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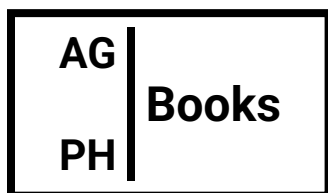
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**2022**



# **Fundamental Of Biochemistry**

Dr. Dhananjay Shivajirao Patil, Dr. Sudarshan Narayan Nagrale, Dr. Kavita Khatana and Dr. Praveen Singh Gehlot

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**Dr. Sudarshan Narayan Nagrale** completed his Ph.D. in Pharmaceutical Sciences. He has over 10 years’ experience



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Anatomy is the study of the internal and exterior parts of the body as well as their physical interactions, while physiology is the study of how those structures work. Anatomy and physiology are two different branches of the same academic discipline.

The axial and appendicular regions are the two primary sections that make up a human body. The head, neck, thorax, abdomen, & pelvis make up what is known as the axial portion of the body, while the upper and lower extremities make up what is known as the appendicular part. Shoulders, upper arms, forearms, wrists, & hands are all considered to be part of the upper extremities, while the hips, thighs, lower legs, ankles, & feet are all considered to be part of the lower extremities.

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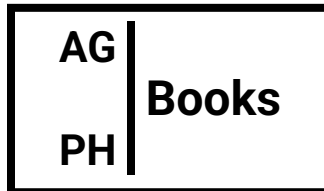
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# Physiology and Human Anatomy I

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मानव एक संसाधन असले तरी स्त्री-पुरुष या घटकाचा प्रभाव एखाद्या प्रदेशाच्या विकासात मोठ्या प्रमाणात दिसून येतो. भारतीय संस्कृतीमध्ये स्त्री ही गृहिणी असली तरी आधुनिक काळात ती पुरुषाच्या समान वेगवेगळ्या क्षेत्रांमध्ये आपले वर्चस्व प्रस्थापित करत असताना दिसून येते. त्यामुळे एखाद्या प्रदेशाचे विकासात पुरुष जातीचा जेवढा प्रभाव असतो त्याच समान तेथील स्त्री या घटकाचा सुद्धा प्रभाव आपल्याला मान्य करावाच लागेल. परंतु हा प्रभाव तेथील साक्षर, रोजगार, व्यवसायिक सहभाग इत्यादी घटकावर अवलंबून असतो. त्यामुळे खालील घटकांचा स्त्री-पुरुष गुणवत्तेवर काय प्रभाव पडतो ते जाणून घेणे सुद्धा आवश्यक आहे.

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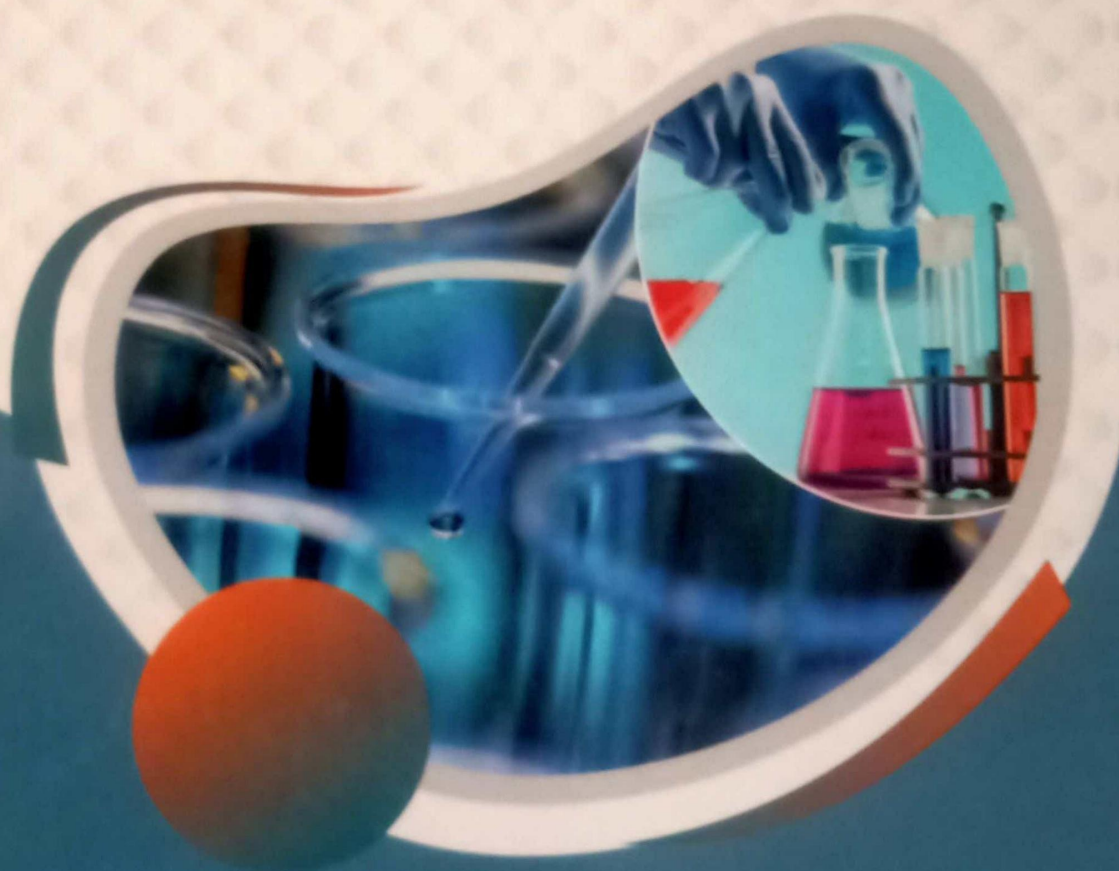


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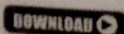
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**Dr. Datta A. Dhale** did his M.Sc. (2001) and Ph.D. (2008) in Botany from Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.). Presently, he is Associate Professor at Post-Graduate Department of Botany, SSVS Sansitha's, L. K. Dr. P. R. Ghogrey Science College, Dhule (M.S.). He is young and enthusiastic teacher and research worker. He is consulted for his expertise in study of Medicinal & Aromatic plants, Pharmacognosy and Phytochemistry. He honoured 16 different awards likes, World Scientist and University Ranking-2021' @ I Rank in (Botany / Pharmacognosy) KBCNM University, Jalgaon (2021), Academic Excellence Award-2020 (Intn. Association of Science Impact, Pune), Distinguished Faculty Award (Intn. Academy of Science & Research, Kolkata, July, 2019), Best NSS Programme officer (Govt. of Maharashtra, 2019), Best NSS Programme officer (KBCNM University, Jalgaon, 2019), Distinguished Researcher Award (14th July, 2017, Nagpur), Maharashtra Gomatmak Innovative Science Teacher Award-2016 (11, Dec., 2016, Goa), Young Scientist award-2016 (Baraut, UP), Young Scientist award-2016 (Salem, TN), Young Scientist award-2014 (Dhule, MH), Dalitmitra Dr. Shirirajji Bhangdiya Award, Best Research Paper Presentation Award, etc. He has published 88 research papers in national and international journals, 15 Book chapters and 05 books. He actively participated in more than 225 seminars and conferences, besides many training programmes. He has keen interest in editing and is associated with journals of different 23 journals. Edited 15 special volumes of different international journal on his name. He guided 29 candidates for research projects for university academic degrees (M.Sc.). As a result of his enthusiasm in NSS and other curricular activities, he worked as a team leader for many national and state camps. He is PhD Guide in Botany. He is now supervising five students pursuing their doctorates in various topics. Additionally, he finished two projects from UGC, Government of India and BCUD, KBCNMU, Jalgaon.



**Prof. (Dr.) Hiteshkumar Arvindbhai Solanki:** A leading figure in the world of Plant Science, Environment conservation and Climate Change for around 28 years. He has received his PhD in 2002 from Bhavnagar University, Bhavnagar, Gujarat. Currently, he is working as Professor of Botany and Head of Environmental Science Department in Gujarat University. His research has included Botany (Alga: Fresh water and Marine Taxonomy, Fungi, Angiosperm Taxonomy, Medicinal Plants, Ethnobotany, Physiology and Biochemistry), Ecology, Environmental Science, Climate Change, Oceanography and Remote Sensing. Based on this research and fellowship training he has received several awards and honors, such as fellow of Society of Earth Sciences etc. He is serving as an editorial member of several reputed journals & expert Reviewers for journals like Resources and Environment Journal – USA, Advancement in Medicinal Plant Research (AMPR), Africa, International Food Research Journal etc. He has authored more than 300 research papers, 22 book chapters and 18 books. Many of his published research articles are in UGC and Scopus indexed journals having good impact factors. He was a member of National Geography Reader Panel, e-Journal of Life sciences Leaflets, The Science Advisory Board (SAB), USA, International Committee on Global Changes of the Geological Environment (IC GCGE), Society of Earth Sciences, The International Committee on Global Changes of the Geological Environment (IC GCGE) GEOCHANGE Initiative Group. He has co-ordinated several seminar/conferences/workshops at the department. He guided around 36 M.Phil. and 36 Ph.D. students. Currently, 08 students from various fields have been doing their Ph.D. under his guidance. He also completed 5 Major projects from ISRO, Government of India and 1 ISRO major project is going on. As a true professor for the field and its knowledge, he uses his research, nonprofits, various talks he has conducted and this book to spread the field to a broader scale. As an award winning mentor, Dr. Hiteshkumar A. Solanki aims to use his research in Botany, Bioinformatic, Climate Change and Environmental Science to further the knowledge of others within the field.

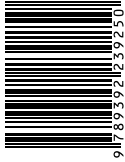


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# Recent Trends in Biological Sciences

**Dr. Datta Dhale  
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**Editors**

**Dr. Datta Dhale  
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29. Community Dynamics

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# **Impact of COVID-19 Pandemic in India**

The background of the cover features a dark, textured surface with a central blue glow. Several red, spherical virus particles with protruding spikes are scattered across the scene, some appearing to be in motion or interacting. The overall aesthetic is scientific and urgent.

## **COVID-19**

**Dr. Archana Singh**





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## Recent Trends in Biological Sciences

In present world, the general public is aware of the widespread economic significance of Biological Science and it Resources. Biological Sciences have been benefited from the intellectual and pragmatic input of ideas and various techniques from other disciplines, including Phyto-chemistry, Bioinformatics, Industrial Chemistry, Food Chemistry, Natural Products, Mushroom Cultivation, Climate Change, Environmental Chemistry, Drug Chemistry and Biochemistry. This book presents a series of vignettes or case studies on how interdisciplinary studies between the biological sciences and other sciences have yielded new insights and products. This book has been initiated with prime motive of projecting the continuum of changes in the field of recent trends in research and it will give light in richness of knowledge. This book 'Recent Trends in Biological Sciences' would be beneficial to the students, teachers, emerging scientists and researchers, from both an individual and institutional perspective.



**Dr. Datta A. Dhale** did his M.Sc. (2001) and Ph.D. (2008) in Botany from Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.). Presently, he is Associate Professor at Post-Graduate Department of Botany, SSVSP Sansitha's, L. K. Dr. P. R. Ghogrey Science College, Dhule (M.S.). He is young and enthusiastic teacher and research worker. He is consulted for his expertise in study of Medicinal & Aromatic plants, Pharmacognosy and Phytochemistry. He honoured 16 different awards likes, World Scientist and University Ranking-2021' @ I Rank in (Botany / Pharmacognosy) KBCNM University, Jalgaon (2021), Academic Excellence Award-2020 (Intn. Association of Science Impact, Pune), Distinguished Faculty Award (Intn. Academy of Science & Research, Kolkata, July, 2019), Best NSS Programme officer (Govt. of Maharashtra, 2019), Best NSS Programme officer (KBCNM University, Jalgaon, 2019), Distinguished Researcher Award (14th July, 2017, Nagpur), Maharashtra Gomatmak Innovative Science Teacher Award-2016 (11, Dec., 2016, Goa), Young Scientist award-2016 (Baraut, UP), Young Scientist award-2016 (Salem, TN), Young Scientist award-2014 (Dhule, MH), Dalitmitra Dr. Shirirajji Bhangdiya Award, Best Research Paper Presentation Award, etc. He has published 88 research papers in national and international journals, 15 Book chapters and 05 books. He actively participated in more than 225 seminars and conferences, besides many training programmes. He has keen interest in editing and is associated with journals of different 23 journals. Edited 15 special volumes of different international journal on his name. He guided 29 candidates for research projects for university academic degrees (M.Sc.). As a result of his enthusiasm in NSS and other curricular activities, he worked as a team leader for many national and state camps. He is PhD Guide in Botany. He is now supervising five students pursuing their doctorates in various topics. Additionally, he finished two projects from UGC, Government of India and BCUD, KBCNMU, Jalgaon.



**Prof. (Dr.) Hiteshkumar Arvindbhai Solanki:** A leading figure in the world of Plant Science, Environment conservation and Climate Change for around 28 years. He has received his PhD in 2002 from Bhavnagar University, Bhavnagar, Gujarat. Currently, he is working as Professor of Botany and Head of Environmental Science Department in Gujarat University. His research has included Botany (Alga: Fresh water and Marine Taxonomy, Fungi, Angiosperm Taxonomy, Medicinal Plants, Ethnobotany, Physiology and Biochemistry), Ecology, Environmental Science, Climate Change, Oceanography and Remote Sensing. Based on this research and fellowship training he has received several awards and honors, such as fellow of Society of Earth Sciences etc. He is serving as an editorial member of several reputed journals & expert Reviewers for journals like Resources and Environment Journal – USA, Advancement in Medicinal Plant Research (AMPR), Africa, International Food Research Journal etc. He has authored more than 300 research papers, 22 book chapters and 18 books. Many of his published research articles are in UGC and Scopus indexed journals having good impact factors. He was a member of National Geography Reader Panel, e-Journal of Life sciences Leaflets, The Science Advisory Board (SAB), USA, International Committee on Global Changes of the Geological Environment (IC GCGE), Society of Earth Sciences, The International Committee on Global Changes of the Geological Environment (IC GCGE) GEOCHANGE Initiative Group. He has co-ordinated several seminar/conferences/workshops at the department. He guided around 36 M.Phil. and 36 Ph.D. students. Currently, 08 students from various fields have been doing their Ph.D. under his guidance. He also completed 5 Major projects from ISRO, Government of India and 1 ISRO major project is going on. As a true professor for the field and its knowledge, he uses his research, nonprofits, various talks he has conducted and this book to spread the field to a broader scale. As an award winning mentor, Dr. Hiteshkumar A. Solanki aims to use his research in Botany, Bioinformatic, Climate Change and Environmental Science to further the knowledge of others within the field.

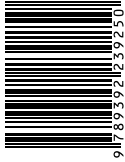


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# Recent Trends in Biological Sciences

**Dr. Datta Dhale  
Dr. Hitesh Solanki**



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Dr. Hitesh Solanki**

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## **Pesticides and Its Impact on Public Health and Environment**

*Nayka Jayshree Subhash\* and Prem Kumar Gautam\**

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### **ABSTRACT**

Pesticides are toxic chemicals that are released into the environment to kill, prevent, control, repel or mitigate the population of harmful pests in an agricultural, domestic, and industrial setting. The production and use of pesticides have increased tremendously in the present time, thus there is a need to evaluate the effects of pesticides on public health and the environment. The different literature on relevant topics is collected and reviewed on their adverse effect on the environment and health. They are any biological or chemical agent that inhibits, weakens, kills, or deters insects. Including rodents, fungi, insects, and some other unwanted plants also known as weeds. It is specifically designed to affect target organisms, but pesticides not only kill target organisms in agriculture and the environment, but also essential (non-target) organisms that can be beneficial to crops, it causes many changes in ecosystems and the environment. Different criteria are used to describe

---

\* Dept. of Botany, G. T. P. College, Nandurbar (M.S., India)

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**मृणाल पाण्डे**  
**की कहानियों में नारी चेतना**

डॉ. महेन्द्र रघुवंशी



# मृणाल पाण्डे की कहानियों में नारी चेतना

डॉ. महेन्द्र रघुवंशी



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## भूमिका

नारी चेतना की दृष्टि से जब हम हिंदी कहानियों की चर्चा करते हैं, तो स्पष्ट है कि उसके उद्भव और विकास के क्रम में स्त्री-अस्मिता के अनेक प्रश्न और उसके दुःख-दर्द हिंदी कहानियों में सदैव शामिल रहे हैं, पर वे सहानुभूति स्तर पर अधिक थे। स्वानुभूति के स्तर पर स्त्रियों की आवाज के साथ लेखिकाओं ने ही अधिक न्याय किया है।

नई कहानी के उद्भव और विकास- क्रम में जिन महिला कहानीकारों ने इस विधा को समृद्ध किया, उनमें मृणाल पाण्डेय का नाम बहुत ही आदर के साथ लिया जाता है। सशक्त, प्रतिभासम्पन्न और सहज रचनाकार के रूप में उन्होंने अपनी अलग पहचान बनाई है। मृणाल पाण्डेय की कहानियों में वैयक्तिक चेतना के साथ सामाजिक सन्दर्भों में स्त्री के संघर्षों और उसकी जिजीविषा को वाणी दी गई है। उनमें गुलामी की बेड़ियों को तोड़ने का संदेश है, तो भारतीय संस्कृति के प्रति गहन अनुराग भी।

प्रस्तुत समीक्षा ग्रन्थ में नारी चेतना की दृष्टि से मृणाल पाण्डेय की कहानियों का अनुशीलन किया गया है, जिसमें विषय से सम्बंधित स्त्री-जीवन के सभी पक्षों पर प्रकाश डालने की कोशिश की गई है।

इस कार्य में अनेक विद्वानों का सहयोग एवं मार्गदर्शन मिला, जिनके प्रति कृतज्ञता ज्ञापित करता हूँ। विशेष रूप से अपनी मूल्यवान सम्मति प्रदान करने हेतु डॉ. राकेश शुक्ल, प्रो. हिंदी विभाग वी.एस.एस.डी. कॉलेज, कानपुर तथा इस पुस्तक को आकर्षक रूप में प्रकाशित करने हेतु प्रकाशक श्री वीरेंद्र शुक्ल, विद्या प्रकाशन, कानपुर के प्रति आभार प्रकट करता हूँ।

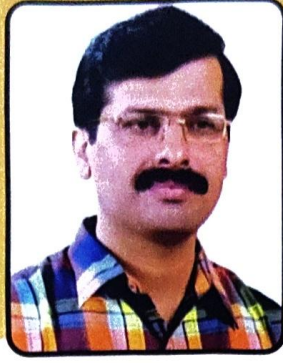
मृणाल पाण्डेय की कहानियों को समझने-परखने की दिशा में यदि यह पुस्तक किंचित भी योगदान करेगी तो अपने कार्य को सार्थक समझूँगा।

डॉ. महेन्द्र रघुवंशी

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## डॉ. महेंद्र रघुवंशी

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**शोध निर्देशक :** कवयित्री बहिणाबाई चौधरी उत्तर महाराष्ट्र विद्यापीठ, जलगांव द्वारा एम.फिल. एवं पीएच.डी. के मार्गदर्शक

**विशेष उपलब्धियाँ :** • कवयित्री बहिणाबाई चौधरी उत्तर महाराष्ट्र विद्यापीठ, जलगांव में हिन्दी अध्ययन मंडळ के सदस्य के रूप में कार्यरत, • उपाध्यक्ष, उत्तर महाराष्ट्र हिन्दी प्राध्यापक परिषद, • लायन्स क्लब, नंदुरबार में सदस्य, के रूप में कार्यरत। • खान्देश ब्यूरो प्रमुख, रघुकलश त्रैमासिक, भोपाल • नॅशनल एडवाईजर कमेटी, आधार पब्लिकेशन, अमरावती में सदस्य के रूप में कार्यरत • संपादक महाविद्यालयीन "प्रेरणा" नियतकालिक • विभागीय सचिव, महाराष्ट्र हिंदी परिषद • जिला प्रवर्तक, करिअर कट्टा, महाराष्ट्र माहिती तंत्रज्ञान सहायता केंद्र।

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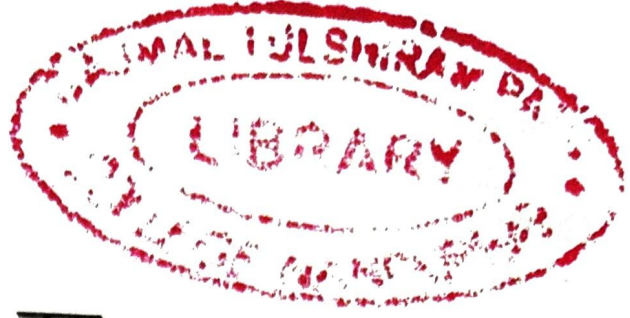
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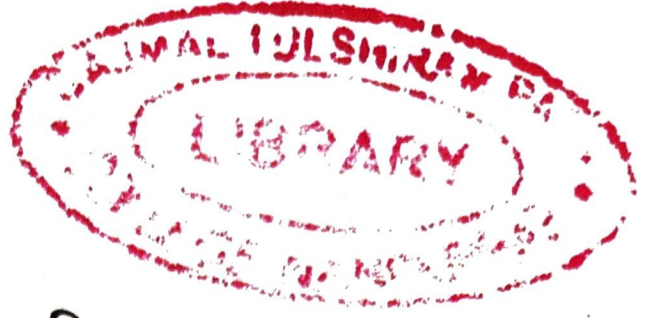
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पाठ्य-पुस्तक से छात्र हो या अध्यापक दोनों को पढ़ने और पढ़ाने में सुविधा होती है। सारी रचनाएँ एक जगह पर एकत्रित रूप से मिलना और न केवल रचनाएँ बल्कि उनके उपर लिखी गई आलोचनाएँ, रचनाकार का जीवन परिचय एवं रचना परिचय तथा वह पुस्तक जिस विधा पर केन्द्रित है उसकी सैद्धान्तिकी यह सारी चीजें एक ही पाठ्य-पुस्तक में मिलना 'देव दुर्लभ' बात होती है। हिन्दी अध्ययन मंडल ने अब तक जितनी भी पाठ्य-पुस्तकें प्रकाशित कीं वह रचनाओं का संकलन मात्र नहीं बल्कि उस पर आधिकारिक विद्वानों द्वारा खोज-बीन कर किया गया भाष्य भी है। इस दृष्टि से इन पाठ्य-पुस्तकों का महत्त्व सौ गुना और बढ़ जाता है।

अध्ययन मंडल ने अब तक जितनी भी पाठ्य-पुस्तकें निकाली हैं वे रुचि आधारित साख पद्धति, भारत सरकार की नई शिक्षा नीति, शासन और विश्वविद्यालय प्रशासन द्वारा समय-समय पर दिए गए निर्देशों के अनुसार है।

सम्पूर्ण भारतवर्ष में सर्वप्रथम रुचि आधारित साख पद्धति के आधार पर पाठ्यक्रम बनाना और उसे सफलतापूर्वक लागू कर, एक शृंखला पूरी कर; पुनः नये सिरे से प्रथम वर्ष के पाठ्यक्रम का निर्माण करने का श्रेय हमारे विश्वविद्यालय को और उसमें भी मानविकी तथा समाज विज्ञान विद्याशाखा को जाता है।

इस वर्ष के पाठ्यक्रम का निर्माण करते समय इस बात का ध्यान रखा गया है कि प्रथम वर्ष में प्रवेशित छात्रों को हिन्दी गद्य और पद्य साहित्य की अलग-अलग



विधाओं और प्रवृत्तियों का सामान्य परिचय हो। इसलिए प्रथम सत्र में गद्य विभाग के अन्तर्गत प्रेमचन्द की 'पूस की रात' और भगवतीचरण वर्मा की 'प्रायश्चित्त' यह दो कहानियाँ, आचार्य महावीर प्रसाद द्विवेदी द्वारा लिखित निबन्ध 'साहित्य की महत्ता', हरिशंकर परसाई का सुप्रसिद्ध व्यंग्य 'वैष्णव की फिसलन', जगदीशचन्द्र की एकांकी 'रीढ़ की हड्डी' और रामवृक्ष बेनीपुरी जी का प्रसिद्ध रेखाचित्र 'सुभान खाँ' तथा पद्य विभाग के अन्तर्गत संत कबीर, गोस्वामी तुलसीदास, कृष्ण भक्त कवि सूरदास और मीराबाई, बिहारी तथा रीतिकाल के सुप्रसिद्ध कवि भूषण का पाठ्यक्रम में समावेश किया गया है। गद्य और पद्य विधा के साथ-साथ विद्यार्थी व्याकरण से भी परिचित हों इसलिए विलोमार्थक शब्द, शब्द संसाधन और पत्र लेखन आदि को भी पाठ्यक्रम में समाविष्ट किया है। वैसे ही द्वितीय सत्र में गद्य विभाग के अन्तर्गत सुषमा मुनीन्द्र द्वारा लिखित कहानी 'मेरी बेटियाँ', और जहीर कुरेशी द्वारा लिखित कहानी 'पहला रोज़ा', राष्ट्रीय धारा के प्रखर विचारक स्वतंत्रवीर सावरकर द्वारा लिखित निबन्ध 'यंत्र से क्या बेकारी बढ़ती है', खानदेश की मिट्टी से उपजे सुप्रसिद्ध व्यंग्यकार डॉ. दिलीप पटेल द्वारा लिखित व्यंग्य 'मारे गए गुलफाम', सुप्रसिद्ध महिला लेखिका ममता कालिया द्वारा लिखित एकांकी 'यहाँ रोना मना है' और महादेव वर्मा का प्रसिद्ध संस्मरण 'पुण्य स्मरण' का तो पद्य विभाग के अन्तर्गत राष्ट्रकवि माखनलाल चतुर्वेदी की कविता 'कैदी और कोकिला', सूर्यकान्त त्रिपाठी की प्रसिद्ध कविता 'विधवा', नागार्जुन की बहुचर्चित कविता 'कालिदास से', धर्मवीर भारती द्वारा लिखित कविता 'टूटा पहिया' गोपालदास सक्सेना 'नीरज' द्वारा लिखित गीत 'साथी दुख से घबराता है', और हरेराम नेमा 'समीप' द्वारा लिखित गज़ल का पाठ्यक्रम में समावेश किया गया है। साथ ही द्वितीय सत्र में भी छात्र व्याकरण से परिचित हों इसलिए अशुद्धि शोधन, कहावतें, मुहावरे और लोकोक्तियों का भी समावेश पाठ्यक्रम में किया गया है।

आशा है कि यह बहुविध विधा मिश्रित सामान्य हिन्दी का पाठ्यक्रम और पाठ्य-पुस्तक छात्र और अध्यापक दोनों की पसन्दी पर शत-प्रतिशत खरी उतरेगी और छात्र के मन तथा मानस पटल पर इतना प्रभाव उत्पन्न करेगी की छात्र आगे चलकर हिन्दी विषय में ही अपने भविष्य कालीन संभावनाओं की तलाश करें।

पाठ्य-पुस्तक अच्छी-बुरी जैसी भी लगे आपकी प्रतिक्रिया हिन्दी अध्ययन मंडल तक प्रेषित कर सहयोग प्रदान करें इसी आशा और विश्वास के साथ अपनी सम्पादकीय टिप्पणी को खड़ी पाई देता हूँ।

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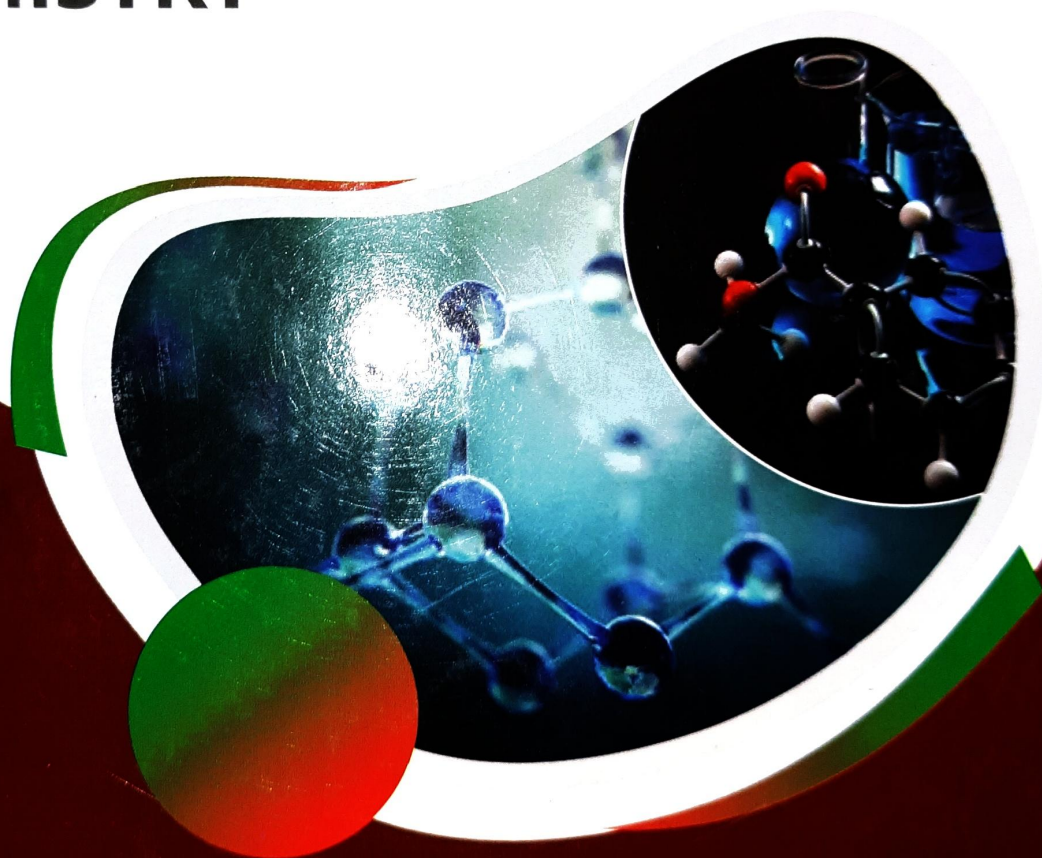
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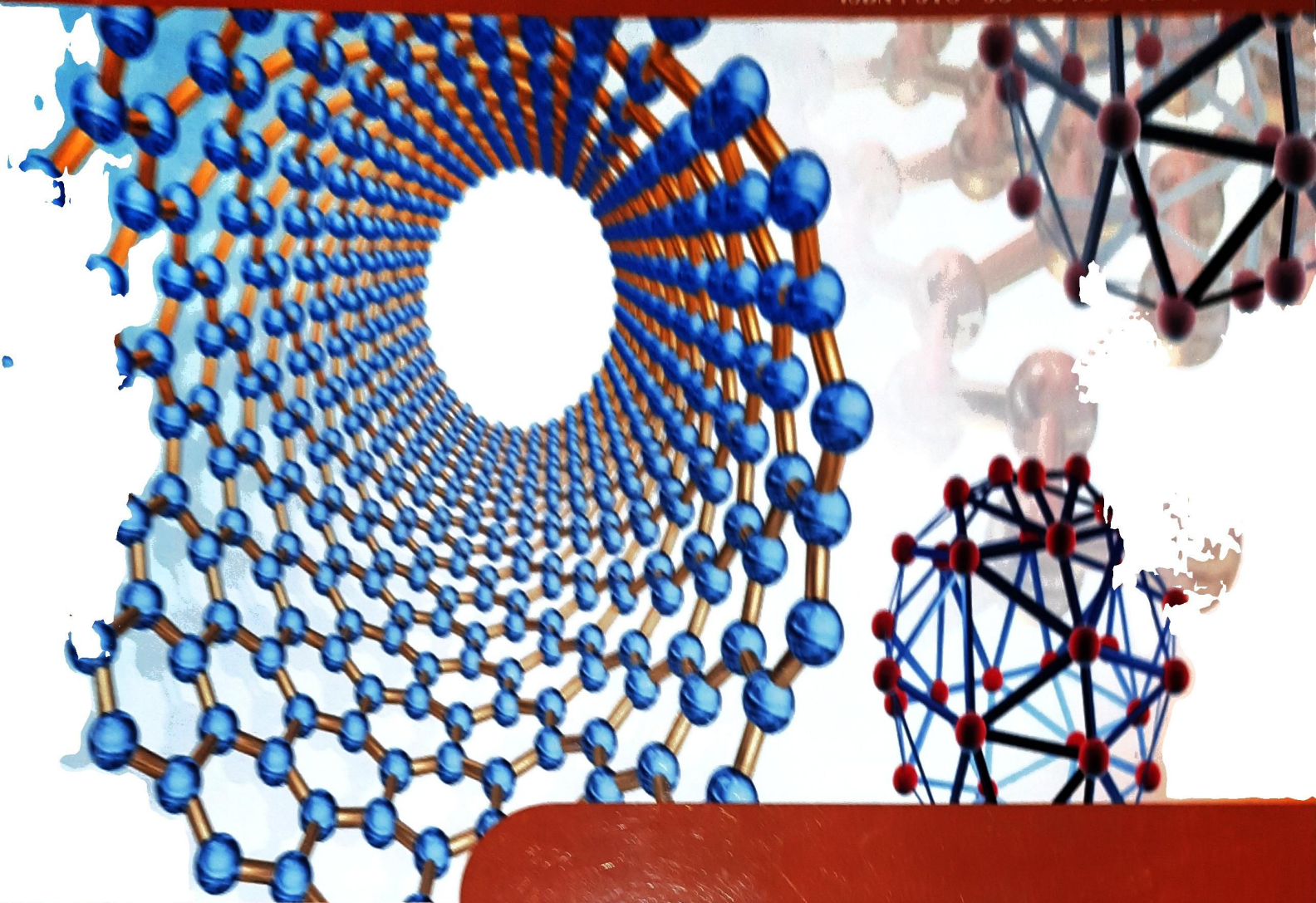
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## An overview of green synthesis and biomedical applications of silver nano particles

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### Abstract -

Silver nano particles have been widely used in the different areas including medicine, industry, biosensors, water purification and catalysis. Physical and chemical methods of synthesis of nanoparticles require toxic chemicals and they may also trigger the formation of toxic by-products during synthesis. These methods of synthesis are very costly, consumes high power and long-time maintenance as well. From chemical to greener is a sustainable research pattern which is opted for many chemicals. Demerits of physical and chemical methods, elevates synthesizing silver nano particles via biological routes. This review paper is designed to give an overview about green synthesis and biomedical applications of silver nano particles.

**Keywords :** Nano materials, silver nanoparticles, green synthesis, biomedical applications,

### 1. Introduction :

Nanoparticles defined as particles having size range between 1-100nm. Nano particles and nano technology has been developed before centuries, but its development reached milestone in last 30 years. Researchers took great interest in nano technology because of their size, shape, structure, colour, remarkable physico-chemical properties and biological activities [1]. Silver nanoparticles (AgNPs) have great toxicities against virus [2], bacteria [3], fungi [4] and another micro-organism [5]. For these reason AgNPs widely used in biomedical sciences [5], such as targeting drug delivery system [6], cancer treatments [7], as an antiviral [2], antibacterial [3], anti-fungi [4]. Nano particles has great therapeutic index and achieve targeting drug delivery for cancer cell without damage healthy tissues [7]. Also, nano particles are used widely in industries, in water purification, as a catalyst, in food processing, as a stabilizer, in a capping agent, as nano fertilizers and many more [8]. Nanoparticles have different properties than bulk material, for example bulk silver is metallic grey on colour while nano silver is deep wine or red coloured. Bulk gold is inert while nano gold is highly reactive. Versatility AgNPs can further be understood by following characteristics:

- They have different physico chemical properties then bulk silver because of their size, shape, surface area, dissolution rate, biological interactions and other impacts [9].
- They are widely used in biomedical sciences because of large surface area and has greater toxicities to the bacteria and virus [2,3].
- They have different shapes like spherical, rod, cube, plate, sheet which is depends on mode of synthesis [10].
- They have tendency to coordinate with vast no of ligands and to interact with biological living system.

In general nanoparticles can be synthesizes by top down and bottoms up methods. In top-down methods bulk particles grinded and then convert nano form, bottoms up approach vice versa. While top-down method includes physical methods, bottoms up approaches include chemical and biological methods [11,12]. Biological synthesis/ green synthesis drew attention of researchers for sake of



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## प्रस्तावना (Introduction) :-

आधुनिक भारताच्या जडण-घडणीमध्ये महात्मा जोतीराव फुले यांचे अत्यंत महत्त्वपूर्ण योगदान आहे. खऱ्या अर्थाने महात्मा जोतीराव फुले हे सामाजिक सुधारणेच्या रणांगणातील एक महान योद्धे होते. त्यांनी समाजातील दलित, शोषित, पिडीत, उपेक्षित वर्गांच्या न्याय, हक्क व अधिकारांसाठी आपले संपूर्ण जीवन हे चंदनासारखे झिजविले. विशेषतः तत्कालीन समाजामध्ये महिला उत्थानाचे अत्यंत महत्त्वाचे कार्य जोतीबांनी केले. मनुस्मृतीद्वारे महिलांना भोगवस्तू म्हणून दर्जा देणे, यज्ञाकरीता पुजाऱ्याची अनिवार्यता, यज्ञामध्ये शुद्धतेचे प्रचलन, अनिष्ट प्रथा, परंपरा इ. च्या परिणामामुळे समाजामध्ये पुरुषांच्या तुलनेत महिलांचा समाजातील दर्जा हा नेहमी दुय्यम राहिला. बालविवाह, विधवा पुनर्विवाह बंदी, सतीप्रथा, देवदासी व केशवपन यासारख्या अनिष्ट प्रथा, परंपरांनी महिलांच्या दयनीय स्थितीमध्ये मोठ्या प्रमाणात भर घातली.

महात्मा फुले म्हणजे भारताच्या सामाजिक इतिहासातील एक महान पर्व होय. भारतीय विषमतेवर आधारीत व्यवस्थेने महिलांना अतिशूद्र ठरवून तिला शिक्षणापासून वंचित ठेवले होते. दैववाद, कर्मकांड, संपूर्ण परावलंबन, टोकाची मानसिक गुलामगिरी व शोषणाचा पुरस्कार करणाऱ्या रूढी, परंपरा यांनी महिलांना मुक्या जनावरांसारखे जीवन दिलेले होते. त्या काळामध्ये महात्मा फुलेंनी सर्वप्रथम महिलांचा समाजाचा एक घटक म्हणून विचार केला. मानवी जीवनातील मुलभूत हक्क व अधिकार महिलांना मिळाले पाहिजे अशा प्रकारची भूमिका त्यांनी घेतली व महिलांच्या दुर्दशेस कारणीभूत ठरणाऱ्या विविध अनिष्ट प्रथा, परंपरांचे निर्मुलन करण्यासाठी त्यांनी खऱ्या अर्थाने पुढाकार घेतला. त्यामध्ये महिलांच्या दुर्दशेस मोठ्या प्रमाणात कारणीभूत ठरणाऱ्या देवदासी प्रथेचे निर्मुलन करण्यात महात्मा जोतीबा फुलेंचा महत्त्वपूर्ण वाटा आहे. महिलांचे होणारे शोषण मग ते कोणत्याही माध्यमातून होणारे असो जोतीरावांना अत्यंत चीड यायची, म्हणूनच जोतीरावांनी देवदासी रूढीच्या

माध्यमातून कोवळ्या व निष्पाप मुलींचे होणारे शोषण, पिळवणूक, अत्याचार थांबविण्यासाठी  
साधक स्वरूपाची पाऊले उचलली.

हात्मा जोतीराव फुले यांचे देवदासी प्रथेविरुद्धचे कार्य -

देवदासीसारखी पाशवी, अमानुष व मानवतेला काळीमा फासणारी अनिष्ट प्रथा  
कोणिसाव्या शतकात मोठ्या प्रमाणात आपली विषारी पाळेमुळे समाजामध्ये खूप खोलवर  
रुजून समाजातील कोवळ्या, अजाण, अल्पवयीन मुलींचे आयुष्य ती उद्धस्त करीत होती. नव्हे  
तर त्यांच्या जीवनात माती कालवून त्यांचे संपूर्ण जीवन मातीमोल करीत होती. खोट्या धार्मिक  
समजुतीला व अंधश्रद्धेला मोठ्या प्रमाणात आहारी जाऊन धर्म व ईश्वराच्या नावावर स्वःत  
त्या कोवळ्या, निरागस, निष्पाप मुलींचे आई-बाप देवाच्या नावाने सोडत असत. व  
अंधश्रद्धेतून डोळस दृष्टिकोनाचा अभाव असल्याने त्या कोवळ्या मुलींचे देवांशी लग्न लाऊन  
देत. देवदासीची ही मानवतेला काळीमा फासणारी चाल महाराष्ट्रासारख्या प्रदेशात मोठ्या  
प्रमाणात बोकळली होती. वेडगळ प्रकारच्या समजुतीतून अंधश्रद्धाळू व धर्मभोळे पालक  
आपल्या मुलींना देवदासी बनवून त्यांना नरकयातना भोगण्यास बाध्य करीत असत. पुढे एकदा  
देवदासी झाल्यावर उदरनिर्वाहाची कुठलीच साधने उपलब्ध नसल्यामुळे त्यांना स्वःतच्या  
पोटाची खडगी भरण्यासाठी वेश्या म्हणून जीवन कठावे लागत असे.<sup>1</sup> या देवदासी प्रथेच्या  
माध्यमातून हिंदू समाजातील मागासलेल्या जातीतील कोवळ्या वयातील मुलींवर होणाऱ्या  
पाशवी अत्याचारास धर्माचा अर्थ नीट न सांगणारे ब्राम्हण जबाबदार आहेत.<sup>2</sup> तसेच देवदासी  
रुढीच्या माध्यमातून भोगवादी संस्कृतीला पाठबळ देणारे श्रीमंत वर्गही तितक्याच प्रमाणात  
जबाबदार आहेत. अशी जोतीराव फुले यांच्या मनाची पक्की धारणा झाली. त्यामुळेच  
अंधश्रद्धेच्या व वेडगळ समजुतीच्या नावावर समाजातील कोवळ्या व निष्पाप मुलींना  
नरकयातना भोगण्यास बाध्य करणाऱ्या देवदासी प्रथेचे समाजातून मुळासकट उच्चाटन  
करण्याचा त्यांनी आपल्या मनाशी ठाम निर्धार केला. मुंबईमध्ये माधवराव रोकडे हे एक आदर्श  
शाळा चालवीत होते. शाळेची आर्थिक स्थिती वाईट होती. परंतु माधवरावाच्या कष्टामुळे व  
सेवाभावी वृत्तीमुळे ही शाळा अत्यंत लोकप्रिय झाली होती. जोतीरावांनी आपली शाळा पाहावी  
व आपले कौतुक करावे असे माधवरावाला वाटत होते. ही शाळा पाहण्यासाठी  
जोतीरावांसमवेत नारायणराव लोखंडे व आनंदराव तालचेरकर, यशवंतराव मणेरीकर सुद्धा  
होते. जोतीरावासमवेत हे सर्व सद्गृहस्थ बग्वीतून जात असता, तेव्हां त्यांना वाटेमध्ये एक  
मिरवणूक दिसली. ही मिरवणूक मोठ्या भव्य-दिव्य स्वरूपात ढोल-ताशांच्या गजरात मोठ्या  
धुमधडाक्यात जात होती. तेव्हा जोतीरावांनी गाडी थांबवून चौकशी केली असता ती लग्नाची  
मिरवणूक एका देवदासीची होती. एक श्रीमंत आई स्वर्गाच्या प्राप्तीच्या आशने आपल्या  
मुलीचा विवाह देवासोबत करून द्यायला जात होती.<sup>3</sup> जोतीरावांच्या दृष्टिस पडलेली मिरवणूक  
ही एका कोवळ्या, निष्पाप, अजाणत्या वयातील देवदासीची होती. तत्कालीन स्थिती लक्षात  
घेता, या मिरवणूकीमागील गौडबंगाल समजण्यास जोतीरावांना जास्त वेळ लागला नाही.



एक घोडा गाडी फुलांनी चांगली सजवली होती. त्या नवरीचे केस मोकळे पाठीवर सोडले होते. कपाळाला लालभडक कुंकवाचा मळवट भरलेला होता, नवरीच्या आजूबाजूला तिच्या काही करवल्या नटूनथटून बसल्या होत्या. यल्लमा देवीच्या उदोउदोचा गजर जोरात चालता होता. वाद्याच्या आवाजात त्या देवदासीची वरात हळूहळू पुढे जात होती.<sup>५</sup> अशा पद्धतीचे भयाण देवदासीच्या रुढींचे वास्तवदर्शी देखावा जोतीराव व त्यांच्या सहकाऱ्यांना 'याची देही, याची डोळा' पहायला मिळाला. देवदासी बनायला निघालेल्या त्या अजाण, निष्पाप व कोवळ्या वयातील मुलींची आई श्रीमंत वर्गातील असून सुद्धा केवळ वेडगळ समजूती, अंधश्रद्धेचा जबरदस्त पगडा, धर्मभोळेपणा, स्वर्ग नरकाच्या काल्पनिक गोष्टींना बळी पडून देवदासीसारख्या धर्मरुढीच्या नरकयातनेत ढकलायला जात होती.

अशापद्धतीने देवदासी प्रथेच्या अंधारलेल्या खाईत लोटल्या गेलेल्या या निरागस मुली देवाच्या नावावर जरी सोडल्या जात असल्या तरी, त्या देवाच्या दासी कमी, परंतु वासनांध, विलासी, श्रीमंत लोकांच्या पाशवी अत्याचाराला बळी पडून त्यांच्या भोगदासी बनत असत. देवदासीची ही अमानवीय रुढी त्यांना वेश्याव्यवसायाच्या मार्गावर घेऊन जात असे. या प्रथेच्या कारणामुळे वरिष्ठ कुळातील मुली वेश्यालयाच्या अंधारकोठडीत एक बंदिस्त जीवन जगत होती. हा सर्व प्रकार स्वतःच्या डोळ्यांनी जोतीराव आणि त्यांच्या सहकाऱ्यांनी बघितल्यानंतर आनंदराव जोतीरावांना म्हणाले की, "स्वतः आई-वडील देव आणि धर्माच्या नावावर आपल्या कोवळ्या मुलींना नरकामध्ये ढकलून देतात. का आपण ही वाईट अनिष्ट प्रथा बंद करण्यासाठी काही करू शकाल?" देवदासी प्रथेमुळे असंख्य कोवळ्या मुलींचे आयुष्य उद्वस्त होत असे. म्हणूनच ह्या प्रथेला पायबंद बसला पाहिजे ही आनंदरावाच्या मनातील तळमळ जोतीरावांना क्षणातच समजली, म्हणूनच क्षणाचाही विलंब न करता देवदासीच्या नरकयातनेतून त्या मुलीला बाहेर काढण्यासाठी जोतीरावांनी तीव्र हालचाली केल्या. त्या देवदासी बनणाऱ्या मुलींच्या लग्नाला खुपच कमी वेळ शिल्लक असल्यामुळे जोतीरावांनी विलंब न करिता ते पोलीसात तक्रार करण्यासाठी गेले. गिरगावच्या पोलीस सुपरिटेण्डच्या घरी गेले. त्या अधिकाऱ्याने जोतीरावांचे म्हणणे ऐकून घेतले. परंतु ते लग्न बंद करण्याचे धाडस त्या अधिकाऱ्यांकडून झाले नाही. कारण हा प्रश्न धर्माशी गुंतलेला होता. १८५७ च्या उठावापासून राणीच्या जाहीरनाम्यानुसार कंपनी सरकारला हिंदी लोकांच्या धार्मिक प्रश्नांत ढवळाढवळ करायची नाही. अशी पक्की समज देऊन ताकीद दिली होती.<sup>६</sup>

माणुसकीला काळीमा फासणाऱ्या ह्या चालीचा खऱ्या हिंदूधर्माशी काहीही संबंध नाही. अशा प्रकारचे जोतीरावांनी समजावण्याचा त्या अधिकाऱ्याला प्रयत्न केला. परंतु तो काहिही ऐकण्याच्या मनस्थितीत नव्हता. जोतीराव त्या ठिकाणाहून ताबडतोब मुंबई पोलीस कमिश्नर मि.सावटन साहेब यांना भेटले जोतीराव नाराज होऊन स्वस्थ बसणाऱ्यापैकी नव्हते ते निर्भयी व धैर्यवान होते. जोतीरावांनी मुंबई पोलीस कमिश्नर सावटन साहेबांना मोठ्या निश्चयाने समजावून सांगितले की, काही समाजातील विलासी प्रवृत्तीच्या लोकांच्या



वस्त्रापूर्तीच्या गरजेसाठी धर्माच्या आधाराने नवीन-नवीन तरुणींचा पुरवठा करणाऱ्या या देवदासी प्रथेला रोकणे नितांत आवश्यक आहे.<sup>५</sup> या निष्पाप कोवळ्या मुलींना अजाणपणे धर्माच्या वेडगळ समजुतीने कुमार्गास लावणाऱ्या आईबापांना सरकारने गुन्हेगार समजून शिक्षा देण्यास पाहिजे.<sup>६</sup> व अशा लग्नाची अनाचारी चाल मोडण्यासाठी सरकारने ताबडतोब प्रयत्न केले पाहिजे. अशा प्रकारची विनंती जोतीरावांनी सावटन साहेबांना केली. तेव्हा पोलीस आयुक्तांनी ते देवदासींचे होऊ घातलेले लग्न थांबविण्याचा आदेश आपल्या हाताखालील पोलीस अधिकाऱ्यांना दिला. व त्या दिवसी होऊ घातलेले लग्न थांबविण्यात निदान जोतीरावांना यश आले. जोतीरावांनी आपल्या कृतीने देवदासी प्रथेच्या मुळावरच प्रचंड हादरे रचण्याला सुरुवात केली होती.

देवदासीचे लग्न थांबविण्यात जोतीरावांना यश मिळाले खरे परंतु या घटना क्रमामुळे मुंबईमधील सनातन्यांमध्ये मोठ्या प्रमाणात खळबळ उडाली. देवदासी प्रथा बंद झाल्यास धर्म बुडेल. पाप घडेल या भितीपोटी अनेक धर्मभोळे लोक आरडाओरडा करीत होते. आपल्या भोगवादी संस्कृतीला पायबंद घातला जाईल म्हणून श्रीमंत व विलासी, व्यभिचारी लोक विरोध करीत होते. देवदासी प्रथा संपूर्णतः बंद झाल्यास, आपला धर्म पुरता बुडून जाईल. या कारणामुळे समाजातील गरीब, अज्ञानी, धर्मभोळे बहुजन वर्गातील लोक मोठ्या प्रमाणात चिंताग्रस्त झाले. दुसरीकडे तत्कालीन वृत्तपत्रांनी या प्रकरणाला मोठ्या प्रमाणात प्रसिद्धी दिली. आणि ओरड केली की ब्रिटीश सरकार आपल्या धर्मांमध्ये हस्तक्षेप करीत आहे. आणि जुन्या, पुरातन रुढी, परंपरा बंद करून आपल्या धर्मावर आक्रमण करीत आहे.<sup>७</sup> अशाप्रकारच्या खोटा अपप्रचार सुरू केला. अशाप्रकारची प्रतिक्रिया सनातन्यांकडून जोतीरावांना अपेक्षित होती. सनातनी लोक नेहमी समाजातील सुधारणेच्या विरोधातच असतात म्हणूनच जोतीरावांचे देवदासी सारख्या अमानुष अशा प्रथेला पायबंद घालण्याचे प्रयत्न मुंबईतील सनातनी लोकांना आवडणारे नव्हतेच. या सनातन्यांच्या वर्गाचे सरकार दरबारी मोठ्या प्रमाणात वजन होते. त्यामुळे वरिष्ठ अधिकाऱ्यांमार्फत बऱ्याच खटापटी करून व कृत्रिम धर्माच्या खोट्यानाट्या कल्पना रंगवून सांगून पुढे ते लग्न काही दिवसांनी घडवून आणले. जोतीरावांच्या कानावर जेव्हा ही वार्ता गेली, तेव्हा दुःखातिरेकाने ते खुप व्याकूळ झाले, कारण धर्माच्या नावाखाली पुन्हा एका अजाण, कोवळ्या व निष्पाप मुलीचे देवदासी प्रथेच्या वेदीवर आयुष्यभर मरणाच्या यातना भोगण्यास जीवन उद्ध्वस्त करणाऱ्या खाईत लोटल्या गेले होते. म्हणूनच या देवदासींच्या अमानुष, अमानवी रुढीकडे सरकारचे लक्ष आकर्षित करून, या रुढीस पायबंद घालावा, या करिता पाठपुरावा करावा, तसेच देवदासी प्रथा ही समाजविघातक रुढी आहे. तो समाजावरील कलंक आहे. या संबंधी समाजामध्ये जनजागृती करण्यासाठी जोतीरावांनी 'दीनबंधू' या वृत्तपत्रातून आपले पुरोगामी विचार जनतेपर्यंत नेण्याचे महत्त्वपूर्ण कार्य केले.

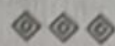


जोतीराव फुले हे खऱ्या दृष्टिने समाजक्रांतिकारक होते. त्यांच्या मानवतावादी दृष्टिकोनातून महिलांच्या संदर्भातील त्यांच्या सक्षमीकरणाच्या आड येणारी एकही रुढी, परंपरा सुटू शकली नाही. सरकारने कायद्याद्वारे देवदासी धर्मरुढीला आळा घालावा. याकरिता त्यांनी अर्जाद्वारे सरकारकडे पाठपुरावा केला. परंतु त्यांच्या या विधायक कार्याचे अल्पावधीत विधायक परिणाम येणारे नव्हते. कारण तत्कालीन समाज हा अज्ञान, अंधकाराच्या काळोखात आकंठ बुडाले होते. समाजामध्ये अज्ञानातूनच अंधश्रद्धा व धर्मभोळेपणा मोठ्या प्रमाणात फोफावला होता. परंतु जोतीरावांनी विधायक परिणामांची अपेक्षा न बाळगता आपली लेखणी व वाणीद्वारे त्यांनी देवदासी प्रथेच्या विरोधात समाजामध्ये जनजागृतीचे कार्य करून समाजाची मानसिकता बदलविण्याचा प्रयत्न केला. समाजामध्ये अनिष्ट रुढी, परंपराचे मोठ्या प्रमाणात स्तोम माजविणाऱ्या भ्रष्ट धर्मव्यवस्थेवरच त्यांनी आपल्या लेखणीने व वाणीने अत्यंत तिखट शब्दात कोरडे ओढले.

स्वातंत्र्योत्तर काळात कायद्याद्वारे देवदासी प्रथेला पायबंद घातला गेला असला तरी, देवांला मुली सोडणे, किंवा त्याच्यांशी लग्न लावून देणे हे गुन्हेगारी कृत्य समजले जात असले तरी, ह्या प्रथेचे समाजातून पूर्णतः उच्चाटन होऊ शकले नाही. त्याकरिता समाजाच्या मानसिकतेमध्ये बदल घडणे महत्वाचे आहे. जर जोतीराव फुले यांच्या विचारांचा पूर्णपणे अंमल करून, त्यांनी सांगितलेले विचार जर मोठ्या प्रमाणात प्रसार व प्रचारीत केले तर खऱ्या अर्थाने देवदासी प्रथेला पायबंद घालण्यास मदत होईल व त्या माध्यमातून देवदासी प्रथेच्या वेदीवर बळी पडणाऱ्या अनेक निष्पाप, अजाण, कोवळ्या मुर्लींचे आयुष्य उद्वस्त होण्यापासून वाचवण्यास फार मोठी मदत होईल. अशा प्रकारे महिला सक्षमीकरणात महात्मा जोतीराव फुलेंचे भरीव योगदान आहे, हे स्पष्ट होते.

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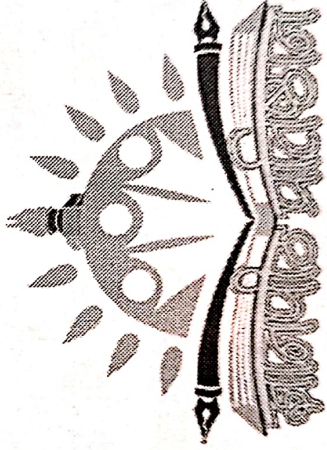
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**ज्ञानपीठ इंटरनॅशनल पब्लिशर**

योगेश्वर ल. जळगांवकर, बंजारा कॉलनी, दत्त मंदिराजवळ,  
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मुखपृष्ठ मांडणी - योगेश्वर जळगांवकर, ऋद्र क्रिएशन्स, नंदुरबार  
व अक्षर जुळवणी - योगेश्वर जळगांवकर, ऋद्र क्रिएशन्स, नंदुरबार  
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ब्रिटिश कालखंडात भारतातील सामाजिक व धार्मिक सुधारणेबाबत चळवळी

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# FUNDAMENTALS OF DATA SCIENCE WITH STATISTICS



Mrs. R. Deepika

Dr. Anuradha SG

Dr. Parth M. Pandya

**Dr. Rupesh Ramesh Deore**





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# Community Dynamics

-SameeraAhrar Ahmad\*

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## ABSTRACT

In any habitat many kinds of plants and animals live together and interact with or influence one another. The entire assemblage (gather) of living organisms forms a community. Organisms live in a surrounding which is non living and is called the environment. The living community in any area influences the non living environment and is itself controlled by the environment.

**Keywords:** Ecology, Community, Succession, Climax, Ecological Niche

## INTRODUCTION

Succession in general refers to the act of repeated following up of one by another in order of time at a given space. In ecology, succession means an orderly sequence of communities of plants (and animals) which occurs over a period of time at the same place. In general the environment changes due to the presence of the plants and their biological activities and this makes the environment less suitable to its

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1. It is the orderly process of community change, these are directional and therefore predictable.
2. Community modifies the physical environment.
3. It culminates in the establishment of as stable an ecosystem as is biologically possible on the site in question.

## Causes

Succession is series of complex processes, as many factors are responsible for it. Mostly, it is caused because of following three types

- (a) *Initial or initiating causes* : The causes can be climatic and biotic. Erosion, deposits, wind, fire etc. caused by lightening or volcanic activity are climatic factors, and the latter includes the various activities of the organisms. Nudation is a process that produce the bare areas or destroy the existing population in an area.
- (b) *Ecesis or continuing causes* : The processes such as migration, ecesis, aggregation, competition, reaction etc. which cause successive waves of populations as a result of changes, mostly in the edaphic features of the area.
- (c) *Stabilising causes* : It is for the stabilization of the community. Clements viewed that climate of the area is the chief cause of stabilization, other factors are there but it is of secondary value.

## Types

Some basic types of succession are as follows.

### Primary Succession

The basic environments such as terrestrial, fresh water, marine environments, the primary succession starts from the primitive substratum, where there was no previously any sort of living matter.



The first group of organisms establishing there are known as the pioneers, primary community or primary colonizers.

### **Secondary Succession**

This succession starts from substrata with already existing living matter. A sudden change in climatic factors, the action of any external force, biotic intervention, fire etc. cause the existing community to disappear. Thus, area becomes devoid of living matter but its substratum is built up. Such successions are comparatively more rapid.

### **Antogenic Succession**

In most of the cases, after succession began the community itself as a result of its reactions with the environment and thus causing its own replacement by new communities. This course of succession is known as antogenic succession.

### **Allogenic Succession**

In some cases the replacement of the existing community is caused largely by any other external condition and not by the existing organisms. Such a course is referred to as allogenic succession.

On the basis of successive changes in nutritional and energy contents, succession are sometimes classified as

### **Autotrophic Succession**

It is characterized by early and continued dominance of autotrophic organisms like green plants. There is gradual increase in the organic matter content which began in a predominantly inorganic environment supported by energy flow which is maintained indefinitely.

### **Heterotrophic Succession**

Heterotrophs such as bacteria, actinomycetes, fungi and animals were dominant in the beginning. The origin is

predominantly with organic environment and there is a progressive decline in the energy content.

## Evolution of Plant Communities

The process is as follows:

**Nudation** : It is a bare area without any form of life. The area may develop due to several causes such as land slide, erosion, deposition or other catastrophic agency.

The causes of nudation may be

**Topographic**: Due to soil erosion by gravity water or wind the existing community may disappear other causes may be due to deposition of sand, landslide, volcanic activity and other factors.

**Climatic** : Glaciers, dry period, hails and storm, frost, fire etc may also destroy the community.

**Biotic**: Man is the most important factor responsible for destruction of forests, grasslands for industry, agriculture, housing etc. other factors are disease, epidemics due to fungi, viruses etc. which destroy the whole population.

**Invasion** : This is the successful establishment of a species in a bare area. The species reaches this new site from any other area.

*This process is completed in following 3 stages.*

**Migration dispersal** : The seeds, spores or other propagules of the species reach the bare area. This process is known as migration done by air, water, wind etc.

**Ecesis establishment** : Ecesis is the process of successful establishment of the species after reaching to the new area and adjustment with the prevailing conditions. After migration seeds or propagules of plant germinate, seedlings grow and adults start to reproduce. This is possible by some and most of them disappear under the primitive harsh conditions. Thus as a result of ecesis, the individuals of species become established in the area.



**Aggregation** : After ecesis, due to reproduction the individuals of the species increase in number and they come close to each other. This is known as aggregation.

**Competition and coaction** : As a result of aggregation of a large number of individuals of the species at the limited place, there develops competition i.e. interspecific and intraspecific mainly for space and nutrition. Coactions is the effect of individuals of a species on one another.

**Reaction** : The most important stage in succession is reaction. In this the living organisms influences the environmental change due to the living organisms. This result in change in soil, water, light conditions, temperature etc. of the environment. The overall effect of reaction is that the environment become unsuitable for the existing community; and so the existing community changes and replaced by another community (seral community).

## Stabilisation (Climax)

A stage in the process occurs and the final last community becomes more or less stabilized for a longer period of time and maintain itself in equilibrium with the climate of the area. This final community is not replaced and is known as climax community and the stage as climax stage.

## Process of Succession

**Xerosere** : The type appears on bare rock surface is xerosere. As the original substratum lacks water and organic matter, and minerals in disintegrated unweathered state. Crustose lichens are the pioneers to colonise this primitive substratum and through a series of successive seral stages the succession finally terminates into a forest which constitutes the climax community.

The various stages and there component plant species of a lithosere appearing on a rock.

*These are as follows:*

**Crustose lichens stage:** The substratum is colonized by these pioneers which is very poor in moisture and organic matter, subjected with extremes of temperature. The lichens of this stage are species of *Rhizocarpon*, *Rinodina* and *Lecanora*. Some acids are produced by these plants and it brings about weathering of rocks. Lichens die and its organic matter gets mixed with the small particles of rocks. However this process is very slow. These lichens are then replaced by foliose lichens.

**Foliose lichens stage :** They appear on the substratum partially built up by the crustose lichens. This community includes species of *Parmelia*, *Dermatocarpon* etc. which have large leaf like thalli. They can absorb and retain more water and are able to accumulate dust part which help in the further build up of the substratum and thus humus becomes accumulated. The weathering of rocks and its mixing with humus results into the development of a fine thin soil layer on rock surface, and thus there is a change in the habitat.

**Moss Stage :** The development of thin soil layer on rock surface, especially in the crevices, favours the growth of some such xerophytic mosses as species of *Polytrichum*, *Tortula* and *Grimmia*. When these mosses grow successfully they compete with the lichens. Due to their death and decay there is further addition of organic matter in the soil. The soil layer now increases in thickness.

**Herbs stage :** Due to growth of mosses, more soil accumulates and there are added more minerals to it due to leaching out from the overlying vegetation. This changed habitat favours the growth of some herbaceous weeds which are chiefly the annuals, followed by biennials and perennials.

Due to their growth and there is much more accumulation of humus in soil together with further weathering of rock. Thus, habitat changes with decreasing xeric conditions. This stage is constituted by such shallow



rooted grasses as *Aristida*, *Festuca*, *Poa*, *Solidago* etc. which in turn are replaced by shrubs.

**Shrub Stage :** Due to much accumulation of soil, the habitat becomes suitable for shrubs which start migrating in the area. These are species of *Rhus*, *Phytocarpus* etc. which overshadow the herbaceous vegetation. The soil is further enriched by this dense shrubby growth. These in turn are finally replaced by trees which make up the climax community.

**Forest stage :** Some xerophytic tree species invade the area. Further weathering of rocks and increasing humus content of the soil favour the arrival of more trees and vegetation finally becomes mesophytic. Thus there develops finally a forest community.

## Hydrosere or Hydrarch

The various stages of hydrosere can be studied in ponds, pools or lakes. Hydrosere, originating in a pond, starts with the colonization of some phytoplanktons which form the pioneer community and finally terminates into a forest, which is a climax community together with their chief components of vegetation.

*The various stages are as follows:*

1. **Phytoplankton stage :** They constitute the pioneer community. Some blue green algae, green algae, diatoms and bacteria etc are the first organisms to colonise the primitive medium of the pond. The soils are very much reduced with a  $P^{H}$  value of not more than 5.00 they multiply and grow for some time.
2. **Rooted submerged stage :** As a result of death and decomposition of phytoplanktons and mixing of it with the silt brought from the surrounding land by rain waters and by wave action of pond water, there develops a soft mud at the bottom of pond. This new habitat which tends to be a bit shallower and where

light penetration may occur now easily becomes suitable for the growth of rooted submerged hydrophytes like *Elodea*, *Hydrilla*, *Potamogeton* etc. these plants bring about further build up of the substratum as a result of their death and decay. The water level also decreases making the pond more shallower. This new habitat now replaces these plants giving way to another type of plants which are of floating leaf type.

3. **Rooted floating stage:** The water depth is almost 2-5 feet. The habitat is colonise by rhizome of hydrophytes which are rooted and their large leaves floating on the water surface. These are species of *Nelumbo*, *Nymphaea*, *Trapa*, some free floating species are *Azolla*, *Lemna*, *Wolffia*, *Salvinia* etc. also become associated with the rooted plants, due to availability of salts and other minerals in abundance. The shallow water is formed due to the decomposing organic matter formed due to death of these plants. The plant species which can float disappear because of less water from the area.
4. **Reed Swamp Stage:** In this stage the plants are rooted and the green aerial part is free floating. Species of *Scirpus*, *Typha*, *Sagittaria* etc. are the chief plants of this stage. The dense vegetation with rhizomes develops. The amphibious species was unable to grow now as the water level reduced.
5. **Sedge Meadow stage :** The area gets colonized by some Cyperaceae and Graminae, such as *Juncus*, *Cyperus*, *Carex*, and *Eleocharis* because of continuous decrease in water level and changes in the substratum. They form a hard covering of vegetation in the centre of the pond as they have much branched rhizomatous system. The mud is exposed to air as there is much rapid loss of water i.e transpiration rate is more and nutrients like ammonia, sulphides



etc. become oxidised to nitrates and sulphates. The marshy vegetations disappear due to this and the mesic conditions approaches.

6. **Woodland Stage** : The soil becomes drier as the marshy vegetation vanish from the area. The area is occupied now by terrestrial plants like shrubs such as *Salix* and trees like *Populus*, *Alnus*. This is the time of humus accumulation and development of forest and the soil favours the arrival of new tree species in the area.
7. **Forest Stage** : This is the climax community. The woodland community is rapidly invaded by several trees. In tropical climates with heavy rainfall, there develop tropical rain forest, in temperate regions a mixed forests develops of *Acer*, *Ulnus* and *Quercus*. Tropical deciduous forests and monsoon forests are seen in regions of moderate rainfall.

Thus in hydrosere, stage 1 is the starting community; stage 7 the end community and stages 2-6 as the seral communities (seral stages).

## Climax Concept

**Monoclimax** : Climate is the important factor for the stabilization of the climax community was expressed by F.E. Clement. In monoclimax community a single type of community is seen within a given region. The land surfaces occupy the same type of plants. According the region the climate will change and so the climax. If the climate of a region is stable the climax community is stable indefinitely.

His views were opposed by ecologists. According to Cowles succession is a variable unit and equilibrium state is never reached; approaching a variable rather than a constant. The progressive and retrogressive changes in communities reflect succession stated by Cooper. So according to him climax state is a stage where very less change takes place and it not the last changed state of succession.

The most objectionable point and subject of controversy about the climax has been its intimate relationship with the climate. In an area of uniform climate different types of climax communities are observed according to soil, topography and other factors.

Hult in Finland described as many as seven habitats types under similar climatic conditions.

Tansley 1935 too disagreed with Clements and put forth his concept that climax communities are infact are controlled by more than one factor and not solely by climate.

In this theory like climatic climax concept of Clements became popularly known as monoclimax theory.

**Polyclimax theory**: Tansley 1935 also opposed Clement as he believed that Climax is controlled by many factors and not only by one climatic factor. Clement also agreed that climax is controlled by many factors rather than only climate alone, but his thoughts about communities is very clear and he indicate that the communities will turn into climatic climax type. It may be sooner or later but it will take place.

**Ecological niche**: The term niche was for the first time used by Grinnel (1971) to explain micro habitats. Ecological niche of an organism includes the physical space occupied by it, its functional role in the community i.e. trophic position and its position in environment gradients of temperature, moisture,  $P^H$ , soil etc and the conditions of existence.

The three aspects of ecological niche are generally designated as:

- (i) The spatial or habitat niche (physical space occupied)
- (ii) The trophic niche (functional role i.e. trophic position) and
- (iii) The multidimensional or hyper volume niche (position in the environmental gradients.)

The concept of ecological niche is of much significance in ecology in terms of differences among species at one place



or at different locations or the same species at more than one place.

### **Spatial or Habitat Niche**

It is the physical space occupied by an individual.

A good example of spatial niche is provided by the three species of fungi colonizing the decaying Culms of a fodder grass *Setaria glauca*. These all fungi live in the same general habitat i.e in the decaying internodes and belong to the same trophic level of decomposers and each of the three species is more frequent and extensive with higher intensity of fruiting on the upper internodes of the grass.

Thus due to the differences in morphological and anatomical characteristics the upper and lower internodes appear to have two distinct micro habitats. So, one find the species very easily on the upper internodes.

### **Trophic Niche**

It is concerned with the trophic position of an organism. The occurrence of weaver birds in vicinity of Lake Mweru, Africa is a good example of trophic niche. All of the three weaver birds differ in their choice for food, thus occupying different trophic niche. Of them two *Placeus meloano* cephalous and *P. collaris* living in same nest but one is insect eater and the other feeds on seeds. Another example is of the two bugs, namely *Notonecta* and *Corixa* live in the same habitat i.e. pond, but occupy different trophic niches *Notonecta* is an active predator, whereas *Corixa* feeds largely on decaying vegetation.

### **Multifactorial or Hypervolume Niche**

The concept of niche as an abstract  $n$  - dimensional inhabited hypervolume was developed by G. E. Hutchinson (1965) of Yale University. Suppose that the range of tolerance for temperature over which a particular species

can live and reproduce is measured and put on graph the same is done for another environmental variable i.e. humidity and put on the second axis of the graph. The space that is enclosed will represent the niche of the species. If the effects of two variables i.e temperature and humidity are independent the space would be a two dimensional box. However temperature and relative humidity are not independent in their biological effects. Tolerance to high temperature might under such conditions of interacting variable the niche would be an ellipse in shape instead of box.

Suppose now that the tolerance to levels of a third variable i.e. available phosphorus was affected by interaction with both temperature and relative humidity. The niche would be a three dimensional, volumetric figure i.e. space enclosed is now a volume in three dimension if we have a fourth variable the space enclosed would be a hyper volume with four dimensions.

Since there are large number  $n$  of other environmental factors both abiotic and biotic that affect the population the niche is  $n$  dimensional hyper volume. This is the fundamental niche of the species. If the fundamental niches of two species overlap then the two species are competing.

## SUMMARY

All the communities which are stable and living in the same environment for a longer period of time is a climax community and every factor is responsible for it not only the climate. Therefore there can be many climaxes as factors governing the environment are different and also the genetic factor is also responsible for the evolution of flora and the biotic potential of the environment. So a variety of stable communities may be expected in a climatic zone, whose stability is largely controlled by soil physiography, man,

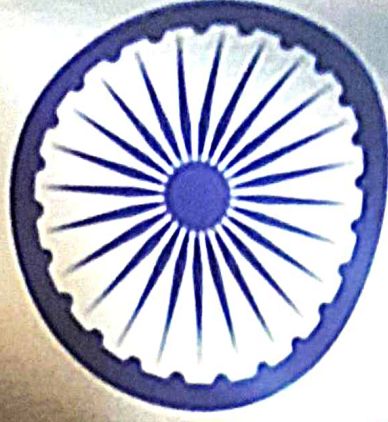


animals etc. (edaphic climax, physiographic climax, biotic climax etc.

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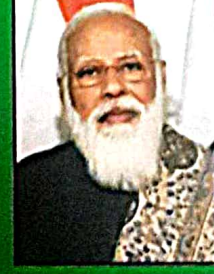
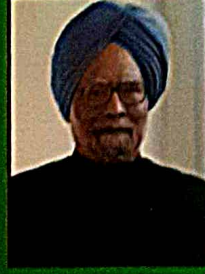
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Making of Contemporary India (1950-2019)

समकालीन  
भारताची निर्मिती  
(१९५०-२०१९)



डॉ. व्ही. जी. सोमकुवर



महाराष्ट्रातील सर्व विद्यापीठांच्या पदवी व पदव्युत्तर वर्गासाठी उपयुक्त  
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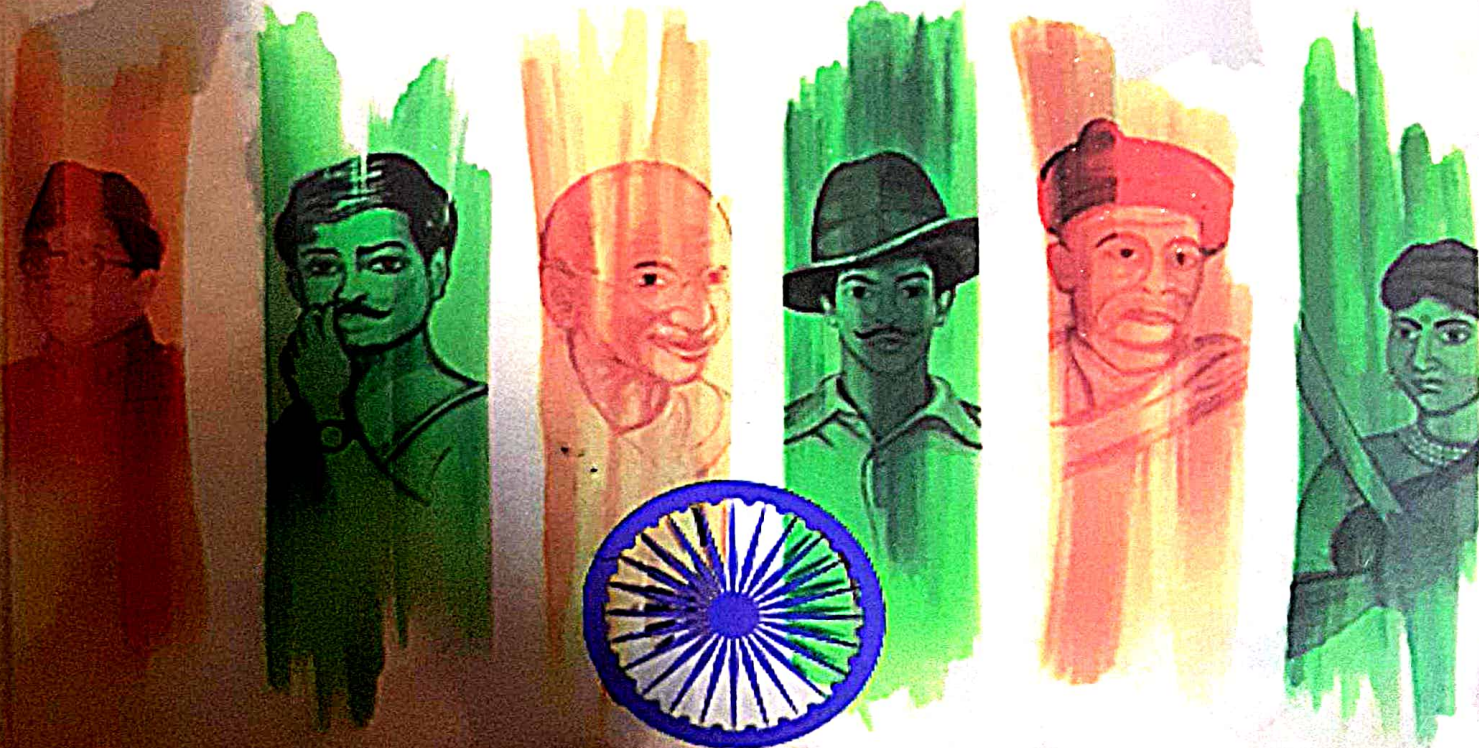
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अमृत महोत्सव

# भारतीय स्वातंत्र्य चळवळीचा इतिहास

(इ.स. १८५७ ते १९५०)



डॉ. व्ही. जी. सोमकुवर



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