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# **SPECTRUM**

**INTERDISCIPLINARY RESEARCH  
JOURNAL**

**Research & Development Cell  
St. Xavier's College  
Mapusa – Goa**



**Awarded the status of  
“College with potential of Excellence”  
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(CGPA Score of 3.12 on 4 Point Scale)  
4<sup>th</sup> Cycle**

# SPECTRUM

## Interdisciplinary Research Journal

Volume XV

August 2023



## ST. XAVIER'S COLLEGE MAPUSA GOA

*Managed by Diocesan Society of Education (DSE)*

*Re-accredited by NAAC with Grade A-CGPA of 3.12 4<sup>th</sup> Cycle  
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# **SPECTRUM**

## **Interdisciplinary Research Journal**

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# **F**rom the **Principal's Desk**



I am highly elated to pen down a few words to announce the release of the Interdisciplinary Research Journal “Spectrum” **Vol. XV** of St. Xavier’s College, Mapusa Goa.

The faculty of both Undergraduate and Post graduate Departments have contributed papers related to their research work thus making it possible to publish this college valuable research journal. This Research Journal is also meant to encourage young researchers specially the students. I am sure it will give us readers a broader understanding of the concepts, phenomenon, innovative techniques, solutions, remedies etc. I owe profound gratitude to all the contributors.

I express my warm Greetings and Congratulations to the Editorial Team under the guidance of Dr. Harshala Shetgaokar for their efforts in giving us this thought-provoking research Journal.

God Bless All Your Future Departmental Endeavours.

**Dr. (Mrs.) Blanche Mascarenhas**  
**Professor and Principal**





# M

## essage from the Administrator

St Xavier's College publishes every year this research journal, 'SPECTRUM' which is a compilation



of the various research papers written by our faculty and students on different subjects. In the field of education, research plays an important part, as it is 'like a master of a house, who brings out of his treasure what is new and what is old' to summarize it in the words of Jesus (Mt. 13, 52). It gives me a great pleasure to indite these few words, first of all to congratulate the staff members who undertook research in their respective field of specialization, and whose works are reproduced here for the benefit of everyone else, especially the students.

We are students, forever. Our education never ends. We are forever teaching ourselves, either formally or informally, because, as the ex-President of India, A. P. J. Abdul Kalam, of revered memory, says: Learning gives creativity. Creativity leads to thinking. Thinking leads to knowledge, knowledge makes your great". It may not result in material greatness but gives us the greatness that arises from moral power, which is able to bind everyone into a seamless humanity, that transcends all the boundaries of region, nationality, race, colour, religion, caste and gender. We have great examples of such great men in the persons of

Mahatma Gandhi, Martin Luther King, Jr, Abraham Lincoln, all who had to pay with their life as they were unbending in their principles of love, tolerance, and oneness of mankind.

I extend my sincere congratulations to the Editorial Board for working hard to bring out this issue and hope that all, especially the students, will profit from it, and may it also provide the necessary impetus for others to undertake such research studies.

God bless you all.

**Fr. Tony Salema**  
**Administrator**



# **F**rom the Editor's Desk



The National Education Policy (NEP) 2020 emphasizes on development of the creative potential of students by encouraging 4 C's critical thinking, creativity, collaboration and communication. In order to strengthen education at every level the Central Government of India is promoting the use of technology and improving quality research at higher educational institutes.

The Research and Development Cell of St. Xavier's College takes great pleasure in releasing the XV<sup>th</sup> Volume of the Interdisciplinary Research Journal 'Spectrum'. The research journal Spectrum provides a medium for our teachers and students to communicate their research findings and inculcate a culture of research in the reader's mind.

I wish to express my sincere gratitude to our Principal Prof. (Dr.) Blanche Mascarenhas and to our Administrator Fr. Tony Salema for their encouragement, support, and co-operation. I appreciate and sincerely thank the authors for their contribution. I am greatly indebted to the reviewers for doing the fine task of peer reviewing. I thank my editorial team members for their dedication and tireless effort towards the successful release of 'Spectrum' Vol. XV.

I hope Spectrum intended to reflect new directions of research and report latest findings will enrich the readers with knowledge and stimulate novel research ideas.

**Dr. Harshala Shetgaokar**  
**Assistant Professor, Department of Botany**



**St. Xavier's College, Mapusa - Goa**

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# **A Commentary on the Justice of Daenerys Targaryen, As Shown in the HBO Series *Game of Thrones***

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**Abstract:** The aim of this article is to disprove the adulation paid to the character Daenerys Targaryen, who is upheld by popular masses as the beacon of justice and compassion. While many consider her a feminist icon, a symbol of environment, and an example women ought to emulate, the truth about this woman's individual development tells a different story. If anything, Daenerys is an example of an individual bitter with hatred, drunk on revenge and deluded with power, who functions on feelings rather than rational thought. Daenerys is an illustration of fascist power and the destructions it brings to the individual and society. The primary resource used is the HBO series *Game of Thrones*, created by David Benioff and D. B. Weiss.

**Key Words:** Justice, Daenerys, Revenge, Retribution, Restitution

## **Introduction**

This article shall comment at length on the justice (or pseudo-justice) of Daenerys Targaryen, as depicted in the HBO series *Game of Thrones*, created by David Benioff and D. B. Weiss. The series itself is an adaptation of George R. R. Martin's novel *A Song of Ice and Fire* and its subsequent sequels. The hypothesis is that Daenerys has a skewed sense of justice which is founded on vindictive desires for power, rather than truth and charity. A good leader understands that one ought to strike a balance between justice, truth and charity. This balance ensures that there is no room for fascist decisions. Daenerys lacks this quality as queen, which ultimately leads to her descent into fascist destruction.

One is aware that the general critique of the final season of *Game of Thrones* involves disappointment in the way the episodes were structured and written. However, given the characterization and arc of Daenerys, considering her god-complex, attempting to save masses of oppressed communities in the name of justice, when what she was really doing was building a royal court and army in order to conquer King's Landing; it was inevitable that her pride would one day facilitate her fall.

### **The Justice of Daenerys**

Daenerys' justice is retributive. In her mind, those who do wrong are inherently evil and must be punished, or even, annihilated. Evil people, according to her, are no different from germs, and should be treated no differently. The problem is that evil begets evil. The desire for revenge and the act of extracting it begins a vindictive cycle of bloodshed that can only be broken by mercy. Revenge drags down innocents, be it individuals, families, or whole nations. Which is exactly what happened when Daenerys burned down the entirety of King's Landing, along with all of its inhabitants; all because one of her dragons was killed. This mad gesture was the fruit of the gradual build-up of the character's god-complex and the resultant downfall.

As a child, Daenerys was wronged by people wielding more power than herself with no agency to exercise her right to a good life. Having suffered severe injustice at the hands of her family, she developed a fractured sense of self-righteousness, that eventually evolved into fascism. Her actions, while Machiavellian, are also rooted in an inordinate desire to act as the saviour of the oppressed. She wants to restore justice, bring peace, and show sinners their rightful place, albeit through means that suit her agenda of revenge and retribution. She wants to take down the crucified innocent from the cross and nail the wrongdoer to it instead. She wants the perpetrators of injustice to suffer the consequences of their own action; for the sinner to understand and experience what it is like to be sinned against. She has no room for mercy, as she perceives it as a sign of weakness. For Daenerys, the wages of sin include death and sinners don't get a shot at redemption, for they deserve no mercy.

However, how does one determine who is evil and who is not? Does the degree of sin reduce its culpability? Does the intention of the sinner matter? What about the mental state of the sinner, his socio-cultural background?

Human beings are a complex construction of mind and soul, intellect and conscience. People sin out of ignorance, or on account of prejudicial customs inherited through social conditioning. At times, personal experiences may lead a person to make decisions that might be morally ambiguous. In other instances, People are pushed into sinful situations by circumstance, in which case, they are not sinning for pleasure, but merely trying to survive. There are also cases where some people lose all inhibition and end up doing things they will deeply regret later. They might even resort to suicide out of guilt. Finally, there are those who resort to sin out of a misguided sense of justice, taking it upon themselves to destroy anyone who stands in their way— like Hitler or Robespierre.

Individuals who have been wronged often experience a sense of power when they punish their perpetrators. It involves taking back control from those who once used it to hurt them. When revenge is exercised on a larger scale, it is often done with a false sense of bravado, a sort of pseudo-justice, which is rooted in the desire to make oneself feel superior or more righteous than others. Moreover, a pervading sense of victimhood often serves as a breeding ground for fascist thoughts as observed in the case of Hitler. Self-pity begins to warrant what it perceives to be justice, when in fact it is the satiation of one's injured ego, which begins to crave retribution.

Daenerys got a kick out of the retribution she meted out to transgressors. Her administration of justice is an act of showmanship, almost performative. With her dragons, the Unsullied, and the Dothraki, she was well equipped to begin a peaceful or at least mildly combative takeover of King's Landing, which was the site of the Iron Throne (A Wiki of Fire and Ice, 2011) that Daenerys desired. The death of a single dragon leading her to torch the entire city killing dozens of innocents is often thought of as the beginning of Daenerys' descent into madness. However, the problem does not begin there; the incident at King's Landing is merely the culmination of an evolving God-complex, where Daenerys was convinced, she was powerful enough to bend everyone's wills in subordination to her own.

The repeated victories of her armies and the adulation she received from the slaves she freed gave her a sense of bravado, which was probably amplified by her evolution from a timid child who was bartered and objectified to a dragon-riding warrior queen. While initially she claims that her rule is not going to be fascist or ruthless, she exercises power with fascist ruthlessness. She crucifies 153 slave masters on the same crosses where 153 slaves were crucified. One of the masters turns out to be a man who had actually raised a cry against slavery. Thus, we see that Daenerys' justice does not spare the just. Her justice is based on superficial and generic perception of any give situation.

On several occasions, Daenerys is advised by Ser Barristen Selmy to base her justice on mercy. Tyrion Lannister too decries her fascism, calling for her to be merciful. Daenerys is fueled by the anger she has internalized from her suffering and ends up channeling it out in a very destructive way. In the final season, when Jon Snow insinuates that people can choose for themselves, Daenerys declares that "They don't get to choose" (Epic, 2019). When he confronts her with her murderous rampage on innocents, especially children, she claims in traditional Machiavellian fashion that "It was necessary" (Epic, 2019).

Justice should be based on the truth and should protect it. The execution of justice is meant to be guided by Prudence, which itself springs forth from wisdom, and one who is wise is also merciful. The merciful forgive out of charity. Charity pays homage to the truth and upholds it. Truth is objective and absolute; it is founded on love and always points towards what is good and right. What is good and right is ordered to serve God and neighbor. Thus, one who walks in the truth, walks in love, for truth knows no wrong. Truth is opposed to hate. Truth transcends misery. Truth brings peace. Charity is the cradle of truth, the seat of wisdom and the scale of justice.

There is no justice in revenge and there is no wisdom in violence. Forgiveness and mercy must be exercised towards others as well as towards oneself. Jon snow tries to help Daenerys understand the importance of forgiveness, particularly forgiving those who have broken one's heart (Epic, 2019). She, however, refuses to listen. "I can't hide behind small mercies," (Epic, 2019) is her response.

Resentment and revenge have the potential to destroy the avenger's conscience. The same has been seen to hold true in the case of many fascist dictators as well as the leaders of several democratic nations. Prejudicial resentment when it goes unchecked and is allowed to fester and grow within oneself has the power to dull the conscience. The rationalizations presented by such a one's mind are often fueled by egotistical ambition. In this case, one begins to believe that they possess a pre-ordained right of some sort to bring restore equilibrium to a situation they have perceived to be chaotic. Such individuals often assume that they are doing the world a favor of some sorts, they genuinely believe that what they are doing is absolutely right. They believe themselves to be guardians of truth they have concocted in their psyche; they make gods out of themselves and revel in the adulation of blind followers. They use fear to stay in power. Fear is the compass they use to navigate the desires of the masses and manipulate these desires to serve their own personal agenda. It must also be noted that such individuals are overly attached to titles and honors, thus we see Daenerys almost always being addressed in a single breath as "the unburnt, the mother of dragons, the breaker of chains, rightful heir to the iron throne, ruler of the seven kingdoms, protector of the realm," a realm she unscrupulously seeks to destroy if it doesn't adhere to her ideology.

Fascists are known to go insane, it's either that or the masses themselves overtake the fascist's breakdown. Real justice does not sleep. However, one also needs to remember that every single action has a consequence, good or bad. These consequences cannot be suppressed or averted. They may be delayed but are inevitable.

### **Retribution vs Restitution**

Evil is the result of a human being's free will, and since it is a person's own will, God can't stop him/her from exercising that will. The idea of a vindictive God is man-made. It is this unfortunate conception of a petty revengeful deity that has fueled religious fanatics for thousands of years. This quality that men have projected on God is simply a shadow of their own psyche. Hitler was a vindictive and petty man, who turned his personal resentment into a national sentiment, evolving it into a cry for justice which finally culminated into genocide. Such

individuals misrepresent the truth, they manipulate facts to suit their agenda, they persecute communities based on a false perception of justice, because they believe that retribution will set things right. Ramzan Kadyrov, the Chechen tyrant, believes that being a homosexual is a sin. Hitler believed that being a Jew was a crime. These opinions, and ideologies aren't based on truth, but on prejudice; it lacks wisdom and charity.

Daenerys was prejudiced against the entire class of wise masters/ slave owners. To her they were all bad, all evil, all corrupt. Every single one of them was the same, hence they all deserved to die. She does not base her judgement on evaluation, or analysis, but on sentimentality. The execution of an emancipated slave is an example of this.

The Sons of the Harpy, who belong to the class of the high-born masters, wish to reinstate slavery, and to do this they use violence. One of the alleged Harpies is caught. Daenerys wishes to execute but her advisors recommend a fair trial, going by the premise that everyone, innocent or not, deserves a chance to explain themselves. Daenerys does not comprehend the meaning of a trial. This becomes evident when the accused is assassinated by an emancipated slave, one of the free folk. Now this man is also guilty of a crime, hence if Daenerys was willing to give fair trial to the Harpy, she ought to have granted the same to the ex-slave. Instead, she makes a public spectacle of the situation, by having the man executed before a gathering of masters and the free folk. Despite cries from the free folk and the accused begging for mercy, Daenerys orders that the man be executed. Thus, we understand that she does not comprehend mercy, and hence, she does not understand justice.

Daenerys functions on the principle of “an eye for an eye and a tooth for a tooth.” The dragon queen's ardent desire to free every slave and punish every slave owner has nothing to do with kindness or love, but everything to do with self-pleasing, and providing herself with a sense of false bravado. The free man who assassinated the harpy acted out of fear, he shared the fear of all the free folk who were terrified of being pushed back into slavery. Daenerys punished him for doing the same thing that she did. In Astapor and Yunkai, she ordered the unsullied to kill all their masters.



Instead of giving the free folk a new identity she orders them to imitate the corruption of their masters. Instead of bidding the slaves to take the high road, she orders them to stoop to the same level as the slave owners. She doesn't realize that violence breeds more violence. In the case of Daenerys, her acts of violence were birthed by prejudice.

While prejudice is inevitable given our concupiscence, it is unacceptable to weaponize prejudice in the name of truth and justice. The allied soldiers who defeated the Nazis and went on a barbaric rampage through German towns and cities were just as horrid as the Nazi soldiers who did the same with Jews. Both acted out of personal bias and a pseudo-nationalist sentiment. Both believed they were charged with a noble task of bringing retribution upon the enemy.

As opposed to retribution, restitution— put simply— is making amends. Restitution gives the sinner an opportunity to recognize the gravity of their actions and reform themselves. It is meant to facilitate the rehabilitation of one's conscience by helping the reprobate understand why his actions are wrong, and how he can make amends. While the latter cannot undo the sin, it does break the chains of continuous evils. The primary victim of sin is the sinner himself/herself. With proper guidance and counselling, wounds that a criminal has inflicted upon him/herself are healed. In the absence of a guide, prisoners are often left to reflect alone.

When a malefactor is given a chance to repent, and if he does take that chance, he gets an opportunity to reform himself. He can take accountability for his actions. This is a gift that is birthed by mercy. Daenerys is unmerciful; thus, restitution is a concept alien to her.

Restitution always begins with the confession of one's sins. Repentance then paves the way for insight. Or perhaps it is insight that helps one to observe and realize the gravity of one's sin and then repent for it. Once repentance sets in, the next step is to make amends, first by seeking forgiveness externally and then internally by learning to forgive oneself. The final step is to take responsibility for one's action.

No such development takes place with Daenerys, since after a certain while her decisions cease to be based on conscience, and are fully governed by her intellect, or her ego. When Jon Snow explains that she gives her transgressors a chance to take accountability for their actions,

Daenerys obstinately shuts him down. Daenerys believes she is immaculate in everything she does, she believes blood needs to be shed for people to be free, not her own blood, but the blood of her enemies. She frees the Unsullied to get herself an army. Yes, she gives them the option of walking away as free men after she has ordered them to murder her captors, but they stay back to serve her. If Daenerys wanted an army she should have taken anyone other than the Unsullied. By removing them from one form of servitude, she locks them into another form of it. Superficially it seems awesome that the people she freed now serve her out of their will. It is nonsensical to assume that men who have been castrated and brainwashed into thinking of themselves as hounds of war from their infancy, men whose agency of free will has been snuffed out of their soul even before they reached the age of reason, would be able to fathom the meaning of freedom. They serve Daenerys, not out of free will, but because they know nothing else. Their logic is based on the principle of dog-like loyalty to the master, and if any betrays the master that individual ought to be killed. That's what Greyworm, the commander of the Unsullied, does after the Great War has ended. He turns into a Robespierre of sorts, reaping any and everyone who went against his queen. Daenerys' lack of conscience is also the reason why she has her dragons roast alive anyone who opposes her. She does not believe in restitution; in her mind she is the harbinger of justice.

## **Conclusion**

Daenerys's story highlights the dangers of adopting a holier-than-thou mindset. No ruler, regardless of how pious or holy or innocent he/she might perceive him/herself, is perfect. No individual, for that matter, is perfect. Everyone has prostituted their soul to sin, in ways both mortal and venial. It is vainglorious to think oneself better than another. The greatest of all whores, is the one who derides his fellow sinners by regarding them as the scum of the earth, no better than germs.

Popular justice, even in the 21<sup>st</sup> century, is barbaric. It is an echo of Daenerys' call for retributive revenge. The mobs are out for blood. There is little to no chance for forgiveness, rehabilitation or reform. The world is so divided and deluded with what it perceives as social

justice, that the individual often holds his peers to a standard so high, one would think angels walked the earth instead of humans. Media trials are the modern replicas of the Roman death pits, where alleged criminals (without proof of guilt) are thrown into the arena to be torn apart limb by limb. The mobs of mainstream social media bear a stark resemblance to the pharisees who were salivating to stone the prostitute to death. It is quite rare for the existing judiciary to deliver justice based on truth and prudence. Even if that is the case, it is often too little, too late. The justice of the world does not function on the same basis as the justice of God, for the standards set by the world are very different from those set by God. For while God is just, he is also merciful, compassionate and slow to anger.

How easy it is to point fingers and publicly deride and obliterate others' reputation. The court of law is no longer the last place of trial, netizens now take it upon themselves to present touchstones of what they think is right. It satisfies one's ego to witness the fall of another person, perhaps because one's mind is diverted from one's own shortcomings, or maybe because the gravity of someone else's fault makes one's own seem minimal. Sometimes the down-spiraling of another's reputation serves as entertainment for the masses. To them, it doesn't matter whether this person's guilt is proven or not. It is a sick form of egotistic gratification to throw stones at a fellow sinner.

It is necessary to correct or rectify behavior that is wrong or immoral. It is unnecessary to terminate a person altogether for a crime. Rehabilitation is a right everyone deserves. Only a psychopath or a neurotic might find it difficult to rectify his behavior, but even such as these are not without hope.

Daenerys, in true authoritarian fashion, took it upon herself to decide who gets to live and who gets to die. She became the lone decision maker of her team (Ng, 2019). She made a little god out of herself. In the name of justice, she spiralled down into fascism. It is, however, quite easy to analyse why this might have happened. Daenerys suffered much, her wounds were deep, and she did not heal. The pain within turned to resentment which then bred revenge. Many of her issues remained unresolved to the end. It is not enough to say that power deluded her, ultimately causing her to lose sight of what is truly right and wrong; Daenerys was impudent with regards

to following the guidance of her counsellors. She is an example of what happens if one takes decisions based on emotions instead of sound prudence. The loss of her friends and her dragons pushed her over the edge. Her decision to set fire to the city and burn down thousands of innocents was completely emotional. She was blinded by revenge, pain and anger. However, this was the culmination of decades of emotional decisions, as pointed before. Thus, Daenerys' end is tragic. Had John Snow not killed her, she might have killed herself or someone else might have completed the job. It is very rare for a fascist to permanently hold power. Their reign always ends, at least that is what history teaches us.

### **Acknowledgement**

The writer is indebted to Dr. Prema Rocha for rendering her continual guidance and patient assistance in the publication of this article. Gratitude is also owed to St. Xavier's College, Mapusa, for encouraging free and critical thinking, while also providing an unbiased platform for diverse opinions.

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# **Gratitude Interventions for Enhancing Physical and Mental Health Outcomes: A Systematic Review of Moderators and Personalized Approaches**

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**Abstract:** This systematic review paper explores the effects of gratitude interventions on physical and mental health outcomes, as well as the role of moderators in influencing these effects. Gratitude interventions have been found to have positive effects on both physical and mental health outcomes, including reductions in symptoms of depression, anxiety, and stress, as well as improvements in physical health markers such as blood pressure and sleep quality. However, not all individuals may benefit equally from these interventions, and factors such as individual differences, cultural factors, delivery mode, and timing and duration may all play a role in the effectiveness of these interventions. This paper highlights the importance of a personalized approach in optimizing the benefits of gratitude interventions for physical and mental health outcomes.

**Keywords:** Gratitude interventions, physical outcomes, mental outcomes, moderators

## **Introduction**

Gratitude is a positive emotion that arises from acknowledging the good things in life. It has been defined as a feeling of appreciation or thankfulness for something that has been given or received. Gratitude is defined by Emmons RA and McCullough ME, [2003] as the feeling of appreciation or thankfulness for something received or experienced. Over the past two decades, there has been increasing interest in the effects of gratitude on health and well-being. Researchers have investigated gratitude interventions, which are designed to increase feelings of gratitude through various exercises or practices.

Gratitude interventions are designed to increase feelings of gratitude and appreciation, and there are various types of interventions that have been studied in the literature. Emmons RA

and McCullough ME, [2003] identified several types of gratitude interventions, including gratitude journaling, gratitude letters, gratitude visits, and gratitude meditation. Gratitude journaling involves writing down things that one is grateful for on a regular basis, while gratitude letters involve writing a letter of gratitude to someone who has positively impacted one's life. Gratitude visits involve visiting someone in person to express gratitude and appreciation, and gratitude meditation involves focusing on feelings of gratitude and appreciation during meditation practice.

Other researchers have also identified additional types of gratitude interventions, such as the Three Good Things exercise, which involves reflecting on three good things that happened during the day and the reasons why they occurred [Seligman ME et al., 2005]. Huffman JC et al. [2016] studied the use of positive psychology exercises, including gratitude interventions, in suicidal inpatients and found that they were feasible and useful.

Gratitude interventions have been shown to have a positive impact on both physical and mental health outcomes. These interventions are relatively simple, accessible and inexpensive, making them a promising tool for promoting well-being and mental health. In recent years, gratitude has gained attention in the field of psychology due to its potential as a therapeutic intervention. In this paper, we will review the current literature on gratitude interventions and their effects on physical and mental health outcomes.

## **Physical Health Outcomes**

Gratitude interventions have become increasingly popular as a way to improve well-being and promote positive health outcomes. While previous research has focused on the psychological benefits of gratitude interventions, recent studies have investigated the impact of gratitude interventions on physical health outcomes. For example, a randomized controlled trial by Emmons RA and McCullough ME [2003] found that participants who kept a daily gratitude journal reported fewer symptoms of illness compared to a control group. In a systematic review of gratitude interventions by Boggiss AL et al. (2020) found that Subjective sleep quality was improved in 5/8 studies. Improvements in blood pressure, glycemic, asthma control and



eating behavior were understudied yet demonstrated improvements (all 1/1). Following are the research evidences of physical health outcomes after using gratitude interventions.

- *Improved Sleep:* Several studies have investigated the impact of gratitude interventions on sleep. Wood AM et al. [2009] conducted a study in which participants were randomly assigned to either a gratitude journal group or a control group. The gratitude journal group was instructed to write down five things they were grateful for each day, while the control group was instructed to write down five hassles, they experienced each day. After two weeks, the gratitude journal group reported significantly better sleep quality and sleep duration than the control group. Similarly, a study by Mills PJ and colleagues [2015] found that a gratitude intervention resulted in improved sleep quality and duration among participants. Similar results were found by Jackowska M et al. [2016] indicating the positive effects of gratitude interventions on sleep.
- *Reduced Inflammation:* Inflammation is a key contributor to a range of chronic health conditions, including cardiovascular disease, diabetes, and cancer. Several studies have investigated the impact of gratitude interventions on inflammation. Huffman JC et al. [2016] conducted a study in which suicidal inpatients were assigned to either a gratitude letter group, a future-directed thinking group, or a control group. After four weeks, the gratitude letter group showed significant reductions in levels of C-reactive protein [CRP], a biomarker of inflammation, compared to the control group. Similarly, Kyeong S et al. [2017] found that a gratitude meditation intervention led to significant reductions in CRP levels in women with chronic low back pain. A randomized controlled trial by Huffman JC and colleagues [2016] found that participants who practiced gratitude meditation had lower levels of inflammation, a known risk factor for cardiovascular disease, compared to a control group.
- *Lower Blood Pressure:* High blood pressure is a significant risk factor for cardiovascular disease. Several studies have investigated the impact of gratitude interventions on blood pressure. In a study conducted by Shipon RW [2007], patients in the gratitude condition who completed the study achieved statistically significant decreases in their systolic blood pressures, whereas study completers in the control group did not. Similar findings were

obtained by Jackowska M et al. [2016] who found that a gratitude intervention led to improvements in subjective well-being which were correlated with reductions in blood pressure. Similarly, a study by Wood AM and colleagues [2010] found that participants who wrote a gratitude letter to someone they were thankful for had lower blood pressure compared to a control group.

- *Enhanced Immune Function:* The immune system plays a critical role in defending against infections and disease. One of the physical health benefits of practicing gratitude identified includes showing heightened immunity in both healthy and sick persons. Brydon L and colleagues [2009] in their research findings suggested that optimism may promote health, by counteracting stress-induced increases in inflammation and boosting the adjuvant effects of acute stress. Research has supported that the intrinsically rewarding experience of gratitude is also associated with greater optimism proving the relationship between gratitude and immune function [Emmons RA and McCullough ME 2003; Froh JJ et. al. ,2008]. Hazlett LI et. al [2021] found that those who showed larger pre- to- post-intervention increases in self-reported support-giving showed larger reductions in amygdala reactivity following the gratitude task [vs. control task]. Where Reductions in amygdala activity were associated with reductions in inflammation closely associated to immunity functioning.

The literature suggests that gratitude interventions have a positive impact on physical health outcomes, including improved sleep, reduced inflammation, lower blood pressure, and enhanced immune function. Considering the myriad of psychological and pro-sociologic benefits enjoyed by those who recognize and share in the benevolence of others, the realization that direct and concrete physical benefits may also accrue. While more research is needed to fully understand the mechanisms underlying these effects, these findings suggest that gratitude interventions may be a promising tool for promoting physical health and well-being.

### **Mental Health Outcomes**

Gratitude interventions have also been shown to have a positive impact on mental health outcomes. These interventions typically involve expressing gratitude for people, experiences, or

things in one's life. Previous research has shown that gratitude interventions can have a range of psychological benefits, including increased well-being, reduced stress, and improved relationships. Bohlmeijer, ET et al. [2021] in their study found that a 6-week gratitude intervention was an effective, low-intensity intervention for enhancing mental well-being. Tolcher K [2022] found that Participants in all three gratitude intervention groups showed improvements in well-being over time, whereas the control group did not report any such improvements. Gratitude journaling appeared to have the most significant positive impact on well-being and affective functioning. While Cheng [2015] concluded that Taking stock of thankful events is an effective approach to reduce stress and depressive symptoms among health care practitioners. Following are related research evidences of gratitude interventions and its effects on mental health.

- *Increased Happiness:* Several studies have investigated the impact of gratitude interventions on happiness. Emmons RA and McCullough ME [2003] conducted a study in which participants were randomly assigned to one of three groups: a gratitude journal group, a hassles journal group, or a control group. After ten weeks, the gratitude journal group reported significantly higher levels of happiness than the other two groups. Similarly, Seligman ME et al. [2005] found that a gratitude intervention led to significant increases in happiness among participants. Another study by Witvliet CV [2019] found that the grateful remembering condition (vs. control) prompted significant increases in state hope and happiness, commending grateful remembering as a practice that can bolster present happiness and hope for the future.
- *Reduced Depression and Anxiety:* Depression and anxiety are two of the most common mental health disorders. Several studies have investigated the impact of gratitude interventions on these conditions where stronger feelings of gratitude have been related to less psychological distress [Fredrickson BL et al., 2003] Kashdan TB et al. [2006] conducted a study in which participants were randomly assigned to either a gratitude intervention group or a control group. After two weeks, the gratitude intervention group showed significant reductions in symptoms of depression and anxiety compared to the control group. Cregg DR and Cheavens JS [2020] based on their research findings

suggested the effects of gratitude interventions on symptoms of depression and anxiety were relatively modest. Similarly, Wood AM et al. [2010] found that a gratitude intervention led to significant reductions in symptoms of depression and anxiety among participants.

- *Improved Resilience:* Resilience refers to an individual's ability to bounce back from adversity and cope with stress. Several studies have investigated the impact of gratitude interventions on resilience. Lambert NM et al. [2009] conducted a study in which participants were randomly assigned to either a gratitude intervention group or a control group. After two weeks, the gratitude intervention group showed significant increases in resilience compared to the control group. Additionally, Sirois FM and Wood AM [2017] found that a gratitude intervention led to significant improvements in resilience among participants with chronic illness. Bono G et al. [2020] based on their findings suggested that grit and gratitude can be promoted to protect college students' subjective wellbeing and better cope with adversity, indicating a positive relationship between gratitude and resilience.
- *Enhanced Social Connectedness:* Social connectedness refers to the sense of belonging and support that individuals feel from their social networks. Several studies have investigated the impact of gratitude interventions on social connectedness. Algoe SB et al. [2008] conducted a study in which participants were randomly assigned to either a gratitude intervention group or a control group. After two weeks, the gratitude intervention group showed significant increases in feelings of social support and connectedness compared to the control group. Similarly, Kini P et al. [2016] found that a gratitude intervention led to significant increases in feelings of social connection and decreased feelings of loneliness among participants.

Gratitude interventions have also shown improvements in the following areas. For example, a randomized controlled trial by Seligman ME and colleagues [2005] found that participants who wrote and delivered a gratitude letter experienced a significant increase in happiness and a decrease in depressive symptoms compared to a control group. Similarly, a study by Rash JA and colleagues [2011] found that a gratitude intervention resulted in decreased

symptoms of posttraumatic stress disorder [PTSD] among military veterans. Gratitude interventions have also been shown to have a positive impact on subjective well-being. For example, a study by Lyubomirsky S and colleagues [2005] found that participants who practiced a gratitude exercise reported higher levels of subjective well-being compared to a control group. Similarly, a study by Sansone LA and colleagues [2010] found that participants who practiced gratitude exercises reported increased feelings of contentment and satisfaction with life.

The above discussed literature suggests that gratitude interventions have a positive impact on mental health outcomes, including increased happiness, reduced depression and anxiety, improved resilience, and enhanced social connectedness. While more research is required to further understand these effects, the above findings suggest that gratitude interventions may be an effective intervention tool used to enhance mental health and well-being.

### **Moderators of the Effects of Gratitude Interventions**

Gratitude interventions have been found to have positive effects on both physical and mental health outcomes, including reductions in symptoms of depression, anxiety, and stress, as well as improvements in physical health markers such as blood pressure and sleep quality. However, not all individuals may benefit equally from these interventions. Several moderators have been identified that may influence the effects of gratitude interventions on physical and mental health outcomes.

- *Individual Differences:* Several studies have investigated the impact of individual differences on the effectiveness of gratitude interventions on physical and mental health outcomes. For example, Wood AM et al. [2010] found that individuals with higher levels of trait gratitude showed greater improvements in well-being following a gratitude intervention. Similarly, Kashdan TB et al. [2009] found that individuals who were more open to experience showed greater reductions in negative affect following a gratitude intervention. These findings suggest that individual differences in personality traits may influence the effectiveness of gratitude interventions on physical and mental health outcomes. Other studies have examined the effects of individual differences on the

effectiveness of gratitude interventions. For example, a study by Wood AM and colleagues [2008] found that participants who scored higher on measures of trait gratitude benefited more from a gratitude intervention compared to those who scored lower on trait gratitude.

- *Cultural Differences:* Cultural differences may also play a role in the effectiveness of gratitude interventions on physical and mental health outcomes. For example, Corona K et. al. [2020] found that Latino Americans reported a higher disposition toward gratitude than did East Asian Americans. Higher disposition toward gratitude was associated with higher self-esteem and with less loneliness and perceived stress across groups. Similarly, Shin LJ et. al. [2019] demonstrated that expressing gratitude may be a less effective happiness-promoting activity in collectivist cultures. These findings suggest that cultural factors may influence the effectiveness of gratitude interventions on physical and mental health outcomes.
- *Delivery Mode:* The mode of delivery may also influence the effectiveness of gratitude interventions on physical and mental health outcomes. For example, Regan A et al. [2023] found that a gratitude letter intervention resulted in greater subjective well-being and other positive outcomes compared to gratitude journal intervention. Similarly, Sin NL and Lyubomirsky S [2009] found that a gratitude visit intervention was more effective in promoting well-being among individuals who were less satisfied with their lives compared to a gratitude letter intervention. These findings suggest that the mode of delivery may need to be tailored to the individual's needs and characteristics in order to optimize the physical and mental health outcomes of gratitude interventions.
- *Timing and Duration:* The timing and duration of gratitude interventions may also influence their effectiveness on physical and mental health outcomes. For example, Seligman ME et al. [2005] found that a gratitude intervention was more effective in promoting happiness among participants who completed the intervention for longer durations [i.e., six months] compared to those who completed it for shorter durations [i.e., one month]. Similarly, Lyubomirsky S et al. [2011] found that a gratitude intervention was more effective when it was completed for longer durations [i.e., six weeks] compared to shorter durations [i.e., one week]. These findings suggest that the timing and duration of



gratitude interventions may need to be carefully considered in order to optimize the physical and mental health outcomes of these interventions.

- *Frequency of use:* Several other moderators have also been identified that may influence the effects of gratitude interventions on physical and mental health outcomes. For example, a study by O'Connell BH and colleagues [2017] found that the frequency of gratitude journaling was related to the magnitude of the effects on well-being. Specifically, participants who journaled more frequently experienced greater improvements in well-being compared to those who journaled less frequently. Ghandeharioun, A et al. (2016) found that as the average frequency of practicing thankfulness increased by more than 120 %, comparing the baseline weeks with the intervention weeks of the main study, in the course of the study's 5 weeks, increases in dispositional gratitude and in psychological wellbeing were also apparent.

The above literature suggests that individual differences, cultural factors, delivery mode, timing and duration and frequency of use may all influence the effectiveness of gratitude interventions on physical and mental health outcomes. These findings suggest that gratitude interventions may need to be tailored to the individual's needs and characteristics in order to maximize their effectiveness. More research is needed to better understand the role of moderators on the effects of gratitude interventions on physical and mental health outcomes, these findings suggest that a personalized approach may be necessary in order to optimize the benefits of these interventions.

## **Researchers Perspectives and Conclusion**

Gratitude interventions have been shown to have a positive impact on both physical and mental health outcomes. Based on the above findings we can observe the improvement taken place in different aspects of health across several research which have proven its efficacy. These interventions can act as a shield towards protecting individuals from future issues. If used by mental and physical health professionals these interventions can also be used as additional interventions along with traditional treatments to help in the recovery process. The mechanisms

by which gratitude interventions improve health are not yet fully understood, but there are several theories. One theory is that gratitude interventions increase positive emotions, which in turn lead to improved health outcomes [Sansone RA et al., 2010]. Another theory is that gratitude interventions increase social support and promote interpersonal relationships, which are important for both physical and mental health [Seligman ME et al., 2005].

Despite the promising results of gratitude interventions, there are some limitations to the current literature. One limitation is the lack of diversity in samples. Most studies have been conducted with college students or middle-aged adults from Western cultures, limiting the generalizability of the findings. Additionally, many studies have used self-report measures, which may be subject to biases and inaccuracies.

There is a need for more research on the long-term effects of gratitude interventions, as well as the optimal duration and frequency of these interventions. Future research should also investigate the effectiveness of gratitude interventions in clinical populations, as well as in non-Western cultures.

In conclusion, gratitude interventions have been shown to have a positive impact on physical and mental health outcomes. These interventions are relatively simple and inexpensive, making them accessible to a wide range of individuals. Gratitude interventions may be particularly useful in promoting well-being in individuals who are experiencing stress or adversity. However, further research is needed to fully understand the mechanisms by which gratitude interventions improve health outcomes and to determine the optimal duration and frequency of these interventions.

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# **Feminist Process Theology: An Alternative Metaphysics of Religion**

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**Abstract:** The heart of every religion is its theology. Feminists argue, metaphysical theorizing on substance has cast its influence on theology. The metaphysics of substance purports, a substance to possess a fixed essence. Theology has placed God in the place of substance in its metaphysical structuring. The fixed essence of God yields a theology which is dogmatic in nature. A religion entrenched in such dogmatic theology closes its doors to engage with other religions. Feminist process theology offers an alternative to dogmatic theology. The present paper attempts to highlight how feminist process theology in offering an alternate metaphysical perspective facilitates in engagement with other religions.

**Key words:** Theology, Substance, Essence, Feminist Process Theology

## **Understanding Religious Intolerance**

Montesquieu said religious wars are not caused by the fact that there is more than one religion, but by the spirit of intolerance and a spread of such intolerance can only be regarded as the total eclipse of human reason. Theology is defined by Online Merriam Webster Dictionary as the study of religious faith, practice, and experience the study of God and of God's relation to the world. It also stands for a theological theory or system, a distinctive body of theological opinion. In attempting a rational understanding of God and His relations with the world, a sense of dogmatism seeps in. Dogmatism in theory interferes with the practice of the religion. Such a dogmatism is often expressed in the religious attitudes of individuals, acts of violence in the name of religion, a false sense of superiority of one's religion etc.

One of the reasons responsible for religious intolerance is the lack of reasonable engagement amongst religions. A ground for possible reasonable engagement may be found by



examining the metaphysical structures of religious theologies. Feminist process philosophy offers one such metaphysical structure which may open up avenues for reasonable engagement. This paper explores such a possibility by offering a bird's eye view of the same. It is based largely on the arguments by Susan Hekman drawn from her paper, "Feminist New Materialism and Process Theology: Beginning the Dialogue".

## **Process Philosophy**

Hekman believes process theology as one of the most important developments of the twentieth century which was supportive of feminist philosophy. Process philosophy is premised on the dynamism of the being. It holds that reality is not static as supposed by the substance philosophers, but dynamic in nature. In this respect, they stand in opposition to substance philosophy. The substance philosophers can be traced back to ancient Greek philosophers as Parmenides and Aristotle. Parmenides conceived reality as simple, internally undifferentiated, static and change was taken as unreal. As opposed to such a view, process philosophers treat becoming as the fundamental unit of philosophical concerns. Substance philosophers conceive of permanence as the real essence of the substance and its changing features as unreal or an appearance. On the other hand, process philosophers treat change as the real essence and permanence as its unreal characteristic. Substance philosophers focus on what is 'out there' and process philosophers deal with what is occurring.

Process philosophers<sup>1</sup> take their support from Heraclitus who believed that only change is truly permanent. Heraclitus who held one cannot step twice in the same water, as both the water and the man have changed. The world we experience every day is a world filled with change and we observe this change in ourself as well. The world is perceived as an interaction of physical, social, organic and cognitive processes. One of the basic metaphysical categories is the functionality of the entity, expressed as what it 'does'.

## **Process Theology**

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<sup>1</sup> Some of the prominent process philosophers are Plotinus, Francesco Patrizi, Leibnitz, Hegel, Whitehead

Process theology draws its roots from process philosophy given by Alfred North Whitehead and Charles Hartshorne. Whitehead in his book *‘Process and Reality’* (1978) states, “Process and being, furthermore, are inextricably intertwined. The actual world is a process and that process is the becoming of actual entities; each actual entity is an organic process. The process itself is the constitution of the actual entity” (1978, pg. 215-219). Whitehead says one must begin with experience, as process philosophy begins with the experience of the organic relatedness of entities. Charles Hartshorne in his work, *Omnipotence and Other Theological Mistakes* (1984), describes God as not being perfect, omnipotent, omniscient, and unchanging. Such God is sympathetic to the lives of all and therefore has feelings. Humans have freedom of will as God is not deterministic. Process philosophy rejects the dualisms of man/nature, mind/body which forms the basis of anthropocentrism in religions. For Whitehead, all opposites are reconciled in nature of things, which in turn influences his view of theology. He believes God to be an actual entity who creates the world and the world in turn creates God. Thus, He gets affected by the temporal processes.

The most important metaphysical category in process theology is the notion of relatedness. God relates to all and all in turn are related to each other. The world is thus characterized as relational and interdependent. In this interdependent world God needs individuals as much individuals need each other. Hartshorne (1984) expresses it in the following statements in his work, ‘Apart from our interest in others, what are we?’ ‘Apart from others we have no self. What is a person if not a being qualified and conditioned by social relations, relations with other persons?’ Whitehead resonates the same sentiment when he holds that every entity needs a society to exist.

### **Process feminist theology and Process theology**

Process theology and feminist philosophy have two major areas of overlap, their mutual rejection of Cartesian self and notion of relatedness.

Catherine Keller a feminist process theologian, drawing on the notion of relatedness calls upon women to rethink their self in terms of differentiation in relation, not as apart from it. She

asks the questions, ‘need differentiation imply separation? Need connection imply merger?’ (1986, pg.134). The self is a complex mix of feeling that rises up in response to feelings of the plural world. The result is radical relatedness (1986, pg.184). To aid this rethinking of the self, Keller turns to process theology. Women have always known their self and all of reality to be interconnected. Such a self is a process with no fixed substance (1986, pgs.194).

## **Conclusion**

The substance philosophy demands a Cartesian knower who apprehends the truth as being out there. Religious theologies in replacing ‘substance’ with ‘God’, attempting to study God as an entity with fixed essence. Such metaphysical theorizing provides uncertain grounds for a reasonable engagement with other religions. On the other hand, feminist process theology in bringing about the metaphysical structure of ‘relatedness’ provides conducive grounds for reasonable engagement with other religions. When one realizes the connectedness with the other, ‘the other’ gets obliterated as a separate entity which in turn enhances empathy and co-operation.

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# Nano Zero Valent Iron (nZVI): Synthesis, Application in Wastewater as an Effective Technology during Crop Cultivation Process

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**Abstract:** Nano-Zero Valent Iron (nZVI) has been extensively studied as a wastewater treatment in the field of agriculture and in industry. Iron being inexpensive and easy available can be used in removal of heavy metals in nano form. In this review, nZVI is synthesized using borohydride reduction method. The prepared nZVI was confirmed by UV-visible spectroscopy, FTIR and XRD analysis. It was further used in degrading the heavy metals or toxic chemicals present in the fertilizers and pesticides used during the crop cultivation process.

**Keywords:** nZVI, nanotechnology, fertilizers and pesticides, photo-catalytic degradation

## Introduction

Water pollution has been recognized as a major issue worldwide, because of high persistence of unmanageable organic contaminants in the aquatic environment and their unfavorable impact on health.<sup>1</sup> Pollution in fresh water ecosystem can include pathogens, organic matter (including plant nutrients from agricultural run-off such as nitrogen or phosphorus).<sup>2</sup> Rapid industrialization and extensive use of pesticides in agriculture practices have contributed to the leaking of pesticide residues into water.<sup>3</sup>

Nano zero valent iron nanoparticle (nZVI) is inexpensive, non-toxic, and environmentally compatible, a promising material which plays a very important role in environmental remediation.<sup>4</sup> It is an increasingly popular choice for treatment of environmental remediation and remediation of contaminated sites.<sup>5</sup> With the help of nZVI, metals such as Pb, As, Cr, Cd, etc. can be erased easily from water bodies.<sup>6</sup> It has become attractive in the degradation of chlorinated contaminants such as DDT because of its potential to remove all the chlorines much faster than natural process under moderate conditions.<sup>7</sup> One significant lead of using nZVI is its

small size, this quality allows the particles to suspend in water for a longer time, making nZVI useful for in situ treatment of contaminated water. The conventional method used for the synthesis of nZVI is the reduction of ferrous or ferric ion using borohydride in aqueous solution.<sup>8</sup> The characteristics and properties of nZVI produced can be affected by the synthesis process. There are four main steps in the synthesis of nZVI: supersaturation of the solution, nucleation of the nZVI cluster, growth of nZVI nuclei, and agglomeration of nZVI.

In recent times, nanomaterials (including nanocomposites and nano bio composite) with high surface area come out as the most economic, rapid, and effective catalyst. nZVI (photocatalyst) by itself or with oxidizing agents are playing a promising role in elimination of pesticide pollution and open the possibilities for other nanoparticles as well.<sup>9</sup> Photocatalytic degradation is an advanced oxidation process, which can be used to degrade pollutants with high concentration, complexity and low biodegradability.<sup>10</sup> Photocatalytic degradation uses light energy to drive pollutant degradation.<sup>3</sup> The oxidation and hydrolysis of pollutants molecules occurs by absorption of photons in the electromagnetic regions.<sup>11</sup>

## **Materials and Methods**

### ***Synthesis of nano Zero Valent Iron (nZVI)***

The chemicals used in the synthesis are purely of AR grade. Accurately weighed 4.869 g  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  was dissolved in 9:1 (v/v) ethanol/water mixture to give 0.018 M ferric chloride solution. It was transferred in a three-necked flask and stirred continuously. After being well stirred, approximately 100 mL of sodium borohydride solution (prepared by dissolving 2.8 g  $\text{NaBH}_4$  in 100 mL water) was added dropwise. The reaction was exothermic because of the reduction of iron in the reaction mixture. Excess borohydride was used with vigorous stirring for better growth of iron nanoparticles. Black solid precipitate was obtained on adding the very first drop of borohydride solution and this continued till the entire addition process. The reaction mixture was stirred for 10 more minutes after addition of entire borohydride solution. The obtained black precipitate was then filtered continuously with hot water using Whatman filter paper No. 41 till chloride was removed. The final washing was given with ethanol and dried at

room temperature. The washing process is the vital step of synthesis due to the prevention of the rapid oxidation of zero valent iron nanoparticles. The solid black colored was used for further studies.<sup>8,9</sup>

## Results and Discussion

### *Characterization of nZVI*

#### UV-Visible Spectroscopy

The UV Visible spectra of synthesized nZVI in (Figure 1) showed the absorption peak at 368.34 nm. This indicated that the Surface Plasmon Resonance (SPR) due to high band intensity and the peaks under visible spectrum.

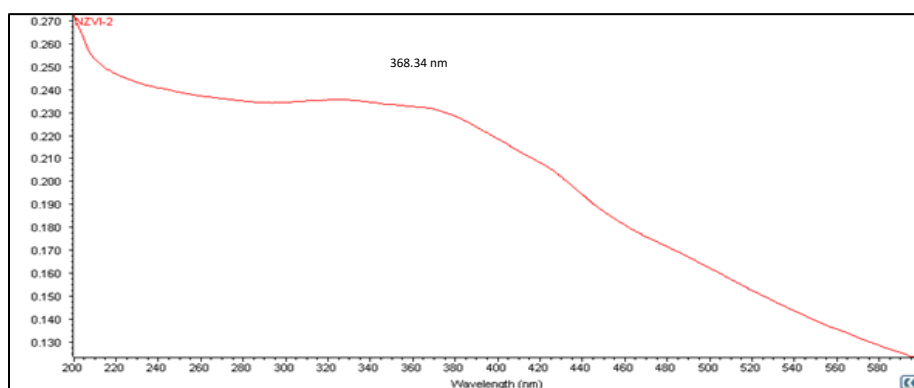


Figure 1. UV-Visible spectra of prepared nZVI recorded in aqueous medium.

#### FTIR Spectroscopy

The functional groups present in the synthesized compound were confirmed from FTIR analysis. Figure 2 shows the functionality present in prepared compound: absorption band at  $3490\text{ cm}^{-1}$  is due to O-H stretching vibration of carboxylic groups. A peak observed at  $1627\text{ cm}^{-1}$  has been related to C=O stretching vibration. Weak signals at  $1015\text{ cm}^{-1}$  and  $652\text{ cm}^{-1}$  are due to C-O stretching and C-H bending vibrations. The presence of oxygen functional groups present in nZVI can be stable site for nZVI.<sup>12</sup>

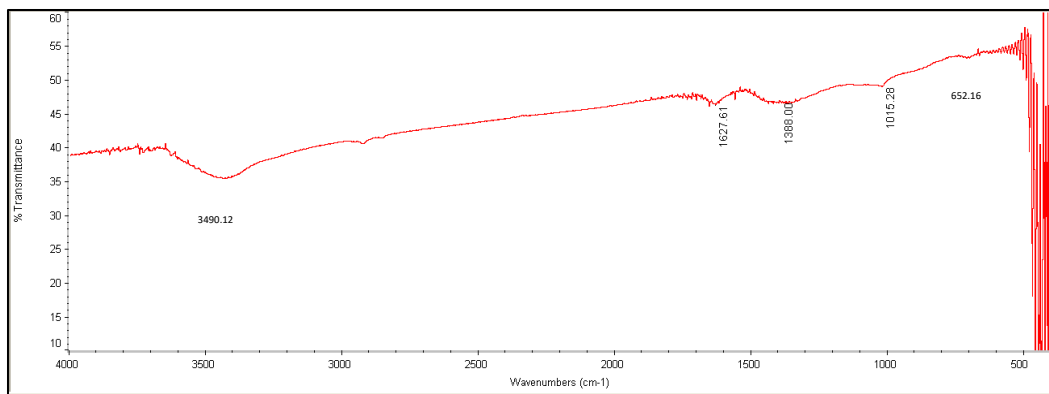


Figure 2. FTIR Spectra of nZVI recorded using KBr.

**XRD analysis**

Figure 3 demonstrates the X-ray diffraction pattern of nZVI prepared using sodium borohydride reduction method. Due to instability of Fe, there was a shift in  $2\theta$  value of  $Fe^0$ . The reflection observed at  $2\theta$  value having intense peak at  $35.7^\circ$  represent (111) lattice plane respectively which confirms the formation of nZVI.

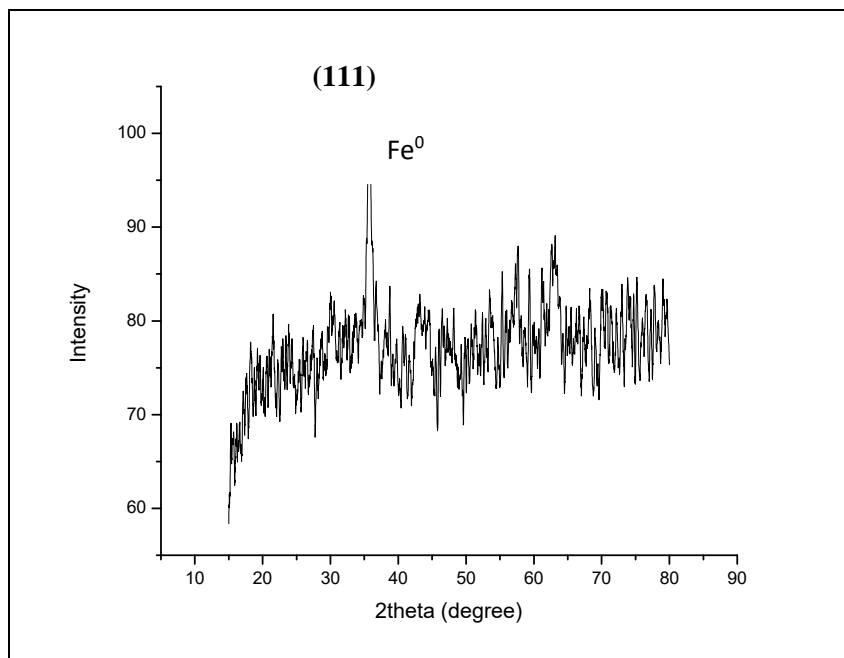


Figure 3. XRD Pattern of nZVI using electromagnetic radiation.



The crystallite size was estimated using Debye Scherer's equation given below where  $d$  is the average crystal size,  $\lambda$  is the wavelength of Cu  $\alpha$  of X-ray radiation and  $\beta$  is full width half maximum (FWHM). The calculated crystallite size of intense peak was found to be 8.054 nm. The shift in the peak value than reported value is because of instability of Fe in nano form.

$$d = k\lambda/\beta\cos(\theta)$$

## Applications

### Electrochemical Measurement

The electrochemical measurement of nZVI was carried out using 3 electrode setup. It consists of prepared nZVI working electrode, platinum as counter electrode and saturated calomel electrode (SCE) as reference electrode. The cyclic voltammograms was recorded at the potential window of -0.2 to 1.4 at scan rate of 50mV/s. the plots of current(A) v/s potential (V) were recorded using different concentration of fertilizers and pesticides using nZVI working electrode to determine the sensitivity.

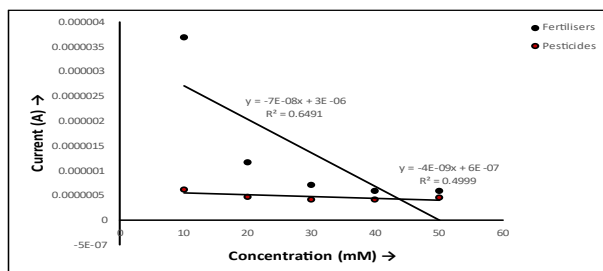


Figure 4a. Current v/s Concentration plots of fertilizers and pesticides of bare electrode at 50 mV/s.

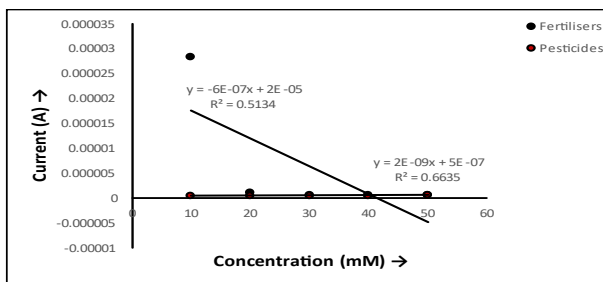


Figure 4b. Current v/s Concentration plots of fertilizers and pesticides using prepared nZVI electrode at 50 mV/s.

The slope obtained from the (figure 4a).and (figure 4b). denotes the sensitivity of fertilizers and pesticides respectively. The Sensitivity obtained for bare electrode for fertilizer and Pesticide are  $-7 \times 10^{-8}$  A/mM and  $-4 \times 10^{-9}$  A/mM respectively. The negative value of sensitivity of bare electrode indicates that the fertilizers and pesticides are toxic to aquatic levels, which can harm the aquatic life when used in the cultivation process. But with using nZVI electrode the sensitivity can be increased to  $-6 \times 10^{-7}$  and  $2 \times 10^{-9}$  A/mM for fertilizers and pesticides. This study confirms that by using nZVI the sensitivity can be moderate and less harmful to aquatic levels.

### Photocatalytic degradation

The degradation study was carried out using nZVI catalyst in order to degrade the toxic chemicals present in the fertilizers and pesticides which were left in the water bodies. About 10 mg of fertilizers and pesticides mixture were dissolved in 100 mL of water. Figure 5 describes the photo-catalytic degradation of fertilizers and pesticides.

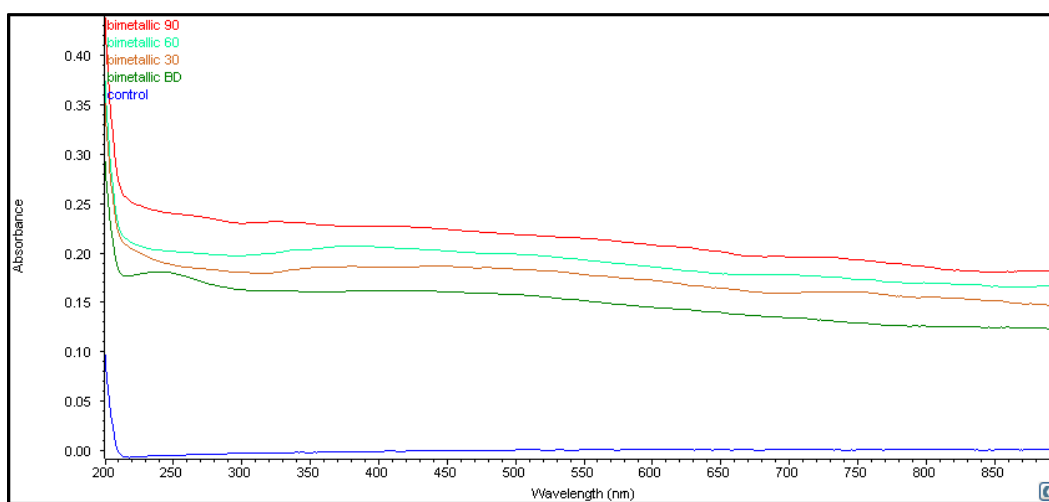


Figure 5. Represent the photocatalytic degradation of nZVI at different time intervals.

Initially absorbance of solution without using catalyst was noted down. To the prepared mixture containing 50 mL in beaker 5 mg of nZVI catalyst was added and kept under the

sunlight and later absorbance was noted after every 10 minutes. It has been observed that there was an increase in absorbance which concludes that the complex can be formed with the catalyst which can be less harmful to the water bodies compared to the control without using catalyst.

## Conclusion

Nanotechnology has shown tremendous applications in the field of water pollution control. In order to solve this concern nZVI has been successfully synthesized which was characterized by using UV-Visible analysis, FTIR analysis and XRD analysis. The primary confirmation of UV-Visible showed absorption peak at 368.34 nm. The FTIR analysis confirmed the functional groups present. The XRD analysis showed reflection peak at  $2\theta = 35.7^\circ$ , which confirms the formation of  $\text{Fe}^0$ . Sensitivity values of fertilizer and pesticides using prepared nZVI composites showed less toxicity compared to bare electrolytes. Photocatalytic degradation using nZVI as a catalyst can lead to less toxicity due to the complex formation with nZVI.

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## Tools Used in Proteomics and Metabolomics: A Review

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**Abstract:** This review deals with Omic technologies. It gives an understanding of the different terminologies used in Omics. The various tools used in proteomics and metabolomics are explained.

**Keywords:** genomics, proteomics, metabolomics, phenomics, mass spectrometry

### Introduction to Omics

The branch of science known informally as omics are various disciplines in biology whose names end in- omics, such as genomics, proteomics, metabolomics, phenomics etc. Omics aims at the collective characterizations and quantification of pools of biological molecules that translate into the structure, function and dynamics of an organism.

Genomics is an interdisciplinary field of biology focusing on the structure, function, evolution, mapping and editing of genomes. A genome is an organism complete set of DNA, including all of its genes as well as its hierarchical, three dimensional structural configuration. In contrast to genetics, which refers to the study of individual genes and their roles in inheritance, genomics aims at the collective characterization and quantification of all of an organism's genes and their interrelations. (Heyn et al.,2012) Epigenetics is the study of how your behaviors and environment can causes changes that affect the way your genes work. An epigenetics trait is a stably heritable phenotype resulting from changes in a chromosome study without alteration in DNA sequence. As described by the developmental biologist Canrad Hal Waddington in 1942, epigenetics emerged as a framework to describe the idea of cell fate, or

how it is that a given stem cell develops into a fully differentiated cell when the underlying DNA sequence has not changed. Epigenetic mechanisms can influence the gene activity at the transcriptional and post-transcriptional levels and/or at the translation level and posttranslational modifications. Such epigenetic mechanisms with a potentially vast spectrum of consequences could result in more varieties of cell differentiations, morphogenesis, variability, and adaptability of an organism, which can be affected. Epigenetics are affected by both genetic and environmental factors. Therefore, the field of epigenetics covers the modifications of DNA, DNA-binding proteins, and histones, which are important in making changes in chromatin structure without any change in the nucleotide sequence of a given DNA. The role of epigenetics in human diseases has been considered from a half of century ago. In the last decade, this subject has attracted many interests, especially in complicated disorders such as behavior plasticity, memory, cancer, autoimmune diseases and addiction as well as neurodegenerative and psychological disorder (Berger et al.,2009).

Proteomics is the large-scale study of proteins. Proteomics is an interdisciplinary domain that has benefited greatly from the genetic information of various genome project including human genome project. It covers the exploration of proteomes from the overall level of protein composition, structure and activity and is an important component of functional genomics. The first proteomic studies were done to identify the protein content in *Escherichia coli*. The mapping of the total protein content was done using two dimensional (2D) gels. After the success of this project, scientists moved on to characterizing the total protein content in animals such as guinea pigs and mice. At present, human protein mapping is done using 2D gel electrophoresis. The study of whole proteins can provide information regarding the health status of an organism. Moreover, proteomics has many applications in genome annotation, disease identification and diagnostics, carrying out protein expression studies during experimentation and protein modifications and interaction studies, etc.

Metabolomics is the scientific study of chemical processes involving metabolites, the small molecule substrate, intermediates, and products of metabolism. Specifically, metabolomics is the “Systemic study of the unique chemical fingerprints that specific cellular

processes leave behind”, the study of their small molecule metabolite profiles. The Metabolome represent the complete set of metabolites in a biological cell tissue, organ or organism which are the end products of cellular processes. Metabolomics can be considered as an extension of proteomics because most metabolites are generated due to the activities of enzymes which are proteins (Horgan& Kenny, 2011).

Phenomics is the systematic study of traits that make up a phenotype and was coined by UC Berkeley and LBNL scientist Steven A. Garon. Phenomics concepts are used in functional genomics, pharmaceutical research, metabolic engineering, agricultural research, and increasingly in phylogenetic studies (Heyn et al.,2012).

## **Tools in Proteomics and Metabolomics**

**Mass Spectrometry (MS):** is an analytical tool to measure the mass-to-charge ratios ( $m/z$ ) of ions in order to determine their molecular weight (MW). This process involves three steps: i) conversion of molecules into gas-phase ions by the ionization source; ii) ion separation by their  $m/z$  values via magnetic or electric fields through a component, namely mass analyzer; iii) detection of the separated ions as electric charge obtaining signals proportional to the abundance of each species. In many configurations, additional tandem MS analyses (MS/MS) are feasible. In the MS/MS mode, the instrument uses the first mass analyzer to select a single ion that is subsequently fired into a collision cell, where it collides with gas molecules such as argon (e.g., collision-induced dissociation, CID) causing the ion fragmentation. The multiple fragment ions are then analyzed in the second-stage mass analyzer giving accurate information on structural features of the parent ion. In an MS spectrum, the x-axis represents  $m/z$  values, whereas the y-axis indicates total ion counts. As this extraordinary analytical technology can provide key information about analytes, including their structure, purity, and composition, it is now routinely used in either industry and research field for various purposes such as drug discovery, diagnostics and bio-analyses. Due to the fact that MS analyses are infrequently performed on a single compound, the study of complex mixtures requires prior purification steps.



By doing so, the mass spectrometers are coupled with dedicated separation devices such as Capillary Electrophoresis (CE), Gas Chromatograph (GC) and Liquid Chromatograph (LC) (e.g., CE-MS, GC-MS and LC-MS) One of the exciting new developments in mass spectrometry that is becoming more widely used for plant-omics is mass spectrometry imaging (MSI). MSI shows great promise for biological studies because it allows for molecular analysis of tissue while retaining information about the spatial distribution of the different analytes in the tissue sample. The conventional tissue extraction methods described above for proteomic, peptidomic, and metabolomic studies do not provide the spatial information that MSI can provide; however, liquid extraction is still the method of choice for large-scale studies as MSI is relatively time consuming and less reproducible when analyzing a large number of samples. Several other biological techniques allow for the visualization of macromolecules in various cellular structures, such as immunolocalization or other techniques that rely on the interactions between the analyte and an external probe and therefore require clear knowledge of the analytes of interest and specifically target larger molecules such as proteins. Mass spectrometry lends itself to discovery experiments in which a multitude of analytes, from metabolites to proteins, can be detected and studied without prior knowledge of sample contents (Girolamo et al 2013).

**Matrix Assisted Laser Desorption / Ionization (MALDI):** The characterization of bacteria by matrix-assisted laser desorption-ionization (MALDI) time-of-flight mass spectrometry (TOF/MS), is with an emphasis on rapid methods; generally applications that involve whole cells, simple cell lysates, or crude bacterial extracts. Chemotaxonomy of bacteria by MALDI-TOF/MS can be accomplished rapidly.

With respect to information content, the MALDI spectra of bacteria can be considered to be at least complementary to data obtained from other methods for bacterial identification. Moreover, MALDI provides unique insights into bacterial biology and chemistry based on the detection of specific chemicals or in the measurement of chemical changes in response to environmental, temporal, or other external influences. Shortly after the introduction of MALDI as a mass spectrometry ionization technique, it began to be used for the study of bacterial biopolymers. These early studies involved the analysis of marker analytes (biomarkers) after

isolation from bacterial cells. In more recent studies, biomarkers have been detected directly from the organism itself. A few studies have been undertaken to explain the reactivity and toxicity of specific chemicals. Such studies can address questions that involve either bacterial or other cellular toxicity endpoints because bacteria can be used to model toxicity and metabolism in other organisms. For example, in the alkylation of a model *Escherichia coli* protein, thioredoxin was used to explain the increased toxicity of a glutathione conjugate of a dihaloethane (Meyer et al., 1994). Most early MALDI-TOF/MS studies of bacteria involved *E. coli*, a common bacterium that continues to be one of the most frequently studied of microorganisms today. Although the most frequently measured biomarkers in MALDI studies of bacteria have been proteins, there have been a few reports on the analysis of bacterial RNA or DNA. Indeed, one of the first applications of MALDI to bacteria involved the analysis of bacterial RNA. The capability to rapidly analyze whole cells has led to a number of studies that demonstrate the possibilities for the rapid identification of specific organisms or stains. Such studies are possible because the biological variation that occurs at the strain level can be significant enough to produce unique biomarker (protein) profiles that can be readily detected by MALDI-TOF/MS, even when no specific steps are taken to enrich samples in the strain specific proteins.

**2D Electrophoresis:** 2D electrophoresis is currently the most widespread technique used for performing functional proteomics (i.e., the large-scale analysis of alterations in protein expression levels). Nevertheless, several limitations inherent to this technology have restricted the full potential of this protein differential display methodology for years. This has even led to the abandonment of 2D electrophoresis by several groups that switched to performing gel-free functional proteomics analyses based on liquid chromatography and mass spectrometry. Meanwhile, important recent advances in 2D electrophoresis, such as the introduction of fluorescent 2D difference gel electrophoresis and numerous protein prefractionation techniques, have thoroughly modernized 2D electrophoresis, making it again one of the preferred methods for the analysis of protein expression differences in many laboratories. Standard 2DE experiments generally show between 1000 and 2000 spots, usually representing the most abundant fraction of the 10,000 or more proteins that are estimated to be expressed in a complex

eukaryotic cell or tissue extract. These abundantly expressed proteins frequently correspond to housekeeping proteins, whereas the more interesting proteins (from a scientific point of view), such as receptor molecules, are present in much lower concentrations, which are therefore not readily visualized. Enrichment of such low-abundance proteins is therefore of the utmost importance. One way to achieve this enrichment is to subdivide the samples into smaller, less complex fractions, whereby low-abundance proteins present in these fractions will be more clearly represented in 2DE.

This sample prefractionation can be performed in many different ways broadly subdivided into three categories: cellular, subcellular and protein sub fractionations. When working with complex eukaryotic tissues, changes in protein expression can be relevant for one or a few of the different composing cell types (e.g., tumor cells compared with healthy, surrounding tissue). Separation and enrichment of these different cell types will result in a clearer detection of protein expression differences that occur in only one cell type, by alleviating the risk of drowning these expression differences in the bulk of non-differentially expressed proteins. One approach to obtain pure cell populations is to use a microdissection technique such as laser capture microdissection (LCM), which has demonstrated compatibility with 2DE. However, a time consumingly large amount of cells must be collected to obtain the required protein concentration to run these samples.

Luckily, recent advances in the chemistry of fluorescent dyes for 2D difference gel electrophoresis (DIGE) have drastically reduced the required amounts of protein, and thus of cells, for 2DE analysis. Another option for purifying complex cell populations is the use of antibody-based fluorescence-activated cell sorting (FACS), although the effect of this kind of treatment on the protein expression profile is yet unknown. Furthermore, this technique requires the cells to be present in a suspension, which is not easily prepared from tissue without influencing the protein expression profile (Kaur et al 2021).

**Microarray:** Analytical methods were developed and applied to a huge variety of biological problems which measured the rate of interaction or the end point between RNA molecules and DNA molecule from which it was transcribed. This method was utilized to

measure number of sequences that repeated in ribosomal genes with the help of labeled rRNA as a probe to measure concentrations of RNA in the solution (Southern, 2001). It was one of the old methods used in the current applications of microarray, where it was used to analyse diversity and gene expression levels in DNA. In late 1960's, it was discovered how to locate position of specific sequences within the chromosomes or the nucleus by carrying out hybridization reaction on cells, which were fixed onto microscope slides with the use of fluorescent probes [currently known as fluorescence in situ hybridization – (FISH)]. Previously, this method was used to fix nuclei and chromosomes to a microscope slide to allow the formation of dsDNA with a probe, but now is used to fix DNA on the slides in one micro array method. The multicolor fluorescent labeling techniques for analyzing multiple probes by FISH is now used for comparative analysis of mRNA's (Horgan & Kenny, 2011).

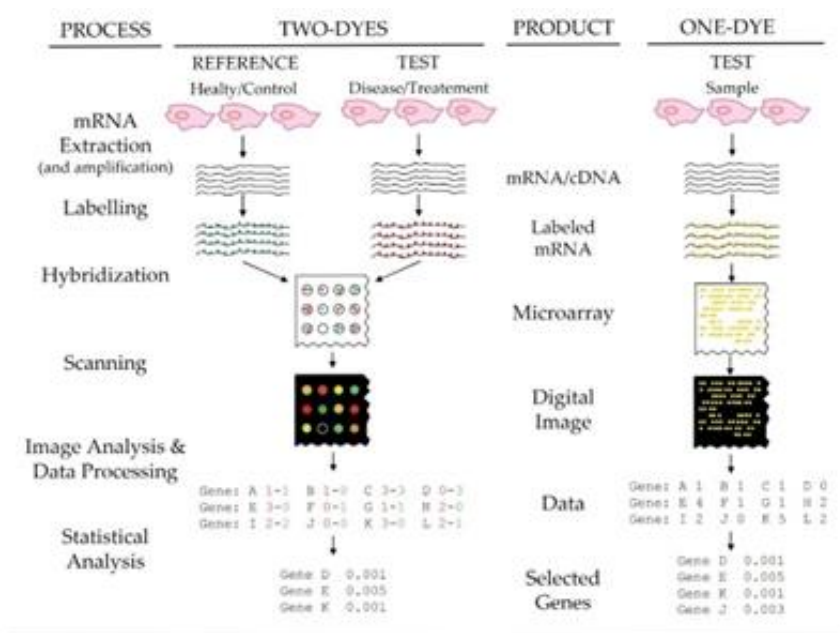


Figure 1. The detailed protocol for use of FISH for comparative analysis of mRNA's.

Thousands of complementary single-stranded sequences complementary to target sequences are bound, synthesized, or held onto a glass support, with size similar to a normal microscope slide. Two main types of DNA arrays are used, which depend on the types of spotted

probes. One type of arrays uses small single-stranded oligonucleotides (~22nt), which are synthesized in situ. The other type uses complementary DNA, more commonly cDNA, which is obtained by reverse transcription of the genes' mRNA, completion of second strand, dsDNA cloning, and PCR amplification of open reading frames (ORF). Large cDNA or ORF sequences should be avoided as they result in uneven optimal melting temperature. It may also result in cross-hybridization of closely related sequences, splicing variants and overlapped genes. In oligo-based arrays, targeted nucleic acid specie is detected by designing many complementary oligonucleotides extending across entire target sequence. The oligonucleotides are designed to avoid cDNA probe and to maximize specificity for target gene. DNA arrays were initially based on nylon membranes which are still in use, however glass provides very good support for attaching nucleotide sequences and is less sensitive to light than membranes. Another recent technology uses already designed oligonucleotide probes, attached to beads which are deposited randomly in a support. The position of each bead and sequence it carries, is determined by a complex pseudo-sequence process. Fluorescent dyes are used to label amplified cDNAs or extracted mRNAs from cell samples or tissues to be analyzed. The DNA array is incubated overnight, to hybridize the labeled samples, which is then washed to remove non-specific hybrids. A laser is used to excite the attached fluorescent dyes to produce light, which is then detected by a confocal scanner. The scanner produces a digital image from the excited microarray. The digital image is further processed by a special software, which transforms the image of each spot to a numerical reading. This process is carried out by finding each spots' specific location and shape, followed by summation of Intensities inside the spots, and estimating surrounding background noise, which is subtracted from integrated signal. The result is an integer value concluded to be proportional to concentration of the target sequence, within the sample, and the probe in the spot is directed to it. In competitive two-dye assays, the readings are converted to a ratio equal to the relative abundance of the target sequence from a reference sample. The target sequence is labelled with one type of fluorochrome, and the reference sample is labelled with another type of fluorochrome. Another technology, namely one-dye Affymetrix, the fluorescent dye is commonly yellow, on the other hand, in two-dyes technologies, the fluorescent dyes used are red for sample and green for reference. The choice of technology depends on the design of experiments, costs, availability. Two-dyes or reference design is more

suitable, when just a few genes are expected to change, if not, a one-dye technology is more suitable. (Trevino et al.,2007).

## **Data Analysis**

With the large amount of data produced in these studies, advanced bioinformatics and steadfast statisticians are fundamental. In transcriptomics and genomics microarray data analysis becomes difficult. Large number of genes in microarray experiments lead to complications in statistics and increase the chances of errors in the results. In proteomics, the properties of many ions are recorded within a single experiment and sophisticated algorithms are used to compare and match this data to a theoretical database to allow identification and quantification of protein. In metabolomics, raw data requires a suitable format before processing.

The methods used for data analysis include various statistical techniques, which include univariate and multivariate analysis, and supervised and unsupervised learning tools. The aim of these experiments is to find data patterns, which provide useful biological information, and which can be used to give rise to further hypotheses for testing. In order to avoid errors due to a large amount of data and multiple testing, data validation is necessary to ensure that the results are not random. P-values can be corrected for false discovery rate. Other methods of model validation include the use of ‘test’ or ‘hold-out’ set. The set used in model production is called training set. Models built using training data can be independently verified using hold-out set. Another method of independent model validation is by the use of permutation testing (Kaur et al 2021).

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## पुंडलीक नायक हांच्या 'खण खण माती' नाटकांतलीं लोकतत्वां

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**सारांश:** एके वेगळे संस्कृतायेचें दर्शन घडोवपी लोकांचो चोमो म्हणल्यार 'लोक' आनी ह्या लोकांचे अभिव्यक्तीं जीं तत्वां मेळटात तीं 'लोकतत्वां'. लोकसमुहातल्या पिळग्या – पिळग्यांच्या जाणवायेतल्यान, अणभवातल्यान निर्माण जाल्लीं हीं लोकतत्वां लोकसाहित्यांतल्यान अभिव्यक्त जातात तशीं तीं ललीत साहित्यातल्यान जातात. नाटककार पुंडलीक नारायण नायक हांणी कोंकणी नाट्य लेखनाची सुरवात 'खण खण माती' ह्या नाटकातल्यान केल्ली. तांच्या ह्या नाटकाक लोकतत्वीय बसका आशिल्ल्यान लोकतत्वीय अभ्यासाचे नदरेन ह्या नाटकाकडेन पळोवपाचो यत्न केल्लो आसा.

**मुखेल उतरां:** लोकसंस्कृती, लोकजिवन, लोकवेद, लोकमन, लोकतत्व

### सुरवेचीं उतरां

लोकतत्वीय अभ्यास ही लोकसाहित्याच्या अभ्यासाची एक वेगळी पद्दत. ह्या लोकतत्वीय अभ्यास पद्दतीत लोकसाहित्याचो अभ्यास जाता. लोकसाहित्य हें लोकसंस्कृतीच्या अभिव्यक्तीचें माध्यम आशिल्ल्यान तातुंतल्यान लोकसमुहाचें लोकमन, लोकजीण अभिव्यक्त जाता. लोकसंस्कृतीतल्यान लोकमन, लोकजीण अभिव्यक्त जाता आनी लोकसाहित्यातल्यान लोकसंस्कृती पडबिंबीत जाता तरीय व्यक्तीमनाची निर्मिती आशिल्ल्या ललीत साहित्यातल्यान लेगीत लोकसंस्कृती दिसून येता. ह्या खातीर समुहमनाची निर्मिती आशिल्ल्या लोकसंस्कृतीत आनी लोकसंस्कृतीची अभिव्यक्ती आशिल्ल्या लोकसाहित्यात ही लोकतत्वां जशीं मेळटात तशीं व्यक्तीमनाची निर्मिती आशिल्ल्या ललीत साहित्यात लेगीत मेळटात. पिळग्या – पिळग्यांच्या परंपरेतल्यान लोकसमुहात प्रचलीत आसपी हीं लोकतत्वां लोकजिणेचो भाग जाल्लीं आसतात. हीं लोकतत्वां लोकमनाच्या खोलायेंत रुजलेलीं आशिल्ल्यान तांचें पालन करप हो आपलो लोकधर्म अशें लोकसमूह मानिल्ल्यान तांकां जायते फावट धर्मीक म्हत्व फावो जावन हीं लोकतत्वां

लोकसमुहांत जिर्वी उरतात. काळ, थळ आनी परिस्थिती प्रमाण ह्या लोकतत्वांनी जरीय बदल घडलो तरीय मूळ गाबो मात तसोच उरता.

नाटककार पुंडलीक नारायण नायक हे कोंकणीतले म्हालगडे नाटककार. खेरीतपणान ग्रामीण समाज आनी त्या समाजाच्या जिणेचें वास्तवीक दर्शन तांच्या नाटकांनी जाल्ल्यान लोकतत्वीय नदरेन तांच्या नाटकांचो अभ्यास करप शक्य आसा. तांच्या आतां मेरेन प्रकाशीत जाल्ल्या नाटकां मदलें पयलें नाटक 'खण खण माती'. नाटककार पुंडलीक नायक हांच्या ह्या पयल्या नाटकाचो लोकतत्वीय नदरेन अभ्यास ह्या लेखांत केल्लो आसा.

## लोकतत्व: संकल्पना

लोकतत्व हें उतर 'लोक' आनी 'तत्व' ह्या उतरांच्या समासातल्यान तयार जालां. सर्वसादारपणान लोक उतर वेगवेगळ्या संदर्भांत वापर जाता. मराठी व्युत्पत्तीकोषांत 'लोक' म्हणल्यार जन, मनुष्य, समाज (कुलकर्णी) अशे अर्थ जाल्यार हिंदीतल्या 'भाषा शब्द कोषां' त जगत, संसार, प्रदेश, स्थान, निवासस्थान, जन, लोक, आदी सारके लोक उतराचे अर्थ दिल्ले आसात (रसाल, 1375). 'लोक' उतराचो उल्लेख वेद, पुराण, उपनिषद आनी भगवद्गीतेंत लेगीत जाल्लो मेळटा.

वयर उल्लेख केला ते प्रमाण 'लोक' उतर वेगवेगळ्या संदर्भांत वापरिल्लें आसलें तरीय लोकतत्व संकल्पनेत 'लोक' म्हणल्यार "एका वेगळ्या संस्कृतीचें दर्शन घडोवपी वर्ग" (मांडे, 10), "सांस्कृतीक नदरेन विशिश्ट मानसीक जडण – घडणीचो आसपाव ज्या समाजात, समुहात दिश्टी पडटा असो मनीस समाज". (भवाळकर, 2) लोकसमुहातल्या ह्या लोकांच्या मनाची समान अशी अवस्था आसता ह्या खातीर समान मनाचे अवस्थेंत जियेवपी, समान जिणेशैली आपणायिल्ल्या भौसांतल्या ह्या चोम्याक 'लोक' म्हणटात (फळदेसाय, 132).

'तत्व' हें उतर इंग्लीश 'Principle' ह्या उतरा खातीर पर्यायी उतर म्हण वापरप जाता. डॉ. हरदेव बाहरी संपादीत 'बृहत् अंग्रेजी – हिन्दी कोशांत' *principle* ह्या उतरा खातीर तत्व, सूत्र, नियम, सिध्दान्त, सार, बीज,

मूलतत्त्व, मूलस्रोत अशीं समान अर्थाची उतरां वापरिल्लीं आसात. सर्वसादारपणान खंयचेय गजालीक अस्तित्वांत हाडपी तशेंच तिच्या उत्पत्तीच्या मूळ कारणाक 'तत्व' म्हणप जाता. पूण लोकतत्व संकल्पनेत लोकसंस्कृतींत, लोकांच्या अभिव्यक्तींत मेळपी, परंपरेच्या प्रवाहात जिवीं उरिल्ल्या तत्वांक 'लोकतत्वां' अशें म्हणटात.

## लोकसंस्कृती: लोकजिणेची आनी लोकमनाची अभिव्यक्ती

लोकसमुहातल्या लोकांची आपली अशी विशिश्ट जिणे शैली आसता. तीच ह्या लोकसमुहाची संस्कृती आसता. लोकमनातल्यान आनी लोकजिणेतल्यान ही लोकसंस्कृती रुपकराक येता. ह्या लोकसंस्कृतीत लोकमनाचें आनी लोकजिणेचें पडबींब दिश्टी पडटा. ही लोकसंस्कृती लोकसमुहान आपणायलेली जिणे शैली आशिल्ल्यान ती पाळपाची निश्चीत अशी तरा थारावन लोकसमुहातल्या लोकांनी ती आपणायिल्ली आसता. तिका पुराय समुहाची मान्यताय आसता. लोकसमुहाचे मान्यताये बगर लोकसंस्कृती आकाराकच येवंक शकना.

लोकसंस्कृती ज्या वरवीं अभिव्यक्त जाता तो लोकवेद. लोकवेद म्हणल्यार पिळग्या पिळग्याच्या परंपरेतल्यान जाणवाय, समजिकाय आनी अणभवातल्यान भौसान एकठायिल्लें गिन्यान. तेंच भौसाचें लोकसाहित्य आसता.

लोकवेदांतल्यान अभिव्यक्त जावपी ही लोकसंस्कृती कृती - उक्तीतल्यान व्यक्त जाता. तातूंत लोकांनी रचिल्लीं आनी गायिल्लीं गितां, काणयो, म्हणी, ओंपारी, हुमाणीं ह्या रुपांतलें गिन्यान. लोकनाच, लोकसंगीत, लोकनाट्य ह्या सारक्यो प्रयोगात्मक कला. चित्र, शिल्प सारक्यो हस्तकला. वैजकी विद्या. तंत्र, मंत्र, जादू सारक्यो विधी तशेंच लोकभ्रम, लोकरुढी, चालीरिती, कल्पना, लोकश्रध्दा, आदी सारक्या गजालीतल्यान लोकसंस्कृती अभिव्यक्त जाता.

## लोकतत्वांचें स्वरूप

लोकसमुहांतलो लोक पुराय वर्सभर साबार विधी - रिती करतात, परबो – उत्सव मनयतात. त्या निमतान सजावट करतात, रांगोळी घालतात, मुर्त्यो तयार करतात, तरेकवार खाणां – जेवणां रांदतात, सैमाची पुजा करतात. तेन भायर वेळाकाळार पुर्वजांचें वैजकीय गिन्यान उपेगांत हाडटात. हीं सगलीं लोकतत्वांची प्रत्यक्ष आनी अप्रत्यक्ष रुपान अभिव्यक्त जावपी रुपां (फळदेसाय, 113). म्हत्वाचें म्हणल्यार लोकमनान मानून घेतिल्लीं हीं तत्वां आसतात.

लोकमनांत निर्माण जाल्लो भंय, श्रध्दा, जिणेचो गाढ अणभव तशेंच स्वताक, कुटुंबाक, समुहाक बरें आरोग्य, सूख – समृध्दी. अदृश्य शक्तीक संतुश्ट करची, तिचे सावन राखण मेळची, तिचो कोप जावंचो न्हय, तिका वश करप, आदी सारक्या उद्देशान हीं लोकतत्वां निर्माण जाल्यात.

लोकसमुहातल्या लोकमनांत प्रचलीत आशिल्ल्या लोकतत्वांक समजून घेतना आदीम काळावेल्या मनीसकुळाचे बाबतींत विचार करुंक येता. आदीम काळार मनशान सैमाची भिरांकूळ अशीं रुपां पळयलीं, आपल्या भोंवतणी घडटल्या साबार गजालीं फाटलें सत ताणें सोदपाचो यत्न केलो पूण ह्या करपात ताका यश येवंक ना तेन्ना ताणें ह्या सैमाकच देव मानलो. हातुंतल्यानच मुखार श्रध्दा, विस्वास, समज, विधी – रिती, मान्यतायो, परबो – उत्सव, आदी गजाली अस्तित्वांत आयल्यो आनी ह्या सगल्यांत लोकसमुहाचें कल्याण, बरेपण आशिल्ल्यान लोकमनांतलीं हीं तत्वां लोकतत्वां म्हण मान्यतायेक पावलीं.

लोकसाहित्यात अभिव्यक्त जावपी लोकमन ही समुहमनाची अभिव्यक्ती आसली तरीय ललीत साहित्यात लेगीत लोकमन दिसून येतात. लेखकाची जडण – घडण लोकसमुहात जाल्ल्यान लोकसमुहातलीं हीं लोकतत्वां ललीत साहित्यात लेगीत दिसून येतात. प्रस्तूत अभ्यासात कोंकणी नाटककार पुंडलीक नारायण नायक हांच्या ‘खण खण माती’ नाटकांचो लोकतत्वीय नदरेन अभ्यास केल्लो आसा.

### **‘खण खण माती’ नाटकांतलें लोकतत्व**

नाटककार पुंडलीक नारायण नायक हांचें 1977 वर्सा 'खण खण माती' हें नाटक जाग प्रकाशनाचे वतीन प्रकाशीत जाल्लें. तांच्या नाट्य प्रवासांत तांचे कडच्यान बरोवन जाल्लें हें ताचें पयलें नाटक. गोवा कला अकादमीच्या पयल्या नाट्य स्पर्धेंत (1976-77) सानमाची हे संस्थेच्या वतीन तें माचयेर आयलें (पुंडलीक, 11).

### **'खण खण माती' नाटकाचें कथानक**

'खण खण माती' नाटक मुखेलपणान मीन वेवसायाक लागून कुटुंबीक जीण कशी उध्वस्त जावंक पावली, मनीस मुल्यांचो कशे तरेन न्हास जावंक पावलो हाचेर उजवाड घालतात. नाटकांतल्या भडक आनी वास्तव चित्रणांक लागून तें गाजलें (पुंडलीक, 12). नाटकांत मुखेल पात्र आशिल्ल्या रॉकसायब लैतांवाचो मिनाखणीर रिव्हर प्लांट आसता. रॉकसायब हेर मिनेरा वरीं व्हडलो मिनेर नाशिल्लो पूण मनान, काळजान मात व्हड. ताच्या त्या ल्हानविकायेचो, सादेपणाचो फायदो ताचे घरकन्नीन (बाय) काडिल्लो. रॉकसायब फुडाराक मिनाचो वेवसाय करून व्हडलो पयशेकार जातलो ह्या आशेर ती ताचे लागीं काजार जाल्लीं पूण घडिल्लें मात साप्प उरफाटें. जिवितांत रॉकसायब पयशे जोडपा परस मनीस जोडपाक वावुरतालो. आपल्या प्लांटार काम करपी कामदारांक बरी वागणूक, वेळार पगार , तांकां फावो आशिल्ल्यो सवलती दितालो आनी होच स्वभाव, वागणूक ताचे घरकान्नीक आवडनाशिल्ली. ह्या खातीर तांच्या त्या खणीवेल्या प्लांटार तांचो सुपरवायझर धर्मा जेन्ना कृष्णाचें पांयजेल लायता, आपल्याक रांदपाक कस्तुराक (कामेरें) दवरता, कामदारांचो पगार वाडोवपाचो प्रस्ताव मुखार दवरता आनी रॉकसायबाच्या सांगणेवेल्यान आपल्याक जाय तशें प्लांटार ऑफिस बांदता तेन्ना ह्या सगल्यां वांगडा आपल्या घरकाराचोय अपमान करपाक ती फाटीं रावना आनी शेवटाक आपलो घरकार ह्या स्वभावाक लागून व्हडलो मिनेर, पयशेकार जावंक पावचो ना हें चितून ताका सोडून ती कुवेटाक वता.

पयशांक लागून सोडून गेल्ले रॉकसायबाचे घरकान्नीविशीं सांगतनाच नाटककार कस्तुराच्या माध्यमातल्यान पिरायेच्या चौदाव्या वर्सा मिना खणीर काम करून पयशे जोडपाक भायर सरिल्ल्या आनी उपरांत ह्याच पयशांच्या आशेक बळी पडून आपली कूड विकपी कस्तुराकय दाखयता. पैशांच्या नादाक लागून कस्तूर आपल्या बेबघ्या घरकाराक पयस करून आपलें कुटूंब उध्वस्त करून व्हडयता. आपल्या घरकान्नीच्या हे तरेच्या वागण्यान कुस्तुराचो

घरकार (खुशाली) सोऱ्याच्या वेसनाक लागून आपलीय जीण उध्वस्त करता. इतलेंच न्हय तर ह्या प्लांटार टूक चलोवपी गोपी ड्रायव्हर कस्तुराच्या नादाक लागून आपले घरकान्नीची फटवण करता.

नाटककार नाटकांत हीं तीन वेगवेगळीं कुटुंबा उबी करून तांचो वेव्हार दाखोवन ह्या मिनाच्या वेवसायाक लागून तांची उध्वस्त जाल्ली समाजीक, कुटुंबीक मुल्यां आनी जीण दाखयता.

### ‘खण खण माती’ नाटकांतलें लोकतत्व

‘खण खण माती’ नाटक गोंयांत मीन वेवसाय सुरु जावन समाज वेवस्थेची, कुटुंब वेवस्थेची घडीच कशी बदल्ली हाचें वास्तवीक चित्र दोळ्यामुखार दवरता. मीन वेवसायांत पैशांच्या नादाक लागून कस्तुर, गोपी आनी रॉकसायबाची घरकान्न आपलो घरसंवसार उध्वस्त करतात. नाटककारान नाटकांत हें दाखोवपाचो यत्न केल्लो आसलोय तरीय लोकतत्वीय नदरेन ह्या नाटका कडेन पळोवप जाता तेन्ना लोक थळावी लोकसंस्कृती, लोकजीण, लोकमन दिसून येता आनी तातुंतल्यानूच लोकमनांच्या खोलायेत आशिल्लीं लोकतत्वां दिसून येतात.

नाटकांतलो टूक ड्रायव्हर गोपी आनी कस्तुर दोगांय फटकळ तोंडांचीच. आपले विशीं दोगांय दोन वेगवेगळ्या प्रसंगार एकसारकींच उद्गारतात. गोपी म्हणटा, “जल्मांक येतना म्हजी लज वारी वांगडाच पुल्ली” (पान 7) आनी कस्तुर म्हणटा, “लजबीज म्हणटा ती वस्त म्हाज्या वारी वांगडाच पुल्ल्या” (पान 14). कुसव्यांत आशिल्ल्या भुरग्याक आनी आवयक जोडपी नाळ म्हणल्यारच ही वार. एका काळार बाळांटेर गांवांतल्यो वैजिणी करताल्यो. बाळांतेरा वेळार ही वार कापप जाताली. कापलेली ही वार घराचे भितोडेकूच पुरपाची रीत आशिल्ली. हे रितीक धरून हे तरेचें उद्गार ह्या पात्रांच्या तोंडात आयिल्ले दिसतात.

नाटकांतलो रॉकसायब लैतांव जरीय व्हडलो मिनेर नाशिल्लो तरीय मिनाखणीर ताचे रिव्हर प्लांट आशिल्ले. ताचो सुपरवायझर धर्मा ताका नवो रिव्हर प्लांट बांदून खणीर सावन डायरेक्ट माल लाडिसांनी हरबराक बोटींनी आपशीच पडटा म्हणल्यारच, मनशांचें सगलें काम मशिनां करपाक लागल्यांत अशें कांय खिणां खातीर सपन दाखयता तेन्ना रॉकसायब आपल्या सपनांत मनशांचें काम मशिनां करपाक लागिल्ल्यान लोक बेकार पडपाक

लागल्यात हें पळयता आनी दुस-याच खिणांत धर्माक सांगता, “पावला कणकणी हांचे स्त्राप आमकां बादतले. आमचीं सपनां हुल्पतलीं. आमच्या अस्तुन्यांचे गाब धरचे नात. आमचे वंशरूख वाडचेनात” (पान 20). ह्या खातीर रॉकसायब धर्माक सांगता, “मनशांच्या पोटार मारपी माकनां आमकां नाका धर्मा. आमची कंपनी लोस जाल्यार उपकात्ता पूण वावराच्या लोकांक वळवळोवपी मशिनरी आमकां केन्नाच नाका – केन्नाच नाका” (पान 21). नाटकांतल्या रॉकसायबाच्या ह्या तरेच्या उलोवपांतल्यान आपल्या स्वार्था खातीर हेरांक दुखोवन, त्रास दिवन तांचे शिराप घेनासतना आपलें जिवीत जगूंक सोदपी मिनेर रॉकसायब लैतांव. आपल्या कश्टाचें आपणें खावंचें, दुसऱ्याच्या तोंडातली उंडी आपणें घेवंची न्हय ह्या तत्वाक पाळो दिवपी हें पात्र. हें करतना स्वाताक लेगीत रॉकसायब लुकसाण करून घेता. सामान्यपणान ज्या धर्मा कडेन जावं समाजा कडेन आमीं बांदलेली आसतात त्या धर्माचीं, समाजाचीं मनीसपणाचे नदरेन कांय तत्वां आसतात. तीं म्हणल्यार हेरांक कश्टावप, दुखोवप ना. उरफाटें जाल्यार हेरांच्या बरेपणां खातीर वावुरचें. अशें जर करिना जाल्यार धर्मतत्वाक, लोकतत्वा पाळो दिना असो ताचो अर्थ जाता. नाटकांतलो रॉकसायब ह्याच तत्वांक धरून आपलें जिवीत आनी आपलो धंदो करतना नाटककारान दाखयला.

दिसाच्या आठ पारां भितर क्रिस्तांव समाजांत सकाळ, दनपार आनी तिनसांज ह्या तीन पारांक खेरीत म्हत्व आसां. ह्या तिनूय पारार मागणें करपाची रीत ह्या समाजात आसा. ह्या मागण्याच्या वेळाचो उगडास करपाक ह्या तिनूय पारार इर्गजेची घांट वाजयतात. घांट आयकून क्रिस्ती भावार्ती त्या वेळार आपलें रोजार करता. नाटकांतलो रॉकसायब लेगीत आपल्या रिव्हर प्लांटार आयिल्लो आसतना इर्गजेची बारा वरांचेर जाल्ली घांट आयकून आंजेलस (रोजार) करतना नाटककारान दाखयलां. हाचोच अर्थ मिनेर आसून लेगीत धर्मतत्वांक तो पाळो दिता.

नाटकांत धर्माचे देखरेखीखाला आशिल्ल्या रिव्हर प्लांटवेल्या ऑफिसात धर्मान जेजुचें पांयजेल लायिल्लें. प्लांटवेल्या ऑफिसात दिल्ल्या भेटेंत रॉकसायब धर्मान लायिल्लें तें जेजुचें पांयजेल पळोवन ताका म्हणटा, “तुवें सारकें केलें. आमच्या प्लांटचेर सदांच जेजुचे कुरपेची सासाय उत्तली. आमची चलणूक उजू दवरूंक आनी आमची नीत सांबाळूंक तो आमकां आदार दिवं” (पान 21). हे तरेच्या रॉकसायबाच्या उलोवपांतल्यान एखाद्या धंद्याच्या



सुवातेर देवाची सासाय वा कुर्पा उरची ह्या खातीर थंय कॅलेंडर, पांयजेल, मुर्तीची स्थापना करपा फाटलें लोकमन दिसून येता.

जेजुचें पांयजेल ऑफिसांत कित्याक लायलां हें विचारतकच आपली चूक जाली अशें समजून धर्मा आपूण तें काडटा तेन्ना रॉकसायब ताका समजावणी दिता, “देवाचें पांयजेल म्हणल्यार तुज्या माथ्यावेलें एलमेट न्हय. तुका जाय तेन्ना तकलेर दवरपाचें आनी नाका तेन्ना खुंटयेक लावपाचें. ह्या जेजुच्या पांयजेला कुशीक तुज्या देवाचें एक पांयजेल लाय”. (पान 21) रॉकसायबाच्या ह्या उलोवपांतल्यान समाजांत वसपी आंतरधर्मीय एकचार दिश्टी पडटा. धर्म खंयचोय आसूं, त्या धर्माचो देवूय कोणूय आसूं पूण सगल्या देवांविशीं समजांत आशिल्लो भावार्त दिसता. आपल्या देवा सारकोच हेरूय देवांविशींचो गोंयच्या समाजांत आशिल्ल्या भावार्तांविशींची ही एक देख म्हणूंक येता. आपल्या देवां वांगडा हेरूय धर्माच्या देवांविशींच्या आदराविशींचें समजातलें हें तत्व.

मनशाक मनीसपणाची वागणूक दिवप हेवूय मनीस जातीचें कर्तव्य. जायते फावट मनीस हें तत्व विसरता तेन्ना लोकतत्वूच मनशाक ती जाणविकाय करून दिता. ह्याच धर्तेचेर रॉकसायब धर्माक सांगता, “मुनीस म्हणल्यार गोरवां न्हय. तांकां मनीसपणान वागोवंक जाय” (पान 22).

मिना खणीर वावर करपी कस्तुर पयशाचें आशेन मिनाखणीवेले टूक ड्रायव्हरां कडेन कुडिचो संबंद दवरतालें. कस्तुराचे हे थेर तिचो घरकार खुशाली तिच्या तोंडार मारता तेन्ना आपलें नांव गांवांत खुशालीनूच पिड्डयार केलां अशें कस्तुर म्हणटा पूण आपणें तशें करूंक ना अशें खुशाली म्हणटा त्या वेळार खुशालीक तें म्हणटा,

“कस्तुर – परमाण जायशी तूं बेताळाच्या देवळांत?

खुशाली – हांव परमाण जाव! कित्याक? (पान 37)

मनीस मनशाक फट मारूंक शकता पूण देवा मुखार उबो रावन वा तांचें नांव घेवन फट उलोवपाचें धाडस करपाक फाटीं फुडे जाता. हाचें कारण दैवतांविशींची लोकमनांतलि भिरांत. गोंयच्या हिंदू, क्रिस्तांव समाजात देव – दैवतां मुखार आपलें कर्तुब सारकें आसा हाचें प्रमाण दिवपा खातीर देवळांत वा दैवताचे मुर्ती मुखार प्रमाण जावपाची

वा सोपूत घेवपाची रीत आसा. दैवता मुखार प्रमाण जाल्यार निर्दोश म्हण गवाय दिल्ल्या मनशाचें खरेंपण लोकसमूह मानून घेता आनी प्रमाण जावपी फट उलयिल्लो ना वा उलयना हें तत्व समजान मानून घेतिल्लें आशिल्ल्यान नाटकांतलें कस्तुर खुशालीक बेताळा मुखार प्रमाण जावन स्वताक निर्दोश म्हण सिध्द करपाक लायता.

खुशालीक सेक्युरिटी म्हण रिव्हर प्लांटावेल्या ऑफिसांत धर्मा कामाक दवरून घेता पूण खुशाली दर दिसा सोरो पिवन ड्युटेर आयिल्ल्यान ज्या वेळार धर्मा खुशालीक काम सोडून वचपाक फर्मायता तेन्नाच रॉकसायब थंय पावता आनी रॉक सायब धर्माक खुशालीच्या वागण्या खातीर ताका भोगसुपाची विनंती करतना म्हणटा, “मागीर भोगशीय ताका. तुजी करणी वयर देवान रुजू करून घेतल्या” (पान 55). खेरीतपणान हांगां क्रिस्ती धर्मशिकवणेतलें तत्व दिसून येता. तें तत्व म्हणल्यार एकाद्यान केल्ल्या चुकी खातीर ताका भोगसणें दिवप. चुकलेल्याक भोगशिल्यार भोगशितल्याची ती बरी करणी थारता. ह्या तत्वाक धरून नाटकांतलो रॉक सायब खुशालीन केल्ल्या चुकी खातीर धर्माक भोगसुपाची विनंती करता.

मिना खणीर ट्रक ड्रायव्हर आशिल्लो गोपी कस्तुरालागीं कुडीचो संबंद दवरून घरा आशिल्ले आपले घरकान्नीक काळखांत दवरता. शेवटाक आपले करणेचो पश्च्याताप जावन गोपी म्हणटा, “घरा बायल आसा म्हजी. दर वर्सा वडापुनवे दिसा उपास करता आनी वडाक प्रदक्षणां घालून जल्मजल्मां होच घोव मेळचो म्हूण भक्तिभावान प्रार्थना करता” (पान 74). गोंयांत हिंदू समाजांत बायलां वडा पुजा करतात. पुजेतल्यान आपल्या सौभाग्याची राखण जावन फुडले सात जल्म लेगीत तोच घोव आपल्याक मेळचो ही वडाची पुजा करपी सवायशिण बायलांची भावना आसता. मुळांत हिंदू धर्मशास्त्रांत वडाक देवत्वाचो दर्जो दिल्ल्यान तेच धर्मीक भावनेतल्यान वडाची पुजा करतात. आपल्या खातीर इतल्या भक्तीभावान, विस्वासान पुजा करपी आपले घरकान्नीची तिच्या अस्वडी आपूण फटवणूक करता हें ताका समजून येता तेन्ना गोपीक आपल्याच करणेचो पश्च्याताप जाता.

नाटकांत पात्रांच्या तोंडातल्यान म्हणीय आयकुवपाक मेळटात. कुसके आंबे मुड्यांत आसतकच सगळो मुडोच कुसपाचो (पान 09), हातिच्या कांकणांक हारसो नाका (पान 14), लज घरल्यार पेज मेळना (पान 14), शिंपीभर शेण खालें सारकेंच आनी वर्जेभर शेण खालें सारकेंच (पान 15), ओमथ्या कळशार उदक (पान 15), शिता

फुडे मीठ खावप (पान 24), देवान ताट दिलां पूण खातल्याचें तोंड धल्लां (पान 42) हे तरेच्या म्हणीतल्यान लोकशिकवण दिसून येता. अप्रत्यक्षपणान सांगून मनशा भितर शाणेंपण रिगोवपाचें, नितीशिकवण दिवपी ह्यो म्हणी आशिल्ल्यान तातुंतल्यान समजांतलीं तत्वां दिसून येतात.

‘खण खण माती’ ह्या नाटकातल्यान जरीय मिन वेवसायाक लागून उध्वस्त जाल्ली कुटुंबीक आनी समाजीक जीण, शेणत चलिल्ली मनीस मुल्यां दाखोवपाचो यत्न नाटककारान केल्लो आसलो तरीय हिंदू, क्रिस्तांव समाजातलीं व्यक्तीचित्रां नाटकांत आयिल्ल्यान त्या - त्या समाजांत प्रचलीत आशिल्ल्या तत्वांच्या प्रभावाखाला तीं जियेतात आनी तीं ज्या लोकसमुहात जियेतात त्या लोकसमुहातलीं तत्वां तांच्या वेव्हारातल्यान, वागपातल्यान, उलोवपांतल्यान, करण्यांतल्यान दिसून येतात.

## निश्कर्श

नाटककार पुंडलीक नारायण नायक हांचें ‘खण खण माती’ हें तांच्या नाट्य लेखनाच्या प्रवासांतलें पयलें नाटक. तो काळ मेरेन गोंयांत मीन वेवसाय तेंगशेर पाविल्लो. ह्या मीन वेवसायाक लागून लोकां कडेन पयसो आयिल्लो पूण पयशांच्या, वेसनाच्या नादाक लागून समाजीक, कुटुंबीक जीण, समाजीक मुल्यांचो न्हास जावपाक लागला हाची गंभीरताय वळखून हे तरेची नाट्यकृती नाटककाराकडच्यान बरोवन जाल्ली. लोकतत्वीय अभ्यासाचे नदरेन ह्या नाटकाचो विचार करीत तर लोकतत्वांच्याच बुन्यादीचेर नाटककारान नाटक उबें केल्लें आसा. तशें पळोवपाक गेल्यार नाटकांतलीं सगलींच पात्रां खंयच्या ना खंयच्या तत्वां प्रमाण आपलें जिवीत जियेतात. नाटककारान भोव कुशळतायेन त्या त्या समाजात प्रचलीत आशिल्ल्या तत्वांच्या आदारान तांचें कर्तुब, लागणूक, स्वभाव दाखयिल्लो आसा. ह्या लोकतत्वांक लागून पुंडलीक नायक हांच्या ‘खण खण माती’ हें नाटकाक थळाव्यापणाचो गंध आयला.

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## दौत्रिना क्रिस्ता: भाशीक अभ्यास

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**सारांश:** फादर थॉमस स्टिफन्स भारतीय भुंयेर येवपी पयलो ब्रिटीश मिशनरी अशें मानतात. ताणें गोंयांत येवन थळाव्यो भासो शिकून तातूंतल्यान धर्मीक साहित्य निर्मणी केली. ही साहित्य निर्मणी मराठी (क्रिस्तपुराण) आनी कोंकणी (दौत्रिना क्रिस्ता) भाशेंत करून ताणें आपलें साहित्यीक कौशल्य दाखोवन दिलां. खास करून अणकारीत स्वरुपाचें 'दौत्रिना क्रिस्ता' हें कोंकणी भाशेक ताच्या हातांतल्यान पयलें पुस्तक फावलें. काळाची गरज म्हणून आकाराक आयिल्लें पुस्तक काळा प्रमाणें नश्ट जाले उपरांत तातूंत आसपाविल्ल्या कांय उतरांचीं बदलपां आनी विद्रुपां जावपाक पावतात. ह्या उतरांची पारखणी केले उपरांत फादर थॉमस स्टिफन्सान अणकारिल्लीं हीं उतरां अर्थपूर्ण म्हणपाक वाव मेळटा.

**मुखेल उतरां:** दौत्रिना क्रिस्ता, फादर थॉमस स्टिफन्स, भाशीक अभ्यास

### सुरवेचीं उतरां

दौत्रिना क्रिस्ता हें फादर थॉमस स्टिफन्स हाणें बरयल्लें क्रिस्ती धर्माचें दोतोनीचें पुस्तक, 1622 वर्सा ताच्या मर्णा उपरांत उजवाडाक आयलें. दौत्रिना क्रिस्ता ह्या पुस्तकाचें मूळ नांव 'DOUTRINA CRISTAM EM LINGOA BRAMANA CANARIM' जें कोंकणी भाशेंत छापिल्लें पयलें पुस्तक अशें मानतात. हें पुस्तक रोमी लिपीन छापिल्लें आसा आनी तातूंत सगळीं मेळून 155 पानां आसात. हें पुस्तक मूळ पुर्तुगेज भाशेन आशिल्ल्या 'Cartilha do Padre Mestre Inacio Martins' ह्या पुस्तकाचो अणकार. 'दौत्रिना क्रिस्ता' ह्या पुस्तकांत क्रिस्ती धर्माची मुळावी शिकवण आसपावल्या. ही शिकवण सतराव्या शतमनांत कोंकणींत अणकारपाचो वावर क्रिस्ती मिशनारांनी केलो. त्या काळा साकून आयज पासून तिचो वापर जायत आसा. तेन्नाच्या काळार साकून आतां पासून ही मुळावी शिकवण (दोतोन) बदलत गेल्या ती स्पश्ट जाता. हो बदल उतरांच्या उच्चारांचेर कशे तरेन जाल्यात,

हें ह्या लेखांत उजवाडाक हाडपाचो यत्न सोदवावराचे नदरेंतल्यान केल्लो आसा. हो सोदवावर फकत दोन प्रकरणांतल्या दोन मुखेल उतरांचेर केंद्रीत आसा. विशय फुडें व्हरचे पयलीं विशयाची फाटभूंय समजून घेवप तितलेंच म्हत्वाचें आसा.

## दौत्रिना क्रिस्ताची फाटभूंय

गोंयांत क्रिस्ती भावार्थ केन्ना परगट जालो? दुसऱ्या उतरांनी क्रिस्ताक मानून घेवपाक केन्ना सुरू जालें? असो प्रस्न करतात तेन्ना जायते इतिहासकार आप आपल्या मता प्रमाणे जाप दितात. फादर कोज्म जुजे कोशता सांगता ते प्रमाणे गोंयांत क्रिस्ती भावार्थ पयल्या शेकड्यांत पावलो हाचें कारण म्हणल्यार आगशे जुवारी न्हंयचे देगेक एक सिरीयन क्रॉस मेळ्ळा. हो खुरीस पयल्या शेकड्यांतलें लक्षण म्हूण इतिहासकार मान्य करतात तरी पूण हे विशीं विवादास्दक आसा.

1510 वर्सा पुर्तुगेजांनी गोंय जिखलें. तेन्ना सावन तांणी क्रिस्ती धर्माचो प्रचार केलो. तांचे बरोबर सुरवातेक सावन फ्रांसिस्कान मिशिनरी आशिल्ले. ते आत्मिकतायेची पोसवण करपा खातीर तांचे बरोबर आसले. तेन्नाच्या काळार असो समज आसलो: जो राजा राजवटकी चलयता, तो राजा आपलो धर्म प्रचार करतालो. हेंच मनांत बाळगून क्रिस्ती धर्म प्रचार जालो अशें आमकां इतिहास सांगतां. कांय इतिहासकार अशेंय मानतात गोंयांत सांत फ्रांसीस शावियर आयलो तेन्ना म्हणल्यार 1542 वर्सा क्रिस्ती भावार्थ सुरू जालो. जेन्ना सांत फ्रांसीस शावियर गोंयांत पावलो तेन्ना ताणें दोतोन शिकवपाक सुरवात केली. पयली पुर्तुगेज भाशेन दोतोन शिकोवपाक पुस्तक उजवाडाक हाडलें. तें म्हणल्यार “दौत्रिना क्रिस्ता” हें पुस्तक 1557 वर्सा छापलें. हाचे उपरांत हेंच पुस्तक गोंयकार कोंकणी उलोवपी विध्यार्थानी कोंकणी भाशेन अणकारलें. सुमार 1556 ते 1561 ह्या वर्सा मदीं हाचो पुरावो लुईस फ्रॉयस हाची चीट दिता. ही चीट ‘*Documentacao para a Historia do Padroado Portugese no Oriente*’ ह्या माथाळ्या खाला ए.दा. सिल्वा रेगो हाणें पुर्तुगालाक 1952 वर्सा छापिल्ली मेळटा. हें पुस्तक कोंकणींतल्यान छापलें

हाची खात्री करून घेतली. ही जावन आसा कोंकणी भाशेक एक खुशालकायेची गजाल पूण तेच बरोबर दुखाची खबर म्हणल्यार ह्या पुस्तकाची एक पासून प्रत हाताक सांपडना.

गोंयांत तिसरी धर्मप्रांतीक परिशद, 1583 वर्सा भरली (Third Provincial Council of Goa). हे परिशदेंत एक म्हत्वाची गजाल जाली, “जी क्रिस्ती धर्माची मुळावी शिकवण आसा ती पुर्तुगेजींत तिचो संक्षेप करचो. हाचें कारण म्हणल्यार सगळें एकसारकेपणान जावंचे खातीर. तशेंच हाचे फुडें ही मुळावी शिकवण थळावे भाशेन अणकारपाची आनी दोतोन लोकांचे भाशेन तांकां शिकोवची”. हेंच मनांत बाळगून मुळावी शिकवण अणकारपाचो वावर सुरू जालो. हाचे उपरांत पयलो वावर जालो तो म्हणल्यार सगळी दोतोन पुर्तुगेज भाशेन संक्षेप करचो. ह्या वावरा उपरांत कोंकणींतल्यान अणकार जालो. जाणकारांच्या मतां प्रमाण हो अणकाराचो वावर 1585 ते 1592 वर्सा मदीं जालो खरो पूण पुस्तक रूपान येवंक ना. पयलीं ताची जायती तपासणी जाली. हो अणकार वावर सगळ्या कोंकणी मनशांक पावलो. ताची अशीं-तशीं बदलपां जालीं. सुमार तीस वर्सां हो अणकाराचो वावर तसोच उरलो. सगळ्या कोंकणी मनशांक ताचो भरपूर फायदो जालो. सगळीं कोंकणींतल्यान क्रिस्ती दोतोन शिकलीं. फादर थॉमस स्टिफन्स भायर पडल्या उपरांत 1622 वर्सा ही दोतोन पुस्तक रूपान छापून आयली.

हें पुस्तक चड व्हडा प्रमाणान छापूंक ना कारण त्या काळार कागदाचो उणाव आसलो. तशेच हें कागद उण्या दर्ज्याचें आसलें. ह्या कारणाक लागून पुस्तक छापलें खरें पूण थोड्या प्रमाणांत उजवाडा आयलें. चड करून इगर्जांनी आनी म्हत्वाच्या स्वातांचेर उपलब्द जालें. हे धर्मशिकवणेचो वापर सगळ्या जावंक लागलो.

पुर्तुगेजांक आपली राजवटकी ना जायत म्हण एक भिरांत आसली. तांकां मना पासून दिसतालें की आपली भास आपले राजवटकेत ते शिकले जाल्यार आमी कितें उलयतात आनी ते कितें उलयतात तें बेस बरें समजूंक येतलें. गोंयांत समजुंया तांची भास उलोवंक दिली जाल्यार ते एका दिसा आमकां जाय तशे चलचे नात. वेळ येतलो आमकां हांगाचे परतचें पडटलें. हेच विशीं चिंता मनांत बाळगून भारताचो तेन्नाचो राजप्रतिनिधी कौन्द द आल्वर फ्रांसिस्को दे तावोरा हाणें 1684 वर्सा खर हुकूम परगट केलो: सगळ्यांनी पुर्तुगेज भाशेन उलोवंचें आनी आपआपली आवय भास उलोवपाक वापरची न्हय. पाद्रींनी तशेंच दोतोन शिकोवप्यांनी दोतोन पुर्तुगेज भाशेन शिकोवंची. सगळ्यो बसका

पुर्तुगेज भाशेन चलोवच्यो. हो हुकूम घालून पुर्तुगेज शिकूंक तीन वर्सांचो वेळ दिलो. कोण आपणाक जाय ते भाशेन वागता ताका खर शिक्षा आसली. हाचे उपरांत जेन्ना आर्सेबिस्प लॉरेनसो दे सांता मारिया दे मेलो (1644-1750) आयलो तेन्ना होच हुकूम अदीक खर जालो.

आर्सेबिस्प आंतोन्यो तावोरा दे नेथवा ब्रुम सिल्वेरा (1750-1755) ह्या आर्सेबिस्पान एक सोंपेपण दिलें तें म्हणल्यार दोतोन कोंकणी भाशेन शिकोवची. जी दोतोन पुर्तुगेजींत आसा ती दर एका पाद्रीन अणकारची आनी पुस्तक रूपान काडून सगळ्यांक पावती करची. फिर्गजकारां लागीं हें अणकाराचें पुस्तक दिवचें. तांणी मागीर आपल्या चाकरांक दोतोन शिकोवंची. अश्या वेळार सगळ्या पाद्रींनी अणकाराचो वावर केलो तातूंत मात पासून दुबाव ना. ह्याच काळांत वेगवेगळे तरेन केल्ले अणकार नदरेक पडटात.

जेन्ना पुर्तुगलाचो दों जुजे पयलो राजा आसलो तेन्ना द मार्कुवीस दे पॅपाल मुखेल मंत्री आसलो. “सगळे जेजुइत पाद्री जे पुर्तुगलाक आनी पुर्तुगेजाच्या राज्यांनी आसात तांकां भायर घालचे” असो ह्या मुखेल मंत्र्यान खर हुकूम भायर घालो. तांकां भायर घातले तेन्ना तांचें सगळें आशिल्लें-नाशिल्लें आपल्या ताब्यांत घेतलें. पुस्तकां पासून, अश्या वेळार पुस्तकां खंय पावलीं वा कितें जालें हाची खबर मेळना. आमी जाणात 1622 वर्सा दोत्रिना क्रिस्ता हें पुस्तक छापून आयिल्लें. तें पुस्तक चड काळ तगचें ना, अशें आमी आदीं फुडेंच उल्लेख केल्लो आसा, कारण कागद उण्या दरज्याचें आसलें. तशे आमी पळोवंक गेल्यार उणीच शंबर वर्सां जाल्लीं. आनीक वायट गजाल म्हणल्यार हाचें फुडें आर्सेबिस्प आयले तांणी कोंकणी दोतोनीक म्हत्व दिलें ना.

कोंकणी दोतोनीचो काळ परतून उदेलो. 1820 वर्सा मानेल दा क्रुज हाणें मुंबय शारांत आनी 1860 वर्सा मिंगेल विन्सेंत दे आब्रेव हाणें कोंकणी दोतोन जी लोक तोंड पाठ जाणा आसलो, ती पुस्तकाच्या रूपान छापली. ह्या पुस्तकां उपरांत आनीकूय जायतीं पुस्तकां छापून आयलीं. एक मुखेल वस्त म्हणल्यार खंयच्याय पुस्तकांत थॉमस स्टिफन्साचें नांव मेळना. आमी जाणात 1622 वर्सा ते 1820 वर्सा ह्या काळा मदलो काळ पळयलो जाल्यार उणेंच दोनशीं वर्सां जातात. आदीं मदीं आनीक वेगवेगळे अणकार नदरेक झळकले पूण तांची प्रत सोदल्यार पासून मेळना.



कांय प्रतांचो फादर कायतान द क्रुज हांच्या *RESEARCH INTO THE KONKANI CATECHISM* ह्या पुस्तकांत उल्लेक केल्लो मेळटा.

काळा प्रमाण नवीं पुस्तकां आयलीं तेन्ना जायतीं बदलपां आनी विद्रुपां जाल्लीं पळोवंक मेळटात. हीं उतरां गोंयांत, मुबंय आनी मंगळूर हांगा बदलत आनी विदरूप जायत गेलीं, तांची हांगा धखल घेतल्या.

### 1. 'शेरण येतांव' हाचीं बदलपां आनी विद्रुपां

फादर थॉमस स्टिफन्स हांच्या दौत्रिना क्रिस्ता ह्या पुस्तकाच्या पांचव्या प्रकरणांत **साल्वे रेजिना** (मूळ पुर्तुगेज उतरां) हीं उतरां **शेरण येतांव तुका राणिये**, अशे भाशेन अणकार केल्यांत. हाचो अर्थ: '*We wholeheartedly renounce that dreadful power and surrender ourselves to ask and seek shelter in our Queen-Mother-Advocate.*' फुडें तांचो कशे तरेन बदल आनी विद्रुपां जाल्यांत तांचेर उजवाड घालतां.

- 'शेरण येतांव' ह्या उतरांच्या बदलाक **XARNAETAM** (शारनायतां) हें उतर, फादर ए. एल.आय. दे रोजा. हांच्या 'क्रिस्तांवपणाची शिकवण, दोतोनीच्य येजामीक,' (नोवा गोवा, 1932) ह्या पुस्तकांत मेळटा.
- फादर जुजे दा. वी. पिन्टो लोबो हांच्या 'पुस्तक क्रिस्तांव दोतोनीचें' (तिसरे खेप, बास्तरा, 1936) ह्या पुस्तकांत **SORONAETAM** (सरनायतां) हें उतर मेळटा. तशेंच फादर एफ. ए. सी. नाजार, (दामान 1955) हांच्या पुस्तकांतूय अशेंच उतर नदरेक पडटा.
- **SORV-VORNITAM** (सर्व-वर्णीतां) हें उतर फादर फ्रांसिस्को झेवियर पिन्टो हांच्या 'केटेसिज्मो दा आर्कीदिवोसेज दे गोवा ऐं कोंकानी,' (बास्तरा, 1948) ह्या पुस्तकांत आसपाविल्लें आसा. 'क्रिस्तांव दोतोनिची समजणी, सर्गाची वाट,' (कराची, 1952) ह्याय तांच्या पुस्तकांत सर्व-वर्णीतां उतराचो वापर केल्लो आसा. तशेंच 1954, 1955, 1956 आनी 1965 ह्या वर्सांनी **सर्व-वर्णीताचो** वापर सेक्रेतारियादो दा दौत्रिना क्रिस्तां, पणजे, हांणी प्रकाशीत केल्ल्या पुस्तकांनीय मेळटा.

मनीस केन्ना केन्नाय बेगीन उलयता तेन्ना आपशींच एकामेकाक तेंकून आयिल्ले वर्ण एकामेकांत भरसून वतात हाका लागून संधी तयार जाता. देखीक 'रामाची आवय' म्हणचे सुवातेर 'रामा आवय' (संधी:रामावय) अशें जाता. अशेंच कितें 'शेरण येतांव' ह्या उतरां विशीं घडलां आसूं येता. फादर थॉमस स्टिफन्साच्या दौत्रिनाच्या काळार (1622) साकून विसव्या शेतमाना मेरेन 'शेरण येतांव' हीं उतरां लोकाच्या तोंडार संवयेचीं जाल्ल्या कारणान आनी बेगीन उलयता तेन्ना आपशींच एकामेकांत भरसून वतात तशीं तीं बदलत वचून XARNAETAM आनी SORONAETAM अशीं जालीं आसूं येता. 'रामावय' ह्या उतराचो अर्थ जाणवता तसो XARNAETAM आनी SORONAETAM ह्या उतरांचो अर्थ मेळूंक कुस्तार जाता. ह्या उतरांचो अर्थ मेळना देखून फादर फ्रांसिस्को झेवियर पिन्टोन SORV-VORNITAM ह्या उतराचो वापर केलो आसूं येता. सर्व-वर्णीतां ह्या उतराची फोडणिशी केली जाल्यार "I praise all to you, Queen" असो ताचो अर्थ मेळटा. होय अर्थ थॉमस स्टिफन्साच्या 'शेरण येतांव तुका राणिये' ह्या अणकारा कडेन कमी पडटा तें जाणवता.

क्रिस्ती धर्म परगटणेचो केंद्र, व्हडलें गोंय (Diocesan centre for Catechism) हांच्या 'देवाच्या भुग्यांची मागणीं'(1973) ह्या पुस्तकांत आनी प्रदेशीक मळार 'शेरणा येतांव तुका राणिये' सोडून 'नमान राणिये' अशे तरेचो अणकार पळोवपाक मेळटा.

## 2. 'गर्भि संभवलो' हाचीं बदलपां आनी विद्रुपां

थॉमस स्टिफन्सान दौत्रिना क्रिस्ताच्या सव्या प्रकरणांत क्रेदाचो अर्थ हातूंत 'जो स्परिता सांता वरउनु गर्भि संभवलो' अशे तरेन वाक्य पळोवपाक मेळटा. 'Gorbhim Sombhoulo' हीं उतरां 300 अदीक वर्सां उपरांत कशे तरेन बदलत आनी विद्रूप जाल्लें आसा ताचेर उजवाड घालया.

- 1968 सेक्रेतारीयादो दा दौत्रिना क्रिस्तां, पणजे, हांणी संपादीत केल्ल्या 'क्रिस्तांव दोतोनीचें पयलें पुस्तक' ह्या पुस्तकांत **GORB SAMBAULO** अशें तरेन वापरलां तें दिसून येता.

- फादर जुजे दा वी पिन्टो लोबो हांच्या 'पुस्तक क्रिस्तांव दोतिरनीचें' (तिसरे खेप, बास्तरा, 1936) ह्या पुस्तकांत **GORB SOMBAULO** अशे तरेचो वापर दिसता.
- फादर फ्रांसिस्को शावियर पिन्टो हांच्या केटेकिज्मो दा आर्कदिवोसेजन दे गोवा एं कोंकनी ह्या पुस्तकांत (बास्तरा 1948) **GORB SOMBOULO** अशे तरेचो अणकार दिसता.
- सेक्रेतारियादो दा दौत्रिना क्रिस्तां हांणी संपादीत केल्ल्या 'कातेकिसमो दा आर्कीदिवोसीज दे गोवा एं कोंकनी' (दुसरी क्लास, सिदाद दे गोवा, 1954) ह्या पुस्तकांत **GORB SOMBOVLO** अशें नोंद जाल्लें आसा.
- फादर फ्रांसिस्को शावियर पिन्टो, क्रिस्तांव दोतोनीची समजुणी, सर्गाची वाट, कराची, 1954 ह्या पुस्तकांत **GORB SOMBOULO** अशें बरयल्लें मेळटा.

थॉमस स्टिफन्सान गर्भि संभवलो अशीं उतरां वापरल्यांत ताचो अर्थ असो: *Conceive in womb*. वयल्या पांचूय देखींनी **GORB (meaning Foetus)** हें उतर घेतिल्लें आसा तें दिसता. थॉमस स्टिफन्सान गर्भि संभवलो हीं उतरां देवशास्त्रीय नदरेंत अर्थपूर्ण आसात तशे तरेचो अर्थ मागिरल्या अणकारांनी दिसना. क्रिस्तां धर्म परगटणेच्या केंद्रान ही चूक सुदरायल्ली आसा. थॉमस स्टिफन्सान घेतिल्ल्या परीं सांबाळ्ळां. "गर्भि संभवलो" तरी आसतना आजून पासून थोडो लोक चुकीचो उच्चार (गर्भ संभवलो) करतात.

## निश्कर्श

गोंयांत धर्माप्रसाराचें काम करतना धर्मीक फुडाऱ्यांनी थळावी भास शिकप सक्तीचें आसलें. ह्याच कारणाक लागून थॉमस स्टिफन्स थळाव्यो भासो शिकूंक पावलो. खास करून मराठी, कोंकणी, संस्कृत आनी कन्नड ह्या भासांचेर प्रभुत्व मेळोवन घेतलें. मराठी (कोंकणी मिश्रीत) भाशेंत ताणें क्रिस्त पुराण बरयलें आनी कोंकणी भाशेंत ताणें दौत्रिना क्रिस्ता अणकारलें. ताणें केल्लो अणकार खूब शास्त्रीय पद्दतीचो आनी देवशास्त्रीय नदरेंत खूब अर्थपूर्ण हें जाणवता.

थॉमस स्टिफन्सान पुस्तक रुपान उजवाडाक हाडिल्लो दौत्रिना क्रिस्ताचो कोंकणी अणकार वावर नश्ट जालो तेन्ना तो तोंडी परंपरेंत (दोतोन) चालू उरलो. तोंडी परंपरा चालंत आसली तेन्ना जायतीं बदलपां आनी विदरूपां पळोवपाक मेळटात. हीं बदलपां आनी विदरूपां एक तर अर्थहीण दिसतात वा मुखेल अर्था कडल्यान पयस गेल्लीं दिसतात.

ह्या अभ्यासांत फकत दोन देखींची फोडणिशी केल्या आनीक कांय उतरां आसात तांचेर अभ्यास करूं येता.

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- Figure parts should be denoted by **uppercase letters** (A, B, C, etc.).

- Each figure should have a concise caption describing accurately what the figure depicts.
- Figure captions begin with the term *Figure* in bold type, followed by the figure number in bold (**Figure 1**).

### Acknowledgments:

Acknowledgments of people, grants, funds, etc. should be placed before the reference section.

### Citations:

Cite references in the text by name and year in parentheses.

Some examples:

1. **Single author:** (Author and year) [Fernandes J, 2017].
2. **Two authors:** (Both should be named and year) [Kaur G and Rai SB, 2012].
3. **More than two authors:** (only the first author's name + et al.) [Kumar M et al., 2020].

The reference list at the end of the manuscript should include only works mentioned/cited in the text and should be arranged alphabetically.

### References should be cited as follows:

Books	Koros, W. J.; Chern, R. T. In Handbook of Separation Process Technology; Rousseau, E. D.; Russell, B., Eds.; Wiley: New York, 1987; Vol. 2, Chapter 20, pp 34-45.
Book Series	Koros, W. J.; Chern, R. T. In Polymers for Fun and Profit; Rousseau, E. D., Ed.; ACS Symposium Series 518; American Chemical Society: Washington, DC, 1997; p 45.
Journals	Guan, L., Jiménez, M. E. G., Walowski, C., Boushehri, A., Prausnitz, J. M. and Radke, C. J. J. Appl. Polym. Sci. 2011, 122, 1457–1471.
Conference Proceedings	Medium, K. P. In Polymers Revealed, Proceedings of the 5th Annual Conference on Hidden Polymers, Istanbul, Turkey, Sept 5–21, 1976; Bluto, M., Ed.; Elsevier: New York, 1977.
Theses	Big, G. H. Polymers in the Automotive Industry. Ph.D. Thesis, University of Scoggins, Fort Lee, MN, June 1954.
Patents	Norman, L. O. (Michelin Co.). U.S. Patent 4,199,533, April 22, 1980.
Online Sources	J. A. Woolam Co., Ellipsometry tutorial. <a href="http://www.jawoolam.com/tutorial_1.html">http://www.jawoolam.com/tutorial_1.html</a> (accessed May 1, 2010).





**SPECTRUM**

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