have become a potent tool for creators to explore themes related to identity, culture, and social issues. With special emphasis on selfhood and disability, this paper will trace a select few comics with people from the margins – individuals in various places who have not felt quite at ease with expressing their individuality, or have been denied the chance to do so in traditional spaces.

The main social media platform that my paper will be taking into account is Instagram – since post-pandemic, the social media application, once used only to share pictures, has now garnered a status for sharing both pictorial and textual experiences across a wide demographic (Shahbaznezhad). My paper will be focusing on three particular webcomics hosted on Instagram for the exploration of the idea of selfhood; namely – Stuti Mamen's Mameness, Aamir's Aamir From Pluto, and Indu Lalitha Harikumar's Individuality. In Mameness, the author delves into her identities and beliefs of being an academic, an artist, and a person of tribal origin. Through Aamir From Pluto, Aamir tries to recount his experiences as someone dealing with Asperger's. In Individuality Harikumar tries to assert her selfhood through recollection of experiences which delineate her identity as a woman in a society which upholds double standards for its subjects.

A very significant aspect that Instagram taps into with its interface is the idea of the self. There is no separate profile page as such, only a bio page where the profile owners provide information about

themselves briefly – labels or ideas that they deem fit to describe themselves. The media interface is photo-centric, captions that go beyond two lines are hidden away, only to be accessed with a ‘more’ option. This preference of the visual renders it a powerful tool for bringing forth a personal narrative more vividly than text. Mameness achieves this by having a bio which reads “Academic, Artist. Panels & Margins. Mental health. Tribal culture. Borderlands. My identities are not up for you to exploit” (Mamen). Through the use of these labels, Mamen expresses clearly what she wishes to be markers of her selfhood – that she is an academic, followed by an artist. Panels talk about her artistic inclination – of exploring what constitutes the content of the stories she narrates, as panels are the window of the comics.

In one of her posts, she depicts the idea of a Borderland – a state coloured in shades of pastel greens and turquoise mountains, painting a picture of serenity. But the subsequent panels keep zooming in on the inhabitants of the place, which expose the underlying anxieties of the civilians of this so-called Borderland. The characters take on a pinkish-orange hue, with the peaceful green giving way to a more charged up narrative of shootings in Arunachal Pradesh, composed in warm tones of red (Figure 1).



This rendering of a Borderland is immensely significant in the journey of Mamen's work, as it delves in to a realm which explores her identity as hailing from a Borderland. She explicates the idea further her caption for the very same post:

“The Borderland depicted in this work is based on Arunachal Pradesh. Tirap District to be specific. The ordeals of those living in the margins however, is similar everywhere. As their lives continue to be torn apart, the people of the Borderland continue to live perpetually caught between several gunpoints, villainised for not choosing a side. It is painful and appalling to witness the lack of empathy and self-entitled ignorance exhibited by people who with great vehemence speak on things they have no experience of.”
(Mameness)

By choosing to talk about all the spheres that plague Arunachal Pradesh, Mamen ekes out a space for herself in which she can express her individuality steadfastly. Through the social medium, she can choose to utilise her visual art as a means of not only self-expression but also as a mode of self-acceptance. Comics hence here becomes a process of self and ethnographical discoveries, and a tool for dissemination of stories that would have been silenced otherwise – hence her naming the series ‘Borderland’ and her emphasis on being from the margins in the bio-note of Instagram. Even her naming the account ‘Mameness’ sheds light on her process of self-discovery and expression. In another panel, she presents a character that is not fictional, as they are in her Borderland series, but rather it is herself, looking for a reflection of representation in the society (Figure 2



Figure 2: Mameness

The idea of hailing from the margins is a fundamental identity of Mameness – hailing geographically from Arunachal Pradesh, a state dealing with strife, antagonism, and questions of national identity itself (Nani 158), and socially from a tribal background, it is representation that Mamen seeks for herself, but not having found

anything that befits her, she chooses webcomics as a mode of questioning the gap, simultaneously representing herself on the social platform.

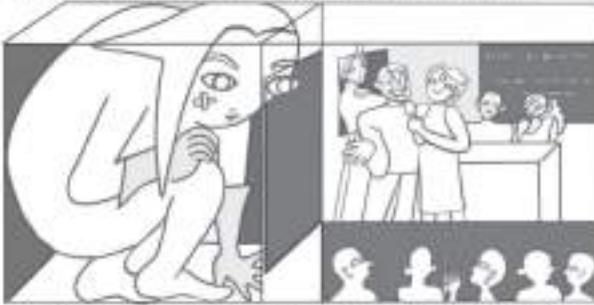
Mameness not only broaches the idea of geographical marginal identity and the negotiation with the self for its expression, but it also takes on the issues of gender. The idea of gender has traditionally been dictated by social expectations from a woman, an identity which has been born out of what Judith Butler terms a “stylised repetition of acts” (519). Butler argues that gender, as an objective natural thing, does not exist: “Gender reality is performative which means, quite simply, that it is real only to the extent that it is performed” (527). Mamen puts to the fore these ‘realities’ which are entrusted upon the women to perform. Taking into account the instances that she has had to face herself, the author recounts in multiples webcomics instances of bias, harassment, and trauma. In one particular post, Mamen draws herself trapped in a box and looking towards an apparent window of the cage-like box towards what appears to be a gender sensitisation programme, where both men and women are discussing women’s issues (Figure 3).

Figure 3: Mameness

Using only three solid colours to depict the comics mentioned above (Figure 3), Mamen creates a visual representation of her trauma. The text describes her torment at being helpless when

IT TOOK ME A LONG TIME TO COME TO TERMS WITH THE FACT THAT INTERNATIONAL WOMEN'S DAY IN THE FORM I KNEW IT, HAS HELD THE POTENTIAL TO TRIGGER ME A LOT OF IT HAS TO DO WITH THE FACT THAT ALMOST ALL SO-CALLED SAFE SPACES I'VE TURNED TO ARE RUN BY ABUSIVE PERPETRATORS AND THEIR ENABLERS.

WOMEN'S DAY PROGRAMMES, GENDER-EMPOWERMENT WORKSHOPS, CONFERENCES ON FEMINIST PRACTICES, ORGANISATIONS DEVOTED TO MENTAL-HEALTH AWARENESS, ACADEMIC INSTITUTES, ALL SORTS OF COLLECTIVES AND PLATFORMS — EVERY SPACE HAS ESTABLISHED ITSELF AS A SAFE HAVEN FOR OPPRESSORS AND EXPLOITERS.



PROGRAMMES ARE HELD, PAPERS PUBLISHED, ANNUAL REPORTS THAT DOCUMENT GENDER SENSITISATION ARE PRESENTED WITHOUT ANY ATTEMPT AT ENSURING THE SAFETY OF YOUNG PEOPLE OF MARGINALISED GENDERS. SURVIVORS OF SEXUAL ABUSE ARE ROUTINELY BLAMED WOMEN FROM MARGINALISED COMMUNITIES ARE PARTICULARLY PUNISHED, HUMILED, AND SYSTEMATICALLY OBTUSCATED. PEOPLE COMING OUT WITH THEIR EXPERIENCE OF FACING INSTITUTIONALISED DISCRIMINATION AND VIOLENCE BASED ON RACE/CASTE/CLASS ARE HAMILTERED.

ABUSERS OF POWER ENSURE YOU ARE THE MONSTER LURKING IN THE SHADOWS EVEN ON THE DAY THAT IS SUPPOSED TO EMPOWER YOU.

perpetrators of injustice on women are provided sanctuary and sometimes a platform to talk about women’s rights and safety in celebrated institutions of the society. She exposes these “so-called safe spaces” that are being run by “predators and their enablers” and talks about how most of the events held to honour or celebrate the marginalised gender are often spaces that have established themselves as “a safe haven for oppressors and exploiters”. By virtue of it being a webcomic, Mamen brings in changes to the text which make considerable difference in her expression and make it uniquely individual. In the panel, she talks about Women’s Day being a trigger for her and she ends the text with the following sentence:

“ABUSERS OF POWER ENSURE YOU ARE THE MONSTER LURKING IN THE SHADOWS EVEN ON THE DAY THAT IS SUPPOSED TO EMPOWER YOU.”

Using an all-caps font to emphasise her point, Mamen further questions the empowerment that society apparently doles out to their women by replacing the upper case 'P' in 'EMPOWER' with a question mark. On the surface level, it appears the same, but if one looks acutely then one can see the question mark. This is perhaps one of the most subtle inquiries that Mamen makes, as she reminds the reader of the harsh truths hidden behind such women empowerment programmes.

The image of herself being trapped in that box is evocative of her past trauma, and she chooses to emphasise that fact by depicting herself with two bandages right below her eye. Lisa Deidrich elaborates on the graphic medium as a tool which allows comics author to re-order life in panels to look for a sense of clarity, while being safe in the knowledge that whatever happens in the investigation, would remain confined within the scope of the page (184). Sohini Kay takes this idea of Diedrich's in her article and expands on it by asserting that comics as a medium are "an investigational space to think, to chart memories, to draw connections" and it "allows the author-protagonist to expose themselves to a simulation of their traumatic event in a controlled environment". The author of Mameness attempts to do the same, by depicting traumatic incidents through a visual representation of herself, she channels the trauma she has faced into the graphic medium. This separation helps in recollection and negotiation of the trauma in a controlled manner.

Webcomics can aid in the process of self-expression and establishing a sense of identity and selfhood. It can also be a medium for the exploration of issues such as mental health and disability, which were earlier considered by the Indian society as taboo subjects. To take an example from Mameness, a simple single panel webcomic with no words depicts the state of mind the author finds herself in (Figure 4).



Figure 4: Mameness

The image reveals the author half-drowning in an extremely large glass full of water with a lone fish floating in the same water. The character seems to be lost in a state of flux and mental trepidation, signifying an immense state of distress to the readers. Susan Squier, a founding member of the Graphic Medicine Collective, writes that in comics “as we read,” we also “internalize the action.” Hence for the readers, the depiction of health issues, both mental and physical, cause an internalisation of the action being presented in the visual form. Webcomics can provide the ability to express oneself through visual metaphors, such as Mamen’s drowning in the glass as a metaphor for losing one’s mind, but they can also depict how one feels inside by deviating from the realistic to the iconographical and the metaphorical, and it is because of this reason that the comics medium is so conducive in visualising trauma and illness (Kay).

Aamir Rangwala’s *Aamir From Pluto* attempts to bridge the gap that exists in India when it comes to the topic of disability. Locating himself loud and clear in his bio as a “Comics writer with Asperger’s”, Rangwala immediately claims his space as an author

with a developmental disorder (Figure 5). There is no hesitation in placing himself on the spectrum, and he asserts his identity as a matter of fact. His webcomics are topical and mostly satirical, touching upon issues of all spheres, not solely concentrating on disability. Rangwala declares his identity and establishes his selfhood through his webcomics in various subtle ways, yet not letting it overpower any narrative of the comics.



Figure 5: Aamir From Pluto

While Rangwala might not actively utilise the medium of webcomics to depict his disability, his personhood comes to the fore through this art. Gillian Whitlock in *The Comics Studies Reader* opines that the “unique capacity of comics (is) to show the process of mental illness from the perspective of the ill, to externalize and give visual body to psychic suffering”. Aamir From Pluto indeed gives body to the ‘psychic suffering’ of the author by giving him an outlet to be himself.

Indu Lalitha Harikumar’s *Individuality* on the other hand is a webcomic that boldly asserts her selfhood in each piece of work. Through the social media aspect of Instagram, she often embarks upon making ‘People powered art projects on Gender and Sexuality’ and her account is a gateway to her experiences sketched out in comics form. Harikumar delineates her observations, impressions and adventures both in her personal and professional life through webcomics. From being born in a marginalised community, to growing up with systematic cruelty and abuse, Harikumar paints a vivid picture of her life in black, white and red. She also organises quizzes which ask her readers (followers on Instagram) for sharing

their personal experiences which she then posts maintaining their anonymity, creating a unique community experience. She often also makes comics of her readers' experiences (with their permission) in her trademark style. Adding to this aspect, she often reflects on this sense of community that she has built on social media (Figure 6).



Figure 6: Individuality

Harikumar also speaks of hardships and personal experiences that have shaped her life. She is unflinching when it comes to talking about her past relationships, be it with her family, her friends, or her partners. A recurrent theme of the comics is the author talking about her vulnerabilities, and her failed relationships with people in positions of power. She chooses the mode of comics to navigate her own emotions and utilises it as a tool in the process of self-discovery. In one particular comic, she addresses and locates her choices in partners deviate towards a certain type because of childhood trauma (Figure 7). As Scott McCloud reveals, iconographical drawing obscures and creates the illusion of distance

that comics authors need for perspective, especially when recalling personal experiences.



Figure 7: Individuality

Webcomics in India are progressively becoming tools to establish selfhood and identity, especially for people from the margins. The expression of self might be different for these authors -- both Mamen and Harikumar add pictures of themselves in between the comics being posted to demonstrate that the realm of creativity is deeply interwoven with the idea of the self, whereas Rangwala chooses to keep his account free of personal photos, and has replaced his full name signature on his comics with his username. The method varies, but on close inspection, it can be found that all three are inextricably linked to their idea of self. The names of the three accounts in question reveal which aspect of themselves they want to focus on. Mamen is deeply involved with her origin and hence chooses to explore her roots through her surname, naming her account Mameness; adding the -ness suffix concentrates on what it is to be Mamen-like, to embark upon the state of being herself, and where she comes from. Harikumar on the other hand chooses to let go of her traumatic associations with her childhood and hence

focuses on her first name Indu, calling her account *Indudividuality*, a play on individuality and herself. It is this deep probing into her self and psyche, and her willingness to traverse a path that is uniquely hers and makes her stand out as an individual that justifies the naming. *Rangwala's Aamir From Pluto* takes on another facet of identity, where instead of focusing on his name, he concentrates on where he is located – this provides a perspective of how people who are affected by disability might see themselves.

Comics as a medium has become accessible with the rise of Internet users, and webcomics, particularly in India have become a platform for people expressing their ideas. The sense of self or selves, plural identities, from places otherwise too remote or marginalised, or even worse – silenced, have come to the fore in this digital age. All three webcomics mentioned in this paper – *Mameness*, *Aamir From Pluto*, and *Indudividuality* have in more ways than one tried to assert their ideas of identity, selfhood and their battles with disability and trauma in the Indian socio-political landscape. Hailed to be “a comic type that continues to develop at a seemingly exponential rate”, webcomics constitute a genre-bending medium that is constantly evolving on the digital platform (Kirchoff and Cook 1) and while the comics themselves might be ephemeral, perhaps they are one of the most important platforms in the country for the mode of self-expression.

Works Cited :

- Bath, Nani. (2009) “Arunachal: Emergence of Issue-Based Politics?” *Economic and Political Weekly*, vol. 44, no. 39, pp. 157–59. JSTOR, <http://www.jstor.org/stable/25663621>.
- Czerwiec, M. et al. (2020) *Graphic Medicine Manifesto*, Penn State University Press eBooks. <https://doi.org/10.1515/9780271079264>.
- Diedrich, L. (2014) 'Graphic Analysis: Transitional phenomena in Alison Bechdel's *Are You My Mother?*,' *Configurations*, 22(2), pp. 183–203. <https://doi.org/10.1353/con.2014.0014>.

- Halsband, M.C. and Grimm, S. (2018) 'Panel Problems: Issues and Opportunities for Webcomics archives,' *Art Documentation*, 37(2), pp. 119–140. <https://doi.org/10.1086/700204>.
- Harikumar, I.L. Indu Lalitha Harikumar (@induividuality) <https://www.instagram.com/induividuality/>.
- Hicks, M.T. (2009) 'Teh Futar': the power of the webcomic and the potential of web 2.0. <https://research.monash.edu/en/publications/teh-futar-the-power-of-the-webcomic-and-the-potential-of-web-20>.
- Highsmith, D. (1987) "Comic Books: A Guide to Information Sources," *RQ*, vol. 27, no. 2, pp. 202–09, JSTOR, <http://www.jstor.org/stable/25828043>.
- Kay, S. (2020) *I Draw* (A graphic Dissertation), Comics as Method and Holding environment. <https://womenwriteaboutcomics.com/2020/10/i-draw-a-graphic-dissertation-comics-as-method/>.
- Lowang, S.M. Stuti Mamen Lowang (@mameness) <https://www.instagram.com/mameness/>.
- McCloud, S. (2000) *Reinventing Comics: The Evolution of An Art Form*. Harper Collins.
- Rangwala, A. Aamir (@aamirfrompluto) <https://www.instagram.com/aamirfrompluto/>.
- Shahbaznezhad, H., Dolan, R. and Rashidirad, M. (2021) 'The role of social media content format and platform in users' engagement behavior,' *Journal of Interactive Marketing*, 53, pp. 47–65. <https://doi.org/10.1016/j.intmar.2020.05.001>.

Petrified Legume Woods from the Neogene of Bengal Basin with remark on Distribution and Paleoenvironment

Dr. Illora Sen*

Abstract :

Petrified wood is one of the most common types of plant macrofossil. Wood is a compact and durable plant material, which resists natural decay and disintegration processes and hence often gets fossilized with time. Wood may become fossilized in various ways depending on the different conditions favoring fossilization viz., the kinds of tissues composing the different plant parts and the conditions to which the plant parts are subjected preceding and during fossilization.

Xylotomy is a branch of plant science, which deals with the systematic study of the different elements of secondary wood. Wood is the most constructive part of a plant as it is subjected to little evolutionary changes compared to flowers and fruits, which have evolved into more complex structures with the passage of time.

In the present study petrified wood remains were collected from different parts of Bengal Basin and sectioned by standard methods. Permanent slides were prepared from the sections and studied for respective xylotomical observations. The current work focuses on the all Fabaceae

*Associate Professor, Department of Botany, Shri Shikshayatan College, Kolkata.

species identified from the study area. The different species identified are viz; *Albizinium eolebbekianum*; *Cassinium borooahii*; *Bauhinia deomalica*; *Cynometroxylon holdenii*; *Hopeoxylon assamicum*; *Isoberlinioxylon congoense*; *Kingiodendron prepinnatum* and *Millettioxylon bengalensis*.

The phytogeographic distribution pattern of the nearest living relatives of the described extinct species has been utilized as a reference database to reconstruct the vegetation pattern and climate of Bengal Basin during Neogene time.

Key Words: Petrified wood, Fabaceae, Bengal Basin, Phytogeography

Introduction :

Bengal Basin, one of the largest sedimentary basins of the world, covers an extensive area including some North Eastern provinces of India and South- Central parts of Bangladesh. The basin has undergone several phases of transgressions, regressions, periodic uplifts, and localised negative movements throughout the period of its evolution.

The basin is remarkable for its typical palaeovegetation, fascinating and complex palaeoenvironment which prevailed through a long geological period.

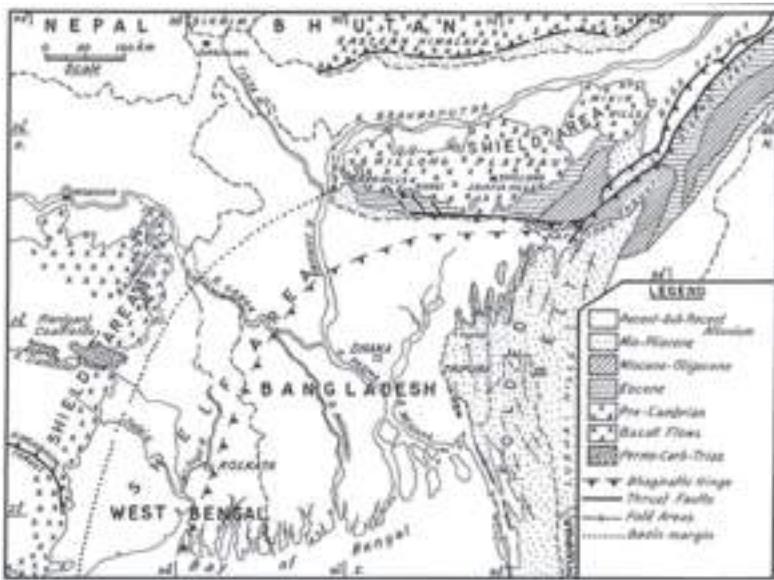
The rich fossil assemblages recovered from the various rock strata of the Basin have been greatly utilized for reconstructing the palaeoenvironment and palaeovegetation of the basin in the past. The petrified woods recovered from the Tertiary beds of the basin are the commonest form of plant fossils, found in great abundance particularly in the Neogene deposits spreading over India and Bangladesh.

Climate of Bengal Basin :

The climate is highly seasonal in character, the annual range of temperature is not too high due to the influence of the Bay of Bengal in the south. The differential nature of the seasons has mainly been attributed to the amount of rainfall received at different times of the year. The presence of high mountain range in the north has considerable impact on the climatic situation of the Basin. Three

specific seasons, viz hot and dry; hot and wet and cold have been recognized in the climatic calendar of the Basin. (Chatterjee, 1970). The climate is typically tropical, temperature varies between 8 °C – 31 °C. The Indian part of Bengal Basin predominantly having tropical climate has distinct vegetational zones (Forest types, Eastern India; plate 105, 1975, prepared under the direction of S.P. Dasgupta, Director, National Atlas organization): –

1. Tropical dry deciduous forests in the western part
2. Tropical moist deciduous forests.
3. Tropical semi-evergreen forest scattered in patches within the basin.
4. Littoral and swamp forests in the deltaic Bengal Basin commonly known as the Sunderbans Mangrove forests.



Map 1: Showing present study area in Bengal Basin, India and Bangladesh

Bangladesh has a tropical climate characterized by two main seasons; a dry season from November to March and a rainy season from June to October. Both the climate and soil of Bangladesh create favourable conditions for the growth of a rich vegetation. Due to different rainfall patterns and soil compositions, the vegetation shows

significant regional variations ranging from grassland to deciduous, mixed evergreen and evergreen forests. Bangladesh experiences two distinct seasons; a cool season from November to January and warm from March to October. Average January temperature is from 19° C in the south to 17° C in the north; maximum temperature is recorded from the western districts (38°>). The forests of Bangladesh are restricted to three zones: - (1) Chittagong Hill Tracts in the south- east, (2) Sunderbans in the southern end and (3) Madhupur Tracts in Central Bangladesh (Reimann, 1993). There are scattered occurrences of forests in the Sylhet district. The Chittagong Hill Tract shows two varieties of forests, the tropical evergreen and the tropical mixed evergreen.

Plant fossils are one of the most reliable indicators of the past climate and petrified secondary wood elements act as highly conserved structure, which remain almost unchanged with time, and hence store valuable information in different geological ages.

The present study of the petrified woods provides significant information about the past floral assemblage in the Neogene of Bengal Basin, India and Bangladesh and the prevailing environment in which it flourished.

Material and Method- The petrified fossil wood remains collected from the different sites (for present work) of Bengal Basin, India and Bangladesh, were initially subjected to very close and thorough examination. The wood samples mostly acquired in good form, indicated favourable conditions of preservation . Description of the external features of the fossil woods was done on the basis of colour, texture, hardness and presence/ absence of growth rings.

All the petrified woods were sectioned along transverse (T.S.), tangential longitudinal (T.L.S) and radial longitudinal (R.L.S) planes with the help of rock cutting machine and permanent slides were prepared following the technique adopted by Hass and Rowe (1999).

Specimen List as collected from different localities of the study area:

Species	Collection Site
<i>Albizinium eolebbekianum</i>	Agartala, Tripura

Prakash, 1975.

Bauhinia deomalica

Baramura, Tripura

Awasthi and Prakash, 1987.

Cassiniun borooahii

Uttar Raipur , West Bengal
& Teliamura Tripura

Prakash, 1975

Cynometroxylon holdenii(Holden)

Lalmal Hill , Bangladesh
& Muhammad Bazar, West Bengal

Bande and Prakash, 1980

Hopeoxylon assamicum Lalitha

Lalmal Hill , Bangladesh &
Burdwan, West Bengal

and Prakash, 1980.

Isoberlinioxylon congoense

Teliamura Tripura

Guleria, 1984.

Kingiodendron prepinnatum

Lalmal Hill , Bangladesh

Awasthi and Prakash, 1987.

Millettioxylon bengalensis

Muhammad Bazar, West Bengal

Ghosh and Roy, 1979a

Observation and Description :

***Albizinium eolebbekianum* Prakash, 1975**

Wood diffuse porous. Growth rings present, delimited by thin lines of terminal parenchyma. Vessels medium to large, solitary and in radial multiples of 2-3, evenly distributed. 3-6 per sq mm; vessels round to oval in cross section. Parenchyma paratracheal and apotracheal; paratracheal parenchyma in the form of narrow sheath around vessels, mostly aliform forming short extensions ; apotracheal parenchyma represented by thin terminal lines. Xylem rays 1-4 seriate, (mostly 2-3 seriate), 6-10 per mm; 3-25 or 48-355 cells high; ray tissue homocellular

***Bauhinia deomalica* Awasthi and Prakash, 1986**

Wood diffuse porous. Growth rings not distinct. Vessels small to medium, round to oval, solitary and in radial multiples of 2-3,

sometimes 2–5, uniformly distributed, 4–6 per sq mm; tangential diameter. 60–150 μm and radial diameter 150–300 μm . Parenchyma paratracheal, aliform–confluent to mostly banded, completely or partly enclosing the vessels, alternating with broader bands of fibres; parenchyma bands 3–5 cells wide and 4–6 per mm, strands storied in nature. Xylem rays fine, exclusively uniseriate.

***Cassinium borooahii* Prakash, 1967**

Wood diffuse porous. Growth rings indistinct. Vessels medium to large, mostly solitary, sometimes in radial multiples of 2–3, evenly distributed, 2–4 per sq mm; tangential diameter–150–300 μm , radial diameter 170–400 μm . vessels sometimes filled with tyloses or dark contents; vessel members 225–450 μm in length; inter vessel pits simple. Parenchyma paratracheal banded, sometimes confluent to aliform, parenchyma bands 4–6 cells wide, cells thin walled, t.d. 12–22 μm and r.d. 15–25 μm . Xylem rays 1–3 seriate (mostly 2), closely spaced, 4–6 per mm; uniseriate ray homogenous, Fibres thickwalled, non-septate, 16–32 μm in diameter.

***Cynometroxylon* Chowdhury and Ghosh, 1946**

***Cynometroxylon holdenii* Prakash and Bande, 1980**

Wood diffuse porous. Growth rings indistinct. Vessels small to medium, solitary or in radial multiples of 2–3, 6–12 per sq mm, tangential diameter 70–200 μm and radial diameter 45–12 μm ; vessels 150–450 μm in height; perforations simple; intervessel pits alternate, vestured, 4–5 μm in diameter. Parenchyma abundant, forming regular concentric paratracheal bands, alternating with fibre bands of almost same width, bands 4–8 cells wide; Fibres thick-walled, 6–10 μm in diameter, non-septate, pits not found.

***Hopeoxylon Navale emend* Awasthi, 1977**

***Hopeoxylon assamicum* Lalitha and Prakash, 1980**

Wood diffuse porous. Growth rings distinct, delimited by layers of parenchyma enclosing gum canals. Vessels medium to large, solitary or in radial multiples of 2–3, 2–4 per sq mm; round to oval in cross-section, tangential diameter 140–200 μm and radial diameter 170–250 μm , vessel members 200–550 μm in length with slightly

oblique ends; tyloses absent but filled with dark brown gummy contents; perforations simple; intervessel pit pairs round to oval; Gum canals in concentric rings, circular to oval, 110–300 μm in diameter, associated with apotracheal bands of parenchyma.

***Isoberlinioxylon* Lakhanpal and Prakash, 1970**

***Isoberlinioxylon congoense* Lakhanpal and Prakash, 1970**

Wood diffuse porous. Growth rings, delimited by narrow lines of parenchyma, small vessels and thick-walled fibres. Vessels small to medium, solitary and in radial multiples of 2–4, evenly distributed, 4–6 per sq. mm, vessels sometimes filled with dark contents, tangential diameter 65–235 μm , radial diameter 90–220 μm ; apotracheal parenchyma scanty, diffuse, sometimes form narrow lines of 1–2 cells delimiting the growth rings, parenchyma cells round to oval; Fibres round to polygonal in cross-section, walls 4–5 μm in thickness; fibres 4–12 μm in diameter, mostly non-septate.

***Kingiodendron* Harms**

***Kingiodendron prepinnatum* Awasthi and Prakash, 1987**

Wood diffuse porous. Growth rings present, delimited by narrow lines of parenchyma and thick-walled fibres. Vessels small to medium occasionally large, mostly circular to oval / elliptical in outline; solitary and in radial multiples of 2–4 evenly distributed, 6–12 / sq mm; vessel members 250 μm in diameter with truncate ends, about 150–600 μm in length, intervessel pits vestured. Parenchyma paratracheal and apotracheal, paratracheal parenchyma vasicentric, forming 2–3 cells wide sheath around the vessels; Rays 1–4 (mostly 3) seriate, about 3–18 cells in height, 7–9 per mm; ray tissue homocellular to weakly heterocellular.

***Millettioxylon* Awasthi, 1967**

***Millettioxylon bengalensis* Ghosh and Roy, 1979**

Wood diffuse porous, growth rings present. Vessels small to medium sized, mostly solitary, sometimes in radial multiples of 2–3; tangential diameter 58–127 μm (mean 90 μm), radial diameter 60–210 μm (mean 120 μm), 5–8 per sq mm; vessel members storied; perforation simple; intervessel pits small, alternate, vestured, 4–6 μm in diameter.

Parenchyma in thin regular concentric bands alternating with broad fibre bands and partially and sometimes wholly encircling the vessels. Xylem rays 1-2 (mostly 2) seriate, homocellular to weakly heterocellular, composed mainly of procumbent cells. Ripple marks present due to storied arrangement of vessel members, parenchyma strands and xylem rays.

Discussion :

The fossil woods for the present study collected from the different fossiliferous sites of Tripura, West Bengal of India and Sylhet, Comilla, Chittagong of Bangladesh reflect a diverse floristic composition, forest pattern and climatic set up.

Reconstruction of past vegetation pattern and the prevailing environmental condition of the present area of investigation during Neogene have been attempted by considering all the previous fossil wood records from the Basin (West Bengal, Tripura and Bangladesh) and the adjoining landmasses including Assam, Arunachal Pradesh, Nagaland in India and the Southeastern countries viz., Myanmar, Thailand, Borneo and Sumatra, as the entire area falls within a tropical belt supported by a uniform climate (Bande and Prakash, 1986). The forest types, phytogeographic distribution patterns and climatic requirements of the modern equivalents of all the respective fossil taxa of this entire landmass can be taken as a reliable database to reconstruct the vegetation of the Bengal Basin during Neogene period.

A close survey of the forest types of all these modern equivalents indicate that most of the genera at present occur in tropical to subtropical moist evergreen to semi evergreen forests, some in moist to dry deciduous and a few in tidal and coastal swampy forests

A detailed study of all the comparable taxa in the present study indicates the predominance of the members of the family Fabaceae uniformly throughout the Neogene exposures of the Bengal Basin (Tripura, West Bengal and Bangladesh)

The modern equivalents of the presently recorded fossil taxa of Fabaceae are *Albizia*, *Bauhinia*, *Cassia*, *Isoberlinia*, *Kingiodendron*, *Ormosia*, *Sindora*, *Pahudia*, *Millettia* and *Afzelia- Intsia*.

Albizia, at present occurs as medium sized trees in the warmer parts of the world. In India the member occurs in the tropical deciduous forests extending from Jammu to Bengal and Assam in the east and as erect trees in the deciduous vegetation of South India and Andamans

Bauhinia, a genus comprising of trees, shrubs and climbers are well distributed in the tropical regions of India viz, commonly occur as medium sized tree in the deciduous forests of Assam, Khasi Hills, Sub Himalayan Tracts in West Bengal, Bihar and also in the dry forests of Central and Southern parts of India.

Presently about 180 species of *Millettia* are distributed throughout the tropical and subtropical warm deciduous to evergreen forests of Africa, India (Deccan, Assam, Sikkim and Manipur), Malaysia, China and Australia (Willis, 1973). *Millettia prainii* with which the fossil taxa in the present work are comparable grows in the evergreen forests of Assam. (Kanjilal and Das, 1938).

Cynometroxylon holdeni, an extinct species of Fabaceae has been recorded from the *Dupi Tila* formation of Bangladesh. Presently the genus *Cynometra* comprises of about sixty species well distributed throughout the tropics in the Indo- Malayan region, Philippines, Australia, Pacific Islands, Mexico, Brazil and Africa.

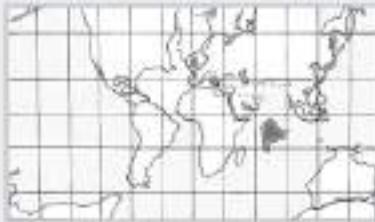
Isoberlinioxylon congoense, a fossil member of Fabaceae was described for the first time by Lakhanpal and Prakash (1970) from the Miocene of the Lake Albert, Congo. The same extinct species has been reported from the Tertiary of Kutch, Gujarat (*Guleria*, 1984). In this present work, *I. congoense* has been identified from Neogene of Tripura. At present, however, *Isoberlinia* is totally lacking from the forests of Indian sub-continent and mainly confined to the tropical Africa (Willis, 1973).

Kingiodendron consists of six species confined to Philippines, Solomon and Fiji Islands (Willis, 1973, p. 616; Mabberley, 1997, p. 379) with a single species growing in the evergreen forests along

the Western Ghats in India from South Kanara to Kerala and Tirunelveli (Ramesh Rao Neogene may be considered as an important landmark in the evolution of flowering plants in India and Southeast Asia as introduction and proliferation of new flora through cross migration between the two landmasses and subsequent intermixing gave a revolutionary turn in the existing vegetation.

Migration of tropical flora from Southeast Asia to India has been earlier discussed by Bande and Prakash (1986) but no precise route was suggested. Paucity of fossil records from Bangladesh and Tripura may be a primary reason for this. The present study fills the gap and suggests that most of the present day tropical elements migrated

•The land connection established between the Indian subcontinent and Southeast Asia via Myanmar by the end of Oligocene possibly caused migration of several tropical moist evergreen to semi-evergreen Malayan elements viz., *Cassia*, *Albizia*, *Millertia* etc from the neighbouring Southeast Asia into the Indian subcontinent via Myanmar (Tukhraj, 1969; Bande and Prakash, 1986). Awasthi and Mehrotra (1993) proposed that some new taxa viz. *Isobertinia*, *Cynometra*, *Sindora* and *Jalbaracardia* were introduced into the Indian subcontinent from Africa via Kutch.



Paleocene (60m.y.) Palaeocontinental Map (After Smith & Briden, 1979)



Late Miocene (10m.y.) Palaeocontinental Map (After Smith & Briden, 1979)

CONCLUSION

Many of the fossil taxa of Fabaceae described here from the Neogene of Bengal Basin are continuing as a part of the present flora of the Basin

- The disappearance of *Sindora* and *Isoberilwa* from Bengal Basin and rather from Indian Sub continent is of substantial phyto-geographic significance

- Reconstruction of past environment has been attempted on the basis of the forest types of the comparable extant forms

- The Neogene may be considered as an important landmark in the evolution of flowering plants in India and Southeast Asia as introduction and proliferation of new flora through cross migration between the two landmasses and subsequent intermixing gave a revolutionary turn in the existing vegetation. The possible reason for this was the change in the orientation of land and sea which had started from the late Cretaceous onwards and reached a climax towards the end of Palaeogene

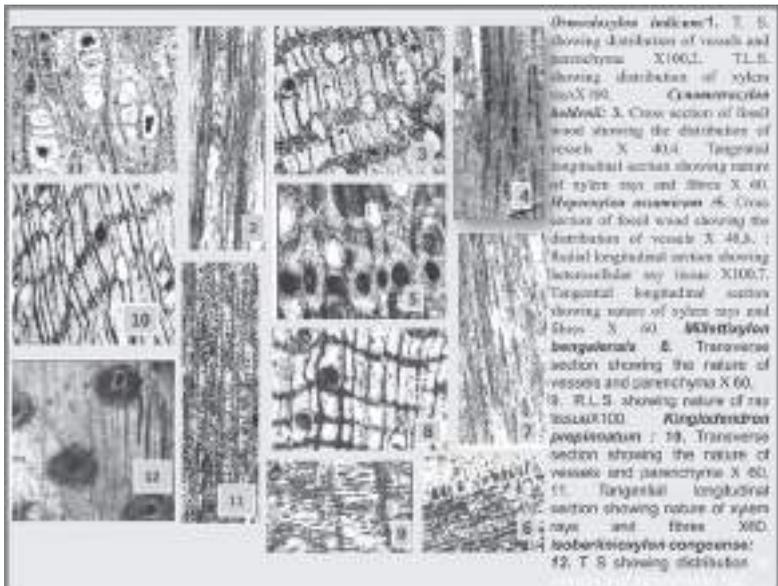
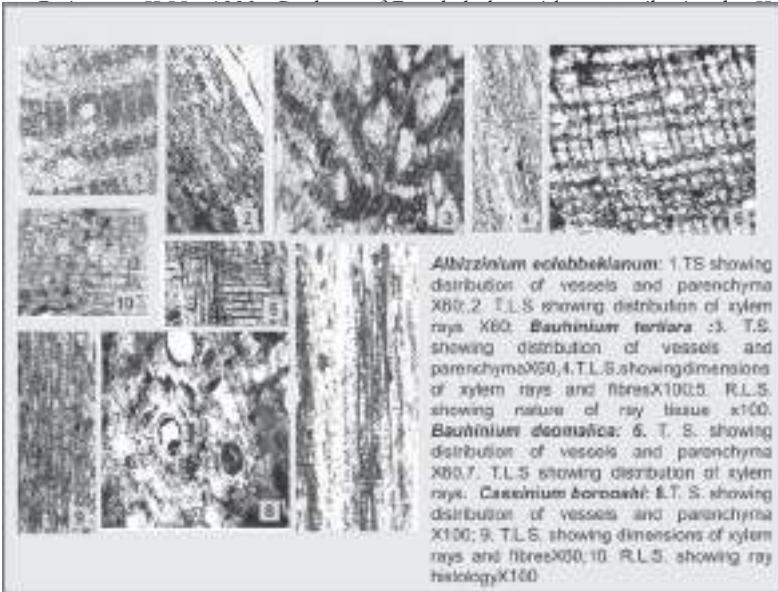
- Earlier the work of Bande & Prakash(1986) discussed the migration of tropical flora from Southeast Asia to India and recently, Mehrotra et al. (2005) proposed different route for the Migration of tropical flora from Southeast Asia to India.

- The present study however suggests that most of the present day tropical elements migrated from Southeast Asian landmasses via lower part of Myanmar through Bangladesh and Tripura to Northeastern and eastern parts of India

from Southeast Asian landmasses via lower part of Myanmar through Bangladesh and Tripura to Northeastern and eastern parts of India

Selected References :

- Bande, M.B and Prakash, U., 1986. The Tertiary flora of Southeast Asia with remarks on..... Indo-Malayan region. *Rev. Paleobot. Palynol.* 49, 203-233.
- Chowdhury, K.A and Ghosh, S.S., 1946. On the *Cynoptroxylon indicum*..... a fossil dicotyledonous wood from Nailalung, Assam-*Proc. Natn. Inst. Sci. India*, 12435-447, New Delhi.
- Ghosh, P.K. and Roy, S.K., 1979. A new species of *Millettia* from Tertiary of West Bengal, India. *Curr. Sc.* 48:165-166.
- Guleria, J.S. 1984 ; Leguminous woods from the Tertiary of district Katchhh, Gujarat. *Palaeobotanist* 31: 238-254.
- Haas and Rowe, 1999. Thin section and wafering. In: Jones, T.P., Rowe, N.P. (Eds), *Geological Society, London*, pp.76-81.



Cricket in Films: Ideas of Nation and Nationalism from Field to Screen

Mayukh Lahiri*

Introduction :

Traditionally, 'Nationalism' is considered as an idea that establishes allegiance of an individual or a group towards the nation or nation state. Simultaneously, it endorses the values that are upheld by the nation. Hence, nation and the established authority who govern the nation try to set specific notions about 'should', 'should not' and 'must' which the individual/group must abide by to prove their loyalty to the nation. Understandably, such notions change according to the preferences set by that established/ruling authority.

The ideas of 'Nation' and 'Nationalism' in India, started to surface specifically from the 1850s and it gained significant momentum through the editorials published by Harish Chandra Mukherjee in his newspaper 'Hindu Patriot'¹. This was the first occasion when the power of media, referring to nationalist thoughts, was realized by the Indian audience. The power of media went to such an extent that the British colonizers, on a number of occasions, took repressive measures to curb the freedom of media. Over the

*Assistant Professor, Department of Journalism & Mass Communication, Shri Shikshayatan College, Kolkata.

years, owing to changing pattern and avatars of media expressions, media contents were developed and disseminated by different political leaders. For instance, in the 1940s Netaji Subhas Chandra Bose had used radio as his preferred medium to transmit his thoughts to his countrymen². This was done by Bose particularly as he could understand that the impact and reach of radio as a mass medium was much higher than that of newspaper.

From 1940 itself the idea of nationalism started to be portrayed on screen; the film titled *Aurat* (directed by Mehboob Khan and later remade as *Mother India* in 1957) was released in that year. Although the ideas of nation and nationalistic thoughts were portrayed through a number of literary works, especially after the formation of Indian Progressive Writers' Association (IPWA) in 1936, *Aurat* was the first impactful film to focus on such ideas. In 1943 IPWA changed to IPTA (Indian People's Theatre Association) and consequently a number of theatrical presentations, based on contemporary literary expressions, were performed. Simultaneously, a number of films were made based on such literary and theatrical pieces. For instance, a film titled *Dharti Ke Lal* (1946) was based on Bijan Bhattacharya's theatrical masterpiece *Nabanna* (1944) which was based on Bengal famine of 1943.

From War to Sports :

Thus, a specific and codified idea of nationalism became widely accepted during the days of Indian freedom struggle. Such specific codification focusing on the atrocities of the British rule and value of earned independence continued till the early 1960s. However, since the Indo-China war of 1962, the narrative of nationalism started to change to a great extent; the focus of nationalism shifted towards organized military operations and success of such operations. Consequently, films like *Haqeeqat* (directed by Chetan Anand), based on that Sino-Indian war, was released in 1964. Similarly, *Hindustan Ki Kasam* (1973), again directed by Anand, was based

on the Indo-Pak War of 1971. Therefore, from the mid-1960s the idea of nationalism merged with the genre of 'War Films' which was already popular in the occidental countries (e.g. *All Quiet on the Western Front*) and such a trend continued till the early 2000s. Such films, made in India, principally focused on India's success in the battlefield against China and Pakistan. Importantly, this time onwards the narrative of nationalism took a turn towards a specific direction – anti-Pakistan. In other words, in order to provide a nationalist perspective opposing Pakistan that became a thumb rule.

Such a pattern of filmmaking, focusing on nationalist narrative, found a new avatar through sports-based films; it was a conscious effort to project sporting arena as alternate battlefields and India's success in such fronts was essentially treated an earning accolades for the 'nation'. However, association of sports and nationalism was not new in India; Mohun Bagan's victory over the East Yorkshire Regiment to win the 1911 IFA Shield gained a more nationalist essence than simple sporting incident. That nationalist essence started to appear on screen from the early 2000s. Notably, due to widespread mediation and impact of that mediation, cricket as a sporting discipline, gained more momentum than any other sporting discipline in India. This was largely facilitated by three factors – a) India's acceptance of the policy of Liberal economy from 1991 (which enabled the foreign channels to operate in the Indian media market and provided descriptive and analytical coverage of cricket), b) India becoming champions in the 1983 cricket world cup and subsequent success (like the 1985 Benson & Hedges World Series) and c) Rise of icons – from Sunil Gavaskar to Sachin Tendulkar to Mahendra Singh Dhoni to Virat Kohli. All such factors ensured that the Indian audience preferred to remain glued to cricket than any other sporting discipline. Hence, a concept of holistic consumption of cricket started to develop from the early days of the new millennium. As result, films, one of the most impactful media contents, started to be themed on cricket – ranging

from cricketing incidents to cricketing icons and their ‘nationalist’ aspect.

Portrayal of Nationalism Through Cricket-centric Films:

One of the landmark incidents in Indian film history took place on June 15, 2001 when *Lagaan* was released. The film came with different odds – a budget of Rs. 25 crores (then the most expensive Indian film), running time of 224 minutes (which diminished the number of daily shows from four to three) and maiden production by Aamir Khan. Most importantly the climax of the film depended on a cricket match which was nothing short of a façade for a freedom struggle. Conceptualization of the film was multilayered – Ashutosh Gowariker, director of *Lagaan*, openly admitted that he was greatly motivated by the 1957 release *Naya Daur* (directed by B.R.Chopra). *Naya Daur* was not essentially a sports-based film in the truest sense of the expression, but the climax of the film was reached through an uneven race between a bus and a cart or tonga. An analytical insight will definitely reveal the thematic similarity between the film *Naya Daur* and the American legend of John Henry as, in both the cases, the essential tussle was between man and machine. Ostensibly, Chopra’s making and treatment of *Naya Daur* was influenced by the contemporary IPTA movement which emphasized on the dialectical and dichotomous relation between the ‘ruler’ and the ‘ruled’.

Gowariker took this very spirit of the ‘ruler’ and the ‘ruled’ and put it in the Victorian colonial setting of 1893. The film starts with the toiling condition of the farmers and atrocities of the British Raj – a very much relatable scenario in colonized India. However, the struggle of the farmers eventually culminates into an all-important cricket match which would determine their existence. Such a derivation through chronological unfolding of events and the ending statement, “Is aitihasik jeet ke baad bhi Bhuvan ke naam itihaas ke panno par kahin kho gaya” (Bhuvan’s name has not been found even after this historic win) definitely lead the audience to believe

in this 'historical' narrative which was designed to incite nationalist emotions. Significantly, the screen time of the aforementioned cricket match in the film was more than an hour and the result of that match actually drew the audience to the climax of the film, both literally and metaphorically.

Lagaan, significantly enough, proved that cricket, the most marketable game in globalized India, did not remain as sporting activity or discipline only, rather it became a 'consumable'. More importantly, mediation of cricket matches as sports broadcasting program was not enough; other mediated contents like films were capable enough to fill the void left even after broadcasting of cricket matches. Hence, *Lagaan's* commercial success substantiated that cricket could be used as a purely entertaining and motivating content if the essence of nationalism is infused. In other words, *Lagaan* changed the dynamics and narrative of cricket to a great extent.

In the following years a number of films blending cricket and nationalism were made in Bollywood. Some of them were incident-based while majority of such films were based on the lives of some well known cricketers. The second category of films came to be known a 'Biopics' – a term which could be and was used in case of various films but the nomenclature predominantly derived from sports-based films or more specifically cricket.

Biopics initiated a new era in sports-centric films. Such a pattern was well supported by sports event-based films. In this regard, a pioneering effort was *Chak De India* (2007) which essentially focused on women's hockey in India. The character of Shah Rukh Khan, portrayed as Kabir Khan, was based on former hockey player Mir Ranjan Negi. The film, though inspiring in its content and treatment, dealt with an incident which never took place; rather it emphasized on the aspect of women empowerment. However, *Chak De India* successfully established the notion that sports-based films were capable of being commercially successful in India. Although, much like its predecessor *Iqbal* (2005), *Chak De India*

also focused on social messages through portrayal of sporting activities rather than classified biopics.

Focusing on biopics in Bollywood started in 2016; two biopics were released in that year – *MS Dhoni, the Untold Story* which was based on the life of Mahendra Singh Dhoni under whose captaincy India won the 2011 ICC Cricket World Cup and *Azhar* which focused on former captain of the Indian cricket team Mohammed Azharuddin. Significantly, *MS Dhoni* and *Azhar*, despite being essentially biopics, were largely different in their approaches – while *MS Dhoni* ended on a positive note of World Cup, *Azhar* emphasized on the talent and victimization of Azharuddin. *Sachin, a Billion Dreams*, based on the life of legendary cricketing icon Sachin Tendulkar was released in 2017. The film descriptively portrayed Sachin's struggle as a middle class boy, his immense talent which earned him a place in the national team at the age of 16 and his subsequent, phenomenal rise to pinnacle of cricketing excellence. In the following years biopics like *Kaun Pravin Tambe* (2022) and *Shabaash Mithu* (2022) were released. While *Kaun Pravin Tambe* was based on legspinner Pravin Tambe who started his cricketing career at the age of 40, *Shabaash Mithu* focused on the cricketing career of former Indian women's cricket team captain Mithali Raj. Adding to the list, a biopic of former Indian fast bowler Jhulan Goswami, titled *Chakda Xpress*, is expected to be released in late 2024 while shooting of the biopic of former Indian captain Sourav Ganguly is scheduled to be started in the second half of 2024.

Apart from such biopics a film named *83* was released in 2021 which portrayed the struggle and triumph of the Indian cricket team led by Kapil Dev. This was the first film which recreated an entire cricketing tournament and not essentially the life of a single person. However, if all the sports-based films are taken into account then films like *Gold* and *Maidan* are also based on a single tournament.

Although conscious efforts have been taken to make films based on other disciplines than cricket, increasing popularity of cricket outnumbered them. Therefore, the most mediated sporting discipline expanded its horizon from telecasting to film screening.

However, there have always been attempts to convey development-based messages through such sports-centric films. Significantly, such developmental messages essentially focus on the marginalized groups of the nation who contribute substantially to the progress of the nation. This pattern of dissemination of developmental messages can be found in several films like *Dangal* and *Ghoomar*, but the nationalist elements remained overwhelmingly present in all such films.

IPL and Nationalism: An Imposition?

In 2007 India went to play the inaugural T20 World Cup, then known as World T20, to South Africa having two major disadvantages – a) it was the least experienced team in the competition; the team had played just one T20 International before reaching South Africa and most of the players were making their T20 International debut and b) India held a historically poor record in South Africa. To everyone's surprise, that inexperienced Indian team, under the leadership of Mahendra Singh Dhoni, lifted the trophy defeating arch-rival Pakistan in the final.

This success, undoubtedly, triggered immense interest among the new generation cricket lovers and functioned as the most potent precursor to the phenomenon called Indian Premier League. Therefore, the quotient of nationalism that got attached to IPL was actually inherited from the T20 World Cup triumph. The inaugural IPL trophy was also designed keeping the map of India into consideration. Ironically, the trophy was received by Shane Warne, an Australian cricketing icon who represented Rajasthan Royals in the capacity of Coach-cum-Captain. Eventually, all the IPL matches started with the Indian national anthem despite the fact that there were at least eight foreign citizens (four cricketers from each team) and the number often used increased with the non-playing officials. Therefore, IPL which categorically included foreign players

(including Pakistani players in its inaugural edition in 2008) in its playing condition opted to play national anthem before the start of every match. However, the initial years of IPL did not have any such practice. In 2020, after an appeal sent to BCCI by Kings XI Punjab co-owner Ness Wadia³, such a decision was taken. It is to be noted that plenty of franchise-based cricket tournaments are organized annually around the world – Caribbean Premier League, Pakistan Super League, Big Bash, Lanka Premier League, T20 Blast, SA T20 etc. without any national anthem.

Theoretical Lens :

There has been an overwhelming anticipation that the entertainment elements, IPL and films alike, have been overtly infused with nationalistic spirit with some definite codifications of nationalism and nationhood. If the pattern of nationalism is taken into consideration then three types of rivalry can be observed –

i) Anti-British: Since the time of independence the idea of nationalism and nationhood were largely centered on freedom struggle – an idea which entirely opposed the British imperialism; the British rulers didn't only take away all the wealth of India but their oppression on people of India for almost two centuries triggered several chapters of unwanted history. Consequently, even after more than 50 years of independence, films like *Lagaan* could draw public attention focusing on the anti-British element.

ii) Anti-Pakistan: The British colonizers left India but left a permanent scar in the form of partition – a political decision that wrecked the subcontinental mindset from its foundation. Several disputes between the two nations and three territories (India, West Pakistan and East Pakistan) caused four major wars (1948, 1965, 1971 and 1999) combined with innumerable military and diplomatic tensions. Although India tasted victory in all exchanges, Pakistan enjoyed supremacy in the sporting arena like cricket and hockey. Therefore, defeating Pakistan in battlefield and sports became the principal concern.

iii) Anti-Australia: This was a relatively new area of nationalism which came into existence from the early 2000s. In the sporting arena, India was essentially considered the 'underdog' against Australia. However, this pattern received a heavy blow when India won the test series against Australia in 2001 and put an end to their 16-test-long winning streak. Australia took a befitting revenge in 2003 by bouncing India in the final of ICC Cricket World Cup. This was the point when anti-Australia, in the sporting arena, started to get associated with the idea of nationalism. If *Chak De India* is taken as a case study then one can instantly relate it to anti-Pakistan and anti-Australia notions – Kabir Khan as captain missed penalty stroke against Pakistan and his career was over. He came back to coach the Indian Women's Hockey Team and defeats Australia in the final of World Championship. Although, hockey has traditionally remained one of the sporting disciplines which had brought laurels to the country, the rivalries (against Pakistan and Australia) were essentially influenced by cricket.

Such pattern of portrayal on screen can be interpreted from a number of theoretical perspectives. If the Agenda Setting theory (1968) pioneered by Maxwell McCombs and Donald L. Shaw is taken into consideration then such films set a definite/specific set of 'targets' – to create natural 'enemy' which is fuelled by a codified sense of 'nationalism'. Hence, a deliberate difference is created between what the audience actually think and what they should think. Therefore, the policy agenda is passed on as media agenda and ultimately it becomes public agenda. The codification is such that it creates a specific and codified structure of nationalism. In this regard, the role of manipulative media plays a major role. Walter Lippmann's 'Public Opinion'⁴ (1922) and Jacques Ellul's 'Propaganda: the Formation of Men's Attitude'⁵ (1973) can be referred to. Both the authors have shown how selective topics are shaped in a palpable or palatable way through their mediated expressions and how public opinion is shaped in alignment with that specific perspective.

Noam Chomsky and Edward S. Herman in their book 'Manufacturing Consent: the Political Economy of Mass Media'⁶

have pointed out five filters which essentially shape mediated contents – Ownership, Advertising, Sources, Flak and Anti-communism. Significantly enough, such a pattern can be noticed in presentation of such sports-based films. The producers or the financiers of the film decide the course of film or more specifically, which particular perspective of an individual or an event will be presented through screen. Similarly, they opt for selective sources which turn the ‘history’ into ‘narrative’ that essentially distorts or contaminates the ‘historicity’ of the topic. Adding to that, the element of ‘nationalism’ inevitably comes with the element of ‘national enemy’ which directly refers to the Chomskian idea of ‘flak’ while communism is traditionally critical about the idea of ‘nationalism’. Undoubtedly, this pattern of ‘ultra-nationalism’ in audio-visual presentation is greatly motivated by the ongoing trend of media conglomeration.

Such practice of ‘nationalist’ films further strengthens the 1980 concept of ‘Spiral of Silence’⁷ proposed by Elisabeth Noelle-Neumann which, in reality, often refers to ‘nation’ and ‘government’ as same or identical identity. Therefore, the numerical superiority of dominant paradigmatic approach often marginalizes the minority and hurts the overall democratic structure of any nation.

Conclusion :

The idea of nationalism, especially when portrayed through films based on sports, attempts to create an alternative paradigmatic approach i.e. one doesn’t necessarily go to the warfront in order to ‘serve’ the nation and prove his/her loyalty towards the nation; a person can bring laurels to the nation from the sporting arena also. Therefore, participating in sports may be viewed as an important ingredient of participatory development which serves a two-fold purpose – a) highlighting India’s achievement in front of the world and b) presenting India as a unified force eliminating the regional/cultural affiliation or bias. In fact, the film *Chak de India* particularly focuses on this matter: coach Kabir Khan asks the players to introduce themselves and puts aside every player who introduces

herself as a player from a particular state. Eventually, the team, with players from different parts of the country, wins the tournament as ‘India’.

Interestingly, most of the sports-based films attempt to depict a slice of history which has never been mentioned in a structured way. This, inevitably, paves way for a debate – whether it is really history or distortion of history. If such films are taken as actual representation or re-creation of history then almost all the sports-based films become nothing less than documentaries. Otherwise, they must be categorized as docu-features, the debate that was initiated by the 1989 television series titled ‘Bodyline’. However, the makers of such contents definitely try to present those as pieces of history, or at least ‘alternative history’ with the intention to motivate the audience towards the notion of established and codified nationalism.

Reference:

1. <https://amritmahotsav.nic.in/district-repository-detail.htm?24316#:~:text=The%20Hindoo%20Patriot%20newspaper%20was,newspaper%20was%20published%20every%20Thursday.> (Accessed on 10.10.2024 at 8:05 pm)
2. <https://economictimes.indiatimes.com/news/politics-and-nation/netaji-subhash-chandra-bose-files-reveal-radio-messages-that-raised-hope-of-bose-brigade/articleshow/49021986.cms?from=mdr> (Accessed on 10.10.2024 at 8:10 pm)
3. <https://www.indiatoday.in/sports/cricket/story/kxip-proposal-bcci-president-sourav-ganguly-national-anthem-before-every-ipl-2020-game-1616806-2019-11-07> (Accessed on 12.10.2024 at 9:00 pm)
4. Lippmann, Walter. *Public Opinion*. Greenbook Publications, LLC. 2010.
5. Ellul, Jacques. *Propaganda: the Formation of Men's Attitude*. Vintage. 1973.
6. Chomsky, Noam & Herman, Edward. *Manufacturing Consent: The Political Economy of Mass Media*. Random House UK. 1995.
7. <https://www.communicationtheory.org/the-spiral-of-silence-theory> (Accessed on 14.10.2024 at 10:20 pm)

Antioxidative and anticarcinogenic activities of green algal Polysaccharides

Priyanka Mukherjee¹

Priya K Gopal²

Santanu Paul²

Ruma Pal²

Abstract :

Green algal polysaccharides were isolated from four potential Chlorophycean strains viz., *Cladophora glomerata*, *Chaetomorpha aerea*, *Rhizoclonium crassipellitum* and *Pithophora cleveana* collected from Indian Sunderbans (22°22'81"N, 88°47'91"E; 22°08'38"N, 88°42'24"E). Purified polysaccharides were tested for their antioxidative and anticarcinogenic properties. The polysaccharides of all the strains showed good antioxidative properties in relation to DPPH scavenging activity, Ferrous ion chelating activity, Superoxide radical scavenging activity and Total antioxidant activity. *Rhizoclonium crassipellitum* (IC₅₀ -8.85 µg/ml), showed maximum DPPH scavenging activity, *Pithophora* (IC₅₀ -14 µg/ml) and (34.84 %) for Ferrous ion chelating activity and Superoxide radical scavenging activity respectively and *Chaetomorpha* (96µgAAE/gm dry mass for Total Antioxidant Capacity). Chemically green

¹Corresponding author: Dr. Priyanka Mukherjee, Department of Botany, Shri Shikshayatan College, Kolkata.

²Phycology laboratory, Department of Botany, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019, West Bengal, India.

algal polysaccharides showed a number of functional groups like, O-H stretching vibrations, C-H stretching vibrations, bound H₂O, glycosidic bond, C-O stretching vibrations, strong C-O-C stretching, weak C-H bonding and 6-sulfate group of D-galactose units as evident from FTIR analysis. The purified polysaccharides were further applied to REH cells which represents an aggressive form of lymphoblastic leukemia of the B-cell type. Maximum anti carcinogenic effect was shown by *Cladophora glomerata* with caspase (3,9) activity. Lesser activity was detected for polysaccharides of *Rhizoclonium crassipellitum*, *Chaetomorpha aerea* and *Pithophora cleveana* as detected by MTT assay.

Keywords: Algal Polysaccharide; FT-IR Analysis; Antioxidants; Application on REH cell line; Caspase (3,9,8) activity; DAPI staining

Introduction:

A complex system of antioxidants is present in all living organisms, some of which remained conserved through ages and are required for the maintenance of life (Kumar et al. 2007). These essential compounds play a vital role in maintaining the living system by remaining active against oxidative damage and participating in signalling pathway of a cell. The imbalance between the pro-oxidants and the antioxidants leads to the production of several reactive oxygen species such as hydroxyl group (OH⁻), superoxide anion(O₂⁻), hydrogen peroxide (H₂O₂) and peroxy radicals. These reactive species generally bring about the changes in the normal cellular redox status, immune function and intracellular functioning of a particular organism leading to the development of various diseases such as, cardiovascular disease, atherosclerosis, neurodegenerative disease, cancer etc (Halliwell 2000; Recharadson 1993). The primary function of any antioxidative compound is to scavenge these reactive oxygen species and thereby quench the singlet and triplet oxygen hence produced (Athukorala 2006; Marchioli 2001). Several synthetic antioxidants such as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT) and tert-butylhydroquinone (TBHQ), are available commercially but their use has been decreasing day by day. There are reports that prolonged use of synthetic antioxidants is sometimes responsible for

carcinogenic effect and liver damage (Pratt 1992). Therefore, search for natural antioxidants are gradually increasing.

Marine resources are gradually attracting attention for their high content of bioactive compounds (Nagai et al. 2003). Seaweeds or marine macro algae are commonly used in the folk medicine since early years, due to their anti oxidative properties in treatment of eczema, gallstone, gout, scrofula, menstrual trouble, renal problems, scabies etc (Chapman et al . 1980). The antioxidant nature of algae can be attributed to their high content of bioactive compounds like, polysaccharides, polyphenols, flavones, flavonols, flavonol glycosides, phlorotannins, fatty acids, pigments, proteins, vitamins etc (Jormalainen et al . 2004; Koivikko et al . 2007; Santoso et al . 2002).

Algal polysaccharides being composed of a mixture of sulfated galactans, such as agar or carrageenans, alginates, fucans, and laminarins have already been proved as potent antioxidants (Bobin-Dubigeon et al.1997; Lahaye et al . 1997; Percival 1967). The sulfated polysaccharides from marine algae are non toxic for human beings and are known to exhibit different biological properties such as anticoagulant, anti-inflammatory, antiviral or antitumoral activities (Boisson-Vidal et al . 1995; Lahaye et al . 1997; Mori et al. 1982). Maximum work with brown algae has been reported till date but relatively little information is available for Chlorophycean members. According to the work of Shao et al .(2013), three sulfated polysaccharides of *Ulva fasciata*, *Gloiopeltis furcata*, *Sargassum henslowianum* were isolated and tested for their antioxidant and antitumor activities in vitro against MKN45 gastric cancer cells and DLD intestinal cancer cells and showed positive results.

In the present investigation four green algal members from brackish water Indian Sunderbans area were taken as experimental materials viz., *Rhizoclonium crassipellitum*, *Pithophora cleveana*, *Cladophora glomerata* and *Chaetomorpha aerea*. All four of them showed high antioxidative properties (data communicated elsewhere), In the present communication their polysaccharide contents were estimated and tested for their antioxidative properties

in relation to % DPPH scavenging activity, % ferrous ion chelating activity, % Superoxide radical scavenging activity and total antioxidant capacity. The extracted polysaccharides were tested against Leukemia cells (REH). Though positive results were obtained in case of all four algae, but polysaccharides from *Cladophora* showed maximum results. Further work was thus carried out with it for studying the anticarcinogenic pathway through caspase (3, 9 and 8) activities.

Materials and Method:

a. Preparation of Algal Polysaccharide:

Four green algal genera viz. *Cladophora glomerata* (Linnaeus) Kützing (CUH/AL/MW 249), *Rhizoclonium crassipellitum* West & G.S.West (CUH/AL/MW 251), *Pithophora claveana* Wittrock (CUH/AL/MW 250) and *Chaetomorpha aerea* (Dillwyn) Kützing (CUH/AL/MW 248) were collected from different regions of Sundarbans (21°45'N 88°45'E/21.75°N 88.750°E). The algal samples after collection were washed thoroughly in running water. They were exposed to 0.5% povidone iodine solution overnight and were further subjected to thorough washing under running tap water. The washed samples were dried, powdered and subjected to depigmentation using sequential extraction with petroleum ether and acetone in a soxhlet apparatus (Sinha et al. 2010). Dried biomass of the selected algae were then again depigmented with Chloroform : Acetone : Methanol (1:1:1). The depigmented biomass was boiled in water using Soxhlet for 3 hrs at 90°C. The supernatant was filtered through cheese cloth. The filtrate was further centrifuged to remove debris at 12,000 rpm for 20 minutes. To it ethanol (4 times) was added and the precipitate was further centrifuged and dissolved in hot water. Sugar analysis was done by Standard phenol-sulfuric acid method (Dubois et al. 1956).

b. FT-IR analysis:

Fourier transform– infrared spectroscopy (FT-IR) was performed on KBr plate. FT-IR spectra were recorded on a Jasco 410 instrument. with a resolution of 4 cm⁻¹. Spectra were obtained in the 4000–400 cm. region.

c. Determination of antioxidant activity of polysaccharide:

i. DPPH radical scavenging assay

The free radical scavenging activity of extracted polysaccharide was estimated using the protocol of Yen and Chen (1995). Here, 2.0 ml of polysaccharide was mixed with 2.0 ml (0.16 mM) methanol DPPH solution. The mixture was vortexed for few minutes and incubated in dark for 30 minutes. The absorbance of the above mixture was measured at 517nm. Sample blank and control was prepared. The IC 50 value was also calculated using scavenging effect.

ii. Ferrous ion chelating assay

Iron chelating ability is another promising test for determining the antioxidant ability of a particular sample. Here, the chelating ability of polysaccharides and standards was estimated using the standard protocol of Decker and Welch (1990). Briefly, 1ml of sample was added to 2mM FeCl₂ (0.5ml) and 5mM ferrozine (0.2ml), the mixture was shaken vigorously and incubated at room temperature for 10 minutes. The absorbance of the mixture was then measured at 562nm. The percentage inhibition of ferrozine –Fe²⁺ complex formation by the extract was calculated using the respective formula:

$$\% \text{ Inhibition} = (1 - A1_{\text{sample}} / A0_{\text{control}}) \times 100)$$

[A₀ – Absorbance of the control, A₁ – Absorbance of the sample extract. The control contained all the above reagents except the algal extract.]

iii. Superoxide anion scavenging assay

Non enzymatic radical scavenging assay was performed using the methodology described by Robak et al. (1988). Here 1ml of sample

was added to a reaction mixture of 0.2ml of PMS, 0.2ml of (0.5mM) NBT, 1 ml of NADH, 1 ml of (0.1 M) potassium buffer (pH 7.2) and then the mixture was warmed at 32 0C for 3 to 5 min. The reading of the mixture was taken at 560 nm.

The scavenging effect (%) was calculated according to the formula – $(1 - \text{Abs of Sample } 560\text{nm} / \text{Abs of Control } 560\text{nm}) \times 100$

iv. Total Antioxidant Assay

Total antioxidant activities of crude methanolic extract was determined according to the method of Prieto et al. (1999). Briefly, an aliquot of 0.3 ml of sample was mixed with 3.0 ml reagent solution (0.6 M sulfuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). Reaction mixture was incubated at 95 0 C for 90 min in the water bath. Absorbance of all the sample mixtures was measured at 695 nm and the total antioxidant activity is expressed as the number of equivalents of ascorbic acid in milligram mg / per gram of extract.

v. Cell viability assay

Cells were seeded at 15×10^5 cells/well in 96-well plate with different concentrations of polysaccharides in a final volume of 200 μl and observed at 48hrs time point by MTT assay at 37 0 C (Pal et al . 2004). An aliquot of 20 μl of MTT solution (5 mg/ml) were added to each well, three hours before the completion of time points. Assessment of the formed Formazone crystals, representing percentage of cell viability was done at 560 nm. Cell apoptosis (100 %) was obtained by lysis of cells in 5 % SDS lysis buffer. The percentage of cell viability was calculated using the formula: % cell viability = $100 \times (\text{O.D. sample} - \text{O.D. } 100\% \text{ lysis}) / (\text{O.D. } 0\% \text{ lysis} - \text{O.D. } 100\% \text{ lysis})$.

vi. Determination of Caspase level

Activity of caspases-3, 9 and 8 was detected in cell lysates (100 μg protein in 50 μl lysis buffer) as per the manufacturer's instructions (Invitrogen). Briefly, REH cells ($5.5 \times 10^5/\text{ml}$) post treatment with polysaccharide (100 $\mu\text{g}/\text{ml}$, 20 h at 37 oC) was washed twice with ice cold PBS, cell lysates prepared and protein concentration

estimated. Lysates were combined with 50 μ l of 25 reaction buffer (containing 10 mM DTT), Caspase 3 substrate DEVD-pNA (4 mM, 5 ml) or Caspase 9 substrate LEHD - pNA (4 mM, 5 ml) or IETD-pNA following incubation at 37 oC for 0-3 h; the release of chromophoreparanitroanilide (pNA) was quantified by measuring absorbance at 405 nm every 30 minutes for 3 h. To confirm the role of caspases in *Cladophora glomerata polysaccharide* induced death, REH cells (1.5x10⁴ in 200 μ l/well) were pre-incubated with a pan caspase inhibitor Z-VAD-FMK (20 mM, 1 h) followed by 48 hrs co-incubation with *Cladophora glomerata polysaccharide* and cell viability evaluated by the MTT assay as detailed above.

vii. DAPI staining

Apoptosis was visualized using the methodology of staining the nucleus of cells with or without treatment with polysaccharide (48hrs) with DAPI (Gopal et al. 2014). Hereafter the treatment with polysaccharide cells were fixed with 4 % Para-formaldehyde and thereby washed with PBS. Then the cells were stained with 5 μ g/ml DAPI for 15 min in the dark. Slides were viewed with a fluorescent microscope at 340-380 nm and \times 1000 magnification (Olympus BX43 Motorized fluorescence microscope). Here, normal nuclei (smooth nuclear structure) and apoptotic nuclei (condensed or fragmented chromatin) were clearly distinguished.

Results:

The experiments were carried out to evaluate the antioxidative and anticarcinogenic potentials of green algal polysaccharides.

From the graphical representation (Fig-1) it can be observed that *Cladophora* showed maximum yield of polysaccharide followed by *Chaetomorpha*, *Rhizoclonium* and *Pithophora*.

The FT-IR spectra of the four purified polysaccharides were shown in Plate 1-4. It was observed that their characteristic peaks lie very close to each other. Prominent peaks appeared in the range, 3442 – 3414 cm⁻¹ which was caused due to hydrogen bonded O-H stretching vibrations. The peak between the range 2929 – 2931

cm⁻¹ were caused due to C-H stretching vibrations. Furthermore, the peak between the range 1645-1652 cm⁻¹ showed bound H₂O. The peak between 1234- 1261 cm⁻¹ were attributed to the sugar ring and glycosidic bond C-O stretching vibrations. The peaks between the range 1000 - 1078 cm⁻¹ was due to strong C-O-C stretching. Another peak between 1407-1418 cm⁻¹ showed weak C-H bending. The above observation are in full accordance with other workers (Lloyd et al. 1961). In case of polysaccharide of *Cladophora* an additional sulphate absorption band at 827 cm⁻¹ was observed which attributed to the 6-sulfate group of D-galactose units .

The radical scavenging activity of the polysaccharides extracted from the algae was found to dose dependent. The best radical scavenging activity has been observed in polysaccharide of *Rhizoclonium* (IC₂₀ -8.85 µg/ml) followed by *Chaetomorpha* (IC₂₀ - 10.77 µg/ml) and *Pithophora* (IC₂₀ - 33.12 µg/ml) (Fig - 2). In case of *Cladophora* (IC₂₀ -38.13 µg/ml) the activity was found to be very low.

The ferrous scavenging activity assay is based on the purpose of the ability of the drug to compete with iron indicator Ferrozine. In the absence of the drug, ferrozine reacts with ferrous ion and forms a complex which is inhibited by the drug. The polysachharide of all 4 algae extracted were tested. From the figure (Fig-3) their ferrous chelating activity was comparatively higher than their DPPH scavenging activity. The results revealed that polysaccharide of *Pithophora* (IC₂₀ -14 µg/ml) had maximum iron chelating activity followed by *Chaetomorpha* (IC₂₀ - 27.55 µg/ml), *Rhizoclonium* (IC₂₀ - 9.35 µg/ml). *Cladophora* had minimum iron chelating activity. Though *Pithophora* showed maximum activity at two concentrations (50 and 100 µg/ml), the initial ferrous ion chelating activity was found to be more in case of *Rhizoclonium* therefore, 20 % inhibition was achieved by 9.35 µg/ml in case of *Rhizoclonium* whereas in case of *Pithophora* it was achieved by 14 µg/ml of polysaccharide.

One of the most toxic reactive oxygen species is the superoxide radical generated through numerous biological and photochemical

processes which decomposes to form the singlet oxygen and hydroxyl radicals. The superoxide radical scavenging activities of all the four samples are presented in Fig- 4. According to the data obtained all the samples had significant dose dependant scavenging activity. The scavenging effect of the different polysaccharides decreased in the order of *Pithophora* (34.84 %) > *Rhizoclonium* (32.20 %) > *Chaetomorpha* (26.31 %) > *Cladophora* (25.95 %) at the concentration of 100 µg/mL.

The total antioxidant capacity (TAC) of the polysaccharides has been represented in the Fig - 5. Maximum TAC was noted in case of *Chaetomorpha* (96 µg AAE / gm dry mass). This was followed by *Rhizoclonium* (87 µg AAE / gm dry mass), *Pithophora* (80 µg AAE / gm dry mass) and *Cladophora*. (72 µg AAE / gm dry mass).

We also screened the anti-leukemic effects of polysaccharides isolated from four algal species on REH cells which represents an aggressive form of lymphoblastic leukemia of the B-cell type. Cells were cultured in the presence of different concentrations (0-100 µg/ml) of polysaccharide for 48 hrs time point. Post treatment cell viability was measured using MTT assay. Data obtained at 48hrs shown in Fig 6 clearly indicates that the polysaccharides isolated from four different algal species possess considerable amount of anti-proliferative efficacy. This anti-proliferative effect is seen to be different for each of the polysaccharide from the four different algal species on REH cells. However, polysaccharides isolated from *Cladophora* was found to be more effective than the rest and *Pithophora* showed least anti-proliferative effect on REH cells. The growth inhibition, induced by these extracts was found to be statistically significant ($p < 0.05$) in REH cell line (Fig.6).

Result of the MTT assay gives the IC50 values of *Cladophora glomerata*, *Rhizoclonium crassipellitum*, *Chaetomorpha aerea*, *Pithophora cleveana* and on REH cells as 41.72 µg/ml < 52.48 µg/ml < 100 µg/ml < 100 µg/ml respectively at 48hrs time point. Since REH cells represents one of the aggressive forms of leukemia, the anti-proliferative efficacy of polysaccharides from *Cladophora glomerata* grabbed our attention and encouraged us to further

explore the anti-proliferative potential of this polysaccharide on REH cells.

REH cells were cultured in the presence of polysaccharides isolated from *Cladophora glomerata*, *Rhizoclonium crassipellitum*, *Chaetomorpha aerea* and *Pithophora cleveana* for 48hrs at indicated concentrations and their anti proliferative effect studied by MTT assay. Each column represents mean value of three independent experiments.

Activation of Caspase 3 and Caspase 9 as the key enzymes for executing the complex cascade known as apoptosis has been well reported in the literature (Harvey et al . 2006). We therefore assessed the role of caspases in *Cladophora glomerata* polysaccharide induced cytotoxicity in REH cells for which we checked the levels of Caspase 9 & Caspase 3 (as elaborated in materials and methods section). Fig.7 indicates that Caspase 3 activity in REH cells significantly increased several folds—the maximum activity was observed at 120 min followed by a gradual decrease in signal that finally plateaued. Caspase 9 activities also increased in treated cells increased with time and max increase in the level was observed at 120 min however the effect was not as profound as Caspase 3 (Fig. 7). We also checked the level of Caspase 8 to find out the involvement of intrinsic or extrinsic pathway and from the data obtained it is confirmed that Caspase 8 has no role in *Cladophora glomerata* polysaccharide induced anti-proliferative effect on REH cells, also ruling out the involvement of extrinsic pathway. To confirm the activation of Caspases in *Cladophora glomerata* polysaccharide induced cell death, we co-incubated treated cells with 10mM Z-VAD-FMK which a pan-caspase inhibitor. Co-incubation with Z-VAD-FMK rescued cells from undergoing cytotoxicity, which confirms the involvement of Caspase 3 and Caspase 9 in *Cladophora glomerata* polysaccharide induced cell death in REH cells (Data not shown).

Cladophora glomerata polysaccharide treated REH cell were taken to prepare lysates which was used to study the activity of Caspase 3, 9 & 8 as described in Materials and methods. Each point corresponds to the mean \pm SD of at least three experiments in

duplicate. REH cells were treated with *Cladophora glomerata* polysaccharide (50 µg/ml, 12 and 24 h) as described in Materials and methods. The figure is a representative profile of at least three experiments.

Nuclear fragmentation by *Cladophora glomerata* polysaccharide in REH cells Work done so far confirmed that *Cladophora glomerata* polysaccharide could induce anti-proliferative effect on leukemic cells involving the caspases, as a reported hallmark event of apoptosis. We further wanted to study its effect on the nuclear morphology of leukemic cells treated as well as untreated control cells (Fig. 8) by DAPI staining. Confocal microscopy images taken thereafter revealed that the nuclei of control cells were round along with a uniform nuclear membrane as compared to the condensed and disintegrated nuclei of REH cells co-incubated with 30 and 100 µg/ml concentrations of *Cladophora glomerata* polysaccharide for 48 hrs (Fig. 8A–C). The nuclear damage induced by *Cladophora glomerata* polysaccharide was in a dose-dependent manner.

Discussion:

Polysaccharides play a very important role in anticarcinogenic effect and as potent antioxidants. Among the studied taxa *Cladophora* showed maximum amount of polysaccharide as compared to the rest. From the FTIR study we also found that *Cladophora* had sulphate absorption band in unique compared to the rest of the algae.

The DPPH radical scavenging activity of the samples are attributed to their ability to pair with the odd electron of DPPH radical (Park et al . 2004 ; Shon et al . 2003;). Shao et al . (2013) showed that the sulphated polysaccharides of *Ulva fasciata*, *Gloiopeltis furcata*, *Sargassum henslowianum* had dose dependant effect on radical scavenging activity which increased in the order of UFP > GFP > SHP (37.63 %, 23.49 % and 14.14 % respectively) at the concentration of 100 µg/ml, This result was similar to our present study. In the present investigation we recorded that polysaccharides extracted from *Rhizoclonium*, *Pithophora* and

Chaetomorpha had better DPPH reducing capacity than *Cladophora* suggesting though it had better anticarcinogenic activity. Similar results was also obtained in the works of Ye et al. (2008), where he showed that three main fractions, SP-1, SP-2 and SP-3 of *Sargassum pallidum* polysaccharides (SP) purified by DEAE-52 anion-exchange chromatography, showed lower antioxidant activities (17.8 %, 19.1 % and 10.2 %, respectively) but were efficient anticarcinogens against Hep G2 cells.

Lipid per oxidation is generally brought about by ROS (reactive oxygen species). One of the most common form of ROS bringing about peroxidation is OH^* . This OH^* is generally produced due to the transition metal ion reaction with H_2O_2 . The most common transition metal ion is ferrous salt. This ferrous ion then forms a ferryl-oxo-iron complex which initiates the lipid peroxidation. In the present study *Pithophora* showed maximum activity while *Cladophora* had comparatively lower activity. According to LeTutour (1990) extracts from brown algae viz., *Laminaria digitata* and *Himantalia elongata*, showed highest activity in sunflower oil preservation by inhibiting methyl linoleate oxidation as well as enhancing the antioxidative effect of vitamin E. He also demonstrated the efficacy of several brown algal extracts in scavenging peroxy radicals. Furthermore, Ruperéz et al. (2002) demonstrated the antioxidant activity of uronic acid containing fucoidan from *Fucus vesiculosus*.

The superoxide radical, a highly toxic species can be generated by numerous biological and photochemical reactions. Superoxide radicals decompose to form singlet oxygen and hydroxyl radicals. In the present non-enzymatic method of NADH – PMS – NBT reaction system, O^* derived from dissolved oxygen by PMS-NADH coupling reaction reduces the yellow dye (NBT) to produce the blue formazan, which is measured spectrophotometrically at 560 nm. In the present investigation, further *Pithophora* and *Rhizoclonium* proved themselves to be potent antioxidants than *Cladophora*. Similar results were also obtained from the total antioxidant assay.

Apart from antioxidant property the extracted polysaccharide has commendable anticarcinogenic activity. According to Nishino (1994) this property of polysaccharide can also be related to the presence of sulfate groups in them. Similar findings were also observed in the works of Okai et al. (1993 & 1999) where he showed that polysaccharides isolated from *Laminaria japonica*, *Undaria pinnatifida*, *Eisenia bicyclis* and *Hijikia fusiforme* have both anti-genotoxic and anticarcinogenic activity. Different studies (Itoh et al. 1993; Zhuang et al. 1995) have shown that polysaccharides of *Sargassum thunbergii* and fucoidan from *S. ringgoldianum* have inhibitory activity against the growth of Ehrlich ascites and lung carcinoma in mice. Studies of several authors (Khomenko et al . 1975; Ye et al. 2008; Zhukova et al . 1999) have shown *Sargassum pallidum* to be efficient inhibitor of human hepatoma cell line (HepG2).

The looming necessity for safer anti-cancer drugs from natural resources makes algal polysaccharides important candidates as potential anti-cancer molecules (Zong et al . 2012). Leukemia represents one such form of cancer with aggressive development and very low 5-year post therapy survival rate in patients. We therefore look at anti-leukemic efficacy of the studied taxa. Work on this aspect has not been done till date and hence encouraged us to identify the probable role of these polysaccharides on inducing leukemic cell death and the probable involvement of apoptosis. From cell viability it was confirmed that the algal polysaccharides possess appreciable anti-leukemic efficacy. Intranucleosomal Chromosomal degradation is reported hallmark event of Apoptosis and in the early stages dense chromosome condensation occurs along the nuclear periphery leading the nucleus and cytoplasm to fragment and form apoptotic bodies (Manna et al. 2012). Executioner caspases are considered critical in the apoptotic cascade and are inducible by different stimuli including anti-cancer drugs or molecules (Burke et al. 2010). Here also we observed increase in Caspase 9 and Caspase 3 activities along with visible nuclear degradation. So it can be concluded that polysaccharides isolated from *Cladophora glomerata* induces cell death in human leukemic cells employing the apoptotic path.

Conclusion:

Thus it can be concluded that Chlorophycean members rich in different bioactive compounds especially the polysaccharides harbouring efficient anti-leukemic effects thereby making potent candidates for future leukemia therapeutics. Since Indian fresh water and brackish water wetlands are dominated by green algal flora they can be easily utilised for making drugs against several diseases primarily cancers. On the other hand brown and red algal flora being mainly limited to marine zone and are essential for other industrial production which have restricted their use in drug industry.

Acknowledgement:

The authors acknowledge the West Bengal State Council of Science and Technology for funding to PM and CAS phase VII, Department of Botany for providing instrumental facility.

References:

- Athukorala Y, Lee K W, Song C, Ahn C B, Shin T S., Cha Y J, Shahidi F, Jeon Y J (2003) Potential antioxidant activity of marine red alga *Grateloupia filicina* extracts. *J Food Lipids* 10:251–265.
- Boisson-Vidal C, Chaubet F, Chevolut L, Siquin C, Theveniaux J, Millet J, Sternberg C, Mulloy B, Fischer A M (2000) Relationship between antithrombotic activities of fucans and their structure. *Drug Devel Res* 51: 216–224.
- Bobin-dubigeon C (1997) Chemical composition, physico-chemical properties enzymatic inhibition and fermentative characteristics of dietary fibers from edible seaweeds. *Science Des Aliments* 17: 619–639.
- Burke S P, Smith L, Smith J B (2010) cIAP1 cooperatively inhibits procaspase-3 activation by the caspase-9 apoptosome. *J Biol Chem* 285(39) :1–9.
- Chapman V J, Chapman D J (1980) *Sea Vegetables (Algae as Food for Man)*. Seaweeds and their Uses 62–97.
- Chen K, Feng H, Zhang M, Wang X (2003) Nitric oxide alleviates oxidative damage in the green alga *Chlorella pyrenoidosa* caused by UV-B radiation. *Folia Microbiol. (Praha)* 48: 389–393.

- Christaki E, Bonos E, Giannenas I, Florou-Paneri P (2012) Functional properties of carotenoids originating from algae .wileyonlinelibrary.com. DOI 10.1002/jsfa.5902.
- Dubois M (1956). Colorimetric method of determination of sugars and related substances. *Analyt Chem.* 28:350–356.
- Decker E A, Welch B (1990) Role of ferritin as a lipid oxidation catalyst in muscle food. *J Agric and Chem.* 38:674–677.
- Gopal P K, Paul M, Paul S (2014) Curcumin Induces Caspase Mediated Apoptosis in JURKAT Cells by Disrupting the Redox Balance. *Asia Pac J Cancer Prev.* 15(1): 93-100.
- Guiry M D, Guiry M D, Guiry G M (2017) *AlgaeBase*. World-wide electronic publication, National University of Ireland, Galway. <http://www.algaebase.org>.
- Halliwell B, Zhao K, Whiteman M (2000) The gastrointestinal tract: A major site of antioxidant action? *Free radical research.* 33: 6.
- Harvey N L, Kumar S (2006) The role of caspases in Apoptosis. *Adv Biochem Eng/Biotech.* 62: 102-128.
- Itoh H, Noda H, Amano H H, Zhuaug H C, Mizuno C T, Ito H (1993) “Antitumor activity and immunological properties of marine algal polysaccharides, especially fucoidan, prepared from *Sargassum thunbergii* of phaeophyceae. *Anticancer .Research.* 13 (6): 2045–2052.
- Jormalainen V, Honkanen T (2004). Variation in natural selection for growth and phlorotannins in the brown alga *Fucus vesiculosus*. *J Evol Biol.* 17(4): 807–820.
- Khomenko V A, Ovodov Yu S (1975) Polysaccharides of brown seaweeds VIII. The structure of the side chains of the sargassan molecule. *Chem of Nat Comp.* 9(1): 96–97.
- Kumar K S, Ganessan K, Rao P V S (2007) Antioxidant potential of solvent extract of *Kappaphycus alvarezii* (Doty). Doty – edible seaweed. *Food Chem.* 107: 289 – 295.
- Koivikko R, Loponen J, Pihlaja K, Jormalainen V (2007) High-performance liquid chromatographic analysis of phlorotannins from the brown alga *Fucus vesiculosus*. *Phytochem Anal.* 18(4): 326–332.
- Lahaye M, Kaefffer B (1997). Seaweed dietary fibres: structure, physicochemical and biological properties relevant to intestinal physiology. *Sci. Aliments.* 17: 563–584.

- Le Tutour B (1990). Antioxidative activities of alga extracts, synergistic effect with vitamin E. *Phytochem.* 29: 3759–3765.
- Lloyd A G, Dodgson K S, Price R G, Rose F A (1961). Infrared studies on sulfateesters. I. Polysaccharide sulfates. *Biochimica et Biophysica Acta.* 46:108–115.
- Marja P, Ka“hko“nen A I, Hopia H, Vuorela J, Jussi–Pekka R, Pihlaja K, Tytti S, Kujala Heinonen M (1999) Antioxidant Activity of Plant Extracts Containing Phenolic Compounds. *J Agric Food Chem.* 47: 3954–3962.
- Manna A, Saha P, Sarkar A (2012).Malabaricone–A induces a redox imbalance that mediates apoptosis in U937 cell line. *PLoS One.* 7: 1–11.
- Marchioli R, Schweigerb C, Giacomo L, Tavazzid L,Valagussae F (2001) Antioxidant Vitamins and Prevention of Cardiovascular Disease: Epidemiological and Clinical Trial Data. *Lipids.*36: S53–S63.
- Mori B (1982) Contents of dietary fiber in some Japanese foods and the amount ingested through Japanese meals. *Nutr. Rep. Int.* 26: 159–166.
- Moffitt M C, Louie G V, Bowman M E, Pence J, Noel J P, Moore B S (2007). Discovery of two cyanobacterial phenylalanine ammonia lyases: kinetic and structural characterization. *Biochem.* 46: 1004–1012.
- Nishino T, Nishioka C, Ura H (1994). Isolation and partial characterization of a novel amino sugar–containing fucan sulfate from commercial *Fucus vesiculosus* fucoidan. *Carbohydr. Res.* 255: 213–224.
- Nagai K, Kamigiri K, Arao N, Suzumura K, Kawano Y, Yamaoka M, Zhang H, Watanabe M, Suzuki K (2003), YM–266183 and YM–266184, novel thiopeptide antibiotics produced by *Bacillus cereus* isolated from marine sponge. *J. Antibiotics.* 56 (2): 123–128.
- Okai Y, Higashi–Okai K, Nakamura S (1993). Identification of heterogenous antimutagenic activities in the extract of edible brown seaweeds, *Laminaria japonica* (Makonbu) and *Undaria pinnatifida* (Wakame) by umu gene expression system in *Salmonella typhimurium* (TA 1535/pSK 1002). *Mutation. Res.,s* 302: 63–70.
- Okai Y, Higashi–Okai K (1994). Identification of antimutagenic activities in the extract of an edible brown alga, *Hijikia fusiforme* (Hijiki) by umu gene expression system in *Salmonella typhimurium* (TA 1535/pSK 1002). *J Sci Food Agric* 66 : 103–110.
- Pal S, Ghosh S, Bandyopadhyay S, Mandal C N, Bandhyopadhyay S, Bhattacharya D K, Mandal C (2004). Differential expression of 9–O–acetylated sialoglycoconjugates on leukemic blasts: a potential tool for

- long-term monitoring of children with acute lymphoblastic leukemia. *Intern J of Cancer* 111: 270–277.
- Pratt D E (1992). Natural antioxidants from plant material. In *Phenolic Compounds in Food and Their Effects on Health*; Huang, M.-T., Ho, C.-T., Eds.; American Chemical Society: Washington, DC.
- Prieto P, Pineda M, Aguilar M (1999). Spectrophotometric quantitation of antioxidant capacity through the formation of a phosphomolybdenum complex: specific application to the determination of vitamin E. *Anal Biochem* 269: 337–341.
- Pulz O, Gross W (2004). Valuable products from biotechnology of microalgae. *Appl Microbiol Biotechnol* 65(6) : 635–48.
- Park P J, Je J Y, Jung W K, Ahn C B, Kim S K (2004). Anticoagulant activity of heterochitosans and their oligosaccharide sulfates. *Eur Food Res Technol* 219: 529–33.
- Percival E (1967). *Chemistry and enzymology of marine algae polysaccharides* (pp.53–71). New York: Academic Press
- Richardson J S (1993). Free radicals in the genesis of Alzheimer's disease. *Annals of the New York Acad of Sci* 695: 73–76.
- Ruperez P, Ahrazem O, Leal J A (2002). Potential antioxidant capacity of sulfated polysaccharides from the edible marine brown seaweed *Fucus vesiculosus*. *J Agric Food Chem* 50:840–845.
- Rice-Evans C A, Miller N J, Bolwell P G, Bramley P M, Pridham J B (1995). The relative antioxidant activities of plant-derived polyphenolic flavonoids. *Free Rad Rsch* 22 :375–383.
- Robak J, Gryglewski R J (1988). Flavonoids are scavengers of superoxide anions. *Biochem Pharmacol* 37: 837–841.
- Santoso J, Yoshie-Stark Y, Suzuki T (2004). Anti-oxidant activity of methanol extracts from Indonesian seaweeds in an oil emulsion model. *Fisheries Sci* 70: 183–188.
- Shao P, Chen M, Pei Y, Sun P (2013). In vitro antioxidant activities of different sulfated polysaccharides from chlorophyten seaweeds *Ulva fasciata*. *Intern J Biolog Macrom* 59 : 295–300.
- Shon M Y, Kim T H, Sung N J (2003). Antioxidants and free radical scavenging activity of *Phellinusbaumii* extracts. *Food Chem* 82: 593–597.
- Singh S (2000). Extra cellular polysaccharide production in outdoor mass culture of *Porphyridium sp.* in flat plate glass reactors. *J Appl Phycol* 12:269–275.

- Vilchez C, Forjan E, Cuaresma M, Bedmar F, Garbayo I, Vega J (2011). Marine carotenoids: biological functions and commercial applications. *Mar Drugs* 9: 319–33.
- Wilhelm S, Helmut S (2005). Bioactivity and protective effects of natural carotenoids. *Biochimica Et Biophysica Acta* 1740: 101 – 107.
- Ye H, Wang K, Zhou C, Liu J, Zeng X (2008). Purification, antitumor and antioxidant activities in vitro of polysaccharides from the brown seaweed *Sargassum pallidum*. *Food Chem* 111: 428–432.
- Yen G C, Chen H Y (1995). Antioxidant activity of various tea extracts in relation to their antimutagenicity. *J Agric Food Chem* 43: 27–37.
- Zhang Q, Yu P, Li Z, Zhang H, Xu Z, Li P (2003). Antioxidant activities of sulfated polysaccharide fractions from *Porphyra haitanensis*. *J Appl Phycol* 15:305–310.
- Zhong A, Cao H, Wang F (2012). Anticancer polysaccharides from natural resources: A review of recent research. *Carbo Poly* 90(4):1395–1410.
- Zhuang Z C, Cun Z, Itoh C H, Mizuno H T, Ito H (1995). “Antitumor active fucoidan from the brown seaweed, umitoranoo (*Sargassum thunbergii*),” *Biosci Biotech and Biochem* 59 (4): 563–567.
- Zhukova N V, Svetashev V I (1999). A high level of dihomogammalinolenic acid in brown alga *Sargassum pallidum* (Turn). *Phytochem* 50(7): 1209–1211.
- Zhang Q, Li N, Zhou G, Lu X, Xu Z, Li Z (2003). In vivo antioxidant activity of polysaccharide fraction from *Porphyra haitanensis* (Rhodophyta) in aging mice. *Pharm Rsrch* 48:151– 155.

Legends:

Fig 1. Graphical representation of Total Polysaccharide Content in Four Experimental Algae

Fig 2. Graphical representation of % DPPH scavenging activity of algal polysaccharides

Fig 3. Graphical representation of % Ferrous ion chelating activity of algal polysaccharides

Fig 4. Graphical representation of % Superoxide radical scavenging activity of algal polysaccharides

Fig 5. Graphical representation of Total antioxidant capacity of algal polysaccharides

Plate 1-4. FTIR representation of polysaccharides extracted from algae :
Plate 1. Rhizoclonium, Plate 2. Cladophora, Plate 3. Chaetomorpha, Plate
4. Pithophora

Fig 6. Anti proliferative activity of Polysaccharide of different Algal species
on human leukemic cells.

Fig 7. Cladophora glomerata polysaccharide induces high levels of Caspase
3 and Caspase 9 in REH cells

Fig 8. Nuclear fragmentation induced by Cladophora glomerata
polysaccharide in REH cells.

Perception and Contribution of Indian Citizens in Conserving Environment on which all life depends

Sagufta Sahin¹

Saikat Kumar Basu²

Abstract :

Being knowledgeable about the environment is what is meant by environmental awareness. It alludes to the collection of values, beliefs, and morals that guide our efforts to improve the state of the environment while also examining and comprehending the issues that arise from it. Knowing, recognizing, and being familiar with our immediate environment has helped us recognize the serious risk it currently faces. Due to the public's ongoing disregard for the natural environment, its conservation, protection, and preservation have taken on highest importance. The purpose of this survey was to gauge how much individuals in our society knew about the environment. 80 randomly selected individuals from West Bengal's rural and urban locations, representing a range of ages (students, teachers, government employees, and others), provided the data for this study. There were 10 easy questions on the survey. Using the data, we were able to determine how many participants were aware of their environmental problems, were taking the appropriate action, and what further actions the government has to take to protect the environment.

¹Assistant professor, Department of Education, University of Gour Banga, Malda

²Research Director, PFS, Lethbridge Alberta Canada;

Email: saikat.basu@alumni.uleth.ca

Introduction :

Without a healthy ecology, human existence is virtually impossible. All elements in our environment, both living and non-living, interact with one another in a natural setting. One of the most important concerns that must be addressed in the fight against climate change and global warming is environmental protection. The world urgently needs sustainable development if we are to protect Mother Earth from the effects of industrialization. In this article, we'll go into more detail on environmental preservation, including its requirements and methods. Environmental conservation is a practice that opens the door for governmental, organizational, and individual protection of the environment and natural resources.¹

Human lives are being severely affected by a number of fundamental environmental challenges. All of these problems, including overcrowding, hydrological problems, ozone depletion, and global warming, as well as deforestation, desertification, and pollution, represent a serious danger to humankind's continued survival.²

It is pointless to anticipate positive progress until environmental protection turns into a powerful mass movement, particularly in the era of digital media, which has the power to spark a revolution and prevent the destruction of our world. In this paper we have discussed about the awareness level of both rural and urban citizens about conservation of environments and whether they practically practice any strategy to maintain the biodiversity in their daily life.³

Need of Environmental Conservation :

Working for environmental protection has become increasingly vital in modern times. The necessity to protect the environment from further deterioration is clarified by the following considerations:

- To decrease pollution of the air, water, and land
- To make it easier to protect natural resources for future generations

- To make sure that biodiversity is protected
- To put sustainable development into practice
- To reestablish ecological harmony
- To protect the environment from the damaging effects of global warming

Citizens' role to Ensure Healthy Environment :

Most of us were aware, around 25 years ago, that the three most prevalent types of pollution in our environment were noise, air pollution, and water pollution.⁴ As a result, we also made an attempt to minimize other disturbances, such as noise and car smoke.

But as time passes, things change, which means that issues also change. The cause of environmental pollution is changing right now. In the same way that plastic, thermocol, and other similar materials may poison our air and water, their usage on land may also do the same, either directly or indirectly, impacting our food chain.⁵

But if the government doesn't step in, can anything be done about this? What kind of good might someone possibly do with their actions?

The truth is that we are all to blame for the current state of the environment, and we must thus assume responsibility for making changes to it. We have made a maze for ourselves as a result of several reasons, including globalization and the resulting lifestyles. We first make issues for ourselves before investing money, effort, and time into finding solutions.

We create garbage first, and then we consider how to address it. We allow poisons to contaminate our water resources, then spend time and money restoring them. To increase crop yields and produce larger fruits, we rely on artificial fertilizers. Then, we peruse the "Organic" sections of shop shelves. Isn't there a more straightforward answer to all of this? Yes, and it is up to us to make it happen.⁶

What can we do as citizens to promote sustainable living?

Strategies to Conserve Environment :

Plastic is prohibited in a number of states; however, enforcement varies. It is intended to eliminate using low-quality plastic and generally to "avoid using anything that is made of plastic or another material equivalent and can be used only once or twice."⁷

Simply said, avoid using 'disposables'. It is best to choose and promote reusable alternatives like paper, steel, melamine, cotton, and others.

The 3Rs — Reduce, Reuse, and Recycle — must get special attention when becoming sustainable.⁸

Reduce: Cut down on as much trash as you can. Avoid using chemicals that are not necessary in order to prevent their negative consequences.

In our daily lives, soap is necessary to wash our clothing or other objects. 90% of the components in soap are essentially worthless. Contrary to popular opinion, a soap that produces a lot of lather is not always a good soap. The 'good' acids in soap, not the lather, clean anything from fabric to vessels to your body. Use 'natural' soaps instead.

Useless items made of plastic or a substitute substance should not be used.

Avoid purchasing online, despite the fact that it seems simpler, as the packaging materials needed result in more waste.

Reuse: Make use of goods that have several uses and may be used repeatedly.

- If you run out of clothes, donate them to the less fortunate rather than tossing them away.
- Put boxes acquired through internet purchasing in order and promote reuse.
- Share used books and toys with the less fortunate rather than throwing them away.

Recycle: If an object is no longer useful in its original form or if it grows monotonous, give it a new look.

- Make curtains, bags, a blanket, a handkerchief, towels, etc. out of your worn-out garments. Ask your kids for assistance when performing such tasks. It offers two benefits. Along with recycling, you are spending precious time with your child and encouraging their creativity.
- Make it a practice to separate recyclable garbage from other waste by kind.

Objective of this Study :

1. To find how many people (of the given number of participants) are aware of their environment.
2. To find out what measure people have taken in daily life to protect the environment.
3. To suggest solutions for protecting the environment.

Methods and Materials:

This paper surveyed 80 people irrespective of their profession both from rural and urban area of West Bengal. It determined the awareness level amongst people. We administered a unique form containing 10 questions. These questions determine the awareness level amongst people. These questions were circulated by both offline and online mode of survey. We used both Google form for our online survey as well as offline survey process for data collection. The data collected were analysed using mean percentage.





Fig 1: Pictures of Participants during the survey on Environmental Conservation to determine the awareness level amongst people in West Bengal. Photo Credit: Saikat Kumar Basu



Fig 2: Pictures of Participants during the survey on Environmental Conservation to determine the awareness level amongst people in West Bengal. Photo Credit: Bratati Barik

Questionnaire :

Table 1. The list of Items for the survey on Environmental awareness

SL. NO.	ITEMS
1	Choose any one environmental problem in your area?
2	Can you give any contribution to conserve the environment of your region?
3	Have you noticed any changes in the environment (your surroundings) as a result of environmental awareness within people?
4	Actions to be taken for against environmental problem?
5	Which type of thing you have to use in your domestic needs?
6	What would you prefer to travel a short distance?
7	How do you manage and dispose the house hold waste?
8	Do you have proper garbage and plastic collection methods at your home?
9	How often do you implement the circular economy (the use of 3r's reduce, reuse and recycle)?
10	Do you segregate the waste into biodegradable and non-biodegradable components before disposing it off?

Result and Discussion :

The data was collected through both google form and offline. Some respondents selected from college campus, university campus and other people present on campus and people from different places of society participated in this survey. The characteristics of participants are show in the Table- 2. This represents that out of 80 people – 45% (36) male and female 55% (44) participated in this survey. The participant in this survey were related to both urban and rural area and mostly belong to 18-77-year age group. The participants are mainly 62.5% (50) Rural and 37.5% (30) Urban.

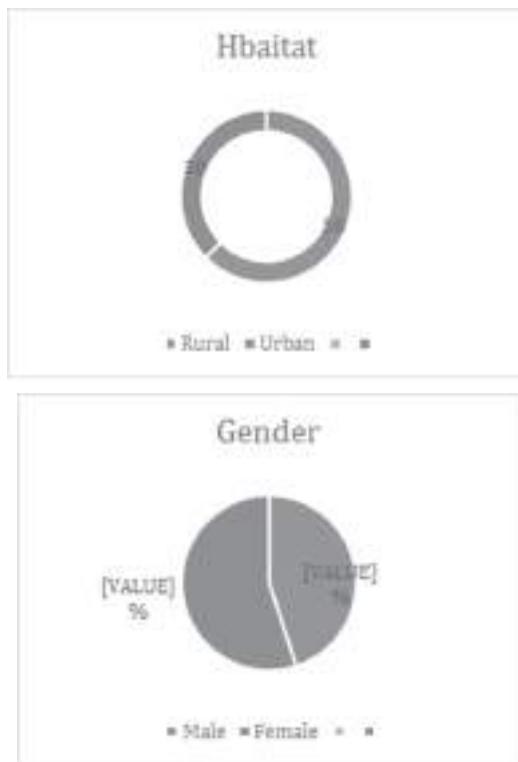


Fig 3: Representation of Participants

Table 2: Representation of Characteristics of Participants

Sl.No.	Characteristics	Participants	No. of Participants	% of Participants
1	Gender	Male	36	45
		Female	44	55
2	Age Group	18 to 30	20	25
		31 to 45	23	28.75
		46 to 55	19	23.75
		56 to 65	11	13.75
		Above 65	7	8.75
3	Habitat	Urban	30	37.5
		Rural	50	62.5
		Total	80	

In this survey, the percentage of student participants were more than people from other professions. One fourth of the responses were received from students and mainly college students have participated. (Table 2) The percentage of 31to45 year age group is higher than other age groups. It means in this survey people from different profession participated. In the Table 3 the professional description of Respondents is mentioned.

Table 3: Representation of Respondents

Sl.No.	Profession	No. of Respondents	% of Respondents
1	Student	25	31.25
2	Teacher	12	15
3	Government Employee	11	13.75
4	Self-employed	23	28.75
5	Others	9	11.25
	Total	80	

In the Table No 3 we can see that along with students' people from different profession also participated in this survey. Teacher, Government officer, and Self-employed means Lawyer, doctor, Businessman etc. and in the category Others the housewife, house maid, swiper, etc included.

The survey was conducted on students, teachers and other people and finally we received responses from them. (See Table-4). This table represent that 56 respondents were aware of their surrounding and only 24 participants made their contribution to conserve the environment of their region.

Table 4: Representation of Response Given by participants

Sl. No.	Questionnaire	Answer	Response	% Response
1	Choose any one environmental problem in your area?	Air Pollution	53	66.25 %
		Soil Pollution	11	13.75%
		Water Pollution	25	31.25%
		Noise Pollution	15	18.75%
2	Can you give any contribution to conserve the environment of your region?	Yes	24	30%
		No	56	70%
3	Have you noticed any changes in the environment (your surroundings) as a result of environmental awareness within people?	Yes, people are enough conscious	26	32.5%
		No changes in the environment	44	55%
		People use separate garbage bag	10	12.5%
4	Actions to be taken for against environmental problem	Forestation	13	16.25%
		Use of Technology	18	22.5%
		Increase budget	12	15%
		Increase awareness	37	46.25%
5	Which type of thing you have to use in your domestic needs	Eco-friendly	47	58.75%
		Artificial	22	27.5%
		Both	11	13.75%
6	What would you prefer to travel a short distance?	On Foot/Cycle	12	15%
		Motorcycle/Car	48	60%
		Other	20	25%
		Dumped it	19	23.75%
7	How do you manage and dispose the household waste?	Decompose	7	8.75%
		Burn it in open air	9	11.25%
		Dispose in the Govt van	33	41.25%
		Other	12	15%

Sl. No.	Questionnaire	Answer	Response	% Response
8	Do you have proper garbage and plastic collection methods at your home?	Yes	23	28.75%
		May be	42	52.5%
		Yes, but not maintained by all family members	15	18.75%
		Always	9	11.25%
9	How often do you implement the circular economy (the use of 3r's reduce, reuse and recycle)?	Sometimes	15	18.75%
		Rarely	45	56.25%
		Most of the time	11	13.75%
10	Do you segregate the waste into biodegradable and non-biodegradable components before disposing it off?	Yes, I have separate bin	28	35%
		Yes, I am not aware	36	45%
		No, but I would like to incorporate it	16	20%

From the survey we can conclude that most of the respondents 66.25% (53) said that air pollution is the major environmental issues in their area as compared to soil erosion, water pollution, noise pollution, Deforestation and some respondents said that all of these environmental problems are common in their region.⁹

Only 30% people are agreeing that they contribute in environmental conservation in their area.

Most of the participants (55%) are responses that they had noticed no changes related to environmental awareness.

According to the majority of the participants (46.25%) the increasing awareness among people for environmental problems is the main action that we should take.

58.75% people think that we should use eco-friendly things in our domestic needs so that we can reduce environmental pollution.

Most of the people in our society (about 60%) chooses motorcycle or car for short distance travel. It is very alarming issue.

Because excessive use of petrol vehicle causes air pollution in the environment. But use of car and motorcycle is also necessary in today's busy world and also help in time management.

In most of the urban area the people (41.25%) dispose the house hold waste in Government van appointed for it. But in rural area people are not enough aware about the dispose of house hold waste.

Majority of the people (56.25%) are not at all aware about the implement of circular economy. 45% participants not at all aware about the method of segregate waste into biodegradable and non-biodegradable components before disposing it.

Overall, we can say that rural people are less aware about environmental conservation in compare to urban people.¹⁰ Very few people in urban area contributed in the environmental conservation in their particular region. We, the educated citizen should take the responsibility to spread awareness.¹¹

On the other hand, Government should also take necessary steps and sanction budget for environmental awareness programe in both rural and urban areas, but some special measure must have to take for rural areas.¹²

So that people of rural areas can also be aware about the latest environmental conservation method and the proper application of technology in this purpose.

Conclusion :

The study clearly shows that even while certain members of the public are aware of specific environmental processes, they are not actively involved in such projects. According to this survey, the majority of participants are conscious of environmental problems but not making any effort to dispose of garbage properly in accordance with the rules in order to stop this threat.¹³ Additionally, students are attempting to apply their knowledge of the environment in a much broader way to their daily activities.¹⁴ However, for a stronger impact, the government should start some rigid, standardised processes to inform people about the value of protecting our environment. To tackle these concerns and build a sustainable

future for our future generations, it is urgent that we launch a global movement by adopting modest, localised acts.

References :

1. Anonymous. (2006). Study to gauge public perception on environmental pollution in India, (www.greenpeace.org/raw/content/India/press/reports/Greenpeace-hands-survey).
2. Åhlberg, Mauri, et al. (2001) “Collaborative Knowledge Building to Promote in-service Teacher Training in Environmental Education”. *Journal of Information Technology for Teacher Education*, vol. 10, no. 3, 2001, pp. [227–240].
3. Arunkumar, J. (2012). A study on assessment of environmental awareness among teacher trainees in teacher training institutes. *International Journal of Research in Social Sciences* 2(3): [312–321].
4. Bisi-Onyemaechi, A.I., et al. (2018) “Evaluation of the School Environment of Public and Private Schools in Enugu to Ensure Child Health Promotion”. *Nigerian Journal of Clinical Practice*, vol. 21, no. 2, pp. [195–200].
5. Samuel Delvin (2010). *Environmental Problems and Issues*. In Sarup and Sons at New Delhi.
6. Verma Binita (2008). *Environmental security and sustainable development: reflections on conceptual framework*. In deep public and deep publications, New Delhi.
7. World Health Organization (1992), *Our Planet, our Health: Report of the WHO Commission on Health and Environment*, Geneva
8. Kirk Smith et al., *Greenhouse Implications of Household Stoves: An Analysis for India*, *Annual Review of Energy and the Environment*, Vol. 25: pp 741–763.
9. Gadde et al., *Air pollutant emissions from rice straw open field burning in India, Thailand and the Philippines*, *Environmental Pollution*, Volume 157, Issue 5, May 2009, Pages 1554 – 1558.
10. Majra, J.P. and Gur, A. (2010). “School Environment and Sanitation in Rural India”. *Journal of Global Infectious Diseases*, vol. 2, no. 2, pp. [109–11].

11. UNESCO. (1972). The Stockholm Declaration. The United Nations Conference on the Human Environment, 5-16 June, Stockholm.
12. UNESCO. (1977). The Tblisi Declaration. Intergovernmental Conference on Environmental Education, Tblisi.
13. Chabukdhara, Mayuri; Nema, Arvind K. (2013-01-01). "Heavy metals assessment in urban soil around industrial clusters in Ghaziabad, India: probabilistic health risk approach". *Ecotoxicology and Environmental Safety*. 87: 57 – 64
14. Milind Kandlikar, Gurumurthy Ramachandran (2000). "2000: India: The Causes And Consequences of Particulate Air Pollution In Urban India: A Synthesis of the Science". *Annual Review of Energy and the Environment*. 25: 629 – 684.

Decolonising ‘Masculine’–‘Feminine’ Binaries : Analysing Woolf’s Social Thought on Gender, War and Androgyny in Selected Fiction

Shruti Dugar*

Baidehi Mukherjee**

Abstract :

Critics have often associated the act of colonizing as an analysis of political thought. Seldom is this oppression of the inferior and the domination of the superior discussed with a similar connotation in the domestic ambience of the society. Patriarchy, the prevalent social structure, where the masculine overpowers its agency to subjugate the weaker and the meeker gender of the feminine, to an extent is quite similar to a colonizing state which asserts its domination on the colonized. This agency however, undeniably goes hand-in-hand to the divisions of values and roles to particular genders, thereby creating a wall of binaries between the biologically-different species. Virginia Woolf challenges and questions this domestic colonialism, not only breaking away from the binaries of gender in the social milieu apprehensive of the Great War, but also, ‘decolonizing’ the masculine superiority and feminine inferiority by paving a path of ‘spiritual androgyny’. This paper aims to examine this social thought of

*M.A. English, Semester - II.

**Assistand Professor, Department of English, Shri Shikshayatan College.

Woolf which she writes in 'A Room of One's Own' and 'Three Guineas', and reflects the same in her fictional realm of selected novels – 'To the Lighthouse', 'Mrs. Dalloway', and 'Orlando'. Focusing on Woolf's radical ideas on gender, war and androgyny as tools to deconstruct and decolonize the superiority and inferiority of genders, this research will delve into woman emancipation, masculinity of war, and spiritual androgyny for a cultured and liberated society.

Keywords: Non-fiction, fiction, Masculine, Feminine, Modernism, War, Androgyny

Locating Woolf in the Turbulence of Modernism:

'Cultural analysis is intrinsically incomplete and worse than that the more deeply it goes, the less complete it is.' (Geertz.29)

Convinced strongly by the extracted words of Geertz from his 'Thick Descriptions', though in a different context, yet it appears a daunting task to locate Virginia Woolf (1882-1941) in the turbulent backdrop of Modernism, and analyse the socio-cultural and political grounds in her works, both fiction and non-fiction. A quick glance of her biography entrusts on critics an image of the female writer with a demeanor showing unflinching strength against all odds of circumstance; be it –'sexual abuse at the hands of her half-brothers from her mother's first marriage' (Cambridge, 5), her nervous breakdown witnessing the deaths of her beloved ones, or her romantic inclination towards Vita Sackville-West in an age where same-sex relationships were prohibited. Yet, despite of all what strikes in the persona of Woolf is her radical thoughts and intellectual foundations that were shaped by her father, who encouraged her in her quest of knowledge and expression, which later appeared prominently in her association with the Bloomsbury Group, which was established on the ideas of Vanessa Bell's 'Friday Club' and Thoby Stephen's 'Thursday Evenings'.

It was with her radical thoughts and abominable spirit that Woolf and her 'stream of consciousness' emerged as a prominent pillar of Modernism along with T.S. Eliot, and James Joyce, amidst the English population apprehensive of the Great War. 'Frederic Jameson had argued the most influential formal impulses of canonical modernism have been strategies of inwardness' (Harker). It is quite

suggestive that this inwardness of which Jameson speaks can be then considered as a subsequent reaction to the savage and brutal actions in the First World War (1914–1918).

Sarah Cole in the research 'Modernism, Male Intimacy, and the Great War' characterizes 'figures like the alienated wanderers; problems such as the impermeability of the individual psyche; images of fragmentation and loss at both personal and cultural levels; an apparent rejection of tradition; formal features such as narrative discontinuity' as the defining features of Modernism as generally conceived (Cole). And, so are the defining tangents of Virginia Woolf's modern connotation of 'stream of consciousness', which seems to be precisely exemplified by her *The Mark on the Wall*, where the narrator muses through different realms from an insignificant black mark on a wall. However, Woolf's concepts on the non-linear random thoughts in human psyche seems to be a pertinent area for psychometric analysis when taking into consideration the entering of the very branch of psychology and Freud in the same era; yet, one must not ignore the fragmented expanse of human mind and its equation with the anxiety and savagery of the two world wars.

One sees in Woolf this fragmented expanse of human mind. Unlike the concealed interior conflict of Dickens' David or Hardy's Henchard as a reaction to their external circumstance, the female writer portrays a level of experience apparently close to the chaotic externality of the situations. What appears intriguing is the role of Time in her fictional realm that assists and facilitates the modern connotation of her stream of consciousness; in *Mrs. Dalloway* the execution of action is confined within a day of twenty-four hours, in which we are introduced to the past and present life of Clarissa Dalloway in which her frigid marriage forms the transition, and the post-traumatic disorder of Septimus which ultimately kills him and his relationship with Lucrezia; *To the Lighthouse*, the time is spanned to an extent of ten years, which begins with Lily working on a painting and ends with the completion of it, bringing in within the process the unsatisfactory gendered dictates followed by Mr. and Mrs. Ramsay, the juxtaposition of nature's immortality to

human death, spinsterhood, and aloneness; and, in Orlando, Woolf completely transgresses the dictates of years to centuries, where Orlando, first speaks as a man and then after a mysterious gender change lives the plight of woman. Witnessing the social thoughts on gender and androgyny, of over three centuries, it is only the psyche of the character and the manuscript of 'The Oak Tree' that remains constant over time. The critical eye, now, will not therefore hesitate to assert that Woolf raises through the 'stream of consciousness, and the playfulness of Time as an anchor, to bring on surface her social thoughts on gender, war, and androgyny attempting to 'decolonize' the masculine-feminine boundaries that forms the basis for patriarchy.

Gender, War and Androgyny in Woolf's Stream of Consciousness:

One must not forget that Virginia Woolf, before her suicide in 1941, lived to see not only the anxiousness and the hollowness of humanity post 1918 as Eliot had versed in his 'The Hollow Men', but also the Great Economic Depression (1930), and the dawn of the Second World War and the rise of Hitler. Her life spanned between Victorian and Modern Era of literature, which though saw progression in scientific innovations, but also challenged and questioned the human existence altogether; for it was within this time frame that for the first time human mind and its psychology was studied with the advent of contemporaries theories by Sigmund Freud; and, gender complexities of homosexuality and androgyny were perceived with novel lenses.

Feminist studies under gender theories, first proved to be prominent with the issues raised by Wollstonecraft in the treatise 'A Vindication of the Rights of Woman', which not only focused on the 'barren blooming' of the 'colonized' gender, but also harshly challenged and questioned Jean-Jacques Rousseau's argument of women as passive and a medium of pleasure to men. Similar ideas on female emancipation and their position in the 'domestically colonized' society is stimulated in Woolf's *A Room of One's Own* – book-length essay featuring a fictional research for a lecture at

Oxbridge; and, Three Guineas – where, ‘Woolf addresses a more vexed question than emigration: women’s establishment with war’ (Middleton). Woolf cross-examines the position of women as she writes in *A Room of one’s Own*;

‘Why did men drink wine and women water? Why was one sex so prosperous and the other so poor? What effect has poverty on fiction? What conditions are necessary for the creation of works of art? –A thousand questions at once suggested themselves. But one needed answers, not questions; and the answer was only to be had by consulting the learned and the unprejudiced.’ (*A Room of One’s Own*, 22)

The critical eye, upon a first glance of the essay will not therefore dare to overlook the steps of Woolf’s essay in the direction of Wollstonecraft’s *Vindication*. However, what appears intriguing are not only the questions and arguments raised by Woolf in her polemics, but also the response the female writer seeks in her fictional realm, to decolonize the gendered binaries.

Endowing the spinster Lily Briscoe with a natural inclination towards the profession of art, in a world where her gender is equated with what Patmore suggested as the “angel of the house”, one sees the character of Lily ‘trespassing’ her boundaries as an independent woman. Living amidst the real consciousness of psyches similar to that of Mrs. Ramsay’s and Charles Tansley, the female artist chooses her artistic faculty to not only escape from the confinement of her gender but also asserts her own individuality and freedom. In *A Room of One’s own*, the critical eye finds the fictional narrator releasing out the anguish upon coming across the different claims on women by men, from Pope to Johnson, which appeared to be translated into the monumental work by Professor X entitled “The Mental, Moral, and Physical Inferiority of the Female Sex”.

These claims flushed the narrator with anger, and burnt her cheeks red – a similar reaction was observed in Lily Briscoe upon hearing Tansley’s comment: “Women can’t paint, women can’t write” (*To the Lighthouse*, 78). This comment brings to mind not only Woolf’s anxiety in the library of British Museum, unable to procure startling fiction on women, but also the myth of Judith Shakespeare, who was bereaved from the fame her creative genius

could bring her. A further analysis on the willing spinsterhood of the female artist, and her voluntary neglect towards Mr. Ramsay's confinement by the end of the third volume, corroborates why Woolf advises daughters of the educated men in her *Three Guineas* to choose the 'masculine-confined areas' particularly literature to preserve the cultural and intellectual liberty which will in turn aid in preventing war-time crisis.

The very title, *Three Guineas* is indicative of the economic status and power which in turn is associated with masculine agency of power and domination. Correlating fascism with the outgrowth of 'domestic colonialism', Woolf's essay examines War as a product of masculine ideologies. In order to decolonize the gendered binaries, Woolf links the pretext of War, with the chain of female emancipation, their education and professional liberty. The polemic writer sees the restriction of the feminine sex to their private areas as a perpetual exertion of influence, directly or indirectly in favor of the war. Woolf advises the colonized gender to break off their shackles which confined them to domestic education of music, art, and mere facts. Woolf claims;

"It was with a view to marriage that her mind was taught. It was with a view to marriage that she tinkled on the piano, but was not allowed to join the orchestra; sketched innocent domestic scenes, but was not allowed to study from the nude; read this book, but was not allowed to read that, charmed, and talked. It was with a view to marriage that her body was educated" (*Three Guineas*, 69-70)

Similar claims were made by *Vindication* as well as in *A Room of One's Own*, through the episode of Trevelyan's history which issued the colonized gender only in the circles of marriage and divorce. The above words extracted from *Three Guineas* bring to suggestion the characters of Mrs. Ramsay. A woman devoted to the traditional duties of her gender, the wife of Mr. Ramsay functions in the narrative as a foil to the independent and artistic Lily. One sees Mrs. Ramsay's urge to the air of freedom the unmarried artist celebrates, quite in contrast to Lily's urge to the apparent completeness in the life of the angel of the house as a wife and a mother, for which a Victorian woman has been educated. The premises which Woolf tries to encapsulate in her essays are

corroborated by the sense of incompleteness in the apparently complete world of Mrs. Ramsay. Marriage proves to be a reinforcing agency of ‘domestic colonialism’, not only in the marital equation shared by Mr. and Mrs. Ramsay, but also in the perception James formulates of their ‘co-dependency’. With the progression in the narrative, the structured gendered binary seems to be more concrete. A verbal spat amidst the husband as a ‘perfect patriarch’ and the wife as an ‘irrational human’, James’ judgement of his parents, an Mrs. Ramsay’s anxieties of Lily’s ‘own room’, undeniably testifies Woolf’s argument in her penned – there is a need to break these binaries and the only possible way the female writer sees is spiritual androgyny. Since, one sees both the counterparts of marriage masked with satisfaction; Mr. Ramsay masks his ‘masculine blemishes’ and Mrs. Ramsay masks her ‘feminine perfections’.

Indeed, the gendered binary of masculine–feminine has not only colonized the liberation of the sexes, but has also disrupted the sanctity of marital associations. Where one sees Mrs. Ramsay stuck to the room these binaries have built, Lily, on the other hand appears to make her own room through her artistic faculty. Woolf, through the female artist evinces what she meant by asserting – “a woman must have money and a room of her own if she is to write fiction” (*A Room of One’s own*, 4). The “room” as a metaphorical space represents a physical separation from the agency of masculinity, and at the same time, ‘is the means of escaping a patriarchal stranglehold on women’s ability to shape society’ (Sheikh). The private, own room of the colonized operates as an apparatus to ‘decolonize’ the binaries which shackles the emancipation and self-will of the ‘other’ gender. To understand the complexity of Woolf’s usage of “room” in *A Room of One’s Own*, critics like Sheikh revisit the fictional realm of Mrs. Dalloway, published four years prior to the essay on gender, homosexuality and androgyny.

From the retirement of the titular character, Mrs. Clarissa Dalloway to her room, re-invoking in her stream of consciousness, her pre-marriage romantic associations, to contemplating in the ‘aloneness’ over Septimus’ suicide – Mrs. Dalloway’s room reveals significant suggestions on the apparatus of the confined space. The

four walls of Clarissa's domestic room seems to lack passion and life, and rather appear as a boundary between the husband and the wife, as Mrs. Dalloway herself reflects; "There was an emptiness about the heart of life; an attic room...the bed narrow; and lying there reading, for she slept badly, she could not dispel a virginity preserved through childbirth which clung to her like a sheet' (Mrs. Dalloway, 46). Though the physical isolation of the husband and the wife separates the "room" of Clarissa from the masculine 'colonization', yet the female character appears to be 'colonized' by the assumed dictates of her gender. Preferring an emotionless marriage with Richard for security as a woman, over the romantic affection towards Peter Walsh, one can see how Mrs. Dalloway is indeed a victim of the 'colonizing' ideologies of dependence and domination.

The impulse to fancy life outside the monotony of 'feminine' duties inculcates in the titular character an 'oddest sense of being invisible', restricting her identity as only "Mrs. Richard Dalloway". A further analysis of the subjugation of Clarissa to the feminine dictates brings forth Woolf's rationale in the utility of the second guinea in obliging the daughters of uneducated women to enter profession. Woolf writes;

"We have strong selfish motives for helping her – there can be no doubt about that. For to help women to earn their livings in the professions is to help them to possess that weapon of independent opinion which is still their most powerful weapon. It is to help them to have a mind of their own and a will of their own with which to help you to prevent war" (Three Guineas, 106)

Virginia Woolf in her treatise *Three Guineas* determines the aspect of 'domestic colonialism' in the context of the Great War (1914–18) by asserting the bloody massacre as an output of masculine infatuation for reputed profession, joy and manly valour. The consequence of this infatuation is concisely interpreted by the perpetual panic of an alarming circumstance of war and death. The car-bickering sound in the initial half of Mrs. Dalloway not only separated the narrative of Clarissa's stream of consciousness, and cautioning her of death but also united her stream with that of Septimus and Lucrezia. Had Lucrezia too, like Mrs. Dalloway not

been ‘colonized’ by dictates of gender, she would not depend on Septimus for self-contentment in her own room, decolonizing the masculine–feminine binary that forms the core of patriarchy.

Woolf’s social thought in *Three Guineas* and *A Room of One’s Own*, however is not only an apparatus to highlight the confined walls of masculinity restricting the individuality of femininity, but upon a further analysis, seems to be an extension to the gender theories of homosexuality and androgyny. By interpolating the fictional narrative of Mary Carmichael in *A Room of One’s Own*, the female polemic writer not only substantiates her ‘inclination’ towards Vita Sackville–West, but also regularizes the standard binaries of man–woman.

“Are there no men present? Do you promise me that behind that red curtain over there the figure of Sir Charles Biron is not concealed? We are all women you assure me? Then I may tell you that the very next words I read were these – “Chloe liked Olivia ...” Do not start. Do not blush. Let us admit in the privacy of our own society that these things sometimes happen. Sometimes women do like women.”

(*A Room of One’s Own*, 69)

The above extracted excerpt is not only a reciprocal analysis of Woolf’s ‘romantic associations’ but also as an agency to deconstruct ‘domestic colonialism’. An erotic inclination towards a member of the same sex, in contrast to Eve Sedgwick’s platonic ‘homosocial desire’ in men, elevates the ‘colonized’ gender to the leveled platform as her partner. With a similarity in gender, their association breaks away from the traditional dictates of provider and care–giver. This analysis of Woolf’s thought is evinced by the ecstasy of Mrs. Dalloway, rekindling her physical association with the free–spirited Sally Seton, who is addressed by Clarissa as her true love. A similar association is analyzed in the relationship of Elizabeth Dalloway and Miss. Doris Kilman, a German woman, condemned by Mrs. Dalloway for her identity. The troubled inclination in the novel portrays the weapons of love and religion to dominate, politically as well as domestically.

Transgressing the space of feminine meekness, Woolf’s contemplation of a “room” becomes more précised when the discussions bring into context spiritual androgyny. Amidst the

emergence of profound 20th century meditations in gender and androgyny, more than *To the Lighthouse* and *Mrs. Dalloway*, it is *Orlando: A Biography* which serves as an eminent piece of fiction that testimonies the subscripts of androgyny. Sporting with a vision of identity that transcends the physical gender of the titular character, after reposing in an undisturbed sleep-like trance, there is an unanticipated change in the gender of Orlando from man to woman. Though many critics consider *Orlando* as a translation of Woolf's own inclination towards Vita-Sackville West, yet often the text is studied deeply with the lens of gender and spiritual androgyny. Woolf in this context writes in *A Room of One's Own*:

“When I saw the couple get into the taxicab the mind felt as if, after being divided, it had come together again in a natural fusion. The obvious reason would be that it is natural for the sexes to cooperate. One has a profound, if irrational, instinct in favor of the theory that the union of man and woman makes for the greatest satisfaction, the most complete happiness. But the sight of the two people getting into the taxi and the satisfaction it gave me made me also ask whether there are two sexes in the mind corresponding to the two sexes in the body?” (*A Room of One's Own*, 82)

Recollecting, through this vision Coleridge's assertion in the androgyny of a great mind that is fully fertilized with the fusion of the masculine and the feminine, Woolf deconstructs the established base of patriarchy. Orlando, the titular character, often analyzed to be a sheer portrayal of Vita, is introduced as a 'man' of the Elizabethan Era, swinging his sword at the head of a moor, bewitched by Sasha and 'romantically' adored by the Queen. However, no sooner one sees an unanticipated transformation in the sex of the character from a man to a woman. Yet, the transgression against the natural, biological laws are apparent only in the physicality of sex and not in the mentality of the gender; “Orlando had become a woman – there is no denying it. But in every other aspect, Orlando remained precisely as he had been. The change of sex, though it altered their future, did nothing whatever to alter their identity.” (*Orlando*, Chapter 3)

Embracing this abrupt transformation quite composedly, the masculinity earlier apparent in the character seemed to be subjugated and 'colonized' by the standards of femininity. It is through Orlando,

stream of thoughts that Woolf testimonies what Wollstonecraft had addressed as ‘barren blooming’ in the context of female education. His ambiguity of the “other sex”, the significance on clothing in gender construction, the vulnerability to be rescued by a man, the “tedious discipline” of sustaining chastity, and the whole corpus of hairdressing and artificial beauty – through Orlando one interprets the ‘gendered’ perspective of the masculine ‘colonizer’ and the feminine ‘colonized’. As Orlando says, ‘I shall never be able to crack a man over the head, or tell him he lies in his teeth, or draw my sword and run him through the body, or sit among my peers, or wear a coronet, or walk in procession, or sentence a man to death or lead an army...all I can do once I set foot on the English soil, is to pour out tea, and ask my lords how they like it.’ (Orlando, Chapter 4)

Once relived the perspective of the ‘colonizer’ and the ‘colonized’, Orlando gradually completes the integration and answers the series of questions raised by Woolf after the episode of the couple accompanying each other in a cab ride, manifested in Orlando’s poetic genius ‘The Oak Tree’. A further analysis of the intermixing of gender in Woolf’s hands brings forth a major tangent of discussion that colonizes the weaker gender – the responsibilities attributed to the provider and the care giver, as apparent in the above extracted excerpt of Orlando.

It was, undoubtedly, the social requisites of patriarchy that articulates the crux of domestic colonialism, which is the key factor in Woolf’s demand of the Outsider’s Society. Affirming the feminine estrangement from the dominant male tradition and to express their own experience of difference, Woolf argues in *Three Guineas*;

“The Outsiders will dispense with pageantry not from any puritanical dislike of beauty. On the contrary it will be one of their aims to increase private beauty; the beauty of spring, summer, autumn; the beauty of flowers, silks, clothes; the beauty which brims not only every field and wood but every barrow in Oxford street; the scattered beauty which needs only to be combined by artists in order to become visible to all.” (Three Guineas, 207)

The echoes of the Outsider’s Society appear to be pertinent in the context of Orlando wandering the Victorian streets. A word–artist at his fundamental core, along with his psyche remains the only

anchor of Orlando transgressing the barricades of time as well as gender. The 19th century construction of marriage and reproduction as the sole destiny for Woman chains the poet inside Orlando. Attempting to contemplate on her duties as a woman, and as a wife in the domestic sphere of the private, having once 'celebrated' life as a man, the femininity in Orlando succumbs to the art of words and poetry. Influenced in her journey by Wordsworth, it is through his literary and artistic faculty that Orlando is seen to achieve spiritual androgyny and formulates a society that incorporates both feminine and masculine auras, decolonizing and deconstructing the binaries, realizing the present moment.

Conclusion:

Analyzing the gender theories of patriarchy, homosexuality, and androgyny, and, the psychology of human mind perturbed by the sights of the Great War, Woolf's representation of contemporary social thought is a concise blend of granite and rainbow. Conjoining quite subtly the harshness of fact with the sweetness of fiction, the beauty of art with the truth of life, the compactness of prose with the harmony of poetry – the female writer through her ink brought forward assertions and claims that compelled the human mind to contemplate on its association with self and others. Apart from the selected fiction that was analyzed in the research, Woolf's social thought are aptly found in her works from 'Modern Fiction' to 'Mr. Bennet and Mrs. Brown', from 'The Waves' to 'Jacob's Room', and to map Woolf as a whole is in itself a daunting task, corroborating the words of Geertz which commenced the discussion.

Works Cited:

- Cole, Sarah. "Modernism, Male Intimacy, and the Great War." *ELH*, vol. 68, no. 2, 2001, pp. 469–500. JSTOR, <http://www.jstor.org/stable/30031977>
- Geertz, Clifford. *Thick Description: Toward an Interpretative Theory of Culture*. New York, Basic Books.

- Goldman, Jane. *The Cambridge Introduction to Virginia Woolf*. Cambridge University Press, 2006.
- Harker, James. "Misperceiving Virginia Woolf." *Journal of Modern Literature*, vol. 34, no. 2, 2011, pp. 1–21. JSTOR, <https://doi.org/10.2979/jmodelite.34.2.1>
- Middleton, Victoria. "Three Guineas: Subversion and Survival in the Professions." *Twentieth Century Literature*, vol. 28, no. 4, 1982, pp. 405–17. JSTOR, <https://doi.org/10.2307/441251>.
- Sheheryar B. Sheikh. "The Walls That Emancipate: Disambiguation of the 'Room' in *A Room of One's Own*." *Journal of Modern Literature*, vol. 42, no. 1, 2018, pp. 19–31. JSTOR, <https://doi.org/10.2979/jmodelite.42.1.02>.
- Woolf, Virginia. *A Room of One's Own*. 1929.
- Woolf, Virginia. *Mrs. Dalloway*. 1925
- Woolf, Virginia. Orlando. Project Gutenberg Australia. <https://gutenberg.net.au/ebooks02/0200331.txt>
- Woolf, Virginia. *The Three Guineas*. The Hogarth Press, 1943.
- Woolf, Virginia. *To the Lighthouse*, 1927.

An analysis and critical appraisal of the works of Bankimchandra Chattopadhyay and Rabindranath Tagore in the 18th and the 19th Century

Sohini Sarkar*

Baidehi Mukherjee**

Abstract :

Bankim Chandra Chatterjee (1838-1894) was the first person who set the tradition of novel writing in Bengali literature with his notable works - Durgeshnandini (1865) , Kapalkundala (1866), Bishabriksha (1873), Anandamath (1882) in the 19th century when India was under colonial rule. Chatterjee as an admirer of English literature ventured to write his first novel Rajmohan's Wife in English and modelled it wholly on Victorian novels. Later , he shifted to Bengali and created literary games which were rich with Bengali flavour and Chatterjee's own creative style but there was a tinge of English literature. His Bengali novels like Bishabriksha, Krishnakanter Will, Chandranath we get to see the reflection of contemporary society, the consequences of succumbing to lust and

*&**Semester-II (PG), Department of English, Shri Shikshayatan College, Kolkata.

passion. Again, in Chatterjee's other novels such as – Devi Chaudhurani, Mrinalini, Radharani women play an important role in the development of the novel. Most importantly, Chatterjee's *Anandamath* showed the patriotic fervour for the first time in the fictional form. Even his satirical works , *Muchiram Gurer Jibancharit*, *Kamalakanter Daptar* deserve special acclamation.

In this article we attempt to analyse how some aspects of English literature influenced Chatterjee immensely in writing his masterpieces with respect to *Rajmohan's Wife*, *Durgeshnandini*, *Rajni*, *Rajsingha* and famous satire *Kamalakanter Daptar*.

At the same period ,we get Rabindranath Tagore (1863–1941) who was a polymath. He wrote many popular novels like –*Chokher Bali*, *Jogajog* , *Shesher Kabita* which showed complexities in the human psyche and its effect on their relationships. His two famous novels *Gora*,*Ghare Baire* gave a glimpse of the Indian Independence movement and an idea of Tagore's concept of nationalism and patriotism. His short stories are also praiseworthy because of the variety of their nature. Tagore is actually famous for his poems because these are filled with uniqueness and subtlety of thought and expression.

Now, if we look at Rabindranath Tagore's poems , especially his verse collection *Gitanjali* (*Song Offerings*) , we realise an intense sense of spirituality surrounds all the verses of the collection. Though the poems manifest Eastern philosophy, a shadow of English literature is also felt from these poems. In this article we also try to analyse how this influence is manifested in the poems of this famous verse collection.

From the beginning of the 19th century for the introduction and the spreading of English literature. From this century Bengalis started to familiarise with Western literature. This century broke the tradition of long narrative poems (*Kavyas*) which were based on mythology and legends and giving didactic messages to the readers. Thus, it marked the commencement of modern Bengali literature manifested in novels. The influence of English writers like William Shakespeare, Lord Byron, Walter Scott, John Milton and

their works on Bengali literature opened a new horizon not only for the Bengali writers but also for the readers.

In 1852, a missionary named Hana Catherine Mullens planted the seed of novel writing in Bengali by writing *Fulmoni o Korunar Biboron*. On the other hand, we got many influential poets but among them Michael Madhusudan Dutt achieved acclaim because of his famous works – ‘Meghnadvadh Kavya’, ‘Birangana Kavya’, ‘Brojangan Kavya’ to name a few by following the tradition of dramatic monologue and Milton’s ‘Paradise Lost’. In this scenario came Bankimchandra Chatterjee and Rabindranath Tagore with their works.

We first talk about Bankimchandra Chatterjee (1838 – 1894), the first Bengali novelist and Indian English writer, who introduced and defined the modern form of novel by writing both in English and Bengali. As one of the first graduates of the University of Calcutta, he had easy access to British literature as the colonial masters gave the opportunity to the educated middle class Bengali people in order to recruit them in the service of the British Government as a part of their colonial policy. But this policy actually enriched Bengali literature. Hence, A.K.Mehrotra opined, “The exposure to English that colonialism necessitated led some Indian writers to discover prose and the realist novel, or blank verse and the sonnet, whose grafts they inserted in their tropical languages and where they have since flourished” (Mehrotra, 13).

Chatterjee did the same in his novels. He was so much influenced by English literature that he wrote his first novel in English and that was *Rajmohan's Wife* (1864). This novel was modelled on the Victorian realistic novels like – Charles Dickens's *David Copperfield*, *Oliver Twist*, although the theme was totally Indian, a story of the plight of Bengali housewife Matangini and like, Thomas Hardy's novels it maintained a chronological order and the convention of Victorian closure. The brief concluding chapter of *Rajmohan's Wife* began thus, “And, now, good reader, I have brought my story to a close. Lest, however, you fall to censuring me for leaving your curiosity unsatisfied, I will tell you

what happened to the other who figured in this tale”(Chatterjee,162).

Not only realism,Chatterjee incorporated Gothic elements and omniscient narrative structure as found in Matangini's journey to Madhav's house as described by him , ‘ dark dungeons lit by a solitary and feeble lamp’(Chatterjee,32).

After writing, *Rajmohan's Wife* Chatterjee gave up writing in English and turned to his mother tongue Bengali in order to create masterpieces like– *Durgeshnandini*, *Rajsingha*, *Rajani*, *Kapalkundala*.

In his first Bengali novel *Durgeshnandini* (1865) ,the influence of English novelist Walter Scott's historical novel *Ivanhoe* (1819) is clearly evident.The plot structure and characters echo Scott's *Ivanhoe*. The journey of *Ivanhoe*, his relationship with *Rawena* and *Rebeca* influenced *Jagatsingha* and the love triangle of *Jagatsingha*,*Tilottoma* and *Ayesha*.

Again, in *Rajni* (1875) we feel the essence of English literature not in its content but in its narrative technique. Chatterjee introduced and skillfully employed the technique of autobiographical style in this novel. Each character — *Rajni* , *Sachish*, *Amarnath* were given space to tell their own viewpoints regarding a single incident. This technique was first introduced by the Gothic novelist *Wilkie Collins* in his famous novel *A Woman in White* (1860). Again, the titular character the blind girl *Rajni* was based on *Nydia* of *The Last Days of Pompeii*(1834),written by *Edward Bulwer Lytton*.

Chatterjee came across the two volumes of *Annals and Antiquities of Rajasthan* by *John Todd*, a British officer, written from 1829 to 1831.This novel compelled him to write his first historical novel *Rajsingha* (1882). It was about the conflict between Rajput king *Rajsingha* and the Mughal Empire *Aurangzeb* which took a proper shape from a brief paragraph of *Todd's* book.

Kamalakanter Daptar (1875), the satirical essay collection of Chatterjee , exhibited the influence of *Thomas De Quincy's* *Confessions of an English Opium - Eater* (1821). In *De Quincy's*

confessions we get his symbolic reveries and visions under the influence of opium. Chatterjee used this technique of dreams and reveries in order to bring the satiric effect. Here, like De Quincy, Chatterjee under the pen name of Kamalakanto commented on the social customs and the British judiciary system. Critics acclaimed Chatterjee mostly for this work, as in this satirical work the critical mind of Chatterjee got reflected in all its glory.

Thus, as the first Bilingual novelist of India, Bankimchandra Chatterjee proved his brilliance both in English and Bengali. Perhaps, we did not get him as a writer if the colonial masters would not introduce their language and literature to the Indian subcontinent. Chatterjee's familiarity with English writers like Charles Dickens, William Makepiece Thackeray, Wilkie Collins, Marie Corelli made him pave the way for Indian English writers as well as Bengali writers.

In the realm of poetry, Rabindranath Tagore was the harbinger of the modernist technique. From his poetry we get a profound sense of spirituality and love for humanity. For the unique theme and technique of Tagore's verse Bengali literature witnessed the beginning of an epoch which influenced the generations after generations of poets.

Tagore's poetry collection *Gitanjali* (Song Offerings) (1910) proved his excellence in the realm of poetry, in this collection he gave vent to his various emotions and expressions. But most importantly, we get to see in this collection of poems the influence of the Romantic poets – William Wordsworth, P.B. Shelley, Lord Byron and John Keats.

Tagore was immensely influenced by the mysticism of the Western poetry, critic Amit Choudhuri said, “Moreover a Western and Victorian in its thrust, involving a sharp Ruskin-like critique of utilitarian values, and valorising of the and the sanctity of the work of art” (Chaudhuri, 121). From Chaudhuri's words, we can derive that not only the Romantic poets influenced him but also poets like Ruskin left a deep impression on him.

Tagore's idea of God also coincides with that of Wordsworth, as evident from the line:

Thou hast made me endless, such is thy pleasure(1)

Again, we perceive Tagore's love for nature as well as mysticism like Wordsworth and Shelley in this line :

Clouds heap upon clouds and it darkens.

Ah, love, why dost thou

me wait outside at the door all alone ?(18)

Tagore, like Shelley and Byron, celebrated the idea of liberty as found in this line :

Where the mind is without fear and the head is held high(35)

Tagore, like them, found an intimate relationship between the nature and the God as if ,nature is the manifestation of the God and through the natural objects we can make sense of the mysticism of the God , as he wanted to convey in these lines :

Thy sunbeam comes upon this earth of

mine with arms outstretched

and stands at my door the livelong day to carry back to thy feet

clouds made of my tears and sighs and songs.(68)

Most importantly, Tagore derived from the Romantic poets the concept of death as the ultimate truth and the medium of a mortal to reach to the God and achieve His grace as he depicted in this line:

Death, thy servant, is at my door.

He has crossed the unknown sea

and brought thy call to my home.(86)

Again, we find a striking line in which Tagore incorporated such a fascination for death which seemed to the readers as if he was romanticising the concept of death like Keats:

O thou the last fulfilment of life, Death, my death, come and whisper to me!(91)

We talk about only the verses from the Gitanjali , yet Tagore's other poems and songs reflected his relationship with the Western

poems ,apart from the Romantics. But he was mostly inspired and influenced by the Romantic poems, like them he was able to create a dreamscape by using words and symbols like- ‘flute’, ‘instrument’, ‘lamp’, ‘song’, ‘singer’, ‘garland’, ‘Lord’, ‘ guest’ , ‘leisure’.

Thus, the influence of English Literature enabled Tagore to open a new horizon in the realm of poetry ,as the Bengali readers couldn't see anything of that sort before even in Michael Madhusudan Dutt’s writings, although he,too, was influenced by English literature even more than Tagore himself as discussed earlier. Tagore actually excelled in writing poetry and introduced the new form of poetry by mixing the Eastern philosophy with the Western style and vice -versa. For this effort , he achieved the title of ‘Kabiguru’ and brought the first Nobel for literature to Asia in 1913.

From this attempt to critically analyse the works of two Bengali writers Bankimchandra Chatterjee and Rabindranath Tagore,we come to understand that for the influence of English literature on their works, during the colonial period of India, Bengali literature saw a drastic change in its realm. Chatterjee introduced,employed and set the mark for the novel writing both in English and Bengali. On the other hand, Tagore changed the definition and purpose of poetry.He for the first time ,like the Romantic poets of England, used poetry as a medium of expressing passion, emotions and spirituality without conveying any moral message to his readers, like his predecessors. Without the familiarity with English literature , Indian literature especially Bengali literature could not get prodigies like Bankimchandra Chatterjee and Rabindranath Tagore.

WORKS CITED:

- Chatterjee, Bankimchandra. *Rajmohan's Wife* . Delhi: Penguin India .2009. Print.
- Chaudhuri, Amit. “ The English Writings of Rabindranath Tagore”. A Concise History of Indian Literature in English. Ed. Arvind Krishna Mehrotra. New Delhi: Permanent Black, 2017. Print.

- Dasgupta, Tapati. “Similarities of Thought between Rabindranath Tagore with Some English Classical Poets.” *Anudhyan An International Journal of Social Sciences* 4 (2008). Web. 14 April, 2024.
- Government of West Bengal. West Bengal Council of Higher Secondary Education. *Bangalir Bhasa o Sanskriti, Ekadash Shreni (Bengalis’s Language and Culture, Class Eleven)*. Kolkata: West Bengal Text Book Corporation Ltd, 2016. Print.
- Mehrotra, Arvinda Krishna. Introduction. *A Concise History of Indian Literature in English*. Ed. Mehrotra. New Delhi: Permanent Black, 2017. Print
- Mukherjee, Meenakshi. “Beginnings of the Indian Novel”. *A Concise History of Indian Literature in English*. Ed. Arvinda Krishna Mehrotra. New Delhi: Permanent Black, 2017. Print.
- Tagore, Rabindranath. *Gitanjali (Song Offerings)*. Alice & Books, 1910. Web. 12 April, 2024.

Gond Art– Its Origin and Distinct Features

Somdutta Roy*

Abstract :

Gond art is one of the ancient tribal art forms, practiced by the Gond tribes, who constitute a large percentage of Indian tribal population. This art form mainly depicts nature and its interconnection with humans. Gonds were story tellers and many folk tales are depicted through their paintings. In recent days awareness needs to be created, so that we can protect our age old art form from extinction.

Introduction:

India is well known for its natural wonders, its diverse flora and fauna, as it is the country where you can find mountain ranges like the Great Himalayas, the Aravallis, the Vindhya, the Satpuras; the Eastern and the Western Ghats; plateaus like the Deccan, Malwa and Chhotanagpur; plains like The Northern Plains, the Indo-Gangetic Plains, the Thar Desert and also islands like Andaman, Nicobar and Lakshadweep. It is located on the Indian plate which got separated from the ancient landmass of Gondwanaland many million years ago. For its varied geographical feature and also for being one of the world's oldest civilizations, it is a country with varied culture, history, rich archaeological heritage and tradition.

*Department of Statistics, Shri Shikshayatan College, Kolkata.

Throughout the years many people of different tribal origin, race and community have migrated from several parts of the world to India, making it culturally rich. This also resulted in the emergence of different styles of art, architecture, handlooms, handicrafts and painting styles. Today also India has huge tribal populations who have their own unique traditions, beliefs, art, culture and livelihood.

Different art forms of different tribes give us idea regarding the culture, beliefs and traditions of the tribe, their lifestyles, their association with the nature etc. Different ceremonies or festivals which they celebrate are also reflected in the art forms. There are several tribal art forms of India- like Sohrai and Khovar Paintings, Warli Paintings, Madhubani, Tanjore or Thanjavur paintings, Bhil art, Gond art, Saura paintings, Pattachitra, Kalamezuthu Art, Pithora, Rajasthani miniature painting and many more. Each of them is unique in their styles and concepts. This paper deals with Gond Art, practiced by the second largest tribal population of India i.e. by the Gond Tribes. In this type of art, lines, dots and dashes plays a significant role to create an impact of movement in the paintings.

Gond Tribes: their Lifestyle and Culture:

In recent days, 705 ethnic groups are recognized as Scheduled Tribes in India. According to 2021 census, around 8.6% of the total population is under this category. Bhil tribes have the largest population among the tribes, followed by the Gonds. These people have originated from the middlemost part of India mainly Madhya Pradesh. They have several subcategories - Raj-Gonds, Khatola-Gonds, Madia Gonds, Dhur Gonds, Dadve Gonds, Mokasi Gonds, Gaita Gonds, and Koyas[1]. Gonds have ruled the middle most portion of India from 14th to 16th century and they have some particular social life styles. They inherited their cultures and traditions from their ancestors in Mesolithic age. Their family used to consist of parents, their male and female children and also unmarried women too. They had a particular family name which indicates that they have originated from the same ancestor. Women carried this family name until she is getting married. Caste system is also prevalent among them and these are determined from birth

only. Apart from handling domestic chores, women also earn their livelihood. Regular marriage, marriage by service, by elopement and also widow marriage are prevalent among this tribe. The Gond people worship several gods and goddesses considering them as forces of nature. They worship different gods of different names whom they consider as the Earth Goddess, God of marriage, the tiger god, the bride- groom god, the creator and others. One of the most important features of their gods and goddesses is that the Gonds believe them to be mortal, so they die and again takes birth. The Gonds have a belief that there is life even after death. They remember them in their festivals and also believe that they will help them in making their life easy. They communicate in their mother tongue Gondi, which is a language of Dravidian origin and they also have their own traditional dance forms. Some musical instruments like drums, flute, and wooden clappers are also commonly used by the Gonds. They also have their own style of art with unique characteristic features.

Origin of Gond Paintings:

The word 'Gond' comes from the word 'Khond' in Dravidian language[2], which means green mountains. These green mountains actually refer to the Vindhya and the Satpuras, where most of these Gond tribe people use to reside. It is believed that the traditional Gond painting was inspired by the paintings done by the ancient men who used to live inside caves. The painters use to draw colourful paintings on the walls of their houses and doors. They often had geometric designs and mainly plants and animals were drawn. They use to draw beautiful paintings involving trees and animals to decorate their houses and floors during festivals. Gond people believe that seeing a decorative painting not only makes one happy but also brings good luck. They think that a beautiful painting on the wall or on the floor will keep evil spirits away from them. The tribal decorations on the floor are called as dignas and the paintings on the wall are called as Bhittichitra[2]; as Gond people use the word 'Bhitti' for walls. The main theme of these painting is nature. Nature is depicted in several ways through this type of

painting and the painters used natural colours for this. Mostly red, yellow, green, white and black colours are used. The colours are all naturally prepared from plants, soil, cow dung etc.

Significance of different subjects and patterns used in Gond Art:

Different patterns and subjects are used in Gond Art. The Mahua tree is used to represent the tree of life. Various animals like peacocks, antelopes, deers, lizards, snakes, wild boars, tigers, monkeys, fish are commonly used in these paintings. According to Malik and Sethi(2019)[3], tree use to play an important role in the life of Gonds, they provide them food, shelter, medicine etc, so, they are depicted as symbol of life. They have long branches on which the birds find shelter and have deep roots, which maintained ecological balance. Trees like Sal, Mahua, Serpenthood, Damur were seen in these paintings. Bada Deva[3] and Lord Shiva were deeply associated with the life of this tribe and they also are found in the paintings. Fine lines, dots, dashes, curved lines, geometrical shapes etc are used to ensure movement in the subjects drawn. The unique styles, motifs, patterns and varied colour combinations used in this art highlight the creativity of the Gond people. Gonds are story tellers. Their age old folk stories are passed from generation to generations through their paintings. The creation of world with the help of mud by Lord Shiva is depicted in the paintings where crab, earthworm and spiders are seen helping the Lord. The paintings also show the origin of Narmada as a river and many such stories.

Effect of Modern Designs on Gond Art:

In recent days some effects of modernization are also been used in Gond Art like cars, aeroplanes, bicycles etc[4]. These are destroying age old painting techniques and age old traditions of Gond art. Instead of natural colours, usage of artificial colours has also increased. Some Hindu deities like Krishna, Ganesha, Kali are now also portrayed in Gond Art.

Problems faced by Gond Artists in Recent Days:

Due to decrease in the overall forest area and increased urbanization, there is unavailability of raw materials for preparing natural colours. Due to lack of proper space, walls and floors are now not always decorated by these paintings. People also have developed a liking towards usage of plastic paintings of deities on the walls and doors. Often workshops are organized for promoting Gond Art, but the artists are not paid well enough for these.

Conclusion:

Gond art is a special type of art form which has been practiced by the Gond tribes from ancient times. This unique type of art form mainly deals with nature and its interconnection with humans. Such an age old art form needs to be protected. In recent years, there has been initiative to decorate walls of different cities with these tribal art forms to create awareness among people. Artists should be encouraged to paint on sarees, shirts and other textile materials to make their art form more popular and at the same time they can use it to earn their livelihood. Educational Institutions also need to create awareness among people about these type of beautiful art forms.

References:

1. Socio-Cultural History of the Gond Tribes of Middle India: Koreti, S., International Journal of Social Science and Humanity, Vol. 6, No. 4, April 2016
2. Gond paintings: A historical evolution: Malik, G. and Sethi, S., International Journal of Applied Home Science, Volume- 5 , April, 2018 (pg 832-836)
3. Pictorial Folklores of Gond Paintings: Symbolism of an Ancient Culture :Malik, G. and Sethi, S., International Journal of Family and Home Science, Vol.15 , Jan.-April, 2019 (131-136)
4. Gond Art A Traditional Artwork of Gond Community of Central India: Rakhe, J., Muppidi, R. and Singhrana, A., Study on Fashion Accessories Design: Sustainability Art, Craft and Design, Volume-1, 2022.

PHYTOCHEMICAL AND PHARMACOLOGICAL ACTIVITIES of *Andrographis*: A REVIEW

Suchhanda Ghosh¹

Raikamal Pal¹

Abstract :

Andrographis paniculata (Burm.F) Nees. commonly known as the "King of Bitters" is an herbaceous plant belonging to the family Acanthaceae and is found throughout the tropical and sub-tropical Asia, South East Asia and India. In India, *A. paniculata* is known as 'Kalmegh'. The chief chemical constituent obtained from this plant is andrographolide which is a labdane diterpenoid lactone, it is known to exhibit a wide range of pharmacological activities such as anti-inflammatory, anti-bacterial, antiviral and is used in the treatment of cardiovascular – cerebrovascular diseases and in protection of the liver and gall bladder. In addition to this activity andrographolide was also reported to attenuate postprandial hyperglycemia by inhibiting α -glucosidase and α -amylase enzyme activities. In biological systems andrographolide can interact with many inter- and intra-cellular constituents as a bipolar compound thus ensuing many biological responses. Andrographolide has been found to inhibit the proliferation of various cell lines including leukemia, breast cancer, lung cancer and melanoma cells.

¹ Assistant Professor, Department of Botany, Shri Shikshayatan College, Kolkata.

The objective of this review is to summarize current knowledge of the biological effects of andrographolide. This article reviews the application, anti-inflammatory mechanism and molecular targets of andrographolides in different inflammatory disease including respiratory, digestive, immune, cardiovascular and tumor system diseases and describe its toxicity and explain its safety. This future direction of andrographolide research also introduces as in the recent research that indicate it's potential clinical application.

Keywords: Andrographolide, ethnobotany, herbal medicine, terpenoids.

Introduction:

The current global population is showing an increase in the types of ailment specially associated with pollution and life style management. The situation thus demands invention and usage of more drugs that bring about minimum side effects. The traditional medicines obtained from plants are thus now being re-explored for their therapeutic potential.

Andrographis is one such plant that is known to contain amazing phytochemicals that has immense therapeutic applications. It comprises of about 40 species that has been used since ancient and ayurvedic times. *Andrographis paniculata*, a common species, is also known by the name of 'King of Bitters'. It is an annual herb that grows up to a height of one meter. It is inherent to India, Srilanka and also distributed in different regions of Southeast Asia, China, America and West Indies. It is known to be Mahatikta in (Sanskrit), Kiryato in (Gujarati), Mahatita in (Hindi) and Kalmeghin (Bengali). Various studies have been conducted by the researchers followed by the reports about therapeutic potential possessed by this herb. The phytochemical studies revealed that *A. paniculata* contains various compounds like diterpenoid lactones, flavonoids and miscellaneous compounds. Due to the presence of these compounds, it possesses a wide range of pharmacological properties (Mishra *et. al.*, 2007).

This review aims to present a comprehensive idea about the various physiochemical activities of the bioactive components

present in the plant, isolation and extraction processes of the phytochemicals and its pharmacological potential.

Ethnobotanical Uses:

The aerial parts, roots and whole plant of *A. paniculata* has been used in traditional medicine by Indians, Chinese and in several other parts of Asia for the treatment of various ailments. It is known to treat stomachaches, inflammation, pyrexia, and intermittent fevers. The whole plant has been used for several applications such as anti-dote for snake-bite and poisonous stings of some insects, and to treat dyspepsia, influenza, dysentery, malaria and respiratory infections. The leaf extract is a traditional remedy for the treatment of infectious disease, fever-causing diseases, colic pain, dyspepsia and diarrhea. In Malaysia, a decoction of the aerial parts is used to treat common cold, hypertension, diabetes, malaria and bite from snake and poisonous insects. In India, ancient Dravidian tribes are known to use this herb in treatment of malaria, eczema, gonorrhea, jaundice, wounds, cuts, boils and skin diseases (Joselin, 2014).

In the Unani system of medicine, it finds usage as an aperient, anti-inflammatory, emollient, astringent, diuretic, gastric and liver tonic, carminative, antihelmintic, and antipyretic. Due to its “blood purifying” activity it is recommended for use in cases of leprosy, gonorrhea, scabies, boils, skin eruptions, and chronic and seasonal fevers. Juice or an infusion of fresh leaves is given to infants to relieve griping, irregular bowel habits, and loss of appetite. The leaves and root are also used in general disability, during convalescence after fevers, for dyspepsia associated with gaseous distension, and in advanced stages of dysentery (Ahmedet. *al.*, 2011).

Phytochemistry:

The chemical substances that are found in *A. paniculata* have been studied extensively. It is reported that the plant contains many diterpenoids, lactones, and flavonoids. Nevertheless, the concentration and composition of its phytochemicals vary, according to geography, plant parts, season, and phenological growth stage.

Different types of phyto-constituents have been isolated from the herb, the most important being the terpenoids. The other compounds include flavones, xanthenes, polyphenols and other macro as well as trace elements.

Terpenoids:

The diterpenoid lactones are the most common terpenoid compounds that are isolated from the aerial parts and roots *A. paniculata* (Pholphana, 2004). The main active compound of *A. paniculata* is andrographolide, which is found in the whole plant, leaves, stem, and roots. The characteristics of andrographolide are a colorless and bitter *ent*-labdane diterpene lactone substance. This substance was first isolated by Boorsma, who named it andrographide, then, in 1911, Gorter proved the structure of andrographolide and named it. It has a very bitter taste, colorless and is crystalline in appearance. Andrographolide can be extracted from all parts of the plant but it is most highly concentrated in the leaves (Cheung, 2001). There are several studies proving that the highest amount of andrographolide is found in the vegetative stage before flowering (about 130 days after initial cultivation). Andrographolide possesses various pharmacological properties, such as anti-allergic, anti-bacterial, anticancer, anti-diabetic, antiinflammatory, anti-leishmanial, anti-viral, antipyretic, analgesic, hepatoprotective, and neuroprotective activities. The other *ent*-labdane diterpenoids from this plant, i.e., neoandrographolide, isoandrographolide, 14-deoxy-11, and 12-didehydroandrographolide, also exhibit pharmacological activities.

The other diterpenoids that have been isolated mostly from the aerial parts of *A. paniculata* includes deoxyandrographolide and neoandrographolide.

Flavonoids:

In addition, the findings of this study indicate that a number of flavonoids have been reported in the past three decades. The isolation and elucidation of flavonoids were mostly performed using

the root, but they were also found in the aerial parts of the plant. Previous studies revealed that the flavonoids show biological activity, including anti-proliferative and anti-platelet aggregation properties (Rao *et. al.*, 2004).

Miscellaneous compounds:

Besides this, xanthone, quinic acid and its derivative, sitosterol, and polysaccharide were reported as minor chemical substances found in *A. paniculata*.

Several miscellaneous compounds have been isolated, especially, from the roots of *A. paniculata*. Four types of xanthenes were isolated from the roots of the plant and has been identified as: 1, 8-dihydroxy-3,7-dimethoxy-xanthone, 4,8-dihydroxy 2,7-dimethoxy-xanthone, 1, 2-dihydroxy -6,8-dimethoxyxanthone and 3,7,8- trimethoxy-1-hydroxy-xanthone respectively using a combination of thin layer chromatography and column chromatography, and were characterized by infrared radiation, mass and nuclear magnetic resonance spectroscopic methods. Five rare noriridoids designated as andrographolide A-E, along with curvifloroside were isolated. Arabinogalactan proteins were isolated from the dried herbs by Prajjal and his colleagues in 2007. Trace elements (Cr, Mn, Co, Ni, Zn, Cu, Se, Rb, Sr, and Pb) and macro-element (potassium and calcium) were identified and quantified in the roots. Cinnamic acid, caffeic acid, ferulic acid and chlorogenic acid were also isolated from the whole plant.

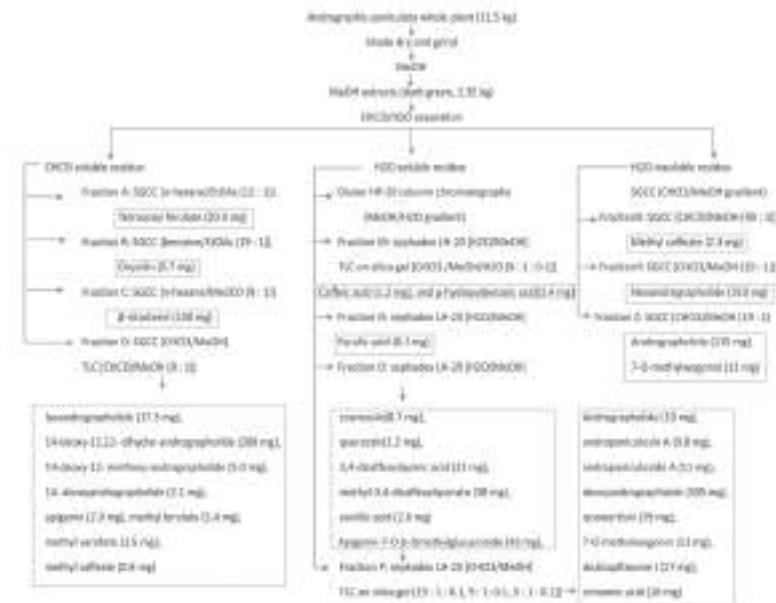
TABLE: Major Bioactive Compounds Isolated from *A. paniculata* and the part of occurrence :

BIOACTIVE	COMPOUND	TYPE	PART	Ref.
		OF THE		
		PLANT		
Andrographolide	Diterpenoid	Leaves	Lactone	Banerjee <i>et. al.</i> , 2017; Paemane <i>et.</i>

			al., 2019
Neoandrogra- pholide	Diterpenoid Lactone	Leaves	Wiert et. al., 2005
14-deoxyandro- grapholide	Diterpenoid Lactone	Aerial parts	Ahmed et. al., 2012; Sale et. al., 2011
Echiodinin	Diterpenoid Lactone	Callus	Arifullahet. al., 2013
Andrograpanin	Diterpine	Leaves	Shen et. al., 2006; Lieu et. al., 2008
Andrographoside	Diterpene	Leaves	Shen et. al., 2006; Majumdar et. al., 2020

Extraction and Purification:

Methanolic extraction and purification of *Andrographis paniculata* is done by several researchers. The bioactive compounds were extracted with different types of solvents such as methanol (MeOH), ethanol (EtOH), hexane, acetone, acetone-water, chloroform (CHCl₃), and dichloromethane from the whole plant, leaves, aerial parts, stems, and roots. Extraction procedure of bioactive compounds of AP from MeOH extracts, for example, is shown in the following Figure. In this extraction procedure, whole plant material of AP (11.5 kg) was shade dried, ground, extracted with methanol (10 L × 6) under reflux for 8 h, and filtered to give residue. After filtration, three residues of the extract were found: (i) CHCl₃ residue (700 g), (ii) H₂O soluble (1.5 kg), and (iii) H₂O insoluble residue (150 g). The residues were then chromatographed to get specific fractions. These fractions were further chromatographed and followed several procedures to identify specific compound



(Figure). A total of 32 bioactive compounds with seven ent-labdane diterpenoids, twelve flavonoids, and two quinic acid derivatives have been isolated and characterized by this procedure (Wu et. al., 2008).

Figure: Extraction of pure compounds of *A. paniculata* from MeOH extracts. Yield of pure compounds is in bracket in mg. Their structures have been elucidated mainly by 1D and 2D NMR and MS spectroscopic methods. SGCC: silica gel column chromatography; TLC: thin layer chromatography, MeOH: methanol; EtOAc: ethyl acetate, CHCl₃: chloroform (adopted from Wu et. al., 2008).

Pharmacological Activities:

The use of the different parts of *A. paniculata* in folk medicine led the scientists to study its pharmacological properties as to authenticate this plant as a therapeutic agent. Many studies showed that this plant exhibited various biological activities such as antimicrobial, cytotoxicity, antiinflammatory, antioxidant,

immunostimulant, antidiabetic, hepato–renal protective, liver enzymes modulatory, neuroprotective and anticancer agent (Majumdar, 2020).

Anti–microbial activity:

Aqueous extract, andrographolide and arabinogalactan proteins that were isolated from the dried herb of *A. paniculata* were screened for anti–microbial activity. The results showed that aqueous extract and arabinogalactan proteins possess antibacterial activity against *Bacillus subtilis* (*B. subtilis*), *Escherichia coli* (*E.coli*), *Pseudomonas aeruginosa* while andrographolide was the only one which is active against *B. subtilis*. All three were also reported to possess antifungal activity against *Candida albicans*.

Antioxidant activity:

Andrographolide and aqueous extract of *A. paniculata* were screened for their antioxidant activity on nicotine induced oxidative stress in liver, kidney, heart, lungs and spleen of male wistar rats. The results showed that intraperitoneal administration of *A. paniculata* (25 mg/kg) and *Aphanamixis Polystachya* (25 mg/kg) for a period of 7 days significantly ($P<0.05$) reduce levels of lipid peroxidation and increase antioxidant enzymes status in five organs screened as compared to nicotine. The methanolic and aqueous leaves extracts of *A. paniculata*, andrographolide and 14–deoxy–11, 12–didehydroandrographolide exhibited lipid peroxidation inhibition in Sprague Dawley rats and free radical scavenging activity against Diphenyl picrylhydrazyl (DPPH). The lipid peroxidation inhibition activity varied from 55.6% to 63.9% and 33.78% to 33.77% for methanolic and water extracts respectively. The activity of the methanolic extracts were higher and significantly different ($P<0.05$) from that of the water extract. The methanolic extract exhibited free radical scavenging activity ranging from 45.67% to 53.82%. The activity of andrographolide was 40.2% and for 12– didehydroandrographolide it was 46.43%. The water extract exhibited poor free radical scavenging activity ranging from 25.29% to 28.77%. The

methanolic, water extracts and isolated compounds exhibited a lower free radical scavenging activity as compared to quercetin (89%) and butylated hydroxyanisole (71%) used as positive controls.

Immunostimulant activity:

The ethanol extract of fresh plant and purified diterpenes like andrographolide and neoandrographolide induced significant ($P < 0.01$) stimulation of antibody and delay hypersensitivity response to sheep red blood cells in mice. The plant preparations also stimulate non-specific immune response of animals measured in terms of macrophage migration index, phagocytosis of C-leucine labeled *E. coli* and proliferation of splenic lymphocytes. The stimulation of both antigen specific and non-specific immune response was lower with andrographolide and neoandrographolide as with ethanol extract. This suggested that the substances present in the extract other than these diterpenes may play a role as immunostimulator.

Cytotoxicity:

The methanolic and petroleum ether extract, dichloromethane and aqueous fraction of methanol extract were screened for antiproliferative activity against HT-29 (colon cancer) cells. The methanolic extract inhibited the proliferation of HT-29 cells by an increase of 50% at a concentration of 10 μ g/ml. The petroleum ether and dichloromethane fractions inhibited proliferation of HT-29 cell with a GI50 value of 46 μ g/mL and 10 μ g/mL respectively. The aqueous extract did not inhibit the proliferation of HT-29 cells. The diterpenes that were isolated from the dichloromethane fraction, andrographolide is the only one that inhibited proliferation of all cancer cells screened. Out of the entire cell screened, 14-deoxy-andrographolide showed moderate inhibition against the proliferation of two cancer cells. The diterpene 14-deoxy-11, 12-didehydroandrographolide did not inhibit the proliferation of any cancer cell line tested. The growth inhibitory activity of methanolic extract of aerial parts of *A. paniculata* and isolated compounds on mouse myeloid leukemia cells have also been reported. The in vitro anticancer activity of andrographolide and its semisynthetic

analogues-3 like 19-isopropylideneandrographolide, 14-acetyl-3, 19-isopropylideneandrographolide and 14-acetylandrographolide were screened for their antitumor activity against MCF-7 human breast cancer and HCT-116 colon cancer cell lines.

Antihyperglycemic Activities:

Diabetic nephropathy has become the leading cause of end-stage renal disease in developed countries, thus creating an increasing clinical problem. To prevent and treat diabetic nephropathy, current methods using agents such as angiotensin-converting enzyme inhibitors, angiotensin-II receptor blockers, and antihypertensive drugs have been attempted in clinical practice. Despite these treatments, numerous patients still develop intractable diabetic nephropathy. This has prompted considerable interest in using traditional medicines to treat this condition. Orally administered glucose-induced hyperglycemia in nondiabetic rabbits was reported to be prevented by the extract of *A. paniculata*. Six weeks of chronic administration of the extract showed no effect on fasting blood glucose levels. The ethanolic extract of *A. paniculata* at a dose of 400mg/kg of dry weight twice daily for 2 weeks to diabetic rats was shown to produce a 49.8% reduction in fasting serum triglyceride levels. This was reported to be greater than the 27.7% decline that was achieved with 500mg/kg body weight twice daily for 14 days. An aqueous extract (50mg/kg body weight) administered to streptozotocin-diabetic rats resulted in a 52.9% reduction in blood glucose levels. Dry powder of the plant material significantly decreased blood glucose levels by 61.8% at a lower dose of 6.25mg/kg body weight.

Hepatorenal protective activity:

Andrographolides and arabinogalactan proteins isolated from *A. paniculata* were screened for hepatorenal protective activity against ethanol-induced toxicity in mice. Intraperitoneal pretreatment of mice with andrographolide (500 mg/kg body weight of mice) and arabinogalactan (125 mg/kg body weight of mice) for 7 days before intra-peritoneal injection of ethanol (7.5 mg/kg body weight) minimized the toxicity as revealed by different enzyme assays in liver and kidney tissues. Both andrographolide and arabinogalactan

significantly ($P < 0.01$) reduced level of glutamic-oxaloacetic transaminase, glutamic pyruvic transaminase, alkaline phosphatase and LP enzymes in liver and kidney in a comparable manner with reference standard Silymarin as compared to ethanol treated group.

Anti-Inflammatory Effects:

Andrographolide has been reported to significantly reduce the inflammation caused by histamine, dimethyl benzene, and adrenaline (Liu et. al., 2008).

Overproduction of NO and prostaglandin E2 (PGE2), because of the expression of inducible isoforms of nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2), plays a significant role in the inflammatory processes of activated macrophages. The secretion of proinflammatory cytokines from macrophages stimulated and promoted by lipopolysaccharide, which causes induction of iNOS, results in increased production of NO. The methanol extract of *A. paniculata* and andrographolide incubated with macrophages have been reported to inhibit LPS-stimulated NO production in a concentration-dependent manner.

Effects on Cardiovascular Disease:

A. paniculata has demonstrated an increase of blood-clotting time; hence, pre and post treatments of the extract of *A. paniculata* after surgery significantly prevent the constriction of blood vessels, thus decreasing the risk of the subsequent closing of blood vessels after angioplasty procedures. Several studies have used animal models to investigate the effects of aqueous extracts and active constituents of *A. paniculata*, both before and after experimental myocardial infarction. An extract of the plant produced antihypertensive effects because it relaxed smooth muscles in the walls of blood vessels and prevented the blood vessels from constricting and limiting blood flow to the brain, heart, and other organs. A time dependent protection of rat cardiomyocytes against hypoxia injury was reported to be caused by the pretreatment of andrographolide; this effect was reported to be associated with upregulation of cellular reduced glutathione (GSH) level and antioxidant enzyme activities.

Clinical Studies:

Antidiarrheal Effects:–

In the tropical and subtropical regions of the world, diarrhea is still one of the major causes of death. In developing countries, it is a principal cause of death in children under 5 years of age and the causes include infectious agents, plant toxins, and gastrointestinal disorders. Many Western medicines, such as kaolin–pectin, bismuth, and loperamide, have long been used to alleviate the symptoms but have included undesirable side effects. It was reported that the ethanol extract of *A. paniculata* cured 88.3% of acute bacillary dysentery and 91.3% of acute gastroenteritis cases. Administering andrographolide was reported to cure 91% of acute bacillary dysentery cases. The same cure rate (91.1%) was also achieved by administering a compound tablet containing andrographolide and neoandrographolide (at a ratio of 7 : 3) in cases of bacillary dysentery.

Effects on Upper Respiratory Tract Infections:–

A. paniculata has been widely used for upper respiratory tract infections (URTIs). In a randomized, double–blind, and controlled study, Thamlikitkul et. al. (1991) administered *A. paniculata* at a dose of 6g/day for 7 days to 152 Thai adults suffering from pharyngotonsillitis, and the efficiency has been reported to be similar to that of acetaminophen in relieving the symptoms of fever and sore throat.

Dosage and Safety of Andrographolide:

Numerous studies have been performed in different countries on the toxicity of *A. paniculata*, finding that it is extremely nontoxic, even at high doses. Sakila et. al. (2009) conducted an antifertility study and found no toxicity, even at a high dose of *A. paniculata* that was administered to rats. The LD₅₀ of andrographolide in male mice through the intraperitoneal route was reported to be 11.46 g/kg. In a study of HIV–positive patients, a dose of 1,500–2,000mg of andrographolide was administered daily for 6 weeks. The study was discontinued early despite some improvements in CD4+ counts, and the side effects were common. Intravenous administration of

andrographolide (10mg/kg) to rabbits showed no abnormal cardiovascular responses. Results from liver enzyme tests indicated that the heart, liver, kidney, and spleen of these rabbits were found to be normal. Mice receiving an oral plant extract (10g/kg) once a day for 7 days proved that no mortality was observed. In another test for toxicity, rats or rabbits receiving 1 g/kg of andrographolide orally showed no changes in body weight, blood count, or the functions of the liver, kidney, or other vital organs. Singha et. al. (2003) noticed that pretreatment of *A. paniculata* and andrographolide at 500mg/kg body weight and 125mg/kg body weight, respectively, could minimize the toxicity when compared with the ethanol-treated group, as evidenced by different enzymatic assays in the liver and kidney tissues; the results were comparable with those of administering silymarin. Our recent study show that andrographolide concentrations of 22 μ g/kg and 55 μ g/kg markedly lowered the mortality rate in mice challenged with ADP (700mg/kg) from 90% to 60%, respectively, indicating that andrographolide effectively prevents thrombo embolism.

Conclusion:

Andrographolide, which exhibits notable pharmacological activities, has attracted the interest of numerous researchers. Because of its rational activity, numerous andrographolide derivatives have been synthesized for the development of biological activities. Thus, this paper summarizes various experimental and clinical pharmacological activities of andrographolide, such as those that are antioxidant, anti-inflammatory, anticancer, antimicrobial and parasitic, hepatoprotective, antihyperglycemic, and antihypoglycemic. Evidence from clinical studies suggests that andrographolide reduces HIV symptoms, uncomplicated upper respiratory tract infections, including sinusitis and the common cold, and rheumatoid arthritis. Nevertheless, summarizing the effects on cardiovascular disease, NF- κ B, and platelet activation of this natural product is worthy of review, and additional studies must be conducted to confirm the toxicological properties of this novel molecule before taking place in clinical studies in patients. This summary offers pharmaceutical chem-

ists and plant scientists' additional thoughts for drug discovery. The combined drug discovery of andrographolide analogues will likely transform them into an effective assemblage of inflammation and cancer treatment in the future.

References:

- Ahmed, Q.U.; Samah, O.A.; Sule, A., *Andrographis paniculata* (Burm.f) Wall. ex Ness: A Potent Antibacterial Plant. In *Antimicrobial Agents*; Bobbarala, V., Ed.; IntechOpen: London, UK, 2012; pp. 345–360.
- Arifullah, M.; Namsa, N.D.; Mandal, M.; Chiruvella, K.K.; Vikrama, P.; Gopal, G.R., Evaluation of anti-bacterial and anti-oxidant potential of andrographolide and echiodinin isolated from callus culture of *Andrographis paniculata* Nees. *Asian Pacific Journal of Tropical Biomedicine*, 2013.
- Al-Attar A. M., “Hypolipidemic effects of coenzyme Q10 in experimentally induced hypercholesterolemic model in female rats,” *American Journal of Pharmacology and Toxicology*, vol. 5, no. 1, pp. 14–23, 2010.
- Awang K., Abdullah N. H., Hadi A. H., and Fong Y. S., “Cardiovascular activity of labdane diterpenes from *Andrographis paniculata* in isolated rat hearts,” *Journal of Biomedicine and Biotechnology*, vol. 2012, Article ID 876458, 5 pages, 2012.
- Bhakuni D. S., Dhar M. L., Dhar M., Dhawan B. N., and Mehrotra B.N., “Screening of Indian plants for biological activity.II,” *Indian Journal of Experimental Biology*, vol. 7, no. 4, pp. 250–262, 1969.
- Banerjee, M.; Parai, D.; Chattopadhyay, S.; Mukherjee, S.K. *Andrographolide: Antibacterial activity against common bacteria of human health concern and possible mechanism of action. Folia Microbiology*, 62, 237–244, 2017.
- Batkhuu J., Hattori K., Takano F., Fushiya S., Oshiman K. I., and Fujimiya Y., “Suppression of NO production in activated macrophages in vitro and ex vivo by neoandrographolide isolated from *Andrographis paniculata*,” *Biological & Pharmaceutical Bulletin*, vol. 25, no. 9, pp. 1169–1174, 2002.
- Borhanuddin M., Shamsuzzoha M., and Hussain A. H., “Hypoglycaemic effects of *Andrographis paniculata* Nees on nondiabetic rabbits,” *Bangladesh Medical Research Council*

- Bulletin, vol. 20, no. 1, pp. 24–26, 1994. Evidence-Based Complementary and Alternative Medicine 15.
- Briel M., Ferreira-Gonzalez I., You J. J., “Association between change in high density lipoprotein cholesterol and cardiovascular disease morbidity and mortality: systematic review and meta-regression analysis,” *British Medical Journal*, vol. 338, no. 7693, p. b92, 2009.
- Babu R., Murugan K., “Interactive effect of neem seed kernel and neem gum extracts on the control of *Culex quinquefasciatus* say,” *Neem Newsletter* no. vol. 15, no. 2, pp. 9–11, 1998.
- Chopra R. N., Nayar S. L., and Chopra I. C., *Glossary of Indian Medicinal Plants*, Publications and Information Directorate, CSIR, New Delhi, India, 1990.
- Cheung H.Y., Cheung C.S., Kong C.K., Determination of bioactive diterpenoids from *Andrographis paniculata* by micellar electrokinetic chromatography. *Journal of Chromatography A*, 930 (1-2): 171–176. 10.1016/S0021-9673(01)01160-8, 2009.
- Caceres D. D., Hancke J. L., Burgos R. A., Sandberg F., and Wikman G. K., “Use of visual analogue scale measurements (VAS) to assess the effectiveness of standardized *Andrographis paniculata* extract SHA-10 in reducing the symptoms of common cold. A randomized double blind–placebo study,” *Phytomedicine*, vol. 6, no. 4, pp. 217–223, 1999.
- Cui L., Qiu F., and Yao X., “Isolation and identification of seven glucuronide conjugates of andrographolide in human urine,” *Drug Metabolism and Disposition*, vol. 33, no. 4, pp. 555–562, 2005.
- Chang R. S., Ding L., Chen G. Q., Pan Q. C., Zhao Z. L., and Smith K.M., “Dehydro andrographolide succinic acid monoester as an inhibitor against the human immunodeficiency virus (43225),” *Proceedings of the Society for Experimental Biology and Medicine*, vol. 197, no. 1, pp. 59–66, 1991.
- Chiou W. F., Chen C. F., and Lin J. J., “Mechanisms of suppression of inducible nitric oxide synthase (iNOS) expression in RAW 264.7 cells by andrographolide,” *British Journal of Pharmacology*, vol. 129, no. 8, pp. 1553–1560, 2000.
- Dua V. K., Ojha V. P., Biswas S., Valecha N., Singh N., and Sharma V. P., “Antimalarial activity of different fractions isolated from the leaves of *Andrographis paniculata*,” *Journal of Medicinal and Aromatic Plant Sciences*, vol. 21, pp. 1069–1073, 1999.

- Deng W. L., "Outline of current clinical and pharmacological research on *Andrographis paniculata* in China," *Newsletters Chinese Herbal Medicine*, vol. 10,, pp. 27–31, 1978.
- Dandu A. M. and Inamdar N. M., "Evaluation of beneficial effects of antioxidant properties of aqueous leaf extract of *Andrographis paniculata* in STZ-induced diabetes," *Pakistan Journal of Pharmaceutical Sciences*, vol. 22, no. 1, pp. 49–52, 2009.
- Dhar M. L., Dhar M. M., Dhawan B.N., Mehrotra B. N., and Ray C., "Screening of Indian plants for biological activity: I," *Indian Journal of Experimental Biology*, vol. 6, no. 4, pp. 232–247, 1968.
- Du Q., Jerz G., and Winterhalter P., "Separation of Andrographolide and neoandrographolide from the leaves of *Andrographis paniculata* using high-speed counter-current chromatography," *Journal of Chromatography A*, vol. 984, no. 1, pp. 147–151, 2003.
- Hossain M.S., Urbi Z., Sule A., Hafizur Rahman K.M. *Andrographis paniculata* (Burm. f.) Wall. Ex Nees: a review of ethnobotany, phytochemistry, and pharmacology. *Scientific World Journal*. 2014;2014:274905. doi: 10.1155/2014/274905. Epub Dec 24. PMID: 25950015; PMCID: PMC4408759, 2014.
- Hossain, S.; Urbi, Z.; Karuniawati, H.; Mohiuddin, R.B.; Moh Qrimida, A.; Allzag, A.M.M.; Ming, L.C.; Pagano, E.; Capasso, R. *Andrographis paniculata* (Burm. f.) Wall. ex Nees: An Updated Review of Phytochemistry, Antimicrobial Pharmacology, and Clinical Safety and Efficacy. *Life* , 11, 348, 2021.
- Husen R., Pihie A. H. L., and Nallappan M., "Screening for antihyperglycaemic activity in several local herbs of Malaysia," *Journal of Ethnopharmacology*, vol. 95, no. 2–3, pp. 205–208, 2004.
- Hung S. K., Hung L. C., Kuo C. D. et al., "Andrographolide sensitizes Ras-transformed cells to radiation in vitro and in vivo," *International Journal of Radiation Oncology Biology Physics*, vol. 77, no. 4, pp. 1232–1239, 2010.
- Iruretagoyena M. I., Sepúlveda S. E., Lezana J. P. et al., "Inhibition of nuclear factor- κ B enhances the capacity of immature dendritic cells to induce antigen-specific tolerance in experimental autoimmune encephalomyelitis," *The Journal of Pharmacology and Experimental Therapeutics*, vol. 318, no. 1, pp. 59–67, 2006.
- Iruretagoyena M. I., Tobar J. A., González P. A. et al., "Andrographolide interferes with T cell activation and reduces experimental autoimmune encephalomyelitis in the mouse," *The*

- Journal of Pharmacology and Experimental Therapeutics, vol. 312, no. 1, pp. 366–372, 2005.
- Jayaprakasha G. K., Selvi T., and Sakariah K. K., “Antibacterial and antioxidant activities of grape (*Vitis vinifera*) seed extracts,” *Food Research International*, vol. 36, no. 2, pp. 117–122, 2003.
- Kuppusamy C. and Murugan K., “Mosquitocidal effect of *Andrographis* [86] P. Singh, M. M. Srivastava, and L. D. Khemani, “Renoprotective effects of *Andrographis paniculata* (Burm. f.) Nees in rats,” *Upsala Journal of Medical Sciences*, vol. 114, no. 3, pp. 136–139, 2009.
- Kumar R. A., Sridevi K., Vijaya Kumar N., Nanduri S., and Rajagopal S., “Anticancer and immunostimulatory compounds from *Andrographis paniculata*,” *Journal of Ethnopharmacology*, vol. 92, no. 2–3, pp. 291–295, 2004.
- Kunwar R. M., Shrestha K. P., and Bussmann R. W., “Traditional herbal medicine in far-west Nepal: a pharmacological appraisal,” *Journal of Ethnobiology and Ethnomedicine*, vol. 6, article 35, pp. 1–18, 2010.
- Joselin, J.; Jeeva, S. *Andrographis paniculata*: A Review of its Traditional Uses, Phytochemistry and Pharmacology. *Medicinal and Aromatic Plants*, 3, 15, 2014.
- Kumar S., Patil H. S., Sharma P. et al., “Andrographolide inhibits osteopontin expression and breast tumor growth through down regulation of PI3 kinase/Akt signaling pathway,” *Current Molecular Medicine*, vol. 12, no. 8, pp. 952–966, 2012.
- Lin F. L., Wu S. J., Lee S. C., and Ng L. T., “Antioxidant, antioedema and analgesic activities of *Andrographis paniculata* extracts and their active constituent andrographolide,” *Phytotherapy Research*, vol. 23, no. 7, pp. 958–964, 2009.
- Lim J. C., Chan T. K., D. Ng S., Sagineedu S. R., Stanlas J., and Wong W. S., “Andrographolide and its analogues: versatile bioactive molecules for combating inflammation and cancer,” *Clinical and Experimental Pharmacology & Physiology*, vol. 39, no. 3, pp. 300–310, 2012.
- Liu J., Wang Z. T., Ji L. L., and Ge B. X., “Inhibitory effects of neoandrographolide on nitric oxide and prostaglandin E2 production in LPS-stimulated murine macrophage,” *Molecular and Cellular Biochemistry*, vol. 298, no. 1–2, pp. 49–57, 2007.

- Li J., Cheung H. Y., Zhang, Z., Chan G. K. L., and Fong W. F., "Andrographolide induces cell cycle arrest at G2/M phase and Evidence-Based Complementary and Alternative Medicine 13 cell death in HepG2 cells via alteration of reactive oxygen species," *European Journal of Pharmacology*, vol. 568, no. 1–3, pp. 31–44, 2007.
- Liu, J.; Wang, Z.T.; Ge, B.X. Andrograpanin, isolated from *Andrographis paniculata*, exhibits anti-inflammatory property in lipopolysaccharide-induced macrophage cells through down-regulating the p38 MAPKs signaling pathways. *International Immunopharmacology*, 8, 951–958, 2008.
- Maiti K., Gantait A., Mukherjee K., Saha B. P., and Mukherjee P. K., "Therapeutic potentials of andrographolide from *Andrographis paniculata*: a review," *Journal of Natural Remedies*, vol. 6, no. 1, pp. 1–13, 2006.
- Majumdar, M.; Dubey, A.; Goswami, R.; Misra, T.K.; Roy, D.N. In vitro and in silico studies on the structural and biochemical insight of anti-biofilm activity of andrograpanin from *Andrographis paniculata* against *Pseudomonas aeruginosa*. *World Journal of Microbiology and Biotechnology*, 36, 143, 2020.
- Mishra, S. K., Sangwan, N. S. and Sangwan, R. S., *Andrographis paniculata* (Kalmegh): A review. *Pharmacological Review*, 1, 283–298, 2007.
- Mishra S., Tiwary S. K., Kakkar A., and Pandey A. K., "Chemoprofiling of *Andrographis paniculata* (kalmegh) for its Andrographolide content in Mathyapredesh, India," *International Journal of Pharmacology and Biological Science*, vol. 1, no. 2, pp. 1–5, 2010.
- Matsuda T., Kuroyanagi M., Sugiyama, S., Umehara K., Ueno A., and Nishi K., "Cell differentiation-inducing diterpenes from *Andrographis paniculata* NEES," *Chemical & Pharmaceutical Bulletin*, vol. 42, no. 6, pp. 1216–1225, 1994.
- Mehellou Y. and Clercq E. De, "Twenty-six years of anti-HIV drug discovery: where do we stand and where do we go?" *Journal of Medicinal Chemistry*, vol. 53, no. 2, pp. 521–538, 2010.
- Nugroho A. E., Andrie M., Warditiani N. K., Siswanto E., Pramono S. E., and Lukitaningsih, "Antidiabetic and antihyperlipidemic effect of *Andrographis paniculata* (Burm. f.) Nees and andrographolide in high-fructose-fat-fed rats," *Indian Journal of Pharmacology*, vol. 44, no. 3, pp. 377–381, 2012.

- Paemanee, A.; Hitakarun, A.; Wintachai, P.; Roytrakul, S.; Smith, D.R. A proteomic analysis of the anti-dengue virus activity of andrographolide. *Biomedicine and Pharmacotherapy*, Jan;109:322–332. doi: 10.1016/j.biopha.2018.10.054. Epub 2018 Nov 3. PMID: 30396090, 2019.
- Pholphana, N.; Rangkadilok, N.; Thongnest, S.; Ruchirawat, S.; Ruchirawat, M.; Satayavivad, J., Determination and variation of three active diterpenoids in *Andrographis paniculata* (Burm. f.) Nees. *Phytochemical Anal International Journal of Plant Chemistry and Biochemical Technology*, 15, 365–371, 2004,.
- Rahman N.N.N. A., Furuta T., Kojima S., Takane K., and Mohd M. Ali, “Antimalarial activity of extracts of Malaysian medicinal plants,” *Journal of Ethnopharmacology*, vol. 64, no. 3, pp. 249–254, 1999.
- Rao Y.K., Vimalamma G., Rao C.V., Tzeng Y., Flavonoids and andrographolides from *Andrographis paniculata* . *Phytochemistry*, 65: 2317–2321, 2004.
- Rajagopal S., Kumar R. A., Deevi. S., Satyanarayana C., Rajagopalan R., “Andrographolide, a potential cancer therapeutic agent isolated from *Andrographis paniculata*,” *Journal of Experimental Therapeutics and Oncology*, vol. 3, no. 3, pp. 147–158, 2003.
- Rajkumar J. S., Sekar M. G., and Mitra S. K., “Safety and efficacy of oral HD-03/ES given for six months in patients with chronic hepatitis B virus infection,” *World Journal of Gastroenterology*, vol. 13, no. 30, pp. 4103–4107, 2007.
- Reyes B. A. S., Bautista N. D., Tanquilut N. C., “Antidiabetic potentials of *Momordica charantia* and *Andrographis paniculata* and their effects on estrous cyclicity of alloxan-induced diabetic rats,” *Journal of Ethnopharmacology*, vol. 105, no. 1–2, pp. 196–200, 2006.
- Sakila S., Begum N., Kawsar S., Begum Z. A., Zoha M. S., Relationship of anti-fertility effects of *Andrographis paniculata* and hormonal assay in female rats, *Bangladesh Journal of Medical Science*, Volume–8 No. 1–2; January–March, 2009.
- Sherwin E. R., Branen A. L., Davidson P. M., and Salminen S., *Food Additives*, Marcel Dekker, New York, NY, USA, 1990.
- Shi G., Zhang Z., Zhang R., “Protective effect of andrographolide against oncanavalin A-induced liver injury,” *Naunyn’s Schmiedeberg’s Archives of Pharmacology*, vol. 385, no.1, pp. 69–79, 2012

- Sattayasai J., Srisuwan S., Arkaravichien T., and Aromdee C., "Effects of andrographolide on sexual functions, vascular reactivity and serum testosterone level in rodents," *Food and Chemical Toxicology*, vol. 48, no. 7, pp. 1934–1938, 2010.
- Sule, A.; Ahmed, Q.U.; Samah, O.A.; Omar, M.N.; Hassan, N.M.; Kamal, L.Z.M.; Yarmo, M.A. Bioassay guided isolation of antibacterial compounds from *Andrographis paniculata* (Burm.f.) Wall. ex Nees (Hempedeubumi). *American Journal of Applied Science*, 8, 525–534, 2011.
- Shen, Y.H.; Li, R.T.; Xiao, W.L.; Xu, G.; Lin, Z.W.; Zhao, Q.S.; Sun, H.D. ent-Labdane diterpenoids from *Andrographis paniculata*. *Journal of Natural Products*, 69, 319–322, 2006.
- Sheeja K. and Kuttan G., "Activation of cytotoxic T lymphocyte responses and attenuation of tumor growth in vivo by *Andrographis paniculata* extract and andrographolide," *Immunopharmacology and Immunotoxicology*, vol. 29, no. 1, pp. 81–93, 2007.
- Shi M. D., Lin H. H., Lee Y. C., Chao J. K., Lin R. A., and Chen J. H., "Inhibition of cell-cycle progression in human colorectal carcinoma Lovo cells by andrographolide," *Chemico- Biological Interactions*, vol. 174, no. 3, pp. 201–210, 2008.
- Singha P. K., Roy S., and Dey S., "Antimicrobial activity of *Andrographis paniculata*," *Fitoterapia*, vol. 74, no. 7–8, pp. 692–694, 2003.
- Trivedi N. P. and Rawal U. M., "Hepatoprotective and antioxidant property of *Andrographis paniculata* (Nees.) in BHC induced liver damage in mice," *Indian Journal of Experimental Biology*, vol. 39, no. 1, pp. 41–46, 2001.
- Thamlikitkul V., Theerapong S., Boonroj P., "Efficacy of *Andrographis paniculata*, Nees. for pharyngotonsillitis in adults, *Journal of the Medical Association of Thailand*, vol. 74, no. 10, pp.437–442, 1991.
- Uttekar M. M., Das T., Pawar R. S., "Anti-HIV activity of semisynthetic derivatives of andrographolide and computational study of HIV-1 gp120 protein binding," *European Journal of Medicinal Chemistry*, vol. 56, pp. 368–374, 2012.
- Visen P. K. S., Shukia B., Patnaik G. K., and Dhawan B. N., "Andrographolide protects rat hepatocytes against paracetamol-induced damage," *Journal of Ethnopharmacology*, vol. 40, no. 2, pp. 131–136, 1993.

- Voravuthikunchai S. P. and Limsuwan S., "Medicinal plant extracts as anti-Escherichia coli O157:H7 agents and their effects on bacterial cell aggregation," *Journal of Food Protection*, vol. 69, no. 10, pp. 2336–2341, 2006.
- Wiart, C.; Kumar, K.; Yusof, M.Y.; Hamimah, H.; Fauzi, Z.M.; Sulaiman, M. Antiviral properties of ent-labdene diterpenes of *Andrographis paniculata* Nees., inhibitors of herpes simplex virus type 1. *Phytotherapy Research*, 19, 1069–1070, 2005.
- Wibudi A., Kiranadi B., Manalu W., Winarto A., and S. Suyono, "The traditional plant, *Andrographis paniculata* (Sambiloto), exhibits insulin-releasing actions in vitro," *Acta medica Indonesiana*, vol. 40, no. 2, pp. 63–68, 2008.
- Xu J., Z. Li, and Cao M., "Synergetic effect of *Andrographis paniculata* polysaccharide on diabetic nephropathy with andrographolide," *International Journal of Biological Macromolecules*, vol. 51, no. 5, pp. 738–742, 2012.
- Yu B. C., Hung C. R., Chen W. C., and Cheng J. T., "Antihyperglycemic effect of andrographolide in streptozotocin-induced diabetic rats," *Planta Medica*, vol. 69, no. 12, pp. 1075–1079, 2003.
- Zhang X. F. and Tan B. K. H., "Anti-diabetic property of ethanolic extract of *Andrographis paniculata* in streptozotocin-diabetic rats," *Acta Pharmacologica Sinica*, vol. 21, no. 12, pp. 1157–1164, 2000.
- Zhu X. K., Guan J., Xiao Z., Cosentino L. M., and Lee K. H., "Anti-AIDS agents. Part 61: anti-HIV activity of new podophyllotoxin derivatives," *Bioorganic and Medicinal Chemistry*, 12, 15, 4267–4273, 2004.
- Zhao H. and Fang W., "Protective effects of *Andrographis paniculata* Nees. on post-infarction myocardium in experimental dogs," *Journal of Tongji Medical University*, vol. 10, no. 4, pp. 212–217, 1990.

চলচ্চিত্রে ব্যবহৃত রবীন্দ্রসঙ্গীতের বিশুদ্ধতা

সুরাঙ্গনা গুপ্ত*

চলচ্চিত্রে বাস্তব জীবনের প্রতিচ্ছবি প্রস্ফুটিত হয় বিভিন্ন দৃষ্টিকোণ থেকে। তার মধ্যে থাকে রোমাঞ্চিকতা, দেশাত্মবোধ ও সমাজচেতনা। দর্শকের সামনে যখন এই ধরনের কাহিনিবিন্যাস পরিবেশিত হয়, তখন দর্শকের যুক্তি ও আবেগ— এই দুই হৃদয়বৃত্তির সহাবস্থান ঘটে। এইখানে আসে চলচ্চিত্রে রবীন্দ্রগানের সার্থক ভূমিকা। ভাবনার মধ্যেই রয়েছে একটা বাস্তবধর্মিতা। রবীন্দ্রসঙ্গীতের সুরধুনি ধারায় সমৃদ্ধ থেকে সমৃদ্ধতর হয়ে উঠেছে বাংলার চলচ্চিত্র।

সূচক শব্দ প্রয়োগ, বলিষ্ঠতা, যন্ত্রাণুষঙ্গ, বাঙালি ও অবাঙালির কণ্ঠে রবীন্দ্রসঙ্গীত, গান ও গল্পের সামঞ্জস্য।

রবীন্দ্রনাথের গান আমাদের জীবনের গান। জীবনের প্রতিটি পদক্ষেপেই তাঁর গান প্রযোজ্য। সুখ, দুঃখ, আনন্দ, বিরহ, উৎসব-অনুষ্ঠান তাঁর গানে ফুটে ওঠে বাস্তব জীবনের বিভিন্ন অধ্যায়ের প্রতিচ্ছবি। আর চলচ্চিত্রও আমাদের জীবনের একটা অঙ্গ। ১৯২৯ সালের ২৬ নভেম্বর একটি পত্রে শ্রী মুরারী ভাদুড়ীকে কবি লিখছেন— “...ছায়াচিত্রের প্রধান জিনিসটা হচ্ছে দৃশ্যের গতিপ্রবাহ। এই চলমান রূপের সৌন্দর্য্য বা মহিমা এমন করে পরিস্ফুট করা উচিত যা কোন বাক্যের সাহায্য ব্যতীত আপনাকে সম্পূর্ণ সার্থক করতে পারে। ... সুরের চলমান ধারায় সংগীত যেমন বিনা বাক্যেই আপন মাহাত্ম্য লাভ করতে পারে, তেমনি রূপের চলপ্রবাহ কেন একটি স্বতন্ত্ররূপে উন্মেষিত হবে না?...”

চলচ্চিত্রকে বলা হয়ে থাকে বাস্তব জীবনের প্রতিচ্ছবি যার কাহিনি নানা দৃষ্টিকোণ থেকে নেওয়া। কোথাও রোমান্টিকতা, কোথাও দেশাত্মবোধ, আবার কোথাও

*বি.এড. বিভাগ, শ্রীশিক্ষায়তন কলেজ, কলকাতা

সমাজচেতনা। এই ধরনের কাহিনি বিন্যাস যখন দর্শকের সামনে পরিবেশিত হয় তখন তাদের যুক্তি ও আবেগ— এই দুই হৃদয়বৃত্তির সহাবস্থান ঘটে। এইখানেই আসে চলচ্চিত্রে রবীন্দ্রনাথের গানের সার্থক ভূমিকা। তাই চলচ্চিত্রে রবীন্দ্রনাথের গান-ভাবনার মধ্যেই রয়েছে একটা বাস্তবধর্মিতা। ১৯৩২ সালে ‘নটীর পূজা’-র মাধ্যমে যার আনুষ্ঠানিক উদ্বোধন। পরবর্তী অর্ধশতাব্দী জুড়ে প্রায় কয়েক শতাধিক গানের একাধিকবার প্রয়োগের মধ্যে রবীন্দ্রসঙ্গীত এক বিশিষ্ট স্থানই অধিকার করেনি, অন্য ছায়াছবি-সঙ্গীতকেও বিশেষভাবে প্রভাবিত করেছে। রবীন্দ্রসঙ্গীতের সুরধুনি-ধারায় সমৃদ্ধ থেকে সমৃদ্ধতর হয়ে উঠেছে বাংলার চলচ্চিত্র।

“চলচ্চিত্রে রবীন্দ্রসঙ্গীতের বিশুদ্ধ প্রয়োগ”— এই বিষয়ে আলোচনা করতে গেলে প্রথমেই যে ছায়াছবিটির কথা স্মরণে আসে তা হল ‘ডাক্তার’ (১৯৪০)। রবীন্দ্রনাথের ‘কী পাইনি তারি হিসাব মিলাতে’ — এই গানটি অত্যন্ত দক্ষতার সঙ্গে এই ছায়াছবিতে পরিবেশন করেন পঙ্কজ কুমার মল্লিক। এই ছায়াছবির পর ১৯৪৮ সালে মুক্তি পায় ছায়াছবি ‘দৃষ্টিকোণ’। এই ছবিতে সঙ্গীতাত্যায় কৃষ্ণচন্দ্র দে পরিবেশিত ‘তোমরা যা বলো তাই বলো’ গানে তাঁর কণ্ঠের বলিষ্ঠতা গানটিকে এক অন্য মাত্রা দেয়। এছাড়াও, এই গানটির যন্ত্রাণুষঙ্গতা আমাদের এই কথাই ভাবায় আজকের যুগে। আমাদের যন্ত্রাণুষঙ্গ নিয়ে যে পরীক্ষানিরীক্ষা তার নব সূচনা হয়েছিল সেই ১৯৪৮ সালেই। ঠিক তেমনি ভাবেই আসে ‘সন্দীপন পাঠশালা’ (১৯৪৯) ছবিটির কথা যেখানে একটি গান ‘যদি তোর ডাক শুনে কেউ না আসে’ আমরা পাই শ্রীমতী সুচিত্রা মিত্রের কণ্ঠে— যা চিরস্মরণীয়। অন্যদিকে, ‘মেঘে ঢাকা তারা’ (১৯৬০) ছায়াছবিতে ‘নীতা’ চরিত্রের ব্যথাতুর আর্তি যেন গান হয়ে ফুটে ওঠে ‘যে রাতে মোর দুয়ারগুলি’ গানে অথবা ‘কোমল গান্ধার’ (১৯৬১) ছায়াছবিতে ‘আকাশ ভরা সূর্যতারার’ গানে প্রাকৃতিক সৌন্দর্য্যানন্দে বিভোর হয়ে ‘নায়কের কণ্ঠে ধ্বনিত হয়ে ওঠে— ‘বিস্ময়ে তাই জাগে আমার গান’। আবার ‘যুক্তি তক্কো গল্পো’ (১৯৭৭) ছায়াছবিতে ‘কেন চেয়ে আছো গো মা’ গানে দেশমাতৃকাকে উদ্দেশ্য করে সমাজের দৈন্যদশার প্রতি তীর ধিক্কার যেন প্রতিফলিত হয়।

এবার আসা যাক, কিছু ছায়াছবির নামে এবং তাতে ব্যবহৃত রবীন্দ্রসঙ্গীত ও শিল্পীদের নামে। ‘বিগলিত করুণা জাহ্নবী যমুনা’ (১৯৭২) ছবিতে কণিকা বন্দ্যোপাধ্যায়ের কণ্ঠে ‘আনন্দধারা বহিছে ভুবনে’, ‘দাদার কীর্তি’ (১৯৮০)-তে হেমন্ত মুখোপাধ্যায়ের কণ্ঠে ‘চরণ ধরিতে দিও গো আমারে’ এবং ‘এই করেছ ভালো নিষ্ঠুর হে’, ‘কাঁচের স্বর্গ’ (১৯৬২)

ছবিতে দ্বিজেন মুখোপাধ্যায়ের কণ্ঠে ‘ভেঙেছ দুয়ার এসেছ জ্যোতির্ময়’, ‘নিমন্ত্রণ’ (১৯৭১) ছবিতে কণিকা বন্দ্যোপাধ্যায়ের গলায় ‘দূরে কোথায় দূরে দূরে’, ‘কুহেলী’

(১৯৭১) ছায়াছবিতে আশা ভৌঁশলের কণ্ঠে ‘মেঘের কোলে রোদ হেসেছে’ ও হেমন্ত মুখোপাধ্যায়-লতা মঙ্গেশকর দ্বৈত কণ্ঠে ‘তুমি রবে নীরবে’ আমরা পেয়েছি। এখানে লক্ষ্যণীয় এই যে বাংলা ছায়াছবিতে রবীন্দ্রনাথের গান কণ্ঠে তুলে নিয়েছেন ভারতবর্ষের অন্যপ্রান্তের কিংবদন্তী শিল্পীদ্বয়— লতা মঙ্গেশকর এবং আশা ভৌঁসলে। বাংলা ছায়াছবিতে রবি ঠাকুরের গান যেমন অবাঙালিকে বাংলায় এনেছে তেমনই বাঙালিকে নিয়ে গেছে সুদূর মুম্বই। উদাহরণস্বরূপ, ‘লুকোচুরি’ (১৯৫৮) ছায়াছবিতে কিশোরকুমারের কণ্ঠে ‘মায়াবনবিহারিণী হরিণী’ — যা মানুষকে প্রাদেশিকতার উর্ধ্বে নিয়ে যায়। এইখানেই চলচ্চিত্রের সার্থকতা।

‘অগ্নীশ্বর’ (১৯৭৫) ছায়াছবিতে আমরা দেখি ডাঃ অগ্নীশ্বর মুখার্জির চরিত্রাভিনয়ে মহানায়ক উত্তমকুমার যখন তাঁর পরলোকগতা স্ত্রীর স্মৃতি রোমন্থন করছেন তাঁর বন্ধুদের সঙ্গে তখন যেন সেই স্মৃতিমেদুরতা আরও প্রগাঢ় হয়ে ফুটে ওঠে ‘পুরানো সেই দিনের কথা’-র মাধ্যমে। এইভাবেই ‘শ্বেত পাথরের থালা’ (১৯৯২) ছবিতে আমরা দেখি আকস্মিক পথ দুর্ঘটনায় স্বামীর মৃত্যুসংবাদ পেয়ে মনের মধ্যে হাহাকার বেজে ওঠে ‘আমার প্রাণের পরে চলে গেল কে’ গানে অথবা ২০০৩ সালে মুক্তিপ্রাপ্ত ‘আলো’ ছায়াছবিতে আমরা দেখি এক সংস্কৃতিহীন গ্রামে সংস্কৃতির আলো ছড়িয়ে পড়ার আনন্দ প্রস্তুটি হয় ‘আমরা নূতন যৌবনের দূত’ গানে। আবার ছবির অস্তিম পর্যায়ে যখন ছবির নায়িকার মৃত্যুসংবাদ তার গ্রামের মানুষের কাছে পৌঁছয়, তাদের শোকাকর্ষ মনের প্রতিচ্ছবি ব্যক্ত হয় ‘যখন পড়বে না মোর পায়ের চিহ্ন এই বাটে’ গানের মাধ্যমে।

যুক্তি ও আবেগ নিয়ে মানুষ। আর চলচ্চিত্র যেহেতু আমাদের দৈনন্দিন জীবনকে প্রতিফলিত করে তাই এর সমস্ত সার্থক পরিবেশনা দর্শকচিহ্নে এক বলিষ্ঠ প্রভাব বিস্তার করে— তা যে কোনও পরিবেশেই সম্ভব। কিন্তু বর্তমানে এক শ্রেণির চলচ্চিত্র নির্মাতা রবীন্দ্রনাথের গানকে পণ্য হিসাবে ব্যবহারে রতী। ফলতঃ রবীন্দ্রসঙ্গীতের সুরের বিকৃতির জায়গাটি অবধারিতভাবে নজরে আসে। উদাহরণস্বরূপ বলা যায় ‘রঞ্জনা আমি আর আসব না’ ছায়াছবিতে সোমলতার কণ্ঠে পাই ‘জাগরণে যায় বিভাবরী’ এছাড়াও ‘পাগলা হাওয়ার বাদল দিনে’ এবং ‘মায়াবনবিহারিণী’ গান দুটির সুর বিকৃত করে ছায়াছবিতে ব্যবহার করার নজির আমরা দেখতে পাই। সুতরাং প্রশ্ন উঠতে পারে, তাহলে কি রবীন্দ্রনাথের গান চলচ্চিত্রে ব্যবহার করা অসঙ্গত? বিশেষজ্ঞদের মতে, ব্যবহার নিশ্চয় হবে কিন্তু গানের সাথে গল্পের যাতে সুষ্ঠু সামঞ্জস্য বজায় রাখা যায়, সেদিকে বিশেষ নজর দেওয়া উচিত। শ্রী শান্তিদেব ঘোষের মতে, “জনসাধারণের রুচি তৈরি নয়, শিশুর মতো তাকে ধৈর্যের সঙ্গে তৈরি করে দিতে হবে। তার কাছে আত্মসমর্পণ করলে চলবে না।”

সাম্প্রতিককালে কিছু চলচ্চিত্রে রবীন্দ্রনাথের গানের সার্থক প্রয়োগ দেখা যায়। তারই একটা সংক্ষিপ্ত তালিকা সংযুক্ত করা হল—

চলচ্চিত্রের গান	গান	শিল্পী
‘দেখা’ (২০০১)	একি লাভণ্যে পূর্ণ প্রাণ	→ স্বাগতালক্ষ্মী দাশগুপ্ত
‘দেশ’ (২০০২)	হিংসায় উন্মত্ত পৃথ্বী	→ লোপামুদ্রা মিত্র
‘চাঁদের বাড়ি’ (২০০৭)	চাঁদের হাসি বাঁধ ভেঙেছে ভেঙে মোর ঘরের চাবি	→ সমবেত → দ্বৈতকণ্ঠ (বাবুল সুপ্রিয় অরুন্ধতী হোম চৌধুরী)
	বাঁধ ভেঙে দাও	→ সমবেত
	ওরে চিত্ররেখা ডোরে বাঁধিল কে	→ ইন্দ্রনীল সেন
‘উৎসব’ (২০০০)	অমল ধবল পালে লেগেছে	→ শ্রাবণী সেন
‘নৌকাডুবি’ (২০১১)	আনন্দলোক মঙ্গলালোকে তরী আমার হঠাৎ ডুবে যায়	→ সুদেষ্ণা চট্টোপাধ্যায় → ?
	খেলাঘর বাঁধতে লেগেছি	→ পরমা ব্যানার্জী
‘সব চরিত্র কাল্পনিক’ (২০০৯)	এ পরাবাসে রবে কে	→ রেজওয়ানা চৌধুরী বন্যা
‘দোসর’ (২০০৬)	আর যেমন করে গাইছে আকাশ	→ চান্দ্রেয়ী ঘোষ
‘আবহমান’ (২০১০)	গহন কুসুম কুঞ্জমাঝে	→ সমবেত
‘অবশেষে’ (২০১১)	দূরে কোথায় দূরে দূরে আজি বিজন ঘরে	→ রূপা গঙ্গোপাধ্যায় → রূপা গঙ্গোপাধ্যায়

আমরা জানি, রবীন্দ্রনাথের গানে কতটা সুসংবাদ অধ্যাত্ম ও বাস্তব চেতনার সংমিশ্রণ রয়েছে। এটাই হল ভারতীয় ঐতিহ্য ও সংস্কৃতি। তাই চলচ্চিত্র ও রবীন্দ্রনাথের গান— এই দুই বিষয়কে পারস্পরিক মেলবন্ধন করলেও আমাদের কর্তব্য বাংলা তথা ভারতের অন্যতম শ্রেষ্ঠ সম্পদ রবীন্দ্রসঙ্গীতের বিশুদ্ধতা বজায় রাখা।

Navigating the Environmental Costs of Urban Development: The Case of Kolkata's Eastern Metropolitan Bypass

Vareeja Ratna¹ Debosmita Ghosh¹

Shreja Saha¹ Adrija De¹

Ankita Banerjee¹ Tirsha Biswas¹

Dr Jayati Das^{1**}

Abstract :

The transformation of Kolkata's eastern Wetlands into the Eastern Metropolitan Bypass reflects the city's urban expansion to accommodate its growing population. While the bypass has catalysed economic development and job opportunities, its construction has significantly altered the city's climatic patterns. Establishing new settlements and the IT hub along the bypass further intensified urbanisation and immigration. Consequently, increased population density, urban infrastructure, and industrial activity have disrupted groundwater seepage, exacerbated vehicular emissions, altered land use patterns, diminished natural greenery, and heightened pollution levels. This study offers a comprehensive analysis of the developmental changes around the EM Bypass, elucidating their impact on Kolkata's temperature rise and broader climatic shifts.

Keywords: EM Bypass, construction, Wetlands, temperature rise

* Geography Honours Batch of 2025, Department of Geography, Shri Shikshayatan College, Kolkata.

^{1**}Associate Professor, Department of Geography, Shri Shikshayatan College, Kolkata.

Introduction:

Kolkata ranked as the eighth-largest agglomeration globally, faces a paradox with the Eastern Metropolitan Bypass (EM Bypass) serving as a boon to the city's populace but a curse to the East Kolkata Wetlands (EKW). Due to rapid urbanisation, expansion, construction and development of the area, the 'Kidney of Kolkata' is witnessing a rise in temperature and climate change. Spanning approximately 125 sq. km, the EKW lies on the eastern periphery, bordered by Kolkata in the west and Rajarhat Newtown in the north. Designated as 'Wetlands of International Importance' by the Ramsar Convention in 2002, the EKW acts as a vital Waste Recycling Region (WRR) and absorbs contaminants from Kolkata. It acts as an absorber basin for a large number of contaminants drained from Kolkata, and its sewage-fed fisheries and garbage dumping fields are destroying the natural habitat of this protected zone. This 'Kidney of Kolkata' acts as a Carbon sink and absorbs the city's stormwater during floods. Despite serving as the 'Kidney of Kolkata' and a Carbon sink, human encroachment, agricultural and aquacultural land reclamation, and rapid urban expansion threaten the EKW's integrity. The sewage-fed fisheries and garbage dumping are degrading its natural habitat. It's a fact that due to certain unplanned and rapid urban expansion of Kolkata city, population explosion due to migration and also increase in urban landfills, this great ecosystem is under threat due to urbanisation. Climate change has exacerbated these challenges, reducing Wetlands ecosystem services and increasing socio-economic vulnerability.

The paper aims to elucidate the correlation between temperature rise and urbanisation, particularly the development of the EM Bypass, and its impact on the EKW biome.

Study Area :

Eastern Metropolitan Bypass (also known as **E.M. Bypass**) is a 32-kilometre, six to eight-lane major bypass road on the east side of Kolkata in the Indian state of West Bengal. It connects Ultadanga (North Kolkata) to Baruipur Puratan Bazar (under the Kolkata

metropolitan area). The road is a major link to Salt Lake and New Town. EM Bypass is part of both State Highway 1 and State Highway 3 and much high-end construction and development in Kolkata has been centred around it.

Hypothesis :

The proposed study seeks to address the issues of how expanding urbanisation and the temperature rise have led to the environmental consequences of wetland degradation. Urbanisation has reduced the wetlands over the past several decades. If wetlands are protected and managed properly, they can play a significant role in helping to acclimatise and lessen climate change impacts. The study tries to seek the correlation between the transformation of the E M Bypass, haphazard urbanisation and the temperature rise that has impacted the Wetlands. A range of factors are responsible for the degradation of the EKW including the area's rapid, haphazard, and unplanned urbanisation and associated infrastructure development. The study aims to investigate the causes of environmental degradation in EKW and Mumbai resulting from urban development.

Moreover, pollution, road proximity, waste dumping, population density, and growth are the main factors for the deteriorating health, quality, and environment of the area. The high concentration of urban infrastructure in the Saltlake-Rajarhat- Newtown area has created additional problems related to water quality deterioration, aquatic pollution and Wetlands degradation impacting the area's ecosystem.

Objectives :

1. To study the changing nature of land use – land cover patterns due to rapid urbanisation and population explosion.
2. To study the factors responsible for the rise in temperature and urbanisation – development along E M Bypass

3. To study how high-end construction has disrupted parts of the EKW
4. To do a comparative analysis of rising temperatures in Kolkata and Mumbai
5. To study the cost of urban development on the environment this this area.

Methodology :

Secondary data is the data which is already available and is derived from the primary sources and is reprocessed for one's. The following data represents various types of cartograms and is collected from secondary sources. Satellite images from Landsat have been used to study the increase in settlement pattern in Kolkata.

Secondary data have been collected from the Pollution Control Board of West Bengal to analyse the gases released by vehicular pollution in EM Bypass. The structural pattern of the Dhapa Dumping ground has been shown, along with the satellite image showing the geographical location of Dhapa Dumping Site Kolkata. To represent the ward-wise frequency of Tanneries, 2008, a chorochromatic map and bar graph have been used. To represent the month-wise maximum temperature trend over Kolkata, a line graph has been used. Satellite images have been used for comparative analysis and to show the spatio-temporal land use pattern of Kolkata during 2019.

Literature Review :

Speaking on the reduction in open spaces, **Mitra** says, "As anyone can see, the Wetlands in the eastern parts of Kolkata have been encroached upon by construction, some planned and some unplanned. The traffic on the eastern metropolitan bypass is practically uncontrollable now. The land use land cover change in the Wetlands area is noteworthy and does have an impact on temperature and overall microclimate of Kolkata."

Data regarding growth and population settlement has also been collected from the **District census handbook of India (District Kolkata, parts A and B) in 1991, 2001, and 2011.**

The article "**Determining Urban Growth in Response to Land Use Dynamics Using multi-layer perceptron and Markov chain models in a Metropolitan City: Past and Future**" by Saleha Jamal and Md Babor Ali, dated July 2023 states that the transformation of land use and land cover the substantial floating and residential population exert significant pressure for fast built-up expansion, resulting in the transformation of land use and land covers, with adverse environmental impacts such as loss of biodiversity, air and noise pollution, soil and water pollution, creation of microclimates, and the urban heat island effect; **Springer Link.**

In the article "**Land reclamation and reuse of wastewater on the backdrop of urban sprawl of Kolkata metropolitan: a case study of East Kolkata, Wetlands, India**" by Pankaj Kumar Roy, Malabika Biswas Roy, Sritama Chatterjee, Sudipa Halder, Swetasree Nag, Arunabha Majumder, dated 16 November 2021 we get to know about how land reclamation is a common problem in the cities. The study has considered land use and land cover of reclaimed land from the past up to the present through a map showing the present status of the Waste Recycling Region (WRR) of East Kolkata Wetlands (EKW) and the Buffer zone; **Modern Cartography Series (Volume 10), Science Direct.**

The rise in minimum temperature and annual temperature of Kolkata is solely due to the urban heat island effect and not due to climate change. Climate change has less to nil impact on the temperature, rainfall and thunderstorms of the city The **paper "Urban development-induced displacement and quality of life in Kolkata"** by Annapurna Shaw and Tara Saharan, draws together issues of urban development-induced displacement and resettlement and the quality of life of the affected population over the longer term; **Research Gate.**

In **"Spatio-temporal change in land use and land cover pattern and its impacts- A case study of East Kolkata Wetlands"** by **Anuska Ray, Ritula Paul** dated **January- June 2022**, states that Kolkata Wetlands are disappearing at a rapid rate of 15 % more than the global average, if this trend continues the remaining portion will be destroyed in the next decade (Salam A and Dasgupta A). Wetlands have been demolished and construction of metalled roads continued. The major threat are rapid urban expansion of Kolkata city. Water logging was also witnessed along the E.M. bypass, following the disappearance of sewage farms and agricultural lands that show a massive conversion of Wetlands area; **January – June 2022, Vol. 3 Issue. 1, PP. 103–110.**

A journal by **Dr. Indrajit Roy Chowdhury** on **"Traffic Congestion and Environmental Quality: A Case Study of Kolkata City"**, dated **July 2015** tells us that traffic congestion is one of the major problems in the city of Kolkata due to high growth rates of motorised transport; **Research Gate.**

Urbanization :

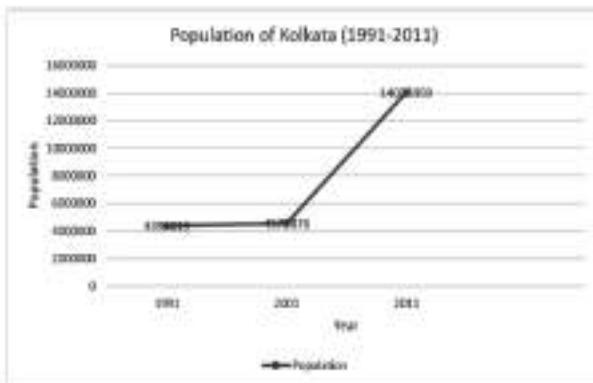


Fig 1 : Showing the rise of population from 1991-2011

Kolkata's population has expanded since the 1980s due to migration (Fig 1), a decrease in the death rate and an increase in the birth

rate. This meant that there had to be an increase in the number of settlements to hold the growing population of the city.

Around this time (1980 onwards), the development of the Eastern metropolitan bypass was at an all-time high. The city was densely populated, and the development of new roads in the east caused the city to expand in this direction.

In the early 2000s, the development of EM Bypass picked up its pace. The last underdeveloped part of Salt Lake (Salt Lake Sector 5) was turned into an IT hub. The IT Hub was again a huge pull factor for the population. The ever-increasing demand for IT jobs in Kolkata attracted more companies to open their branches in the Salt Lake region.

The following graph portrays the increase in Kolkata's population since 1991, mainly owing to the setting up of the IT Hub. (source: Census Handbook of India 1991,2001,2011)

More settlements were created as a result. The best place suitable for these was the newly developed EM Bypass. An increase in settlement and offices led to the construction of more institutions, be it educational, medical or entertainment. This urban spread is termed as Urban Agglomeration. Urban agglomeration in Kolkata was seen mainly around the EM Bypass.

In the Satellite Image interpretation from Landsat (USGS) and LISS III series (ISRO, India) and the Govt. of West Bengal, India), the brown patches depict the settlements under the Kolkata Municipal Corporation (Fig 2) The second is an image showing settlements along EM Bypass (Fig 3)

If the two images are contrasted, it can be seen that the settlements post-1990 expanded around the EM Bypass area.

EM Bypass became responsible for most of Kolkata's economic development and is also receiving a lot of attention for the developmental plans of the West Bengal Government. For Example, the Mahishbathan flyover was allocated a budget of 150 Cr INR for Fiscal Year 2024-25. Despite the economic development, EM

Bypass has led to a change in Kolkata's climatic pattern exponentially.

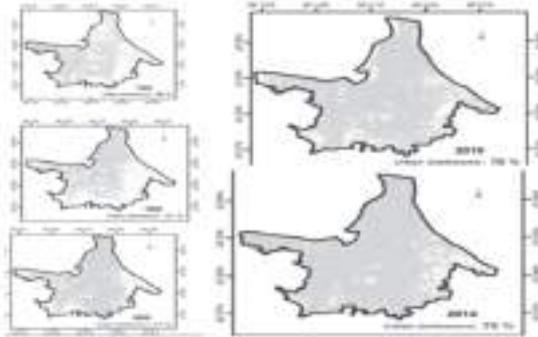


Fig.2 Satellite image interpretation settlements in Kolkata since 1980

With the expansion of Kolkata, its Wetlands fringes were reduced, thus destroying not only an aquatic ecosystem but also the city's natural waste-treating region. There was thus a decrease in waste-treating opportunities for the ever-expanding population. Listed as Wetlands of global importance under the United Nations Ramsar Convention, the waters offer natural climate control by cooling sweltering temperatures – and act as valuable flood defences for low-lying Kolkata. Differential heating of land and water leads to cooling of the surrounding areas. With the encroachment of the Wetlands by the urban agglomeration, the natural climate control source is slowly disappearing.

The huge housing complexes (like The Address, Urbana T2 & T3, Ozone, Forum Atmosphere, Avishikta 1 & 2, Ruchira and The Westin) in the eastern fringe of the city, particularly the EM bypass, are still using groundwater, which is pushing the eastward flow, pointed out by Kalyan Rudra, Chairman of the West Bengal Pollution Control Board and a water expert. Kolkata has about 800 completed high-rise buildings and many more under construction.



Fig. 3 : Satellite image showing settlements along EM Bypass
(Garia to Bidhannagar)

Also, the place for settlements across EM Bypass was expanded through the felling of innumerable number of trees in the erstwhile green area. The most recent, extreme cases of deforestation were seen in the southern extension of the EM Bypass (Garia to Baruipur). Between June to October 2012, at least 3500 trees were axed to widen the bypass and build new settlements. The Eastern Kolkata Wetlands Authority had suggested trees to be planted along the Wetlands as compensation, but such positive development was minimal. Trees, like Wetlands, are also a natural temperature regulator of the city. According to the United States Environmental Protection Agency, trees and vegetation lower the surface temperature by providing shade and aiding in evapotranspiration. It also keeps the rainfall in a check place.

As Eastern Kolkata Wetlands eventually changed from a green jungle to a concrete one, the mercury levels set a record-breaking high. The rate of increase in temperature in Kolkata has been found to increase since the exponential growth of settlements. The rise in settlements also meant an increase in demand for water for domestic and commercial purposes. Groundwater extraction for the population of Kolkata increased and was greater than the rate of interception. The UN predicts Kolkata to face water scarcity by

2050 and if the growth of buildings is not controlled, especially in the EM Bypass the city of joy will face this grave problem much sooner.

The urban sprawl of eastern Kolkata began with the growth of the IT sector in the city i.e. in the early 2000s. According to the District Census Handbook of Kolkata, 'Kolkata has a Tropical wet-and-dry climate. Summer is hot and humid and during dry spells, the maximum temperature often touches 40°C during May and June.'

However, since 2016, the temperature in the city has touched 40 degrees Celsius in April itself. From 2010 to 2015, Kolkata would often see temperatures higher than 40 degrees, which is quite unnatural for a tropical wet-dry climate. This matches the timeline with the growth of the IT Hubs and Kolkata's new urban agglomeration. It can thus be said that building settlements led to a rise in temperature and a change in the city's climatic pattern.

Traffic Along The EM Bypass :



Fig. 4 : Traffic along EM Bypass

The Eastern Metropolitan Bypass was designed as a six to eight-lane bypass to lessen traffic congestion (Fig 4) on the entire stretch of Gariahat Road. The areas in EM Bypass are designated as the busiest areas concerning traffic, which is often accompanied by

pollution. The EM Bypass is linked with different types of vehicles, including trucks, motorcycles, cars and public transport like buses, taxis and other motorised vehicles that play a crucial role in the emission of pollutants into the air. To make transport accessibility better, the construction of permanent media railings all along the median of the EM Bypass (between Ruby crossing and Dhalai Bridge) and both sides of the pavements. This led to an increase in the number of automobiles increasing traffic pollution as well.

The following pollutants are the main polluting emissions emitted by the vehicles along the EM Bypass.

PM10: The main examples of this particulate matter include dust, soot, liquid droplets etc. It can scatter or absorb the infrared radiation and impact the temperature likewise. During winter, due to high pressure, these matters stay suspended in the lower layer of the atmosphere resulting in the formation of intense smog. Smog contributes to increasing the temperature. Specifically, particulate matter like soot and dust absorbs the heat waves emitted by the Sun and thereby warms up the lower portion of the atmosphere. Not only does it lead to climatic impact like this but it also affects the respiratory health of people as well.

CO₂ is one of the main pollutant gasses that impacts the temperature. It absorbs the terrestrial radiation which is re-radiated back from the earth's surface. This leads to the warming of the lower atmosphere as a result of which the temperature increases.

NO₂: or nitrogen dioxide, is another crucial greenhouse gas composed of nitrogen and oxygen. Similar to carbon dioxide, it traps terrestrial radiation, leading to atmospheric warming and temperature elevation. In the EM Bypass, nitrogen dioxide contributes to the ground-level formation of ozone (O₃) and particulate matter (PM_{2.5}), further exacerbating temperature rises.

The increased presence of pollutant gases during evening hours traps more terrestrial heat waves, leading to further temperature rise. This underscores the significant and multifaceted impact of EM Bypass traffic on temperature dynamics.

Danger to The Kidneys of The City :

The EM bypass that runs along East Kolkata, has the presence of Wetlands (Fig 5) that look like any other lake but is one of the largest bayous in the Ganga delta and is bordered by the satellite townships of Salt Lake and Newtown–Rajarhat. With the heavy population rise combined with economic and industrial growth, there's mounting pressure on the city's wastewater and sewage management.



Fig. 5 : The Wetlands of the City

Geographically the Wetlands to the east of Kolkata comprises many water bodies from North and South 24 Parganas. The Wetlands are man-made and the system of wastewater treatment is the largest in the world. One of the most important threats to these Wetlands is that of encroachment due to the construction of the Eastern Metropolitan Bypass which has led to urban development. The constant change of land use patterns has affected the ecology of these Wetlands. Many large pisciculture ponds have been converted into paddy fields. The industries in the adjacent areas have made unauthorised connections to the sewers to empty their untreated wastewater. The sewers on the other hand empty the water into the channels that later join the Wetlands. This is causing a deposition of the heavy metals in the canals and ultimately the quality of fish and vegetables produced in the Wetlands is far below the edible standard.

Kolkata Wetlands have been constantly treated as sewage or waste management systems. This is a failure by The Government while

trying to save a whopping Rs 4,680 million a year in sewage treatment costs it is destroying the natural biome. The total area of the East Kolkata Wetlands is 12500 ha of which approximately 45.93 % is the water body and 38.92 % is agricultural land. The remaining portion is occupied by urban and rural settlements and sites for garbage disposal. The EKW has decreased by 15% between 1991 and 2001, by 4% between 2001 and 2011, and by approximately 3% between 2001 and 2021. With the rapid urban expansion, the city has been moving eastward towards the Wetlands, due to which the Wetlands have been gradually shrinking over the years.



Fig. 6 : Map of Kolkata, showing groundwater level, comparing pre and post-monsoon seasons of 2010 and 2018

The Kolkata Wetlands, crucial for the city's ecology, gained global recognition under the Ramsar Convention in 2002 due to concerns over their loss. Despite their importance, Wetlands face threats from pollution and development. Some of the most heavily polluted stretches in Kolkata lie alongside the Wetlands. The Wetlands being the low-lying areas are susceptible to waterlogging even with low amounts of precipitation. The rising pace of development is pointed out as the root cause of the problems around Wetlands depletion. Pollutants from tanneries and industries, notably in Chinatown, flow into these water bodies, exacerbating their degradation. Rapid urban development further strains Wetlands, exacerbating issues like water logging and habitat destruction. The neo-liberal approach to development to a great

extent is the prime cause of unbalanced growth and urbanisation has fuelled the process of destruction of the environment and is detrimental to conservation of the natural habitat. These water bodies are important. They impact the microclimate of the local area and act as carbon sinks, Dr Mohit Ray, an environmental activist who has campaigned extensively to save Kolkata's water bodies Balancing development with ecological conservation is crucial. These Wetlands are not just ecosystems but also impact local microclimates and serve as vital carbon sinks, emphasising the need for their preservation amid urban expansion.

Kolkata is located in the lower Delta Plain of Ganga, Bhagirathi River basin, its geology consisting mainly of clay and clay loom. The upper clay layer extends to a depth of 10 to 25 metres below ground level(mg). Then the sand layer extends up to 30 to 35 mbgl. Below this extends another layer of clay up to the depth of 65 to 120 mbgl. Kolkata is mainly composed of confined aquifer. The upper aquifer is 10 to 20 metres thick, and the second occurs at a depth of 65 to 120 metres. It is the most potentially exploited aquifer of Kolkata. Since the population of the city has risen over the years, the water demand is not fulfilled, and the people use tap groundwater for the use. The heavy withdrawal of groundwater for domestic and industrial use has led to the fall of 9.75 metres of piezometric level during the last twenty-five years. The trend that is emerging, the city hardly has a place for natural recharge of groundwater The high-rise buildings that are constructed along EM Bypass are the main culprits in the depletion of groundwater in Kolkata.

Neglect of Waste Management :

Open dumping is practised throughout India. Kolkata is no exception. The city generates about 3,500 to 3,700 tonnes of municipal solid waste (MSW) daily i.e. 1.3 million tons annually. This waste is almost entirely disposed of at the Dhapa Dumping Area(Fig 7) with a very small portion going to another small municipal dump site in the city.



Fig. 6 : Structural pattern of Dhapa dumping ground

Almost the entire area of Dhapa is a part of the East Kolkata Wetlands (listed as a Ramsar site in 2002).

The biodegradable waste in Dhapa had accumulated over decades. Due to an increase in waste over the years. On average, about 2,800 tonnes of garbage is being dumped per day at Dhapa, Kolkata.

Temperature Analysis :

Temperature analysis urbanisation and infrastructure development, such as the construction of major roadways like the Eastern Metropolitan Bypass (EM Bypass), can significantly influence local temperature patterns. Understanding the impact of such developments on temperature dynamics is crucial for assessing their broader environmental implications and informing sustainable urban planning strategies. In this section, we analyse the temperature rise in Kolkata (Fig 8) concerning the development of the EM Bypass, focusing on both observational data and potential mechanisms driving temperature changes.

Temporal rise: Temporal rise of temperature data is undertaken to unveil enduring trends and fluctuations in Kolkata's climate. The era of construction of the EM Bypass has been focused. Employing sophisticated statistical methodologies like trend analysis and time series modelling, we aim to precisely gauge the magnitude and import of temperature alterations over time.

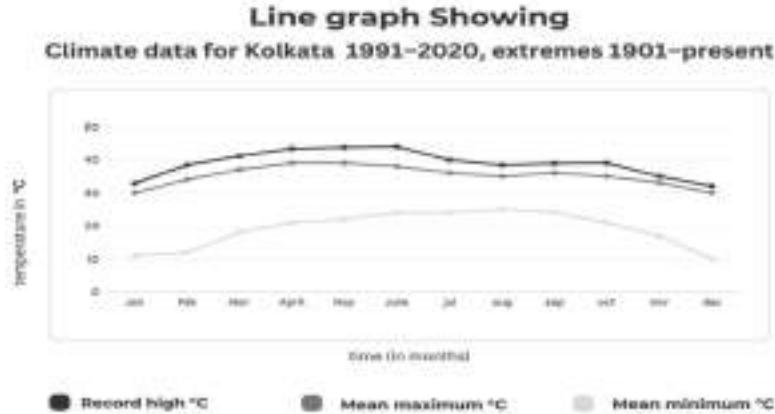


Fig 8: Line graph showing temperature change in Kolkata from 1991 to 2020

Comparative Analysis: The escalating trend in the annual mean minimum temperature may find its roots in the urban heat island effect, with the burgeoning development around the EM Bypass serving as a catalyst. The minimum temperature in this city is generally attained early in the morning. However, the observed rise indicates inadequate cooling until morning, indicative of heightened heat retention within the city. Common in sprawling metropolises, built-up areas comprising streets, monuments, and high-rise buildings are constructed using materials with high heat capacities, absorbing more heat during the day and releasing it slowly at night. Consequently, as a result, the city becomes comparatively warmer than the suburban and rural surroundings. Over the years Kolkata has witnessed the increased urbanisation facilitated by projects like the EM Bypass. The temperature data from 1991 to 2020 for Kolkata reveals a pronounced warming trend, as evidenced by the consistent rise in both mean maximum and mean minimum temperatures across the months. From January to May, there is a noticeable escalation in temperatures, with May emerging as the hottest month on average, marked by the highest mean maximum temperature of 39°C and the highest mean minimum temperature of 22°C. Record-high temperatures have been observed in April, May, and June, emphasizing the intensity of the warming trend

during these months. This trend underscores the impact of climate change on Kolkata's climate, with rising temperatures posing potential challenges for the city's inhabitants and ecosystems. It underscores the urgency of implementing measures to mitigate further temperature increases and adapt to the changing climate conditions in the region.

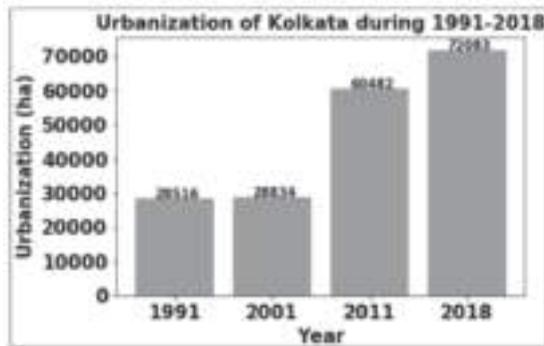


Fig 9: Growth buildup in Kolkata over the years

Fig 9 shows the growth of the built-up area/urbanisation of Kolkata. It is seen that the built area has increased from 28516 Hectares in 1991 to 72083 Hectares in 2018. It is also seen that there is a jump in the built-up area from 28834 Hectares in 2001 to 72083 Hectares in 2018. This shows that during recent decades Kolkata has witnessed rapid urbanisation. Surprisingly after 2000, we can also see the upward spikes in the annual mean minimum temperature and annual mean temperature of Kolkata.

The escalating trend in Kolkata's temperature is intricately linked to various mechanisms and drivers, each playing a significant role in shaping the city's climate dynamics. One of the primary drivers of temperature rise is the urban heat island effect, amplified by the extensive development surrounding the Eastern Metropolitan Bypass (EM Bypass). The proliferation of built-up areas, high-rise buildings, and other structures, contributes to heat absorption during the day and delayed heat release at night. Consequently, Kolkata experiences a prolonged and intensified warming effect, particularly evident in the early morning hours.

Furthermore, the surge in vehicular traffic, notably along the EM Bypass and its adjacent corridors, exacerbates the urban heat island effect. Traffic emissions introduce greenhouse gases and other pollutants into the atmosphere, further exacerbating heat retention within the city. Additionally, alterations in the precipitation cycle, diminish the cooling effect of rainfall, exacerbating temperature rise in Kolkata.

RISING TEMPERATURE IN KOLKATA AND MUMBAI- A Comparative Analysis :

In the following section, we have measured different parameters between the two most prominent cities of our country: Mumbai and Kolkata as both have been built after disrupting the natural ecology. The Mumbai landscape was once an ecologically rich area with dozens of Wetlands and presently it has been turned into one of the world's most busy cities. In Kolkata, the Eastern Metropolitan Bypass construction was made by destroying a part of the east Kolkata Wetlands.

URBAN HEAT ISLANDS :-

In Kolkata, rapid urbanisation, industrialization, and deforestation have catalysed the Urban Heat Island impact. The city's haphazard expansion has diminished green spaces, fostered concrete sprawls, and amplified vehicular emissions, collectively driving up temperatures. Kolkata's annual mean temperature has risen by approximately 0.7°C over the past century. Concurrently, Mumbai grapples with Urban Heat Island challenges, compounded by its coastal locale, high population density, and rapid urbanisation. The prevalence of concrete landscapes, scarcity of greenery, and constraints on sea breeze exacerbate temperature spikes, particularly during the summer months.

LOSS OF GREEN SPACE :-

Studies reveal that between 1991 and 2018, Mumbai city lost nearly 40 per cent of its green cover, including forests (dense vegetation). Furthermore, Mumbai has witnessed a 2°C rise in average

temperature across 27 years. Mumbai lost 81 per cent of its open land, 40 per cent green cover, and approximately 30 per cent of its water bodies between 1991 and 2018, while the built-up area has risen by 66 per cent during the same period.

Comparatively, an analysis of Kolkata's Wetlands area changes from 1991 to 2017 revealed an increase in temperature in Kolkata by nearly 5°C as urban sprawl grew 33% in 30 years. The loss of Wetlands from 1991 to 2001 was 23.55%, while it was 7.34% from 2011 to 2017. Green space in the city has deteriorated, with the total area covered by green space in 1991 being approximately 38.12% of the total area, declining to around 26.98% of the total area in 2020.

POPULATION DYNAMICS :-

Both cities have experienced substantial population growth, straining housing, infrastructure, and public services. Kolkata's population has surged from 4.6 million in 1951 to over 14 million in 2021. Mumbai's population growth has been even more pronounced. Mumbai's population has skyrocketed from 2.9 million in 1951 to over 20 million in 2021.

Conclusion :

The research highlights the significant influence of urbanisation and infrastructure development on temperature dynamics in Kolkata and Mumbai, as evidenced by rising temperatures and dwindling green spaces. While the transformation of Kolkata's eastern Wetlands into the Eastern Metropolitan Bypass brought economic development and enhanced transport accessibility, it also unleashed a cascade of negative environmental impacts. The city now grapples with heightened temperatures, reaching alarming levels in recent years. Factors like settlements, traffic emissions, tanneries, and changes in land use patterns contribute to this complex interplay, exacerbating the urban heat island effect. Urgent measures are imperative to mitigate these effects, preserve green spaces, and implement sustainable urban planning strategies. The intricate relationship between infrastructure development and environmental degradation

underscores the need for holistic approaches to ensure the resilience and well-being of cities in the face of climate change.

Acknowledgement :

The success and outcome of this article was made possible by the guidance and assistance of many people. We feel extremely privileged to have received this support. We would like to express our sincere appreciation to our esteemed Professor, Dr. Jayati Das, whose contribution was invaluable in the completion of this research paper. We fully acknowledge her assistance and are deeply grateful for her help.

Bibliography :

1. Ali, Sk Ajim, and Ateeque Ahmad. "Analysis of Chemical and Heavy Metal Concentrations of Leachates and Impact on Groundwater Quality Near Dhapa Dumping Ground, Kolkata." *Asian Profile*, vol. 47, no. 1, March 2019, pp. 19-37.
2. Bhattacharya Mongabay, Snigdhendu, "Kolkata attempts to eliminate 'legacy waste' in landfills through biomining."
3. Directorate of Census Operations West Bengal. "District Census Handbook of India." *Census India, 2011*, https://westbengal.census.gov.in/DCHB_2011_WB_Part_A/1916_PART_A_DCHB_KOLKATA.pdf
4. Dubey, Payal, and Goyal Kumar Sudhir "Human health impact of air pollution related to road traffic - A review." *AIP Publishing*, vol. 2721, no. 1, 2023.
5. Ghosh, Subrata, et al. "Analysing risk factors for shrinkage and transformation of East Kolkata Wetlands, India." *Spatial Information Research*, vol. 26, no. 5, August 2018.
6. Herald Deccan "Rise in Mumbai's average temperature due to increase in the built-up area:Study"<https://www.deccanherald.com/india/rise-in-mumbais-average-temperature-due-to-increase-in-built-up-area-study-1041742.html>
7. Majumdar, Dipanjali et al. "Emission, speciation, and evaluation of impacts of non-methane volatile organic compounds from open dump site." Published online: 24 Jun 2014.
8. Mukherjee, Shubham, and Wiebke Berbermeier. "An Overview of the Impacts of Land Use Land Cover Changes (1980-2014) on Urban Water Security of Kolkata." 2018, p. 25.

9. Satpati Lakshminarayan et al, Neoliberal urban sustainability in Old Kolkata, India: Case studies of contested developments.. UGC – HRDC, University of Calcutta, Kolkata, India.
10. Sawyer, Lindsay, and Schmid Christian. "Bypass urbanism: Re-ordering center-periphery relations in Kolkata, Lagos and Mexico City." 2021, vol. 53(4), p. 29.
11. Sharan Tara, Shaw Annapurna, "Urban development-induced displacement and quality of life in Kolkata." 2018, vol. 31(2), p. 18.
12. Times of India, "Kolkata chokes as Dhapa fire rages unchecked for five years." <https://timesofindia.indiatimes.com/city/kolkata/kolkata-chokes-as-dhapa-fire-rages-unchecked-for-five-years/articleshow/67402725.cms>
13. United Nations Industrial Development Organization Vienna, 2011. "Introduction To Treatment Of Tannery Effluents." United Nations Industrial Development Organization
14. Vishwakarma Anil, Kunte Anand, Dr.Mishra D., and Panchal Sudeshna "Dhapa Dumpsite Environmental And Social Assessment Report." Issued on 17-06-2013, revision 30-6-2013, rev 17-07-2013, rev 21-9-2013, rev 09-12-2013, rev 10-02-2014.

An Overview on the Trajectory of Women's Entrepreneurship in India

Vidhi Banka¹

Ashu Pugalia¹

Kavitha Sundararajan**

Abstract :

This study delves into the trajectory of women's entrepreneurship in India, looking at its historical evolution, prevalent challenges, government policies, and trends. Through secondary data analysis and literature review, it explores various dynamics that have influenced women's entrepreneurial participation. A major limitation of this study is that it relies on secondary data and lacks fieldwork, but tries to provide some useful insights.

Findings show an increase in women-led enterprises after liberalization and significant growth in women-led startups after the recession in 2008. There are significant challenges but women are being supported well by government schemes like Mudra Yojana and Stand-Up India. The study highlights the importance of continued policy support, societal encouragement, and financial accessibility to empower women entrepreneurs, fostering economic and social progress in India.

Keywords: Women Entrepreneurship, Female Entrepreneurship, Historical progression, Challenges, Government Schemes, Growth, Trends

¹Student, Postgraduate Department of Commerce, Shri Shikshayatan College, Kolkata.

**Assistant Professor, Department of Commerce (Evening Section), Shri Shikshayatan College.

Background of the study:

For years, business ownership in India has been male-dominated, with women often seen as dependent on men (Sharma & Gaur, 2020). However, with economic liberalization and globalization economically active women (Sachdeva, 2023; Kokila et al., 2024) have broken various glass-ceilings, risen the corporate ladder, and achieved entrepreneurial success. They are no longer bound by the constraints of domestic walls and have indeed come a long way. From running small cooperative businesses and small-scale enterprises to pioneering in various sectors, including technology and commerce, there are quite a few women-led unicorns in India today that are being recognized as major contributors to economic growth (Srivastava & Jain, 2024). The emergence of women as entrepreneurs in India can be viewed as a resurgence of their rightful socio-economic status (Uma, 2023).

As per the website of the Technology Development Board, Department of Science & Technology (Technology Development Board, 2022), the Government of India has defined women entrepreneurs as “an enterprise owned and controlled by a woman having a minimum financial interest of at least 51% of the capital and giving at least 51% of the employment generated in the enterprise to women”.

Such women entrepreneurial enterprises can be classified as (i) owned by women, (ii) managed by women and (iii) employing women and should be set up under the Companies Act. (Technology Development Board, 2022).

India's entrepreneurial landscape is undergoing a truly exciting transformation, driven by women-led ventures ranging from Shri Mahila Udyog Lijjat Papad, a cooperative business started by seven women in 1959 with Rs 80, to billion-dollar unicorns like Nykaa and Mamaearth (Sharma et al., 2022). Women entrepreneurs are making their mark, with Lijjat Papad representing the early spirit of women in Indian businesses, while Nykaa, founded by Falguni Nayar in 2012, showcases the new wave of tech-savvy, successful unicorns (Paul, 2022).

This evolution highlights the expanding opportunities and approaches for women entrepreneurs in India, prompting the undertaking of this study to trace the trajectory of women's entrepreneurship in the country.

Brief Review of Literature:

The literature on women's entrepreneurship in India is vast and complex, covering a wide range of issues. In their systematic review, Baral et al. (2023) provided valuable insights into the current state of research in this field in India, revealing four main themes on women entrepreneurs (WEs): success factors for WEs, challenges faced by WEs, factors attracting and motivating WEs, and performance measures for WEs. Similar reviews reveal substantial studies on the examination of barriers and motivational factors influencing women's participation in entrepreneurship (Prashar et al., 2018). Another theme revolves around the factors driving the success of women-owned ventures in India (Kothari, 2017; Prashar et al., 2018; Agarwal et al., 2020; Virani et al., 2022). Most studies review the trends and changes in women entrepreneurship in India using data from different government and non-governmental sources (Pramanik & Mitra, 2023).

Studies show how despite historical challenges, India has seen a significant increase in the number of women entrepreneurs, contributing to economic growth and challenging the notion that entrepreneurship is solely a male domain (Patil & Deshpande, 2021). Economic liberalization and globalization have played pivotal roles in this transformation, leading to the growing importance of women-owned businesses in India and encouraging the nation's economic growth (Kokila et al., 2024; Sachdeva, 2023). Thus, understanding the historical progression is crucial to gaining insight into the trajectory of women's entrepreneurship in India.

Women entrepreneurs in India have faced numerous challenges, covering various aspects and substantial literature is available on the same. The main challenges identified from the literature are financial challenges, lack of knowledge and experience, work-life balance, gender discrimination, sociocultural factors, and lack of government

support (Abdulla and Ahmad, 2023), leading to necessary educational and skill deficiencies (Agrawal et al., 2023). Economic barriers pose key challenges— such as limited access to funding, (Majumdar et al., 2023), and insufficient working capital, lack of social, technical, and government support, hindering business operations and growth (Sathiyabama & Velmurugan, 2019). A serious issue is the deep-rooted cultural and societal factors such as gender bias and family pressures (Agrawal et al., 2022), gender discrimination, balancing family responsibilities while managing the business (Majumdar et al., 2023), societal attitudes and stereotypes which affect an entrepreneur's work-life balance and support networks (Banu et al., 2021). Moreover, policy and institutional challenges further complicate these issues (Shastri et al., 2021; Chhabra et al., 2023).

To overcome such challenges, government interventions play a vital role, and several recent studies are highlighting the impact and significance of salient government policies in supporting women entrepreneurs and reducing gender disparities in entrepreneurship. Such policies have been found to positively and significantly impact women's entrepreneurship in India (Sundarakumar et al., 2023; Tyagi et al., 2021). Government schemes like Mudra Yojana, Startup India, Stand-Up India, and the National Skill Development Mission have played pivotal roles in fostering entrepreneurship among women in India by providing collateral-free loans, easier access to funding, and skill enhancement opportunities (Tiwari, 2021). Understanding the trajectory of women entrepreneurship in India necessitates studying both the challenges encountered by women entrepreneurs and the impact of government policies.

The status of women entrepreneurs in India can be assessed through data trends, such as those provided by the Global Entrepreneurship Monitor (GEM) data, although research on female entrepreneurship utilizing GEM data in India is still in its early stages (Sánchez-Escobedo et al., 2016). Pramanik and Mitra (2023) review the trends and changes in women entrepreneurship in India using data from different government and non-governmental sources. By examining trends over time, it is crucial to understand the trajectory of women entrepreneurship in India accurately.

While there exists a wide variety of literature on women entrepreneurs and their role in economic growth and development, there are gaps in the literature regarding the specific dynamics which focus only on the trajectory – such as trends, interactions, patterns, factors influencing participation, growth etc. specific to India.

By focusing on the changing dynamics of women entrepreneurship, this study aims to capture the multifaceted nature of this phenomenon and to achieve the same it will seek to study the following:

- trace the evolution of women's involvement in Indian businesses
- identify and examine the broad challenges or barriers faced by women entrepreneurs in India
- review the different government policies and initiatives in India aimed at promoting women entrepreneurship
- explore trends and patterns depicting the trajectory of women entrepreneurship in India.

This exploratory study thus attempts to provide insights into the changing dynamics of women entrepreneurship in India. The immediately following section will trace the evolution of women's participation in business in India, providing historical context and milestones. This will be followed by the identification and examination of the challenges and barriers faced by women entrepreneurs, as well as government schemes implemented to overcome such challenges. Subsequently, an exploration of the trends and patterns in women entrepreneurship in India will be conducted. Finally, the study will conclude by summarizing the findings.

Historical Progression:

Until the 1800s, women only managed small handloom enterprises or ran small businesses – such as making pottery, papads, and bangles (MReview, 2022). Even at that time there was no formal education for Indian girls and schools were accessible only to boys. The University of Calcutta (in Kolkata) was the first university in India that started admission of girl students, in 1877 (MReview, 2022).

By the mid-18th century, societal restrictions began to loosen-up. This allowed more women to step into the entrepreneurial sphere. The British era brought further reforms aimed at improving women's status. But substantial advancements in women's rights and opportunities primarily came post-independence in 1947. Constitutional guarantees of equality catalysed the growth. The introduction of economic reforms in 1991 which includes liberalization, privatization, and globalization, marked a pivotal shift in the Indian economy and there was a significant growth post the recession in 2008 (Lal, 2015). The Government of India established the National Skill Development Policy and the National Skill Development Mission in 2009 to provide skill training, vocational education, and entrepreneurial growth to the developing labour force (Selvi & Rathna, 2023). A detailed timeline is provided below in Table 1, offering a closer look at the progression of women's entrepreneurship in India:

Table 1– A closer look at the progression of women's entrepreneurship in India:

PERIOD	IMPACT	SOME PROMINENT ENTREPRENEURS
Prior to Independence (Before 1947)	The introduction of the modern factory system in the mid-19th century led to the first wave of entrepreneurship, dominated initially by Parsees, followed by the emergence of Gujrati and Marwari entrepreneurs. Women entrepreneurship was however, virtually non-existent prior to Independence in 1947 due to societal norms and suppression (Lal, 2015).	

<p>Post-Independence (After 1947) & Before Liberalization (Pre-1991): Limited Scope</p>	<p>During this period, traditional norms confined women to home-based roles, limiting their access to education and financial resources, which hindered their entrepreneurial ambitions. Despite this, there were isolated cases of successful women-led ventures, showcasing their inner strength and potential. Microfinance institutions and microcredit for women in 1980s (Bernard, 2015), formation of Self-Help Groups due to emergence of institutions like the Grameen Bank provided much needed capital for women entrepreneurs, but its impact was limited.</p>	<p>Founded in 1959 by Shri Mahila Griha Udyog Lijjat Papad, stands out as one of India's earliest and most successful women-led enterprises, evolving from a small-scale cottage industry into a corporate giant over four decades (Kapil & Kapil, 2009). Shahnaz Hussain started her own company in the 1970s, focusing on Ayurvedic beauty and healthcare products. Despite the conservative social environment, she managed to take her brand to a global level (Kataria et al., 2020).</p>
<p>Post-Liberalization (after 1991) & Pre-Recession (before 2008): Entering the Business World</p>	<p>Women empowerment was boosted by economic liberalization and better educational opportunities (Ghosh & Cheruvalath, 2007). The period saw an increase in the number of women starting businesses, reflecting the</p>	<p>Vandana Luthra is the founder of VLCC which gained recognition post 1991 which started as a wellness centre and grew into a major brand offering a wide range of well-known beauty services and products.</p>

	<p>positive impact of liberalization and globalization on entrepreneurship in India.</p>	<p>Kiran Mazumdar Shaw founder of Biocon Limited, a biopharmaceutical company headquartered in Bangalore, began operations in 1978, but gained significant traction and recognition in the 1990s and beyond, becoming one of India's leading biotech firms (Singh and Singh, 2022).</p>
<p>Post Recession (2008 and beyond)</p>	<p>The 20th century brought increased awareness and educational initiatives aimed at nurturing entrepreneurial spirit among women of India. It was supported by institutions like National Institute for Entrepreneurship and Small Business Development (NIESBUD) and led to upliftment of women in society. Expansion of the internet and technology paved the way for novel business opportunities, and it contributed to spread of knowledge among the masses.</p>	<p>Falguni Nayar, the founder of Nykaa, established her venture in 2012, an e-commerce platform specializing in beauty and wellness products. She successfully built Nykaa into a prominent brand, and today it stands as a unicorn and a listed Indian company (Singh and Singh, 2022).</p>

	<p>The post-recession period since 2008 witnessed a surge in entrepreneurial activity globally, marked by economic restructuring and a rise in innovative startups. This era gave rise to a new breed of entrepreneurs, including women from diverse backgrounds, who ventured into entrepreneurship not only to support their families but also to pursue their dreams.</p>	
--	--	--

Source: Adopted from Lal (2015)

According to Lal (2015), the liberalization of markets has encouraged women to step forward, become better educated and become entrepreneurs. These educated women today fearlessly are venturing into small and medium-sized enterprises, contributing to both employment generation and the nation's GDP.

In contemporary times, women are breaking free from traditional roles and embracing entrepreneurship, marking a significant shift from being solely homemakers (Dastidar & Kalit, 2020). The 21st century has witnessed a transformation in the status of women in India, driven by factors such as industrialization, urbanization, and progressive social legislation (Suba & Sneka, 2016).

Challenges for Women Entrepreneurs in India :

Women entrepreneurs in India face numerous challenges. These challenges impact their ability to grow their businesses and contribute fully to economic development. Understanding these barriers is crucial for to get a better insight into entrepreneurial landscape in India and its trajectory. Table 2 below discusses the

major challenges or barriers faced by women entrepreneurs in India as discussed in various pieces of literature.

Table 2– Some of the major challenges faced by women entrepreneurs in India

Nature of Challenge	Impact	References
Socio-cultural barriers	Societal norms and cultural expectations pose significant challenges for women entrepreneurs in India, such as limited access to resources, gender stereotypes, and a lack of social capital. Patriarchal norms and societal rules hinder their ability to run family businesses or pursue independent ventures.	(Singh and Singh, 2022; Aggrawal et al., 2022; Sachdeva, 2023)
Economic barriers	Women entrepreneurs in India face significant financial challenges, such as difficulty in securing loans due to perceived lower creditworthiness and higher risk of business failure. They also struggle with cash flow issues due to delays in payments and fund blockages.	(Sharma, 2013; Dutta & Mallick, 2022; Kumar & Shobana, 2023; Aravamudhan et al., 2024)

	<p>Economic liberalization and globalization have increased the prominence of women-owned businesses, but majority-female-owned firms still experience more financial constraints compared to male-owned or minority female-owned firms, highlighting the substantial impact of economic and financial barriers on women-led enterprises. Problems in attracting customers, market behaviours, and corruption also pose challenges for women entrepreneurs.</p>	
<p>Institutional challenges</p>	<p>Women entrepreneurs face significant institutional challenges, including limited access to business networks, inadequate knowledge of navigating governmental bureaucracy, and</p>	<p>(Gaur, Kulshreshtha & Chaturvedi, 2018; Shastri et al., 2021; NITI Aayog, 2022; Agrawal et al., 2023)</p>

	<p>reduced bargaining power. Around 82% of women-led enterprises are micro-units operating as sole proprietorships in the informal sector, further limiting their access to formal support and resources. Additionally, many women lack formal education, entrepreneurship education, capital, skilled manpower, management skills, and infrastructural support, all of which are crucial for successfully running and growing their businesses.</p>	
Personal factors	<p>Women entrepreneurs often grapple with the challenge of balancing their family responsibilities with their business endeavours. The demands of unpaid care work, conflicting roles as homemakers and business owners, family and work-related stress, and</p>	<p>(Pareek & Bagrecha, 2017; Abdulla & Ahmad, 2023; Majumdar et al., 2023)</p>

	<p>unsupportive family members can significantly impact their motivation and ability to succeed in their entrepreneurial ventures. Achieving a work-life balance becomes particularly challenging due to the time constraints imposed by managing both family and work responsibilities simultaneously.</p>	
--	---	--

Despite these challenges, women are leveraging digital platforms, policy support, and a more progressive societal mindset to build thriving businesses and become influential leaders in various industries (Srivastava & Jain, 2024). To overcome barriers to women's entrepreneurship development in Indian robust strategies are essential, with government support and motivation being the most influential strategy. Collaboration between society and the government, focused on removing barriers and providing support, is crucial for promoting women's entrepreneurship. (Prashar et al., 2018; Tripathi & Singh, 2018; Chhabra et al., 2023).

Policy and Economic Changes :

Understanding key government support programs for women entrepreneurs in India is crucial for comprehending the trajectory of women's entrepreneurship in the country. These programs offer skill training, financial assistance, and institutional support to empower women entrepreneurs (Sachdeva, 2023). Initiatives like the "Stand up India" and "Mudra Yojana Scheme for Women" provide essential financial benefits and loans, enabling women to establish and grow their businesses (Sathiyabama & Velmurugan,

2019). Table 3 provides highlights on some of the major recent Central schemes in this regard. Evaluating the effectiveness of these programs reveals their positive impact on women's entrepreneurship, highlighting their role in fostering economic empowerment, social inclusion, and gender equality (Sundarakumar et al., 2023).

Table 3– Highlights of major government schemes

SCHEMES	MINISTRY	BENEFITS OF SCHEME
Mahila Samridhi Yojana	Ministry of Social Justice and Empowerment	It is a Micro Finance scheme for women with a rebate in interest. Financial Assistance up to the cost of Rs. 1,40,000/- is provided.
Mudra Yojana for Women	Ministry of Finance	Loans up to Rs 10 lakh are provided to women entrepreneurs without any collateral and with low interest with flexible repayment tenure.
Stand-Up India (SUI)	Small Industries Development Bank of India (SIDBI)	This scheme was launched in 2016. The objective of the SUI scheme is to facilitate bank loans between Rs.10 lakh and Rs.1 Crore to at least one Scheduled Caste (SC) or Scheduled Tribe (ST) borrower and at least one-woman borrower

		per bank branch for setting up a greenfield enterprise.
Women Scientists Scheme	Ministry of Science and Technology	Primarily aimed at providing opportunities to women scientists and technologists between the age group of 27-57 years. Women scientists are being encouraged to pursue research in frontier areas of science and engineering.
Women Entrepreneurship Platform (WEP)	Niti Aayog	Through its partnerships, services are provided in 6 main focus areas. Focus areas are Community and Networking, Funding and Financial Assistance, Incubation and Acceleration, Compliance and Tax Assistance, Entrepreneur Skilling and Mentorship, Marketing Assistance.

Source: *Startup India – Schemes by Central Government Departments; (Startup India, DPIIT, 2024)*

Several policies and programmes are being implemented for the development of women entrepreneurship in India (Suba & Sneka, 2016). The Mudra Yojana has been instrumental in promoting financial inclusion and empowering women by providing them with the necessary financial resources to start and grow their businesses. As on November 2023, out of total 44.46 crore loans sanctioned under Pradhan Mantri Mudra Yojana, 30.64 crore (69%) have been sanctioned to women. Further under Stand-up India, as on 24.11.2023, out of 2.09 lakh loans sanctioned, 1.77 lakh (84%) have been sanctioned to women entrepreneurs (Ministry of Finance, 2023). The government schemes, incentives and subsidies have stimulated and provided much-needed support measures to women entrepreneurs (Gaur, Kulshreshtha & Chaturvedi, 2018).

Trends :

Understanding trends in data is essential for grasping the trajectory of phenomena like women entrepreneurship. Analyzing trends allows us to measure progress, track disparities, and identify emerging challenges and this section offers valuable insights into these aspects.

- The Department for Promotion of Industry and Internal Trade (DPIIT), operates under the Ministry of Commerce and Industry in India and released the "STATES' STARTUP RANKING 2022 on Support to Startup Ecosystems," which evaluates states based on their support and infrastructure for startups, fostering entrepreneurship and innovation across the country. According to the report, the increase in the number of women-led startups in India from 345 in 2016 to over 32,000 in 2023, indicates a significant surge in female entrepreneurship over the years. It indicates a growing trend (CAGR of nearly 40%) of women venturing into business ownership and leadership roles in India over a period of seven years as shown in Figure 1.

Figure 1– Increase in number of Women-Led Startups in India from 2016 to 2023

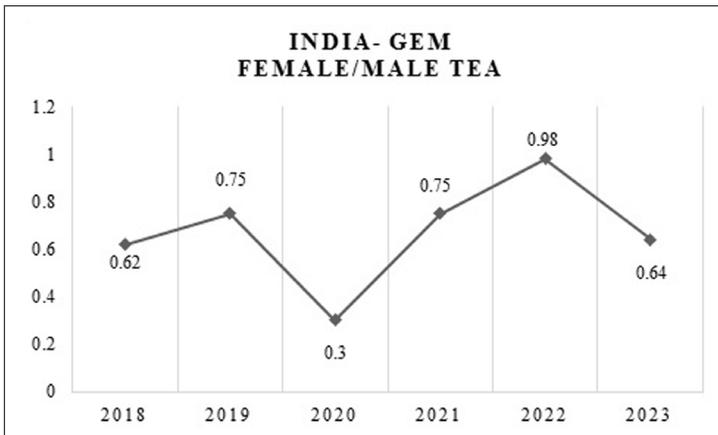


Source: *States' Startup Ranking 2022 on Support to Startup Ecosystems* (DPIIT & Ministry of Commerce and Industry, 2024)

- The Women in India's Start-up Ecosystem Report (WISER) provides valuable insights into the representation of female entrepreneurs in the startup landscape. According to the report, female entrepreneurs currently account for 18% of the startup ecosystem. Additionally, the report highlights significant growth in the number of unicorns, with 105 startups achieving unicorn status in 2022 compared to just 13 in 2017. Furthermore, the proportion of unicorns led by women increased from 8% to 17% during this period. These statistics indicate a positive trend towards greater gender diversity and inclusivity in the Indian startup ecosystem, showcasing the increasing prominence and success of women entrepreneurs. (The Udaiti Foundation, 2023).
- The Global Entrepreneurship Monitor (GEM) is an international organization that monitors entrepreneurial activity worldwide and releases annual reports offering comprehensive insights. It measures the Total Early-Stage Entrepreneurial Activity (TEA) metric, which measures the percentage of the adult population engaged in starting or running new businesses. It also publishes the Female/Male TEA Ratio which is the percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a 'new business', divided by the equivalent percentage for their male counterparts. Figure 2 shows the trend in Fe-

male/Male TEA ratios for India from 2018 to 2023. It reveals a fluctuating trend in gender parity in entrepreneurial activity. During 2018 to 2019 there was an increase in the ratio from 0.62 to 0.75 indicating progress toward gender parity, but which sharply declined to 0.3 during the COVID-19 pandemic. There is a rebound to 0.75 in 2021 and a near parity at 0.98 in 2022 which shows resilience and recovery among women entrepreneurs, followed by a decline to in 2023. Figure 2 provides further insights. This is despite the significant participation gap between men and women in the workforce, with women's participation being much lesser compared to men as per a Discussion Paper by NITI Aayog (2022). This disparity contributes to a smaller pool of women engaging in entrepreneurship.

Figure 2– Female/Male TEA ratios for India from 2018 to 2023– The percentage of women entrepreneurs over their male counterparts as per GEM

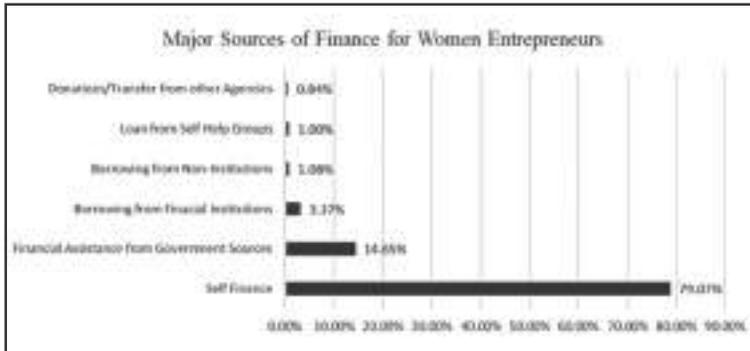


Source: As per GEM Report (2015 –2023); <https://www.gemconsortium.org/data>

- Finally, the study reviews funding trends for women entrepreneurs. The data shows heavy reliance on self-financing or bootstrapping (as shown in Figure 3) and lower contributions from financial institutions and government assistance highlighting chal-

lenges faced by women in the entrepreneurial ecosystem in securing external funding.

Figure 3 Major sources of finance for women entrepreneurs in India



Source: *All India Report of Sixth Economic Census, 2013-14*

As per recent reports by the International Finance Corporation (IFC), although men and women access loans in similar proportions, the loan amounts for women are significantly lower, more than 50% below those accessed by men. Similarly, out of the Pradhan Mantri Mudra Yojana (PMMY) institutional credit for women in 2018-19, only 41% of loans sanctioned to women were in the small loan category, which is around Rs 50,000 (Rao, 2022).

Despite the significant disparity in access to capital and a considerable participation gap, women entrepreneurs in India are steadily making their mark. While total early-stage entrepreneurial activity reports indicate that women are at 9.3% versus men's 14.6%, the growing momentum and support for women entrepreneurs promise a more balanced and inclusive entrepreneurial landscape in the near future.

Discussion, Findings and Conclusion :

The exploration of women's entrepreneurship in India, by tracing the historical evolution of women's involvement in Indian businesses, identifying prevalent challenges, reviewing government policies, and analyzing trends; provides a broad understanding of

its trajectory. However, the study primarily relies on secondary information from various reports, which may not fully capture the breadth of the women entrepreneurial landscape in India. The absence of fieldwork and direct interaction with entrepreneurs, limits understanding of the current scenario and the challenges they face. Nonetheless, it helps provide valuable insights.

It is evident that the liberalization of markets and changing societal roles have encouraged more women to become entrepreneurs, contributing to both employment generation and GDP growth (Lal, 2015; Dastidar & Kalit, 2020). In the past few years, women entrepreneurs have significantly contributed to the country's development and social progress due to industrialization, urbanization, education, and increased awareness (Garg & Agarwal, 2017). Glass ceilings have been shattered, and women are found involved in every line of business (Koneru, 2018).

Women entrepreneurs in India face numerous challenges, including limited access to capital, societal biases, and economic disparities. However, they are leveraging digital platforms and policy support to build successful businesses (Srivastava & Jain, 2024). Government schemes such as Mudra Yojana and Stand-Up India have provided crucial support, empowering women entrepreneurs by offering financial assistance and institutional support (Sachdeva, 2023; Sathiyabama & Velmurugan, 2019). However, to further bolster female entrepreneurship, appropriate support and motivation from society, family, and government are essential to encourage contributions to India's economic progress (Vinoth & Revathy, 2016). The number of women-led startups in India has seen a significant increase over the years, indicating a growing trend of female entrepreneurship. Despite fluctuations, progress toward gender parity in entrepreneurial activity in India has been observed. However, the significant participation gap between men and women in the workforce remains a challenge (NITI Aayog, 2022). It can be said that today we are in a better position wherein women's participation in entrepreneurship is increasing considerably (Koneru, 2018).

The rise of digital platforms has provided women with new avenues to start and grow their businesses. The advent of e-commerce and digital marketing has opened up new opportunities for women entrepreneurs, allowing them to reach wider markets (Bansal, 2021). The development of women-centric business networks and support groups has been beneficial. Organizations such as WEConnect and the National Association of Women Business Owners (NAWBO) and aggregator platform like the Women Entrepreneurship Platform, provide crucial support and networking opportunities (Rao, 2017). Growing awareness about gender equality and women's rights has led to a more supportive environment for women entrepreneurs. The increasing focus on gender equality has encouraged more women to pursue entrepreneurship, with society gradually becoming more accepting of women in leadership roles (Kaur, 2020).

References

- Abdulla, F. S., & Ahmad, A. (2023, July 19). Challenges Faced by Women Entrepreneurs of 21st Century. *Journal of Management & Science*. <https://doi.org/10.57002/jms.v21i1.368>
- Agarwal, S., Lenka, U., Singh, K., Agrawal, V., & Agrawal, A. M. (2020). A qualitative approach towards crucial factors for sustainable development of women social entrepreneurship: Indian cases. *Journal of Cleaner Production*, 274, 123135. <https://doi.org/10.1016/j.jclepro.2020.123135>
- Aggrawal, A., Carrick, J., Kennedy, J., & Fernandez, G. (2022). The plight of female entrepreneurs in India. *Economies*, 10(11), 264. <https://doi.org/10.3390/economies10110264>
- Agrawal, R., Bakhshi, P., Chandani, A., Birau, R., & Mendon, S. (2023). Challenges faced by women entrepreneurs in South Asian countries using interpretive structural modeling. *Cogent Business & Management*, 10(2). <https://doi.org/10.1080/23311975.2023.2244755>
- Aravamudhan, V., Sivakumar, K., Vishnu, C. R., & Mohanasundaram, K. (2024). Challenges faced by women entrepreneurs in rural India: A mixed-method study on perception. *The International Journal of Entrepreneurship and Innovation*. <https://doi.org/10.1177/14657503241254954>

- Banu, J., Baral, R., A. Agarwal, U., & Rastogi, M. (2021). Role of socio-cultural factors in shaping entrepreneurial decision and behavior: An Indian perspective. In *Women's Entrepreneurship and Culture*. Edward Elgar Publishing. <http://dx.doi.org/10.4337/9781789905045.00015>
- Baral, R., Dey, C., Manavazhagan, S., & Kamalini, S. (2023). Women entrepreneurs in India: A systematic literature review. *International Journal of Gender and Entrepreneurship*, 15(1), 94–121. <https://doi.org/10.1108/ijge-05-2021-0079>
- Bernard, D. K. (2015). Microfinance Services: Facilitating Entrepreneurial Success of Poor Women. *Review of Contemporary Business Research*, 4(2). <https://doi.org/10.15640/rcbr.v4n2a5>
- Chhabra, M., Singh, L. B., & Mehdi, S. A. (2022). Women entrepreneurs' success factors of Northern Indian community: A person-environment fit theory perspective. *Journal of Enterprising Communities: People and Places in the Global Economy*, 17(6), 1293–1314. <https://doi.org/10.1108/jec-04-2022-0059>
- Dastidar, S., & Kalita, N. Changing Dynamics of Women Entrepreneurship in India: Its Problems and Prospects. *Entrepreneurship in the New Era*, 39.
- Dutta, N., & Mallick, S. (2022). Gender and access to finance: Perceived constraints of majority-female-owned Indian firms. *British Journal of Management*, 34(2), 973–996. <https://doi.org/10.1111/1467-8551.12623>
- Garg, S., & Agarwal, P. (2017). Problems and prospects of woman entrepreneurship—a review of literature. *IOSR Journal of Business and Management*, 19(1), 55–60.
- Gaur, S., Kulshreshtha, V., & Chaturvedi, R. (2018). Challenges and opportunities for women entrepreneurs in India. *Ijrar.com*. Retrieved May 23, 2024, from http://ijrar.com/upload_issue/ijrar_issue_1244.pdf
- Ghosh, P., & Cheruvalath, R. (2007). Indian Female Entrepreneurs as Catalysts for Economic Growth and Development. *The International Journal of Entrepreneurship and Innovation*, 8(2), 139–147. <https://doi.org/10.5367/000000007780808048>
- Gopikala, K. (2014). Women entrepreneurship in India: Challenges and opportunities. *International Journal of Humanities, Arts, Medicine and Sciences*, 2(12), 35–48.

- Kapil, K., & Kapil, S. (2009). From a Nano Enterprise to a Mega Brand: Journey of Lijjat Papad. *SEDME (Small Enterprises Development, Management & Extension Journal): A Worldwide Window on MSME Studies*, 36(1), 1–10. <https://doi.org/10.1177/0970846420090101>
- Kataria, D. A., Nandal, D. N., & Malik, D. R. (2020). Shahnaz Husain–A Successful Indian Woman Entrepreneur. *International Journal of Disaster Recovery and Business Continuity* Vol, 11, 88–93.
- Kokila, M. S., Ch, R. K., & Chandra, S. (2024). Women’s entrepreneurship in India: A barometer for international shifts in start-up activity. In *Technical and Vocational Education and Training: Issues, Concerns and Prospects* (pp. 507–512). Springer Nature Singapore. http://dx.doi.org/10.1007/978-981-99-7798-7_42
- Koneru, K. (2017). Women entrepreneurship in India–problems and prospects. Available at SSRN 3110340
- Koneru, K. (2017, January 1). Women Entrepreneurship in India – Problems and Prospects. Social Science Research Network. <https://doi.org/10.2139/ssrn.3110340>
- Kothari, T. (2017). Women entrepreneurs’ path to building venture success: Lessons from India. *South Asian Journal of Business Studies*, 6(2), 118–141. <https://doi.org/10.1108/sajbs-03-2016-0021>
- Kumar, J.Suresh & Dr, D.Shobana. (2023). Evolution and Significance of Women Entrepreneurs in India. *World Journal of Advanced Research and Reviews*. 19. 1445–1458. 10.30574/wjarr.2023.19.2.1554
- Lal, A. T. (2015). Women Entrepreneurs in India – Over the Years! *Abhigyan*, 33(2), 13–25. <https://doi.org/10.1177/0970238520150202>
- Lal, K., & Arora, V. P. S. (2017). Women Entrepreneurship: An overview of Indian scenario. *International Journal of Enterprise Computing and Business Systems*, 7(1),
- Majumdar, R., Mittal, A., & Bhardwaj, S. (2023). The challenges faced by women micro-entrepreneurs: Evidence from urban India. *Vision: The Journal of Business Perspective*. <https://doi.org/10.1177/09722629231185464>
- Ministry of Finance. (2023, December). 69% of the total 44.46 crore loans sanctioned under Pradhan Mantri Mudra Yojana, have been

sanctioned to women. <https://pib.gov.in/>. Retrieved May 25, 2024, from <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1987773>

- MReview. (2022, November 17). Shattering the glass ceiling – India's richest self-made women – Masters' Union Review. Masters' Union Review. Retrieved May 24, 2024, from <https://review.mastersunion.org/tracing-the-history-of-women-entrepreneurs-in-india/>
- NITI Aayog, Chand, R. & Singh, J. (2022). Workforce Changes and Employment Some Findings from PLFS Data Series. In <https://www.niti.gov.in/>. NITI Aayog. Retrieved May 26, 2024, from https://www.niti.gov.in/sites/default/files/2023-02/Discussion_Paper_on_Workforce_05042022.pdf
- NITI Aayog. (2022). Decoding government support to women entrepreneurs in India The anatomy of entrepreneurship support schemes. In <https://www.niti.gov.in/sites/default/files/2023-03/Decoding-Government-Support-to-Women-Entrepreneurs-in-India.pdf>. MicroSave Consulting in collaboration with NITI Aayog's Women Entrepreneurship Platform (WEP). <https://www.niti.gov.in/sites/default/files/2023-03/Decoding-Government-Support-to-Women-Entrepreneurs-in-India.pdf>
- Pareek, P., & Bagrecha, C. (2017). A thematic analysis of the challenges and work-life balance of women entrepreneurs working in small-scale industries. *Vision: The Journal of Business Perspective*, 21(4), 461–472. <https://doi.org/10.1177/0972262917739181>
- Patil, P. A., & Deshpande, Y. M. (2021). Women entrepreneurship. In *Research Anthology on Challenges for Women in Leadership Roles* (pp. 36–56). IGI Global. <http://dx.doi.org/10.4018/978-1-7998-8592-4.ch003>
- Paul, S. (2022). The transformation from Pickles, Powder and Pappad to Engineering, Electronics and Energy: An overview on Women Entrepreneurship in India. *Redshine Archive*, 1. <https://doi.org/10.25215/1387453440.004>
- Pramanik, S., & Mitra, D. (2023). Women entrepreneurship over the last two decades: A study of trends and changes. In *Gender Equality from a Modern Perspective* (pp. 91–115). Apple Academic Press. <http://dx.doi.org/10.1201/9781003377979-6>
- Prashar, S., Vijay, T. S., & Parsad, C. (2018). Women entrepreneurship in India: A review of barriers and motivational

- factors. *International Journal of Entrepreneurship and Innovation Management*, 22(3), 206. <https://doi.org/10.1504/ijeim.2018.091767>
- Rao, P. (2022, October 15). Women entrepreneurs and access to finance: why credit stays small. *Financial Express*. Retrieved May 26, 2024, from <https://www.financialexpress.com/business/sme-msme-fin-women-entrepreneurs-and-access-to-finance-why-credit-stays-small-2712586/>
 - Sachdeva, G. (2023). Indian women's entrepreneurship. In *Advances in Human Resources Management and Organizational Development* (pp. 184–200). IGI Global. <http://dx.doi.org/10.4018/978-1-6684-7669-7.ch011>
 - Sánchez-Escobedo, M. C., Fernández-Portillo, A., Díaz-Casero, J. C., & Hernández-Mogollón, R. (2016). Research in entrepreneurship using GEM data. Approach to the state of affairs in gender studies. *European Journal of Management and Business Economics*, 25(3), 150–160. <https://doi.org/10.1016/j.redeen.2016.09.002>
 - Sathiyabama, P., & Velmurugan, R. (2019). Challenges faced by women entrepreneurs in Coimbatore District. *Journal of Advanced Research in Dynamical and Control Systems*, 11(0009–SPECIAL ISSUE), 1091–1099. <https://doi.org/10.5373/jardcs/v11/20192676>
 - Selvi, R & Rathna, G.Anitha. (2023). Challenges And Issues for Women Entrepreneurs in India.
 - Sethi, S. (n.d.). (problems, solutions & future prospects of development). *Psu.edu*. Retrieved May 23, 2024, from <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=29ec0997cb4001847eedcd06e1203e4eb9c0c7bf>
 - Sharma, R., Sharma, A., Rana, G., & Jain, V. (2022). *Woman Entrepreneurship in India: A Paradigm Shift*. In *Entrepreneurial Innovations, Models, and Implementation Strategies for Industry 4.0* (pp. 117–136). CRC Press.
 - Sharma, V., & Gaur, M. (2020). Women Entrepreneurs in India: A Study of Opportunities and Challenges. *Journal of Xi'an University of Architecture & Technology*, XII(VII).
 - Sharma, Y. (2013). Women entrepreneur in India. *IOSR Journal of Business and Management*, 15(3), 9–14.
 - Shastri, S., Shastri, S., Pareek, A., & Sharma, R. S. (2021). Exploring women entrepreneurs' motivations and challenges from an

institutional perspective: Evidences from a patriarchal state in India. *Journal of Enterprising Communities: People and Places in the Global Economy*, 16(4), 653–674. <https://doi.org/10.1108/jec-09-2020-0163>

- Singh, A., & Singh, R. (2022). Women Entrepreneurs in India: Evolution, Current Challenges and Future Prospects. *Journal of Pharmaceutical Negative Results*, 13(4), 729–735..
- Srivastava, A., & Jain, A. (2024). The pink billion dollar club: Women entrepreneurs, public policy and the rise of unicorns in India. In *Humanizing Businesses for a Better World of Work* (pp.49–60). Emerald Publishing Limited. <http://dx.doi.org/10.1108/978-1-83797-332-320241004>
- Startup India, DPIIT. (2024). Women Entrepreneurship. Startup India. Retrieved May 25, 2024, from https://www.startupindia.gov.in/content/sih/en/women_entrepreneurs.html
- States' startup ranking, 2022 | National Report. Available at: https://www.startupindia.gov.in/srf-2022/SRF_2022_Result_page/National_Report_14_01_2024.pdf (Accessed: 24 May 2024).
- Suba, B., & Sneka, M. (2016). Women entrepreneurship in India. *Shanlax International Journal of Commerce*, 4(3), 21–36. https://www.shanlax.com/wp-content/uploads/SIJ_Commerce_V4_N3_004.pdf
- Sundarakumar, S., Selvi, J. T., Ilangovan, K., Srinivasan, V., Kannan, A. S., & Arunachalam, V. (2023). Influence of government initiatives and information on Indian women entrepreneurial ventures. In *Advances in Business Information Systems and Analytics* (pp. 209–220). IGI Global. <http://dx.doi.org/10.4018/979-8-3693-2193-5.ch014>
- Technology Development Board, T. (2022). National Tech Excellence Award for Women 2022. <Http://Www.e-Techcom.Tdb.Gov.In/>; Technology Development Board-Department of Science & Technology. http://www.e-techcom.tdb.gov.in/national_awards_women_2022.php
- The Udaiti Foundation (2023, October). https://ifinrlead.org/wp-content/uploads/2023/10/Women-in-India-s-Startup-Ecosystem-Report-WISER_October_2023.pdf. (2023). In <https://www.udaiti.org/>. The Udaiti Foundation. Retrieved May 25, 2024, from https://ifinrlead.org/wp-content/uploads/2023/10/Women-in-India-s-Startup-Ecosystem-Report-WISER_October_2023.pdf

- Tiwari, A., Hogan, T., & O'Gorman, C. (2021). The good, the bad, and the ugly of 'Startup India'-a review of India's entrepreneurship policy. *Economic & Political Weekly (EPW)*, 56(50), 45-52.
- Tripathi, K. A., & Singh, S. (2018). Analysis of barriers to women entrepreneurship through ISM and MICMAC. *Journal of Enterprising Communities: People and Places in the Global Economy*, 12(3), 346-373. <https://doi.org/10.1108/jec-12-2017-0101>
- Tyagi, N., Sharma, R., & Jain, P. (2021). Policy approaches to promote women entrepreneurship in India. In *Sustainable and Responsible Entrepreneurship and Key Drivers of Performance* (pp. 147-165). IGI Global. <http://dx.doi.org/10.4018/978-1-7998-7951-0.ch009>
- Uma, K. (2023). Globalization and Women Entrepreneurship in India. *International Journal of Research in Business Studies*, 8(2).
- Vinoth, P., & Revathy, B. (2016). Women entrepreneurship in india. *Women Entrepreneurship*, 54.
- Virani, S., Sharma, S., & Tapas, P. (2022). Factors influencing the start-up intentions of urban women in India: A theory of planned behaviour based approach. *World Review of Entrepreneurship, Management and Sustainable Development*, 18(3), 282. <https://doi.org/10.1504/wremsd.2022.122539>

About the Author

FACULTY

Aishwarya Bhutoria, Department of English
Anasua Das, Department of Botany
Chitrita Banerjee Department of Bengali
Debolina Guha Thakurta, Department of English
Dishari Mukherjee, Department of bengali
Divyani Sharma, Department of English
Illora Sen, Department of Botany
Mayukh Lahiri, Department of Journalism & Mass Communication
Priyanka Mukherjee, Department of Botany
Santanu Paul, Department of Botany, University of Calcutta
Ruma Pal, Department of Botany, University of Calcutta
Sagufra Sahin, Department of Education, Gour Banga, University
Saikat Kumar Basu, Research Director, PFS, Lethbridge Alberta Canada
Baidehi Mukherjee, Department of English
Baidehi Mukherjee, Department of English
Somdutta Roy, Department of Statistics
Suchhanda Ghosh, Department of Botany
Raikamal Pal, Department of Botany
Surangana Gupta, B.Ed Department
Jayati Das, Department of Geography
Vidhi Banka, Department of Commerce
Ashu Pugalia, Department of Commerce
Kavitha Sundarajan, Department of Commerce

STUDENTS

Oisi Konar, Department of Botany
Disha Chakraborty, Department of Botany
Trishita Saha, Department of Botany
Barsha Mandal, P.G.Department of English

Deepanjana Halder, P.G. Department of English

Sohini Sarkar, Department of English, P.G. Department of English

Vareeja Ratna, Department of Geography

Debosmita Ghosh, Department of Geography

Shreja Saha, Department of Geography

Adrija De, Department of Geography

Ankita Banerjee, Department of Geography

Tirsha Biswas, Department of Geography

Vidhi Banka, Department of Commerce

Ashu Pugalia, Department of Commerce

Priya K Gopal, Research scholar Department of Botany, University of Calcutta