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**K K Mashood, Tathagata Sengupta
Chaitanya Ursekar, Harita Raval & Santanu Dutta**

**Homi Bhabha Centre for Science Education
Tata Institute of Fundamental Research
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Preface

“We’ve arranged a global civilization in which most crucial elements profoundly depend on science and technology. We have also arranged things so that almost no one understands science and technology. This is a prescription for disaster. We might get away with it for a while, but sooner or later this combustible mixture of ignorance and power is going to blow up in our faces.”

— Carl Sagan

Conference epiSTEME 8 is a biennial international event to review research in science, technology and mathematics education (STME) hosted by the Homi Bhabha Centre for Science Education (HBCSE), a National Centre of the Tata Institute of Fundamental Research (TIFR). Initiated in 2004, the primary aim of the conference is to nurture and promote scholarship in STME research, which is still nascent in India. The conference, by bringing together leading researchers from across the globe, has been playing an important role in strengthening the field in this country. It is unique in its addressal of multidisciplinary issues pertaining to the teaching and learning of science, technology and mathematics. Arguably epiSTEME is the flagship conference in STME research in India, an area that holds great potential for the country owing to its huge, aspiring student and teacher population. Details of the past seven editions of the conference are available at <http://www.hbcse.tifr.res.in/episteme>.

Quality science education to a larger populace is integral to our economic and societal progress. To enable this challenging task, it is important that we deconstruct the core issues at the intersection of content, cognition and culture relevant to STME education. Conference epiSTEME 8 will have its focus centred around some of these core issues. In particular the conference aims to generate discussion around topics on important scientific practices such as modelling in STME, alternative conceptions in various disciplines, role of language in STME, insights from cognitive science and sociocultural studies relevant to STME, among others. The premise of the conference is based on the conception of science as a liberal art. A panel discussion on the same titled ‘*Towards a pedagogy of science as a liberal art*’ will also be held as part of the conference.

The four different strands and various sub-themes around which the review talks, papers and poster presentations of the conference fall, are:

Strand 1: Historical, Philosophical and Socio-cultural Studies of STME: Implications for Education

- Theme 1: History and Philosophy of STME
- Theme 2: Socio-cultural and gender issues in STME
- Theme 3: Science and Technology Studies
- Theme 4: Science as a Liberal Arts

Strand 2: Cognitive and Affective Studies of STME

- Theme 1: Modelling in Science Education
- Theme 2: Knowledge representation
- Theme 3: Affective aspects of learning
- Theme 4: Problem solving, learning and reasoning
- Theme 5: Visuo-spatial thinking

Strand 3. Language, Pedagogy and Curriculum in STME

- Theme 1: Language and learning
- Theme 2: New Media, Role of ICT in teaching-learning
- Theme 3: Classroom interaction and discourse

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- Theme 4: Assessment and evaluation
- Theme 5: Professional development of teachers
- Theme 6: Educational initiatives and innovations

Strand 4. Discipline-based Education Research with Emphasis on Undergraduate Science Education

- Theme 1: Astronomy Education Research
- Theme 2: Biology/Life Science Education Research
- Theme 3: Chemistry Education Research
- Theme 4: Physics Education Research

There are nine review talks from leading scholars around the globe on some of the key themes mentioned under the above strands. In addition researchers from across the world will be presenting papers and posters. In total epiSTEME 8 received around 110 submissions from 13 different countries (Australia, Brazil, Cyprus, Germany, India, Nepal, Rwanda, Somalia, South Africa, Switzerland, Uganda, United Kingdom and United States). All submissions were sent to at least two reviewers working in related areas for blind reviews. The list of reviewers is included in the proceedings. We thank all the reviewers for their scholarly remarks which we hope helped the authors and significantly improved the quality of the manuscripts. We accepted around 60 papers, out of which authors of 51 papers registered for the conference. Of these 30 papers will be presented in the oral mode and the rest 21 in the poster mode.

We express our sincere gratitude to all members of HBCSE for their help and cooperation at various phases of the conference organisation. In particular we thank Prof. K. Subramaniam and Prof. Sugra Chunawala for their support, guidance and encouragement. We thank the convenors of the previous two editions of the conference, Prof. Savita Ladage and Prof. Sanjay Chandrasekharan for their guidance throughout. We greatly appreciate the contribution from all the members of the academic committee and local organisation committee for the conference. The head of administration Shri Abhyankar and head of accounts Shri V.P. Raul deserve special mention for their help towards planning and execution of various crucial organisational aspects of the conference. We thank Manoj Nair for his help in setting up the conference website, paper submission portal and the payment gateway.

We specially thank Charudatta Navare, Deborah Dutta, and Deepika Bansal for helping us with editing works. We thank Adithi Muralidhar for her guidance with the publication of these proceedings.

— K.K. Mashood, Tathagata Sengupta, Chaitanya Ursekar,
Harita Raval and Santanu Dutta
January 2020

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A STUDENT-CENTRIC APPROACH FOR DEVELOPING SCIENTIFIC COMMUNICATION SKILLS IN UNDERGRADUATE MICROBIOLOGY STUDENTS

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Scientific Communication is an important skill which needs to be developed in students for building a successful career in science. Here, we report the design and development of a student-centric, activity-based course in scientific communication skills (SCS) for undergraduate Microbiology students. We followed a pedagogical strategy that allowed for integration of assessment with the learning activities. The effectiveness of the course was measured by administering questionnaires to the students both before and after the course. The comparison between the results of the pre- and post-intervention questionnaires revealed that the students demonstrated an overall increase in their understanding of key concepts essential for SCS after undertaking the course. This report, even though preliminary, highlights the importance of developing a student-centric course in SCS at the undergraduate level.

INTRODUCTION

Proficiency in scientific communication is an important goal of undergraduate science education. As tertiary level science degree programs form the foundation of the life sciences sector by providing skilled manpower, it has been proposed that formal communication in science courses be introduced at this early stage of career development (Anderson & Helms, 2001; Spektor-Levy, Eylon, & Scherz, 2009). The major aim of such courses is to enable students to develop an ability to locate and retrieve relevant information, to critically evaluate information; to analyse and organize the information; to draw inferences based on evidence; and to be able to disseminate the acquired knowledge in an appropriate form by different modes of communication (NRC, 2012; McComas, 2014). Besides, a course in Scientific Communication Skills (SCS) may also assist students to verbalize their understanding of a subject matter for themselves and self-evaluate their own learning (Murray & Hughes, 2008). However, it has been observed that STEM students often find communicating 'science' a challenging task and traditional courses fail to build the necessary skills required (Grant, Liu, & Gardella, 2015). Therefore, it is essential to develop a course which integrates learning activities incorporated with tasks that aid in understanding the concepts and terms of the subject matter, and at the same time, engage the student in acquiring skills required for communicating their learning (Hurd, 2000). In this regard, an SCS course was introduced to second-year undergraduate science students of St. Xavier's College (Autonomous), Mumbai University in June 2011. Initially, a semester-long, one credit (15 contact hour) course was developed as a series of hands-on activities purposefully designed for better conceptual understanding of the subject matter. The core syllabus of the SCS module offered in the third

semester almost remained the same, however, the pedagogy was modified to be more student centric and activity based. The instructors noticed that just the theory of SCS was not enough for the students to understand and apply the concepts of SCS. Thus, the SCS course module was modified and extended to Semester 4 where the students were asked to apply the skills in writing their laboratory projects (proposal, poster, project report, manuscript and presentation) which is evaluated as a part of SCS course.

Here, we elaborate upon the course design and its impact on students evaluated by a questionnaire administered to the students both before and after the first half of the course. We also note the qualitative differences observed in the students' responses and how it has served as a feedback for evolving and improving the course over the last seven years.

METHODS

Course Design and Execution

The SCS course in Microbiology has been divided into six modules spanning over two semesters. While the focus of the earlier semester (third) is the comprehension of various aspects of scientific communication, the latter semester (fourth) deals with the application of the concepts learned.

The first module of the course requires that the students create mind maps on any Microbiology topic chosen by them (in consultation with the mentors) and convert it into a chart or a model to be presented in the annual exhibition organized for the orientation of the first-year Bachelor of Science students. One example of a mind map and the corresponding chart prepared by the student is shown in Figure 1 (Matthews & Matthews, 2008; Buzan & Buzan, 1993).

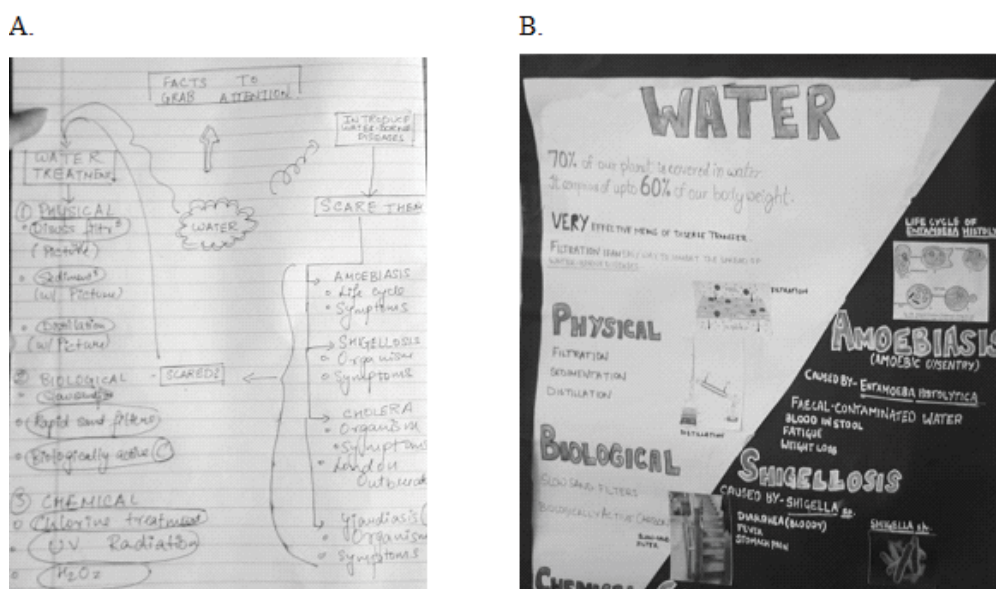


Figure 1: A) An example of a mind map prepared by a student B) shows the corresponding chart made by the same student.

This activity engages the students in researching the literature, retrieving the relevant information, organizing the information and finally verbalizing their assimilated knowledge. The effectiveness of mind maps in organizing information and developing knowledge structures has been established earlier (Buzan & Buzan, 1993). The evaluation of this task is done by mentors who visit each exhibit (chart/model) and assess it for the relevance of content, comprehensiveness, and clarity. The students are also assessed for their verbal explanation of the chosen topic to the visitors/mentors. We have observed that not only does this task act as an ice breaker between the freshers and the sophomore students but it also develops a sense of self-efficacy among the second-year students.

The next module deals with comprehending technical information and summarizing it. The students are first sensitized to crucial elements of summary writing and then given short research articles or popular science commentaries (audio-visual) relevant to the discipline to summarize in their own words (word limit: 150). It has been reported that summarizing in their own words helps students in comprehension of new information which is an indicator of student learning (Haystead and Marzano, 2009). The difference between a summary and an abstract is also emphasized. The evaluation involves summarizing scientific information provided to students in the form of an audio-visual documentary or a science topic-based film. The use of varied modes of scientific information challenges the students with multisensory inputs and fosters comprehension skills that promote learning (Blomert & Froyen, 2010; Clark, Nguyen, & Sweller, 2006).

The next three modules were designed based on our observation that undergraduate students often struggle with understanding research articles and find it challenging to grasp technical information. Similar difficulties faced by students globally have also been reported (Goldbort, 2006). Proficiency in scientific communication necessarily requires understanding the elements of a good scientific report/research articles. Hence, students are initially introduced to components of a scientific write-up, generally a research article (Murray & Hughes, 2008). One of the most important aspects discussed in detail is 'plagiarism'. Students' difficulty with recognizing and understanding the concept of plagiarism is a challenge faced by educators worldwide (Dawson & Overfield, 2006). The concept was dealt with as a series of discussions with exemplars of plagiarism, paraphrasing, and citations extracted from several kinds of scientific literature. Students are also made aware of software available for detection of plagiarism (eg: Turnitin and a free tool available online-SEO plagiarism checker). The idea is to sensitize students to the importance of maintaining academic integrity and avoiding plagiarism. Further, the students are introduced to various sections of a primary research article and familiarized with the IMRaD format (Sollaci & Pereira, 2004). Students are then engaged in a group reading exercise where they try to understand a simple research paper by paying attention to its title, abstract and other sections up to the references as per the standard guidelines (Hoogenboom & Manske, 2012). Generally, the instructors ensure to give research articles from different peer-reviewed journals to familiarize the students to the fact that different journals may follow slightly different formats. This is followed by a discussion of the papers read (2-3 papers) in the class by the groups to share their perspectives with their peers. The papers assigned to the class are usually chosen from the field of Microbiology and mostly have methodologies familiar to students. The final learning task of the course in this semester is critiquing a research paper which is carried out as a group discussion activity moderated by the instructor. The students are divided into groups of 10-12 students and allowed to read and discuss 2-3 papers. This interpersonal exchange of ideas encourages

peer learning, teamwork and developing soft skills of a student (Besley & Tanner, 2011). Students are also introduced to allied concepts such as peer review, open access articles and bibliometric databases such as Web of Science and Scopus. The final evaluation for this course involves writing a critical review of a research paper from a journal for them to understand the importance of publishing in peer-reviewed journals. All the aspects learned throughout the semester are assessed in this activity such as students' attention to the relevance of the title, comprehensiveness of the abstract, appropriate literature citations, checking for plagiarism and referencing style. The advanced part of this course is dealt with as an integrated activity with the disciplinary research projects undertaken by students in the next semester (fourth). The students are introduced to literature reviews, referencing styles, reading different types of research reports and other activities. The students write their own project proposals before embarking upon the research projects which are ratified by the mentors. The learnings from both the semesters culminate in the form of a scientific report, a poster and an oral presentation for summarizing their work which forms a part of an assessment for the SCS course.

Participants

The SCS course typically accommodates 33-37 student participants for this study, per year. The students belong to the second year of Bachelor of Science course in Microbiology with an average age of 19 years. The course spans 2 semesters of the year. The number of credits is one per semester and the number of contact hours is 15 per semester.

Questionnaire Design

The course in SCS started in 2011. Although the need for an SCS course was apparent, we began to ponder over the effectiveness of the course after a few years of its inception. We took oral/written feedback from the students to assess the efficacy of the course. In order to formalize the assessment, a questionnaire was designed to evaluate the impact of the course on the students during the last year. The questionnaire was designed based on the modules and what the students are expected to know after the course was completed. Since most students joining the course come with little prior knowledge or familiarity with the topic, the questionnaire comprised of questions about general aspects of scientific communication and was administered to students before the beginning of the course (before the third semester designated as pre-intervention questionnaire) to gauge a baseline understanding of the students for the topic. The students are given 30 min for answering the questions. The questionnaire was also administered at the end of Semester 3 (after the end of the first half of the course designated as post-intervention questionnaire). Over the years, the questionnaire has evolved based on the responses of the students. A sample of the common questionnaire used in the study is given in Table 1.

The questions were purposefully designed to be open-ended in nature to serve as a formative assessment and provide an insight into alternative conceptions of the students. As detailed earlier, in the third semester, the students are exposed to activities for comprehending various aspects of scientific communication while in the fourth semester, they apply all their learning to write a research report. Therefore, a similar questionnaire is administered again to the students at the end of the fourth semester to assess whether the reiteration of concepts leads to the enhanced grasping of the topics. However, in this report, we only present examples from student responses from the questionnaire administered before and after the third semester.

Sr. No.	Question	Responses – Pre- intervention questionnaire	Responses – Post- intervention questionnaire
Q.1	Give an example of plagiarism. You may create one.	<ul style="list-style-type: none"> • Copy-pasting matter from the internet • Using research material without permission from the publisher • Don't know • Stealing someone's idea • Violating copyright 	<ul style="list-style-type: none"> • When a researcher copy-pastes some writing from another paper • When something is written as it is without paraphrasing • A research paper published in one country has the same publication in another country in a different journal • Copying the same words
Q.2	What do you understand by paraphrasing? Explain with the example you have given as an answer to Q.1.	<ul style="list-style-type: none"> • To explain in one's own work • Summarising someone's work • Don't know • To reduce the size of a big paragraph • Gives credit to the inventor 	<ul style="list-style-type: none"> • Modification of a sentence so that the meaning remains the same • Write a sentence in one's own words after understanding the essence of the given content • Understand the meaning and then write in one's own words • Rewriting in one's own words without the meaning being lost
Q.3	How would you differentiate between a review article and a research paper?	<ul style="list-style-type: none"> • A research paper talks about one's discoveries, whereas, review article you critique someone's paper • A research paper is writing about the experiment, whereas, a review article is one's opinion of a research article • Don't know • A research paper is scientifically proven, whereas, a review article is theoretical 	<ul style="list-style-type: none"> • A review article is to critique a paper; research paper gives details • A review is like a summary of many research papers put together; research paper follows the IMRaD format • A review article is not in much detail; research paper gives all details • Review article does not follow IMRaD format; research paper does
Q.4	How is a summary different from an abstract?	<ul style="list-style-type: none"> • A summary is a scientific content; abstract is something which is thought by a person • A summary is a detailed explanation; abstract is a short mind map • A summary is a whole story or idea explained in short; abstract is all important points about the idea • A summary is something written in brief; abstract is a visual summary 	<ul style="list-style-type: none"> • A summary is an overview of an experiment, abstract gives an idea of the paper • A summary can be written for an article, an abstract is written only for research papers • A summary is a discussion of the article in short. Abstract highlights the main points of the research paper • A summary is a shorthand version of a full-length article or paper; abstract is like a brief preview of the research paper
Q.5	If you were to write a reference for your research paper, how would you write it? Show this as an example of a reference.	<ul style="list-style-type: none"> • Don't know • Paper on ABC by Mr. X pgs- 1-2 • Not relevant • Write the page and article number and name of the paper 	<ul style="list-style-type: none"> • Authors, XYZ, journal name • XYZ, authors, journal name • Authors, journal name, XYZ • Author surname, initials, year

Sr. No.	Question	Responses – Pre- intervention questionnaire	Responses – Post- intervention questionnaire
Q.6	Write down the subtitles you would use to write a proposal.	<ul style="list-style-type: none"> • Don't know • I did not understand • Not applicable • Theory abstract result conclusion 	<ul style="list-style-type: none"> • Introduction, materials, and methods; applications, expected results • Introduction, materials, and methods; applications, expected results, the relevance of the project, budget • Introduction, materials, and methods; applications, expected results, budget, references

Table 1: Questionnaire with examples of pre-intervention and post-intervention Responses

Data Analysis

The responses obtained from the administration of the questionnaire was assessed qualitatively as well as quantitatively. The correct responses were designated as positive responses and the comparative data between the pre- and post-intervention questionnaire is presented as a bar chart (Figure 2). Further, a qualitative analysis was done of the student responses received both before and after the course which served as indicators of a change in student responses. Some randomly chosen responses from both the pre- and post-intervention questionnaire have been presented in Table 1.

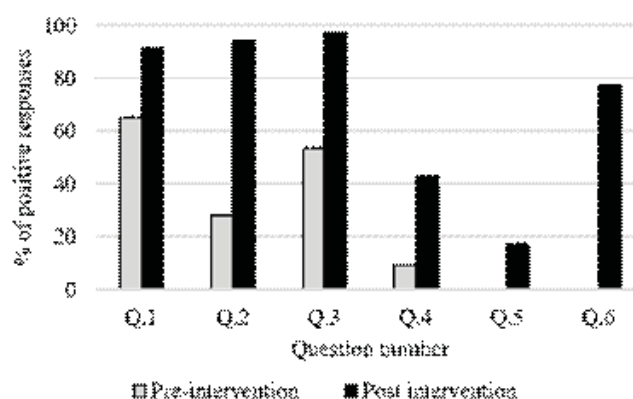


Figure 2: The percentage of positive responses obtained from the students for the administered questionnaire before (pre-intervention) and after (post-intervention) the course is represented on the Y-axis while the number of the question is represented on the X-axis.

RESULTS AND DISCUSSION

The percentage of positive responses obtained by administration of the pre- and the post-intervention questionnaires to students is presented in Figure 2. An overall increase in the number of positive responses was observed across all the six questions. The maximum increase (77.14%) was observed for question number 6 while the lowest change (17.14%) was recorded for question number 5. It was noted that even though students were aware of the concept of plagiarism (Q.1), they did not know about paraphrasing (Q.2).

Most students associated paraphrasing with either shortening the length of the content, summarising the content or writing the same content but giving credit to the original author (Table 1). However, after the course, most students correctly stated the meaning of paraphrasing as writing the content in one's own words after understanding the essence of the original text. This aspect was dealt in the class with several examples of paraphrasing and extended discussions. Based on the formative assessments and feedbacks over the years, it was realized that merely apprising students about plagiarism did not help them in correcting their mistakes while active group discussions in class with varied examples remedied the problem. This was also evident in the examples created by the students as a response to Q.1. Almost none of the students could create an example for Q.1 in the pre-intervention questionnaire. Many did so in the post-intervention questionnaire. An example given by one of the students was "Plaque assay is much similar to viable count" stated as is as plagiarism and modified as "There are various similarities in viable count and plaque assay" for paraphrasing in Q.2. Another example given for Q.1 was "The cellulose degraders were isolated from soil samples and were enriched in MacBeth's medium" and modified as "Soil sample was used to isolate cellulase enzyme producers. MacBeth's broth was used to enrich them." for Q.2. Further, it was observed that students had minimal or no understanding of research articles in general. Most students did not understand the difference between a research and a review article (Q.3) or between an abstract and a summary (Q.4). Most students associated an abstract with a research article only after the course. Students also had minimal or no understanding of the concepts of reference writing before the course which increased marginally after the course (Q.5) (Table 1). However, it was noted that reference writing skills improved substantially after the fourth-semester course where the topic was dealt in much detail and they actually applied it to write the references in their project reports (data not shared in this report). Overall, a change in the vocabulary of the answers was observed where students' usage of technical terms increased in the responses after the course. The activity on critiquing of the primary journal article used for evaluation of module 6 of the course gave an insight into the learning of the students. A few students understood the abstract as something of a prelude to a journal article which does not necessarily outline results. Also, many students critiqued the absence of a detailed method for standard protocols which are generally cited as previous publications in most research articles. Additionally, most students only wrote about the negative aspects of the given article; although we did expect the students to appreciate the well-written portions of the articles too. Most of these issues are discussed with students in the next semester, though we also plan to address these with the next batch of incoming students in the third semester. Since, the students were not exposed to any course on scientific communication skills in their previous years of study, the changes observed in the students' understanding of the subject matter may be attributed to the SCS course module attended in the college.

LIMITATIONS OF THE STUDY

We recognized a lack of general communication skills in English in a few students which made it difficult for us to evaluate their understanding properly. Even though we realize that proficiency in English is a primary requirement for developing effective SCS, currently our course does not address the problem.

We started the course on SCS in the year 2011 with some modules which were activity-based. Every year we observed students, took their feedback and went on revising the course. It has been our observation that

student learning improved as we went on designing activity-based classes. Even though we took feedback of the course every year both during the course and at the end of the course, we did not systematically record the student learning data over the early few years. The data that we present in this study is derived from the last year only. There is no quasi control for this study where a similar course without following activity-based methods was delivered and could be used for comparison. However, an elaborate study with an appropriate control group of students and using standard tools for measuring student learning as a proof of concept is now underway for the current year. The data presented in this report is preliminary and is part of the current ongoing study.

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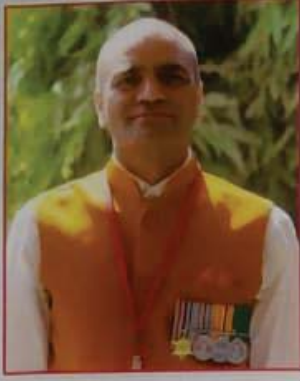
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हिन्दी कथा-साहित्य पर गाँधीवाद का प्रभाव

डॉ. भगवती प्रसाद उपाध्याय

हिंदी कथा-साहित्य पर गाँधीवाद के प्रभाव की चर्चा करने से पहले गाँधीवाद को समझना समीचीन होगा। गाँधी जी ने एक समतामूलक समाज के निर्माण की कल्पना की थी। स्वेच्छा से समतामूलक समाज का निर्माण करना गाँधीवाद कहलाता है।

नरेश मेहता ने अपने उपन्यास उत्तरकथा में 'गाँधीवाद' और 'मार्क्सवाद' की व्याख्या करते हुए लिखा है कि गाँधीवाद और मार्क्सवाद दोनों का उद्देश्य समान है, किंतु दोनों के मार्ग अलग-अलग हैं। वस्तुतः स्वेच्छा से समतामूलक समाज का निर्माण गाँधीवाद है, जबकि जबरन किए गए समतामूलक समाज का निर्माण मार्क्सवाद है।

इस तरह "स्वेच्छा से लागू किया मार्क्सवाद गाँधीवाद कहलाता है, जबकि जबरन थोपा हुआ गाँधीवाद मार्क्सवाद कहलाता है।"

अर्थात् लक्ष्य समान होने के कारण गाँधीवाद और मार्क्सवाद दोनों का प्रभाव हिंदी कथा साहित्य पर पड़ा है। यह बात दीगर है कि कालांतर में अव्यावहारिक कहकर उसे खारिज करने का प्रयास किया।

हिंदी साहित्य के आधुनिक काल की शुरुआत में ही गाँधी जी हिंदी भाषा और साहित्य से जुड़ चुके थे। गुजराती मात्रभाषा होने के बावजूद गाँधी जी ने हिंदी के प्रचार-प्रसार के लिए दक्षिण भारत हिंदी प्रचार सभा (मद्रास) तथा हिन्दुस्तानी प्रचार सभा (मुंबई) की स्थापना की थी। गाँधी जी ने हिंदी पत्रकारिता के साथ-साथ हिंदी साहित्य लेखन में भी रुचि ली थी। गाँधी जी का गहन लेखन 'कथ्य' और 'शिल्प' दोनों धरातलों पर सहज और सरल था।

“उनके लेखन में कलात्मक सहजता और विभिन्न विधाओं की विशेषताएँ थीं। 4 सितंबर, 1888 में लिखे गए उनके यात्रा वृत्तांत को हिंदी के आधुनिक काल का प्रथम यात्रा-वृत्तांत कहा जाता है। जब आधुनिक हिंदी खड़ी बोली विशेष रूप से गहृत संघर्षरत था, उस समय के लिखे गए यात्रा-वृत्तांत के उदाहरणों से गाँधी जी की हिंदी गद्य शैली की प्रामाणिता की अनुभूति होती है।”²

स्वयं गाँधी जी को हिंदी साहित्य से बड़ा लगाव था। उनकी प्रिय कवयित्री मीराबाई, प्रिय कवि नरसी मेहता और तुलसीदास जी थे।

डॉ. राजम नटराजन पिल्लै अपनी पुस्तक “गाँधी युगीन नारी जागरण और उपन्यास” की भूमिका में लिखती हैं कि “गाँधी जी के व्यक्तित्व और चिंतन धारा ने बीसवीं सदी के पूर्वाध की भारतीय राजनीतिक चेतना और सामाजिक, सांस्कृतिक चेतना को ही नहीं, वरन् तत्कालीन साहित्य को भी गहराई से प्रभावित किया।”³ लेखिका के अनुसार गाँधीवादी विचारों ने मुंशी प्रेमचंद, जैनेन्द्र जी और यशपाल जी के उपन्यासों में नारी विषयक चिंतन को प्रत्यक्ष रूप से प्रभावित किया है।

जहाँ तक हिंदी कथा-साहित्य पर गाँधीवाद के प्रभाव का प्रश्न है यह प्रभाव प्रेमचंद जी से लेकर विष्णु प्रभाकर तक दिखाई पड़ता है। प्रेमचंद जी के उपन्यास रंगभूमि, प्रेमाश्रम कायाकल्प, कर्मभूमि आदि गाँधीवाद के सिद्धांत से प्रभावित हैं। रंगभूमि का ‘सूर’ तत्कालीन व्यवस्था का विरोध अहिंसक तरीके से करता है। अतः नैतिकता के धरातल पर वह गाँधी जी का प्रतिरूप लगता है। इस उपन्यास में गाँधी जी द्वारा चलाए गए विविध कार्यक्रमों सूत कताई, बुनाई, हरिजनोद्धार, नशाबंदी, जातिगत, सदभाव आदि को चित्रित किया गया है। प्रेमचंद जी की कई रचनाओं में गाँधीवाद प्रत्यक्ष रूप से दिखाई देता है। उनके बारे में यह भी कहा जाता है कि जो कार्य गाँधी जी राजनीति के क्षेत्र में कर रहे थे वही कार्य प्रेमचंद जी साहित्य के क्षेत्र में कर रहे थे।

डॉ. चन्द्रकांत बादिवडेकर अपने लेख “हिंदी उपन्यास और गाँधीवाद” में लिखते हैं कि “गाँधीवाद का प्रभाव प्रेमचंद के बाद जैनेंद्र की कुछ रचनाओं में भी दिखाई पड़ता है। ‘परख’ में गाँधीवाद का प्रभाव सत्यधन पर दिखाई पड़ता है, किंतु वकील सत्यधन ने इस प्रभाव को बाह्य रूप में, ग्रहण किया था। जैनेंद्र ने ‘सुनीता’ और ‘सुखदा’ जैसी रचनाओं में स्त्री के पर पुरुष से प्रेम करने की मनोवैज्ञानिक समस्या का समाधान गाँधीवाद, दृष्टिकोण अर्थात् हृदय-परिवर्तन के सिद्धांत से ढूँढ़ने का प्रयास किया है।”⁴

हिंदी साहित्य में सियाराम शरण गुप्त एक ऐसे लेखक हैं, जिनकी रचनाओं पर गाँधीवाद का बाह्य प्रभाव तो नहीं है, किंतु उनके व्यक्तित्व में गाँधीवाद के सिद्धांत का पूर्णतः पालन हुआ है। ठीक इसी प्रकार सुभद्रा कुमारी चौहान, भवानी प्रसाद मिश्र और कन्हैयालाल मिश्र 'प्रभाकर' आदि ने भी गाँधी जी से प्रभावित होकर हिंदी साहित्य सेवा और 'राष्ट्रसेवा' में अपना बहुमूल्य योगदान दिया।

विष्णु प्रभाकर की कहानियों 'अधूरी कहानी' 'धरती का स्पर्श', 'बेटे की मौत', 'सफर के साथी', 'आजादी' आदि में भी गाँधीवाद का प्रभाव नजर आता है।

निष्कर्ष रूप में यह कहा जा सकता है कि वर्तमान दौर में जब मनुष्य आवश्यकता से अधिक स्वार्थ, आलस्य और दिखावे में लिप्त है, तब गाँधी जी के सिद्धांत और अधिक प्रासंगिक हो जाते हैं।

साहित्य के विद्यार्थी के तौर पर हम गाँधीवाद से या तो सहमत हो सकते हैं या असहमत, किंतु गाँधीवाद को पूरी तरह से नजर अंदाज करना कठिन कार्य है।

वर्तमान दौर में साहित्यकार गाँधीवाद का ढोल न भी पीटे तो इससे कोई फर्क नहीं पड़ता, किंतु 'सत्य' और 'यथार्थ' पर आधारित साहित्य में गाँधीवाद दबे पाँव चला ही आता है। जब-जब साहित्यकार समतामूलक समाज के निर्माण हेतु अपनी प्रतिबद्धता दर्शाएगा, तब-तब गाँधीवाद साहित्य के दुग्ध में शक्कर की तरह घुल-मिल जाएगा।

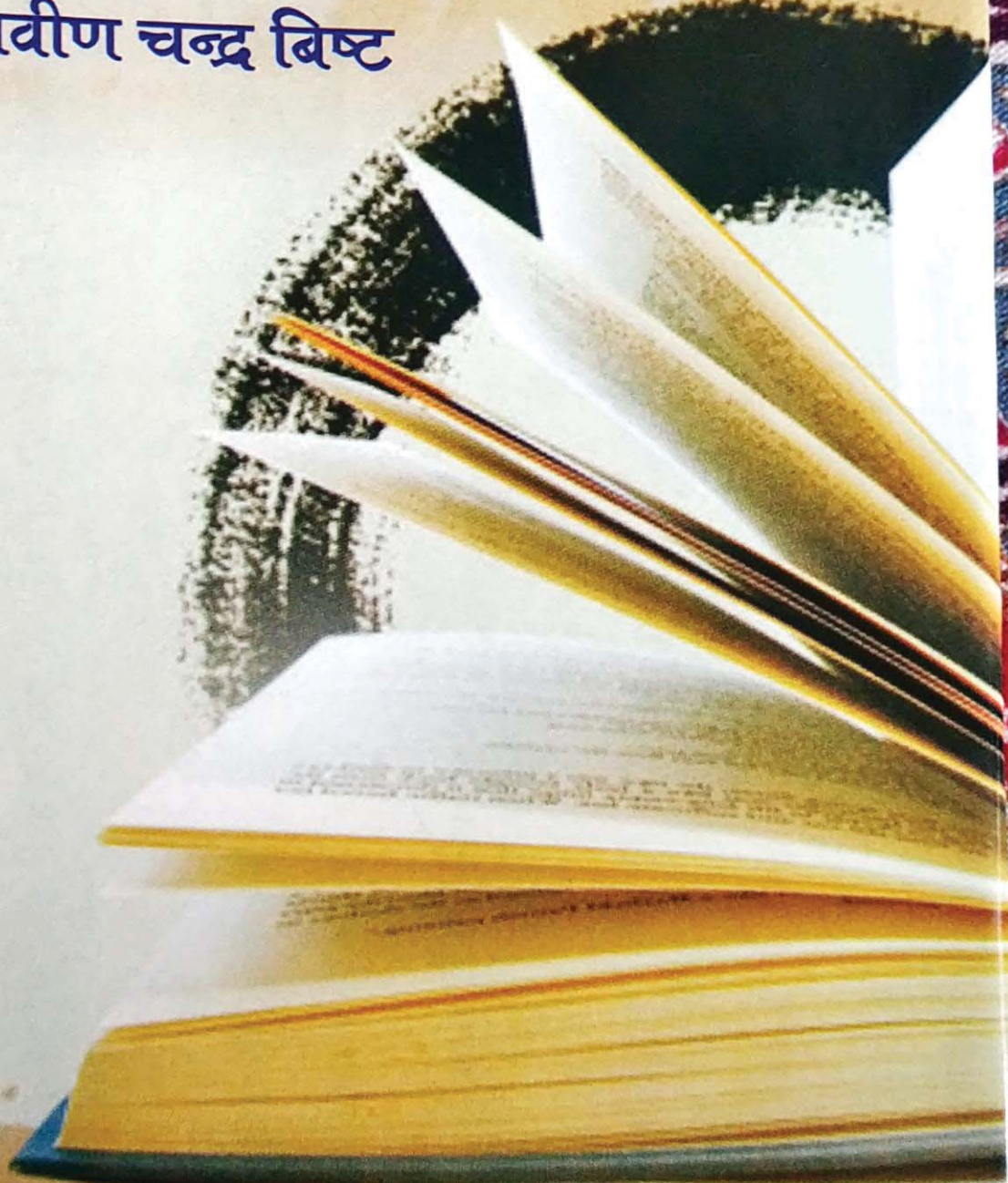
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मुम्बई-1

आधुनिक हिन्दी साहित्य की वैचारिक पृष्ठभूमि

संपादक
डॉ. प्रवीण चन्द्र बिष्ट



आधुनिक हिन्दी साहित्य की वैचारिक पृष्ठभूमि

संपादक

प्रवीण चन्द्र बिष्ट

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एशियन ऑफसेट प्रिंटर्स, मौजपुर, शाहदरा, दिल्ली में मुद्रित।

Adhunik Hindi Sahitya Ki Vaicharik Prasthbhumi
By Dr. Pravin Chandra Bisht

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15.

आधुनिक उपन्यासों में नारी के विविध रूप

डॉ. आशा नैथानी दायमा

‘आधुनिक उपन्यासों में नारी के विविध रूप’ विषय पर अपने विचार प्रस्तुत करना चाहती हूँ। मैंने चार उपन्यासों का चयन किया है, उनमें से दो हिन्दी लेखिकाओं द्वारा लिखित हैं तथा दो गुजराती लेखिकाओं की रचनाएँ हैं। चारों उपन्यासों के केंद्र में नारी की व्यथा-कथा है। हिन्दी के विवेच्य उपन्यास हैं ‘पतझड़ की आवाज़ें’ लेखिका निरुपमा सेवती तथा ‘उसके हिस्से की धूप’ लेखिका मृदुला गर्ग। गुजराती के विवेच्य उपन्यास हैं ‘बत्रीस पूतली नी वेदना’ लेखिका ईला मेहता तथा ‘त्रीजो किनारो’ लेखिका वर्षा अडाल्जा।

चारों उपन्यासों पर विमर्श करने से पहले आपसे एक विचार साझा करना चाहती हूँ। आधुनिक उपन्यासों के युग का प्रारंभ भारतेंदु युग से मानें तो कहना होगा कि नारी को अपनी बात उपन्यासों के माध्यम से लोगों तक पहुँचाने में एक शताब्दी से अधिक समय लग गया। जब केवल पुरुष लिख रहा था तब नारी को लेकर जो कुछ भी लिखा गया, सामान्यतौर पर वह पुरुष का अपना दृष्टिकोण था, समस्याएँ भी उसकी थीं, सोच भी उसकी थी और समाधान भी उसी का था। नारी वहाँ देवी थी, पूज्या थी, देवी वरदान तो दे सकती थी, लेकिन यह सवाल नहीं कर पाती थी कि कब तक मुझे इसी मुद्रा में रहना होगा? नहीं कह पाती थी कि रोज़ लड़ू ही भोग धरते हो, आज समोसा रख दो क्योंकि देवी की अपनी कोई इच्छा नहीं होती। नारी वहाँ पतिव्रता थी, अपना धर्म निभा रही थी, लेकिन कह नहीं पाती थी कि ‘पत्रीव्रता’ जैसा कोई शब्द क्यों नहीं है? नारी त्याग की मूर्ति थी, त्याग करना उसका कर्तव्य था, लेकिन किसी ने नहीं सोचा कि इस हाड़मास की

बनी त्याग की मूर्ति की भी तो अपनी कुछ इच्छाएँ होंगी। इसके अलावा नारी वहाँ दासी थी, कुलटा थी, कुलकलंकिनी थी और ऐसी नारी की तो कोई वाणी हो ही नहीं सकती। यानी सामान्यतौर पर उपन्यासों में नारी पूज्या थी या भोग्या थी, नहीं थी तो इन्सान नहीं थी। स्वतंत्रता प्राप्ति के बाद पढ़ने-लिखने वाली नारी बड़ी संख्या में जीवन के विभिन्न क्षेत्रों में आगे बढ़ी है। उसने लेखनी भी थामी और छठे-सातवें दशक में हिन्दी में महिलाओं के अनेक उपन्यास सामने आए। प्रारंभिक दौर में लेखिकाओं के तेवर बड़े आक्रामक रहे, स्वाभाविक है ये आक्रोश पुरुषों पर था। अमृता प्रीतम, मृदुला गर्ग, कृष्णा सोबती जैसी लेखिकाओं ने नारी को जिस रूप में प्रस्तुत किया, वह कोई सम्माननीय रूप नहीं था। दरअसल किसी व्यक्ति को बहुत दबाया जाता है तब प्रतिक्रिया बड़ी तेज़ होती है। इनके उपन्यासों को पढ़कर लगता है कि चूँकि नारी सदियों से कुचली गई थी इसलिए आजादी मिलने पर वह संबंधों की विकृतियों में जीने लगी। लेकिन अब ये उफ़ान धीरे-धीरे थम गया है और अब संतुलित रचनाएँ, सामने आ रही हैं।

गुजराती भाषा में हिन्दी के करीब एक दशक बाद लेखिकाएँ मुखरित हुई। कुंदनिका कापड़िया का उपन्यास 'सात पगला आकाश माँ' नारी व्यथा की कथा है। इसके अलावा इला मेहता, वर्षा अडाल्जा, हिमांशी शेलत, बिंदु भट्ट आदि लेखिकाओं के नाम उल्लेखनीय हैं। इला मेहता का मानना है कि आज महिला केवल घर, पति और बच्चों से ही अपनी पहचान नहीं बनाना चाहती, वह चाहती है कि उसकी अपनी सोच अपनी पहचान हो। 'तेना पर आरोपायेला अनेक गुणों' वास्तव-मा तेनी पोतानी आंतरिक जरूरियातों नहीं पण समाज नी सगवड साचववा जरूरी एवा गुणो छे, ते ए समझी सकी छे—यानी आज की नारी ये समझ चुकी है कि उसके तथा कथित गुण उसकी अपनी नहीं समाज की जरूरतें हैं। (परब पत्रिका-1983)

जिन उपन्यासों पर विमर्श करने जा रही हूँ, ये चारों उपन्यास महिलाओं द्वारा लिखे गए हैं। हिन्दी की लेखिकाओं से आप परिचित हैं। गुजराती की ये दोनों लेखिकाएँ गुजराती साहित्य अकादमी पुरस्कार से पुरस्कृत हैं तथा गुजराती साहित्य परिषद की सदस्याएँ रही हैं। मैं व्यक्तिगत स्तर पर ये मानती हूँ कि एक अच्छे ईमानदार रचनाकार को स्त्री या पुरुष के खाँचे में नहीं बाँटना चाहिए। अच्छा रचनाकार इन बातों से ऊपर उठ चुका होता है। जब निराला कहते हैं, "मैंने मैं शैली अपनाई, देखा एक दुखी निज भाई, दुःख की छाया पड़ी हृदय पर मेरे, झट निकल वेदना आई।" तब इस वेदना को आप कृत्रिम कैसे कहिएगा? बावजूद

इसके यह भी स्वीकार करना होगा, “जाके पाँव न फटी बेवाई, वह क्या जाने पीर पराई।” इसलिए पुरुषों के अनुभवों से परे की ये दुनिया उन महिलाओं की है, उन त्याग मूर्तियों की है, जिन्होंने पुरुष से प्रशंसा पाने की बड़ी कीमत चुकाई हैं।

सिद्धान्ततः होना तो ये चाहिए कि मैं चारों उपन्यासों की संक्षेप में कहानी सुनाऊँ, पर वह संभव नहीं, इसलिए कथ्य की बात करती हूँ। चारों ही उपन्यासों में नारी केन्द्र में है। हर कथा नारी के ही इर्दगिर्द घूमती है। ‘पतझड़ की आवाज़ें’ तथा ‘बत्रीस पूतली नी वेदना’ दोनों ही उपन्यासों में अनेक नारी पात्र हैं। अधिकतर पात्रों की कहानी में दुख है, वेदना है। समाज से, परिवार से सताई हुई है ये नारी, अकेलेपन से पीड़ित है। ‘पतझड़ की आवाज़ें’ की अनुभा तथा ‘बत्रीस पूतली नी वेदना’ की छाया अपने परिवार के लिए पैसे कमाने की मशीन से ज्यादा कोई मायने नहीं रखतीं। जबकि इन्हीं उपन्यासों की सुनीला, रेखा सारी भौतिक सुविधाएँ होते हुए भी अधूरी हैं। सुनीला के पति के लिए वह केवल खूबसूरत जिस्म है और रेखा के पति के लिए वह एक ऐसा शिकार है जिसके लिए उसने विवाह से पहले अपने मित्र विपुल से सौ रुपए की शर्त लगाई थी।

विपुल कहता है कि तुम्हारा पति अच्छा शिकारी है, सचमुच अच्छा शिकार घर पर है और रेखा सोचती है, ‘सर्वत्र ऐज...स्त्री एटले शिकार (बत्रीस पूतली नी वेदना (ईला मेहता)।) नारी का शोषण करने के लिए पैसा बहुत अच्छा अस्त्र है पुरुष के पास। चाहे वह ‘पतझड़ की आवाज़ें’ का बॉस सी.के. हो या फिर ‘बत्रीस पूतली नी वेदना’ का फिल्म प्रोड्यूसर मि. कौल दोनों ही बड़े धिनौने तरीके से महिलाओं को अपने जाल में फाँसते रहते हैं। नौकरी दिलवाना या फिल्म में हीरोइन बनाना तो बहाना मात्र है।

‘उसके हिस्से की धूप’ तथा ‘त्रीजो किनारो’ दोनों ही उपन्यासों में नायिका अपना अस्तित्व ढूँढ़ रही है। मनीषा भटक रही है जितेन, मधुकर फिर जितेन मगर इसका अंत कहाँ है? त्रीजो किनारा की नायिका ‘अशुमी’ की भटकन शारीरिक नहीं, मानसिक है, लेकिन हताशा निराशा वहाँ भी हैं। ‘उसके हिस्से की धूप’ में पति-पत्नी के संबंधों में आए बासीपन को, अकेलेपन को नायिका बार-बार महसूस करती है, उसे नएपन की खोज है, जबकि ‘त्रीजो किनारो’ में लेखिका माँ-बेटी के संबंधों को नए सिरे से टटोलने का प्रयत्न करती है। पति-पत्नी के संबंधों में आई दरार को यहाँ नायिका झेल नहीं पाती, वह उस दीवार को तोड़कर उसे लाँघकर बाहर चली जाती है और अपने गर्भ में पल रहे उस पुरुष के अंश को भी मिटा देती है। दोनों ही उपन्यासों के प्रमुख पात्र जितेन (उसके हिस्से की धूप) हो या

नीलाम्बर (त्रीजो किनारो) 'मौलिक सुविधाओं' को जुटाने में, अपनी महत्त्वकांक्षाओं की मरोचिका में डूब रहे हैं, पत्नी के भीतर क्या कुछ टूट रहा है, वे महसूस नहीं कर पाते।

'बत्रीस पुतली नी वेदना' की नायिका लेखिका है, परंतु घर का कामकाज, बच्चे की परवरिश, पढ़ाई-लिखाई, पति जब भी घर पहुँचे, चाय की प्याली मुस्कराते हुए देना, ये सारी जिम्मेदारियाँ पूरी करने के बाद जो वक्त मिलता है, वही लेखन के लिए होता है। ये सभी नारियाँ आधुनिकाएँ हैं, विभावरी स्टेज अभिनेत्री है, छाया सेल्स मैनेजर है, अनुमा ऑफिस में सेक्रेटरी है, रेखा उद्योगपति की पत्नी है, बावजूद इसके सभी परतंत्र हैं।

अत्याधुनिकाओं का चित्रण करने के साथ ऐसे पात्र भी हैं, जैसे 'त्रीजो किनारो' की नीलिमा जो एक सामान्य संगीतकार से विवाह करती है, सामान्य जिंदगी जीती है और कहती है कि अपने ढंग से जी रही हूँ, विवाह किया है और यही मुक्ति भी है, जबकि 'पतझड़ की आवाज़ें' की विवाहिता सुनीला आत्महत्या कर लेती है, एक बेहतर जन्म की कल्पना में।

'बत्रीस पूतली नी वेदना' के अंत में मंच पर खड़ी अनुराधा कहती है, "स्त्री धर्म अलग, पुरुष धर्म अलग। स्त्री धर्म बनाने वाला भी पुरुष। आदर्श पत्नी, आदर्श माता, आदर्श नारी वही जो हजारों अन्याय सह ले। पीड़ा के स्वर हृदय की दीवार को तोड़कर कभी बाहर न सुनाई दें। त्याग, समर्पण जो स्त्री इन्हें निभाए, वही महान। ये सारा कुछ हमें इस क़दर रटवा दिया गया कि हम कुछ और बोलना या सोचना ही भूल गईं।

चारों उपन्यासों की नारियाँ पढ़-लिखकर अपने पैरों पर खड़ी हैं और घर बाहर की दुनिया की दोहरी जिंदगी जी रही हैं। लेकिन अधिकांश पुरुषों ने अपने आप को बदलने का प्रयत्न नहीं किया, यही उनके लिए हितकर भी था। घर और बाहर की दुहरी मार झेलने वाली अनुभा या छाया अब टूटने के कगार पर हैं, क्योंकि हमारे परिवारों ने दो तनख्वाहों का स्वागत करना तो सीख लिया है, लेकिन दूसरी तनख्वाह लाने वाली नारी अभी भी परिवार की दोयम दर्जे की सदस्या है, मालिक तो पुरुष ही है। आधुनिक परिवेश में अपनी अस्मिता ढूँढती नारी भटक रही है। इस भटकन के कारण, संबंधों में आए टकराव के कारण परिवार और समाज दुष्परिणाम झेल रहे हैं। इन लेखिकाओं ने इन्हें अपने स्तर पर रोकने का प्रयास किया है।

इन उपन्यासों को पढ़कर एक बात स्पष्ट हो जाती है कि इन लेखिकाओं ने पुरुष वर्ग की आलोचना के लिए ये उपन्यास नहीं लिखे हैं। बड़ी बुनियादी ज़रूरतें

हैं इनकी, शिकायतें हैं इनकी। यह कहने का साहस करना कि 'कब खुलेंगे पुरुषों के बाज़ार' (पतझड़ की आवाज़ें) लेखिका के तथाकथित 'बोल्डनेस' को जाहिर नहीं करता, वरन् कुंठा और पीड़ा को दर्शाता है। एक टेलीविजन के साक्षात्कार का उदाहरण देना चाहती हूँ। एक सज्जन एक समाज-सेविका का साक्षात्कार ले रहे थे—बात उन पुरुषों की चल रही थी जो घर-परिवार छोड़कर रोजी-रोटी की खोज में बरसों शहरों में एकाकी जीवन व्यतीत कर रहे हैं। साल भर में एक बार गाँव जाना हो पाता है। ऐसे में पुरुष क्या करें? समाज-सेविका का कहना था इसलिए जिस्मों के बाजारों का होना जरूरी है, वरना ये पुरुष 'डिप्रेशन' में आ जाएंगे। और मैं सोचने लगी पुरुषों के लिए तो यह व्यवस्था कर दी समाज ने और सरकार ने लेकिन उस पत्नी का क्या? वह भी तो साल भर गाँव में अकेली जी रही है। मिरगी के दौर के दौर पड़ते रहते हैं उसे, झाड़-फूंक करवाई जाती है। उसके 'डिप्रेशन' के बारे में कब सोचेगा ये समाज। दरअसल हमने नारी को अलग व्यक्ति माना ही नहीं। ईला मेहता कहती हैं, 'मैं तुम्हारी पत्नी हूँ, बावजूद इसके एक व्यक्ति भी तो हूँ। हमेशा नारी ही अपना अस्तित्व मिटाकर पुरुष की बन जाए क्यों कहा जाता है ऐसा? क्या पत्नित्व और मातृत्व के अलावा नारी का कोई अस्तित्व ही नहीं?"

जैसा कि मैंने प्रारंभ में कहा था कि पुरुषों के उपन्यास लेखन के करीब एक सदी बाद नारी ने उपन्यास बड़ी तादाद में लिखने शुरू किए। पिछले 55-56 वर्षों में जीवन के हर क्षेत्र में बड़ी तेज़ी से परिवर्तन आए हैं। राजनीतिक, सामाजिक, आर्थिक, साहित्यिक और सांस्कृतिक स्तर पर भी। आज की लेखिका भी उनसे गुज़र रही है। आज की नारी का लेखन किसी के आगे गिड़गिड़ाता नहीं, आक्रमण भी नहीं है ये। बस अंतर ये आया है कि अब नारी ने अपनी आँखों से परिवार को, समाज को देखना शुरू कर दिया है। कभी आँखें चुंधियाती हैं तो कभी आँखों में किरकिरी भी लगती है, तो कहीं पनियाती भी है ये आँखें। कथा के स्तर पर कथ्य तथा शिल्प के स्तर पर भाषा के स्तर पर जो भी समानताएँ या भिन्नताएँ हों, एक समानता आपको हर नारी उपन्यासकार में मिलेगी, वह यह कि हर कृति पुकार-पुकार कर कह रही है कि वह देवी नहीं बनना चाहती, दासी नहीं बनना चाहती, उसे मानव बनने का अधिकार दीजिए।

अध्यक्षा, हिन्दी विभाग
संत जेवियर कॉलेज
मुंबई, महाराष्ट्र

Foldscope and its Applications

EDITOR-IN-CHIEF

Dr. Arun Dev Sharma

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PREFACE

A Foldscope, a low-cost science tool, is an optical microscope that can be assembled from simple components, including a sheet of paper and a lens. It was developed by Dr. Manu Prakash and designed to cost less than US\$1 to build. It is part of the "frugal science" movement which aims to make cheap and easy tools available for scientific use in the developing world. The Department of Biotechnology (DBT), Government of India and the Prakash Lab at Stanford University, USA signed an agreement to bring the Foldscope to India to encourage curiosity in science. It is being used as a teaching tool for the students in biology, chemistry, physics and many other streams. Keeping these facts in the background, the editors and authors of the book have tried to compile their research and review outlook about Foldscope usage and its various applications. The aim of this book is to facilitate the adoption of Foldscope as an educational and research tool by students, teachers, scholars, scientists and the general people. Many authors who are also Project Investigators and recipients of the Foldscope research grant acknowledge Department of Biotechnology, Government of India. The authors hope that this book will not only provide pleasant reading but also practical knowledge which can be utilized by the user of this book in the area of Foldscope microscopy.

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MAPPING MICROSCOPIC BIODIVERSITY IN AQUATIC ECOSYSTEMS USING PAPER MICROSCOPE 'FOLDSCOPE'

Dr Maya Murdeshwar^{1*} and Dr Sujata Deshpande², Siddhi Parab¹, Jennifer Tellis¹

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Abstract

The aim of the project was to explore in biodiversity of microflora and microfauna in aquatic ecosystems using the paper microscope Foldscope. The type and abundance of microorganisms were investigated in still water systems of a water lily pond and a rain water harvesting pond at Maharashtra Nature Park, Dharavi, Mumbai. The physical parameters like pH and temperature were measured. The Foldscope is a 'frugal science' tool designed by Dr. Manu Prakash, Associate Professor of Bioengineering at Stanford University, USA. It is an inexpensive, portable, light-weight paper microscope, small enough to fit into a pocket, and amenable with on-site field studies. The advantages and applications of the Foldscope will also be discussed. The project was funded by the DBT-PrakashLab Research Grant (Foldscope India Phase-I) of the Department of Biotechnology (DBT), Government of India.

Keywords: Foldscope, Aquatic ecosystem, Biodiversity

INTRODUCTION

Biodiversity coupled with abiotic factors determine the flow of nutrient cycling and primary production^[1]. It involves the variability in living organisms with respect to species, functions, taxonomy and phylogenetics^[1]. An 'Ecosystem' involves collection of all living organisms along with physical and chemical parameters that make their environment^[1, 2]. The abiotic components involve temperature, moisture, chemical composition of soil or water whereas biotic components involve primary producers, herbivores, carnivores and detritivores organisms. The entire surface of the earth is a continuous series of ecosystems, and thus any changes in the ecosystem parameters would affect the well-being of human beings and other living organisms^[2,3].

Ecosystem assessment can be done by characterization of the ecosystems - such as the quality of water, checking for food web functioning within different food chain levels, chemical composition levels such as nitrogen, carbon levels and by checking for biological indicator organisms^[4]. Depending on the condition of the ecosystem, the number and the type of organisms varies. Also, assessment of indicator organism could be a cost effective method^[3,4].

Aquatic ecosystems comprise of aquatic environments including oceans, estuaries, lakes, ponds, wetlands, rivers, and streams^[5,6]. Freshwater systems are classified as standing lentic systems (no overall directional displacement) and flowing lotic systems (consistent directional flow), and have salt concentrations less than 1%^[5,6]. Examples of freshwater ecosystems are standing aquatic systems like ponds, lakes and flowing aquatic system like streams, rivers. The topmost layer of pond water is called as littoral zone where there is high sunlight penetration and thus photosynthetic organisms such as algae, diatoms, aquatic vegetation are present^[5]. Just below the littoral zone is limnetic zone where the planktonic organisms resides which plays an important role in aquatic food chain^[5]. However, during Spring and Fall seasons due to the high wind flow both the zones mix up and thus non-uniform microbiota distribution occurs^[4,5]. Factors that affect the aquatic ecosystem are sudden increase in water levels, increased holding time of sediment and organic matter due to reduced velocities, habitat changes, etc. Anthropogenic activity has a great impact on nutrient cycling, phytoplankton diversity, causing eutrophication^[7,8,9]. The phytoplankton diversity consisted of diatoms, dinoflagellates, blue-green algae, green algae and their abundance varies depending on seasonal conditions^[3,7].

The 'Foldscope'^[10,11,12,13] is a result of the effective combination of the art of origami and the physics of optical designing and imaging. It is an invention of 'frugal science' devised by Dr Manu Prakash from Stanford University. It is a microscope made out of a sheet of paper, a glass lens and a magnetic coupler, the cost of which is expected to be USD \$1 (~ INR Rs.70) to manufacture. It aims to make high-end scientific equipment and scientific exploration

accessible to the common man. The Foldscope, with dimensions of $70 \times 20 \times 2 \text{ mm}^3$ and weighing less than 8.8g, and fits into a pocket. Different Foldscope designs provide a magnification from 140X to 2000X with sub-micron resolution^[10,13]. It can be easily assembled from a sheet of paper in 10 minutes, comes with an accessory toolkit including paper slides, plastic coverslips and other basic requirements. Adjustments can be made in all three axes, i.e. X-, Y-, and Z- axis. It requires no external power supply and has the capacity to withstand harsh environments^[10].

The objective of the project was to study the microscopic biodiversity that abounds in freshwater ecosystems in Maharashtra Nature Park, Dharavi, Mumbai. The type and abundance of the microflora and microfauna were documented using the Foldscope, in relation to the physical and chemical parameters of the freshwater bodies prevalent at that time. This observational study helped identify aquatic species that inhabit freshwater habitats.

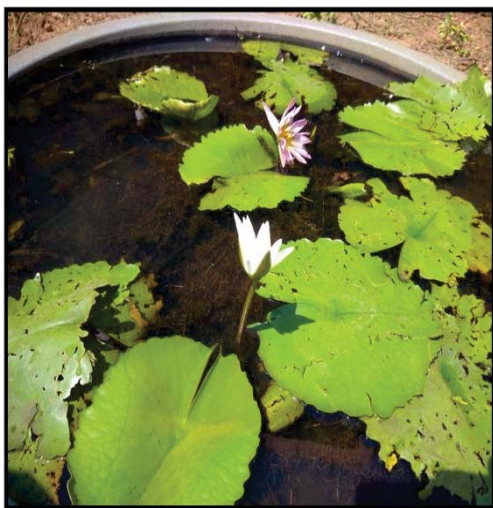
Materials and Methods

Study Site & Microhabitats selection

The Maharashtra Nature Park, Dharavi, Mumbai, is man-made ecosystem, built on a dumping ground. Due to the strict regulations maintained by the park authorities, both macro- and micro-flora and -fauna are protected. This site was chosen for the project. The data was collected during August 2018 to March 2019, between 0900 hours to 1500 hours on the days of visit as the park was open during this time.

Water ecosystem

Water lily pond (Fig.1A) and rain water harvesting system (Fig.1B) were selected, both of which are standing aquatic ecosystems in which there is no flow of water. The water remains still for a long duration and thus sample can be collected and analyzed easily, giving reliable results.



1A. Water lily pond



1B. Rainwater harvesting pond

Fig.1. Study Sites

Water Sample Collection

Using a clean glass dropper (Borosil), the water at the surface and depth of 10 cm was collected in sterile 50 ml falcon tube (BD Germany) from the water lily pond (Fig.2A). Depth was measured using a regular clean, plastic ruler (Faber Castle). The water just underneath the water hyacinths in the Rainwater Harvesting system was collected in a similar manner (Fig.2B).



**Fig.2A. Water collection from
Water lily pond at 10cm depth**



**Fig.2B. Water collection from
Rainwater harvesting pond**

Fig.2. Water Sample collection

Temperature

Water temperature was measured using a glass mercury thermometer (Microtroniks Chemical Mercury Thermometer). Temperature of surface water, water at the depth of 10 cm in water lily pond and the water just beneath the water hyacinth in the Rainwater Harvesting system were measured.

pH

The pH of all water samples was checked using pH paper strip (Fisher Scientific) at the time of sample collection.

Foldscope Analysis

The 10 Foldscopes (Foldscope Instruments Inc., USA) provided by DBT – PrakashLab Foldscope (India Phase I) Category B research grant were used to analyse the water samples. They possess a magnification of 140X and a resolving power of 0.2 μm . The observations were documented through photographs and videos captured using LG-Q7 camera phone (Model no. LM-Q710TS, 1080 x 2160 pixels). Natural daylight was used to make all observations.

RESULTS

Temperature

The measured temperatures were as follows: surface water (21°C - 22°C), water at the depth of 10 cm from water lily pond (18°C - 19°C) and the water just beneath the water-hyacinth in the rainwater harvesting system (23°C - 25°C), respectively.

pH

The measured pH values were as follows: surface water (pH 6.5), water at the depth of 10 cm from water lily pond (pH 6.5) and the water just beneath the water hyacinth in the rainwater harvesting system (pH 7.5), respectively.

Foldscope Analysis

Foldscope analysis showed the presence of motile protozoa, cyanobacteria and algae. These were identified by comparison to data available on Microcosmos^[14], AlgaeBase^[15], World Register of Marine Species (WoRMS)^[16] and other standard platforms that provide information about aquatic organisms. Several small, highly motile organisms were also observed. However, their documentation was difficult, and thus their morphological study and identification could not be completed. The results of the study, including photographs and videos have been uploaded on the Microcosmos^[14] website with #sxcm hashtag.

***Chlorococcum* spp.**

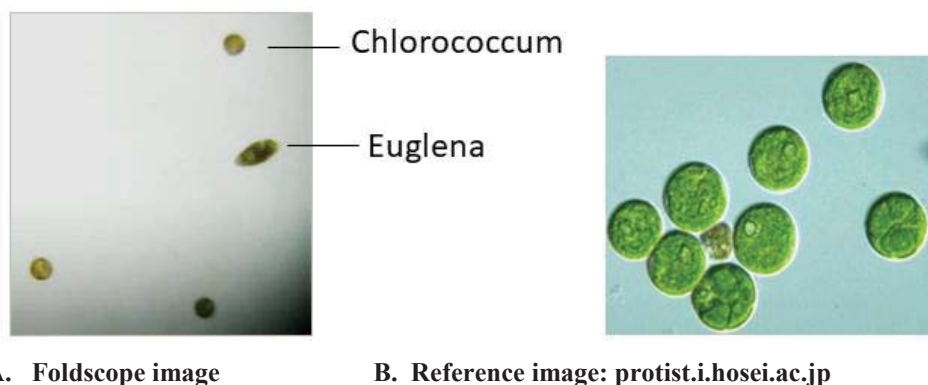


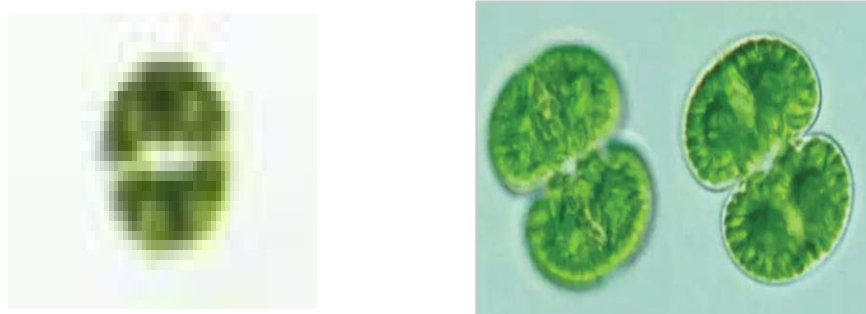
Fig.3. *Chlorococcum*

Classification according to AlgaeBase^[15]:

Domain:	Eukaryota
Kingdom:	Plantae
Division:	Chlorophyta
Class:	Chlorophyceae
Order:	Chlorococcales
Family:	Chlorococcaceae
Genus:	Chlorococcum

Chlorococcum is a unicellular green algae found in freshwater. It is spherical in shape with a single chloroplast^[17,18] and the ability to form biofilms on wet surfaces^[17,18]. Chlorococci move in a circular manner. Reproduction is through zoospores. They help in photosynthesis and produce oxygen in ecosystem.

***Cosmarium* spp.**



A. Foldscope image

B. Reference image: protist.i.hosei.ac.jp

Fig.4: *Cosmarium* spp

Classification according to AlgaeBase^[15]:

Domain:	Eukaryota
---------	-----------

Kingdom:	Plantae
Subkingdom:	Viridaeplantae
Infrakingdom:	Streptophyta infrakingdom
Phylum:	Charophyta
Class:	Conjugatophyceae (Zygnematophyceae)
Order:	Desmiales
Family:	Desmidiaceae
Genus:	Cosmarium

Cosmarium is a genus of non-flagellate, green algae, characterized by the bi-lobed body structure^[19,20]. Each cell contains two fairly elaborate chloroplasts. Asexual reproduction occurs by septum formation. They are found in still or slow-flowing freshwater containing dissolved calcium or magnesium carbonates.

Cylindrotheca spp.

A. Foldscope image



B. Reference image: oceandata.ucsc.edu



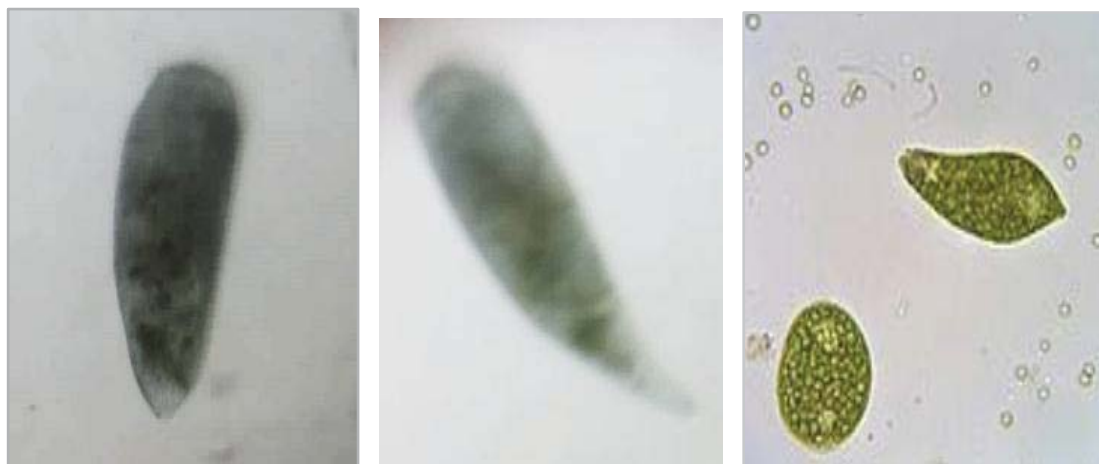
Fig.5: *Cylindrotheca* spp.

Classification according to WoRMS^[16]:

Kingdom:	Chromista
Subkingdom:	Harosa
Infrakingdom:	Heterokonta
Phylum:	Ochrophyta
Subphylum:	Khakista
Class:	Bacillariophyceae
Subclass::	Bacillariophycidae
Order:	Bacillariales
Family:	Bacillariaceae
Genus:	Cylindrotheca

Cylindrotheca are a class of diatoms found prominently in freshwater ecosystems^[15,16, 21]. They are characterized by divided chlorophyll, with a nucleus in the center. Their cilia beat in synchronized waves, thereby propelling the organism through the water. They are known to contribute to climate change processes and form a substantial basis of the aquatic food web.

Euglena



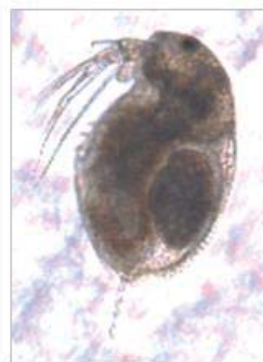
A. & B. Foldscope images

C. Reference image: protist.i.hosei.ac.jp

Fig.6. *Euglena*

Domain:	Eukaryota
Phylum:	Euglenophyta
Class:	Euglenophyceae
Order:	Euglenales
Family:	Euglenaceae
Genus:	Euglena

Euglena are photo-heterotrophic eukaryotes that have characteristics of both plant and animal cells^[22,23]. They are commonly found in fresh and marine water system, and still water in which there is bloom. They possess chloroplasts which help in photosynthesis. The plasma membrane is called 'pellicle' and is flexible. It helps in locomotion and capturing prey. Contractile vacuoles are present that help in expelling excess water into the surrounding^[22]. They possess an eyespot and a photoreceptor which help in detection of light^[22]. *Euglena* moves by a whipping motion of its flagella. They feed on unicellular organisms such as algae, bacteria^[22]. They are either in free-swimming stage (motile stage) or non-motile in cyst stage^[22,23]. They form cyst to protect themselves from harsh conditions. They play an important role by production of oxygen in the environment. Reproduction is by asexual reproduction (binary fission) or mitosis.

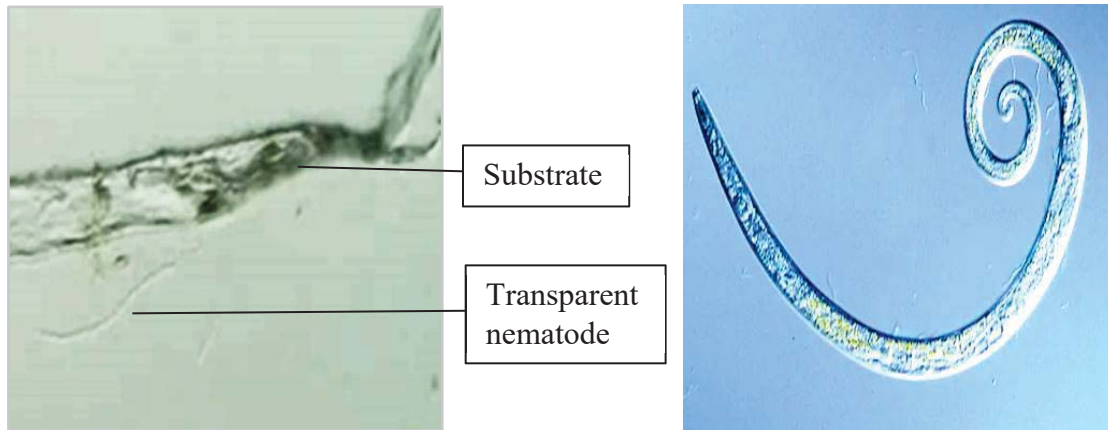
Macrothrix* spp.****A. Foldscope image****B. Reference image: cfb.unh.edu*Fig.7: *Macrothrix* spp.**

Classification according to WoRMS database^[16]:

Kingdom:	Animalia
Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Branchiopoda
Subclass:	Diplostraca
Infraclass:	Cladoceromorpha
Superorder:	Cladocera
Order:	Anomopoda
Family:	Macrothricidae
Genus:	Macrothrix

Macrothrix are water fleas found along weedy margins of ponds and ditches^[24,25]. They are 0.2 - 6.0 mm in size, have a discrete head, a single median compound eye and a shell enclosing the trunk or abdomen. They possess characteristic antennae. They create currents in the water using their 'limbs' that help them in feeding on microscopic organic matter present in the surrounding water^[24,25]. They reproduce by cyclical parthenogenesis.

Nematodes



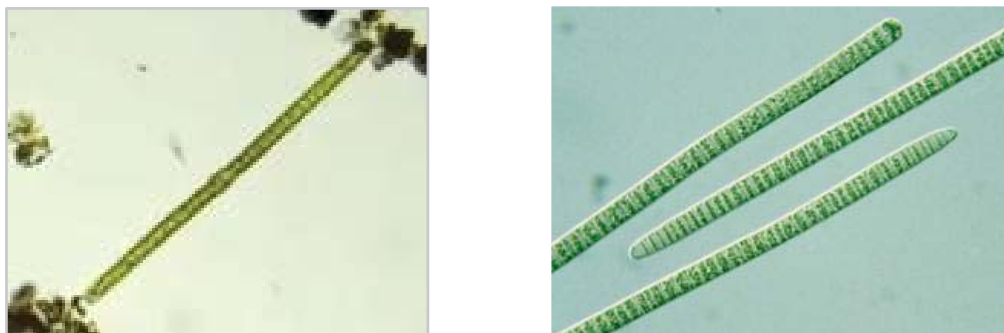
A. Foldscope image

B. Reference image: Olympus.magnet.fsu.edu

Fig.8: Nematodes

Kingdom:	Animalia
Phylum:	Nematoda
Commonly known as:	Roundworm
Commonly found in:	Marine, freshwater, and terrestrial environments.
Mobility:	S-shaped motility

Nematodes are transparent, elongated cylindrical in shape without segmentation. The outer layer is made of elastic cuticle which sheds four times during its life form^[26,27,28]. Their size ranges from mm to cm and hence they are easily visible to the human eye. They move by forming S-shaped curves by maintaining high internal body fluid pressure and tough elastic nature of cuticle^[26,27]. Nematodes are parasitic in nature, feeding on algae, bacteria, fungi, and other nematodes. They mostly inhabit moist areas and may be found in the body fluids of hosts during parasitic interactions^[26,27]. Birds carry nematodes from one ecosystem to other during their annual migration^[26]. They play an important role in nutrient recycling and the decomposition of waste materials^[26,27]. They act as bio-indicators, their absence in aquatic system indicating polluted water or the presence of toxic substances^[29]. Enterobacteriaceae is usually microflora in the guts of nematodes, thus presence of nematodes in drinking water is not safe^[29].

Oscillatoria

A. Foldscope Image

B. Reference image: protist.i.hosei.ac.jp

Fig.9. Oscillatoria

Domain:	Bacteria
Phylum:	Cyanobacteria
Class:	Cyanophyceae
Order:	Oscillatoriales
Family:	Oscillatoriaceae
Genus:	Oscillatoria

Oscillatoria are photosynthetic, unbranched filamentous green cyanobacteria^[30,31]. They show oscillating movement in which filaments can slide back and forth in order to orient themselves towards a light source. They are commonly found in fresh watersources, for example, in water troughs made for animals. They reproduce by fragmentation.

Bdelloid Rotifer

Phylum:	Rotifera
Class:	Eurotatoria
Order:	Bdelloidea



A. & B. Foldscope images

C. Reference image: nmnh.typepad.com

Fig.10: Rotifer spp.

Rotifers are planktonic, size ranges from 1mm-3mm and may have different body shapes such as sac-shaped, spherical, cylindrical, wide and flattened, or long and slender and colorless body^[32,33,34]. They are commonly known as ‘wheel’ or ‘whirling’ animals, rotifers are found in brackish or marine habitats, still water such as lake bottoms, in soil, or on mosses. The body of rotifers is divided into three parts - head, trunk, and foot^[33]. Head region contains coronal cilia that produce water currents which helps in drawing the prey towards the buccal field or sometimes they have spines or bristles in place of cilia which prevent prey from escaping^[32,33]. Body is annulated that is ring shaped which provides flexibility to organism to capture the prey. They feed on small animals, algae, organic matter, also some species act as parasitic on crustaceans, protists, snail eggs^[34]. The adult rotifers and their eggs act as prey for long tailed ducks, copepods, nematodes^[34]. Although they are sessile and remain attached to substratum, creeping motility is observed while catching prey by secretion of pedal glands which help in attaching

or cement the foot to the surface and extending the body with the help of annulation that helps to draw head towards the prey. Life span is about 6 to 45 days. A unique feature of bdelloid rotifers is that they are entirely made of females – there are no males. They reproduce asexually by parthenogenesis. It is said that presence of rotifers in activated sludge, provides the good oxygenated water ^[32,33].

***Urocentrum* spp.**

A. Foldscope image



B. Reference image: protist.i.hosei.ac.jp



Fig.11: *Urocentrum* spp.

Classification according to WoRMS^[16]:

Kingdom:	Chromista
Subkingdom:	Harosa
Infrakingdom:	Alveolata
Phylum:	Ciliophora
Subphylum:	Intramacronucleata
Infraphylum:	Ventrata
Class:	Oligohymenophorea
Subclass:	Peniculia
Order:	Peniculida
Family:	Urocentridae
Genus:	Urocentrum

Urocentrum belongs to the most developed class of protists^[36,37]. It is a rotund ciliate, slightly bifurcated by two distinct bands of cilia. It has a tufted tail of fused cilia on the posterior. The organism spins on its tail, swimming rapidly in a slightly irregular spiral. The cell surface is covered with cilia that beat in synchronized waves, hence propelling the organism through the water. Reproduction is primarily asexual, by binary fission, but sexual reproduction also occurs by conjugation^[37].

Hydrachna* spp.****A. Free floating adult*B. Parasitic young on
aquatic vegetation****C. Reference image****Fig.12. *Hydrachna* spp. (Red Water Mites)**

Phylum:	Arthropoda
Subphylum:	Chelicerata
Class:	Arachnida
Order:	Acarina
Family:	Hydrachenellae
Genus:	Hydrachna

Water mites are motile, sexually reproducing zooplanktons with size ranging from 2-7 mm. They are often bright coloured to attract or warn predators or for mating purposes^[38,39]. Adult water mites (nymph stage) are free swimming, whereas young ones (larval stage) act as parasite which crawl on aquatic vegetation^[38,39]. They have four pairs of legs that contains small hair that helps in propelling through the water^[38]. They are carnivorous in nature and feed on other insect larvae, snails, small crustaceans with the help of retractable piercing mouthparts by secreting digestive enzymes and then sucking out dissolved tissues^[39]. They do not have antennae but have a pair of finger-like pedipalp to catch a prey^[39]. They have the ability to survive in low dissolved oxygen levels in polluted aquatic system^[38,39].

Contraction of Internal Organs of an Unidentified Organism

Under the Foldscope, the contraction of internal organelles, and of contractile vacuoles was observed for a transparent unidentified organism. Data has been recorded and saved in video format available on the Microcosmos website.

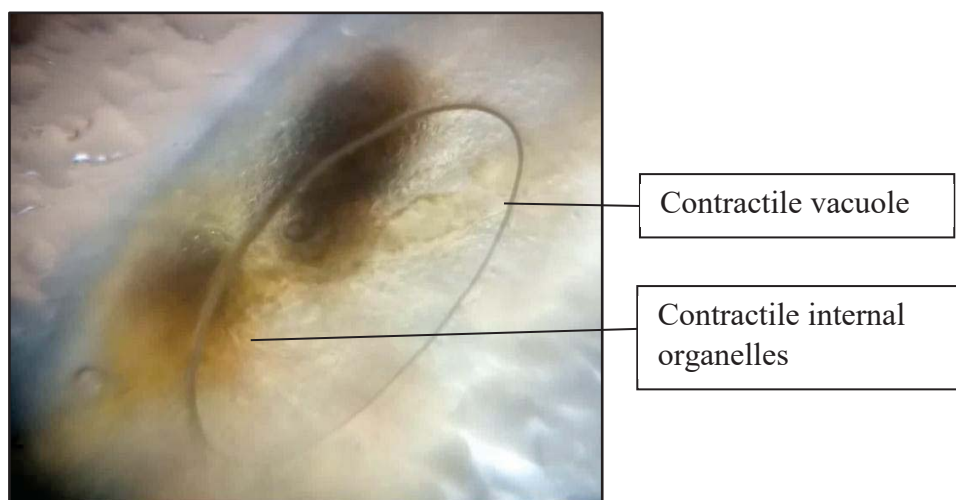


Fig.13. Contraction of internal organelles of an unidentified organism

Conclusion

Sustaining biodiversity of plant and animal life is important for the environment and also for the quality of human life^[2,3,7]. Humans are dependent on aquatic environment in everyday life. Aquatic bacteria and fungi breakdown the harmful toxins in the sewage systems, and also in rivers and streams^[8]. The aquatic wildlife are important sources of food, energy, money (in terms of jobs), atmospheric oxygen, buffers against new diseases, pests and predators, and finally, protection against food shortage and global climate change^[1,5,6,8]. Keeping this in mind, the project was undertaken to document the natural biodiversity in freshwater ecosystems. However, much less diversity of organisms was observed in freshwater ecosystems as compared to marine ones. This could possibly be explained by the no directional flow being a barrier to species migration, the relative variability of physicochemical conditions, the relative geological youth of freshwater systems^[4,40] and perhaps by the limited magnification of the microscope. Though the Folscope had limitations in terms of magnification and field of view, it was served its promised function of being a great tool for education. The exercise was in all very fruitful in making these observations and studying the magical microscopic world of aquatic ecosystems.

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INDIAN DEMOCRACY AT 70

Challenges Ahead

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A matter of Rights amid Wrongs: A case study of Valmikis of Jammu & Kashmir

Pratiba Naitthani

Right to Equality under Article 14 is considered to be the most important Fundamental Right guaranteed to each and every citizen of India, without any discrimination on the basis of caste, color, creed, religion, gender, economic status etc. However, this provision of the constitution is brazenly violated in the state of Jammu & Kashmir. Article 35 A of the Indian constitution allows the state of Jammu & Kashmir to decide the Permanent Residents of the state and those deemed fit by the state are given the Permanent Resident Certificate that is the PRC. It basically extends the benefits of the state services and facilities to those who are PRC holders. It was in 1957 when the SafaiKarmacharis or Sweepers in Jammu and Kashmir went on strike. This strike went on for over one month and hence about 200 scheduled caste persons, Valmikis as they call themselves, were brought to Jammu and Kashmir from Punjab, to work as SafaiKarmacharis/sweepers. Although they were promised PRC, even after living in the state for almost 60 years, these SafaiKarmacharis are not given PRC. This has resulted in state invented discrimination against the Scheduled Caste persons from Punjab. They are compelled to live like refugees, without any rights which are enjoyed by the scheduled caste persons elsewhere in India.

This paper attempts to find out the root cause and implications of the blatant discrimination against the Scheduled Caste persons in the state of Jammu & Kashmir. In the largest democracy of the world, such discrimination and exploitation in the name of law are unheard of. Rights can not be selective for one section of the society and not for the other. The soul of Democracy is Equality, Liberty and Justice and it is imperative that the state ensures these for all.

In the absence of any formal references or data available, the researcher made multiple visits to the area and collected most of the information by visiting the field, ie Jammu city, in the Bastis/localities of the Valmikies and by interacting with the community. Interviews both individual and group were conducted to collect information and data. Information was also collected by responses to RTI and referring to the Constitution of India, Constitution of Jammu and Kashmir, books, govt documents and newspaper reports.

Introduction of the area:

This study was conducted in the state of Jammu & Kashmir. Under the 1st Schedule of Indian Constitution it is the 15th state of India situated in the Northern India. The state currently has three parts namely Laddakh, Jammu & Kashmir. The population comprises of Muslims, Hindus, Buddhists and Sikhs. This study was conducted in Jammu region, where Valmiki, (as they call themselves), the Scheduled Caste persons from Punjab, have been living since 1957.

Historical Background:

As India got free from the enslavement of the British, the princely state of Jammu & Kashmir acceded to India on 26th October 1947, with Maharaja Hari Singh, the ruler of this State, signing the Instrument of Accession to join the dominion of India. With the end of hereditary rule in

different princely states in independent India, the democratically elected governments took over the administration, both at the central and at the state levels. The Constituent Assembly formulated the Constitution of India. However, the democratic process of forming a constituent assembly for the state could not be completed in Jammu & Kashmir due to the attack by the Pakistan army on 22nd October 1947, along with the Pathan Tribals, (Jagmohan, 2014, Rao, 2002) on the state. The situation in Jammu & Kashmir was 'unusual and abnormal', besides, India took the issue of Pakistan aggression to the United Nations on 1st January 1948 and the matter was pending there, hence it was so decided that till the normal life is restored, (N. G. Ayyanger in Constituent Assembly, 17th October 1949, Legal Documents, 2016, pp58), a temporary Article be added in the constitution, which originally was Article 306 A, later inserted in the constitution as Article 370. This proposal made by N.G. Ayyanger was accepted by the constituent assembly. Although passed by the constituent assembly, Article 370 was a temporary arrangement, to be in force till situation in the state became normal. It made provisions that the constitution of India will not by default be applicable in the state of Jammu & Kashmir, except for Defense, Foreign Affairs and Communications. Art 370 also allowed modification by the President in the existing laws for the state of Jammu & Kashmir to meet any situation in the absence of a representative body. Thus, for implementation of the Indian constitution in the state a Presidential order with concurrence of the state legislature was required.

Jammu & Kashmir does not have any Special Status:

It is noteworthy that nothing in Article 370 denotes or indicates or mentions that Jammu & Kashmir has been granted any Special Status. In 1950 when the constitution was adopted, Part XXI had the title mentioned in the const as Temporary & Transitional

Provisions. It was in 1962 that the word Special was added in part XXI, for Art 371, (Constitution of India, Bakshi, pp 394). Article 370 is Temporary and not Special, nor does it at any point mention Special Status for Jammu & Kashmir, (Constitution of India). In fact, Article 370 was to be implemented only as long as the Indian Constitution was made applicable in the state, (N. G. Ayyanger in Constituent Assembly, 17th October 1949, Legal Documents, 2016, pp 61),

Article 35 A:

On the pretext to regulate the rights of people in the state, through Permanent Resident Certificate or PRC, a new law was suggested by the then Jammu & Kashmir leadership. Since, Article 370 allowed modifications by the President for the state of Jammu & Kashmir, it paved the way for Presidential order of 1954. This Presidential order added a new provision in the constitution, Article 35 A, which intended to limit the entitlement of rights and privileges of some people within the state.

On 14th May 1954, the President of India issued an order- Constitution (application to Jammu and Kashmir) Order 1954, (Kaul, 2017, pp 07)

After Article 35, the following new article shall be added, namely "35 A. *Saving of laws with respect to permanent residents and their rights: Notwithstanding anything contained in this Constitution, no existing law in force in the State of Jammu & Kashmir, and no law hereinafter enacted by the Legislature of the State -*

- *Determining the classes of persons who are, or shall be, permanent residents of the State of Jammu & Kashmir; or*
- *Conferring on such permanent residents any special rights and privileges or imposing upon other persons any restrictions as respects -*
- *Employment under the State Government;*

- Acquisition of immovable property in the State;
- Settlement in the State; or
- Right to scholarships and such other forms of aid as the State government may provide'
- Shall be void on the ground that it is inconsistent with or takes away or abridges any rights conferred on the other citizens of Indian by any provision of this Part."

It is pertinent to note here that under sub section (1) of Article 370, the President of India can issue an order with concurrence of the Govt of Jammu & Kashmir but it neither empowers the President to bring about any amendment to the constitution nor abridge any Fundamental Rights, (Kaul, 2017, pp 09)

Thus, Presidential Order issued for implementing any existing Article cannot be assumed to be the power of President to amend or add a completely new Article in the constitution, without going to the Parliament. The President does not enjoy the power to amend the constitution, under article 368 only the Parliament can amend the constitution, (Bakshi, 2018, pp 392). However, despite clear provisions, Article 35 A was inserted in the constitution through Presidential Order, without referring it to the parliament. This article empowered the state of Jammu & Kashmir to decide whether and individual should be granted Permanent Residence Certificate.

Section 6 in Constitution of Jammu & Kashmir:

As per the Constitution of Jammu & Kashmir, the definition of Permanent residents in Section 6:

(1) Every person who is, or is deemed to be, a citizen of India under the provisions of the Constitution of India shall be a permanent resident of the State, if on the fourteenth day of May, 1954-

- (a) he was a State Subject of Class I or of Class II;
- (b) having lawfully acquired immovable property in the State, he has been ordinarily resident in the State for not less than ten years prior to that date.

(2) Any person who, before the fourteenth day of May, 1954, was a State Subject of Class I or of Class II and who having migrated after the first day of March, 1947, to the territory now included in Pakistan, returns to the State under a permit for resettlement in the State or for permanent return issued by or under the authority of any law made by the State Legislature shall on such return be a permanent resident of the State.

(3) In this section, the expression "State Subject of Class I or of Class II" shall have the same meaning as in State Notification No. 1-L/84 dated the twentieth April, 1927, read with State Notification No. 13/L dated the twenty seventh June, 1932. (Constitution of Jammu and Kashmir, pp 3 and 4) •

(The term "State subject" means and includes —

Class I.— All persons born and residing within the State before the commencement of the reign of His Highness the late Maharaja Gulab Singh Sahib Bahadur, and also person who settled therein before the commencement of samvat year 1942 and have since been permanently residing therein.

Class II—All persons other than those belonging to Class I who settled within the State before the close of samvat year 1968 and have since permanently resided and acquired immovable property therein.)

Thus, it is absolutely the prerogative of the State legislature to define the Permanent Resident and thus, enable a person to enjoy the rights he is entitled to as a citizen of India. The problem with Article 35 A is also its origin, it has been created under Article 370 which itself is a Temporary provision. Despite all the controversies, Article 35 A thus far has prevailed and has been

instrumental in the formation of laws pertaining to the Permanent Resident Certificate under the constitution of Jammu & Kashmir.

Article 35 A is basically misuse of provisions of Article 370 because it was added in the Indian constitution without the involvement of Indian Parliament. Article 35 A violates the constitution of India as no organ or authority can amend/delete/modify/change/add anything in the constitution except for the Indian Parliament. It is also a violation of the basic principles and rights enshrined in the Preamble of the Constitution. As a result of the implementation of Article 35A, lakhs of Indian citizens have been deprived of "JUSTICE, social, economic and political" and "EQUALITY of status and of opportunity". It has also failed to "promote FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation", enshrined in the Preamble to the constitution of India, (Bakshi, 2018, pp 1)

The case of Valimikis in Jammu and Kashmir:

It was the dream of Dr. Ambedkar to give equal rights and equal status to the scheduled caste persons, the downtrodden section, to the suppressed and exploited sections of the society. His dream was shared by the leaders of India, who aspired to guarantee Liberty, Equality and Justice to all, without any discrimination on any ground. In order to fulfill this dream, fundamental rights were guaranteed to all, there has been consistent endeavour to uplift the downtrodden sections of our society. Irrespective of the state or region they live in, all the scheduled caste persons are entitled to certain special rights and privileges, to bring them at par with the rest of the society. However, considering the sub human condition of the Valmikas in Jammu and Kashmir, this dream of Dr. Ambedkar, has no significance. They live in appalling condition with no rights, no human dignity and no hope for a better future.

The researcher made three visits to Jammu in a span

of one year. The first visit was to understand and explore the reality of the problems described, followed by basic interaction with the Valmikis. In the next two visits detailed group discussions were held to discuss various aspects of the issues and problems of the Valmikis. The personal visit to the Valmikis settlement also gave an insight into the subhuman conditions this community lives in. In three visits to Jammu to meet the Valmikis. The participants consisted of Males and Females, though the number of males was larger than the females. The age of participants varied from few above 60, some between the age of 40-60 years and majority between 20- 40 years. In the age group between 40-60 years, few were uneducated, few had studied up to 8th to 10th Std, whereas in the age group between 20-40 years all were educated and some had degrees like, M. A., M. Com., M. Sc., C. S., B. A., B. Sc. etc.

About 15,000 people, who call themselves Valmikiies, live in Jammu, they belong to the Scheduled Caste. Their forefathers were brought to Jammu from the state of Punjab by the govt of Jammu and Kashmir. The Valmikis of Jammu are a glaring example of modern-day slavery. They live in abject poverty and deprivation, inflicted by the laws of the state. They are compelled to live in sub human conditions, like refugees, stripped of all Fundamental Rights, in their own country because they do not have the PRC. Since they are not PRC holders, the state literally does not even acknowledge their existence. It is shocking that the state rules prevent them from taking up any job other than that of a sweeper in the Jammu Municipal Corporation. They are not even entitled to promotion despite 25-30 years of serving as a sweeper. Professional education and govt jobs are far fetched dreams for the Valmikis. Owning a house and property, voting in the elections, enjoying the benefits of govt schemes is beyond their imagination. It is disturbing that in 21st Century, in the largest Democracy in the world, there is a section of citizens, which is not only denied human rights, but denied the very right to existence.

Following is the study of the Valmikis, their past, their struggle for survival and the current condition.

The Strike of SafaiKarmacharies:

It was in 1957 the SafaiKarmacharis or sweepers of the state of Jammu & Kashmir went on a month-long strike. This resulted in piles of garbage and filth accumulating in Jammu, creating a danger of breakout of an epidemic. The then Prime Minister BakshiGhulam Mohammasin the cabinet meeting decided to bring the scheduled caste persons as SafaiKarmacharis or sweepers to Jammu from the neighbouring state of Punjab. They were brought from Amritsar and Gurudaspur. The government of Jammu & Kashmir promised them that the PRC rules will be relaxed to accommodate them and thus the Valmikis settled in Jammu. The bastis/ settlements of Valmikies were mainly in three areas, Valmiki Colony in Gandhi Nagar, Christian Colony in Bakshi Nagar and Dogra Hall in Reshamgarh. In those days these areas were far from the city and were more or less deserted. In these bastis they were provided with free water and electricity connections along with houses to live in. The Valmikis started work without any further delay and cleared the city of Jammu of the garbage and filth piled up for over a month.

The denial of rights and legal glitches:

According to Article 35 A the power to grant PRC is with the Jammu & Kashmir legislature and since the Valmikis were brought to the state after 1944 as per the rules of PRC they are not entitled to be state subjects/ permanent residents and hence the PRC is not issued to the Valmikis. Although the Valmikis from Punjab came and settled permanently in Jammu & Kashmir, for two generations they did not realise that the PRC was not given to them. Nor did they understand the implications of not having the PRC. According to the respondents the first two generations carried forward the legacy of being

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just a sweeper. However, the third generation started getting educated and since now they were educated, they planned to take up jobs other than being a sweeper in the municipality of Jammu. The Valmikis got a nasty shock when they were told that despite being educated, they cannot take up any jobs other than as a sweeper as they do not have the PRC. Things got worst when they were told that not only, they are ineligible for any government jobs being Non-PRC holders, but they can take up a job only as a sweeper, that too only in the Municipality of Jammu, because this is the legal provision. In the absence of PRC, they are living a life without any rights, privileges and dignity. It is a life of misery and exploitation.

Discussion and Analysis:

The sufferings and challenges of Valmikis:

While discussing their sufferings, issues, problems and challenges the members of the Valmiki community expressed their plight and helplessness and raised many thought-provoking questions. They described their problems and discussed the struggle of survival so far.

The general views expressed by the respondents were that 'India is a democracy, all have equal rights, then how can one state of the country make such discriminatory laws and deprive a particular, vulnerable section of the society of its basic human rights? How can a law be created to ensure that the depressed class remains depressed and is consistently exploited? How can the law create compulsions of deprivation and suppression of a community? Why are we denied any growth, progress, education and human dignity? Today everyone is fighting for the rights of the Rohingyas, they are foreigners, they are refugees, but since last 60 years we are deprived of our fundamental rights in our own country, we are denied human dignity, we have been running from pillar to post but no one is listening to us,

no one is even considering our plea, what kind of activism is this?’

Caste based discrimination, exploitation and deprivation:

The male members were more articulate while expressing themselves. The leader of the Valmiki Gharu Bhatti said that ‘nowhere, in the country the Scheduled Castes face such discrimination and ill-treatment like Jammu & Kashmir. This is the only state where the law discriminates against the Scheduled Caste persons. We did not come here forcefully, nor did we come here as refugees, we are requested by the Jammu & Kashmir govt to come here and clean the month-old filth. We were promised PRC but 60 years have gone by, we did not get anything. We are living here since 1957, but we cannot buy property, we cannot start business, nor can we get good education and good jobs. Since we do not have PRC, we are not given the Scheduled Caste certificate. Due to which we do not get any reservation in education or employment, nor do we get any benefits of state or center schemes, which are available to other Scheduled Caste persons in the entire country. Many of us can’t even get the BPL (Below Poverty line) cards, meant for the poor section of the society. This is the only state where the law ensures that the exploited remains the same, he must get more exploited, he should not grow and flourish. He must remain deprived.’ It was indeed shocking to hear these revelations by the community. In the absence of a Caste Certificate, not only in Jammu and Kashmir, but anywhere in India, they cannot avail of any benefits extended to the Scheduled Caste persons in India. It was ironical to see that some of those, who had relatives on Punjab, compared their socio-economic conditions with their relatives, who had access to reservations in education and employment and were well to do compared to those living in Jammu and Kashmir.

but we cannot get a bigger house. Four generations are compelled to live in single room.' This was evident from the condition of their houses and the extremely narrow lanes of their settlement. Since they are not allowed to buy property, reconstruct or even renovate the houses given by the state, they cannot grow horizontally. Hence, they are growing vertically, by building more floors above the existing house. The condition here is dangerous, as these added floors are not cemented, hence are unstable, besides, the ground floor walls are developing huge cracks because of the weight of the added floors. The unreasonable restrictions are compelling the Valmikis to live in dangerous conditions.

Poor living conditions:

It is indeed true that there are no proper roads in Valmikibastis/settlements. They clean the drainage of the entire city but there are no proper drainages and hence during the rains the dirty water of the drains enters their houses. The high voltage electric wires are hanging so low that it can touch people while walking on the streets. They have filed complaints many times but it falls on deaf ears. No one comes even to check the poor and dangerous conditions they are living in.

Denial of voting rights:

One of the respondents raised the issue of denial of voting rights to the Valmikis, he said that 'We are bound to work as sweepers only in the municipality, but see the irony, we cannot contest municipality elections, in fact we are debarred from even voting in the municipal elections. Since we have no voting rights, we have no voice in the local management of the basti and hence, no one pays any heed to our problems. Similarly, we cannot vote in the state legislature/ state assembly elections, hence no MLA or politician is bothered about us. We do not exist for them, because we cannot vote for them.'

Denial to join Central Services:

A young respondent, now a petitioner in the Public Interest Litigation filed in the Supreme Court, challenging 35 A, shared her experience. She said that 'We cannot join any central govt services, like the armed forces, BSF etc because we do not have PRC.' She wanted to join the Border Security Forces, BSF, a security service under the central govt. But being a non-PRC person, she was denied the job. She added that the govt has various schemes for the girl child, but they cannot avail of any of the central or state schemes for the girls. Even the benefits under the National SafaiKarmachari are denied to them.

The political parties which thrive on Dalit Politics, are not bothered about us because we are very small in numbers. We are citizens of India, then why are we denied our fundamental rights? The laws of this state ensure that we remain backward, clean their filth and remain deprived of basic rights.' Said one of the respondents. 'A scheme in collaboration with the National SafaiKarmacharis Finance and Development Corporation and the Ministry of Social Justice and Empowerment was launched in J&K for the socio-economic growth of safaikarmacharis, but Valmikis cannot take its benefit because they are not the permanent residents of J&K.' (Manhotra, 2015)

The Struggle of the Valmiki so far:

With passing years, the Valmikis realized that just crying foul is not the solution. If they want their rights and dignity back then they must organize themselves and take concrete measures. Thus, came the idea of forming area wise organizations. The Valmiki Valmiki Mohalla Trust was formed in Gandhi Nagar in 1996 and now all the activities through this organization. They elect their president. The organization deals with local issues like water and electricity supply, ration cards, Adhar cards, other amenities etc. Similarly,

the Valmikis in Dogra Mohalla have formed the Valmiki Sadar Sabha.

In the year 2006 the Valmikis submitted a Memorandum to the Law Minister Jammu & Kashmir, highlighting their plight and drawing the attention of the govt towards the injustice done to the community. Following are the excerpts from the Memorandum-

'That apart from the restriction in govt employment for the SafaiKarmacharis, the colony of the safaikarmacharis, ie Christian Colony, bakshi Nagar, Dogra Hall, Reshamgarh, Valmiki colony Gandhi Nagar, has not been regularized till date, it is pertinent to mention here that as per the communication number JDA/VC/331/34/PS dated 20-08-2004, 30 colonies were recommended by the Vice Chairman, Jammu Development Authority for regularization, but surprisingly this issue of colonies of safaikarmacharis has been ignored by the Housing and Urban development department.

Pension benefits were extended to the SafaiKarmacharis by the govt vide order no 285.HUD/LSG of 1995 dated 29-09-1995, should be extended to the safaikarmacharis.

Govt order no 205 of 1962 dated 02-06-1962 grant of lease of plots of land measuring 3 Marlas in favour of Gorkhas and Bazigars on payment of ground rent, without charging any premium and relaxing the rule to produce PRC for the same has not been extended to the SafaiKarmacharis. Neither their colonies are regularized nor are they given any land. It is humbly submitted that state subject to be issued or state subject conditions may be relaxed in favour of the safaikarmacharis.'

GharuBhatti, the leader of the Valmikis in Gandhi Nagar has been tirelessly working to get justice for his community. On 16th December 2017 he wrote an open letter to the govt of Jammu & Kashmir. Some of the points raised in his open letter express the desperation of the community:

"Our Plight is presently so grievous that:

- We don't have security of ownership of the houses that we have occupied for approximately 6 decades,
- We can't avail our fundamental rights which should be guaranteed to us as citizens of India,
- Our children have no right to obtain higher (professional and technical) education in the State where we have lived in for three generations,
- We are discriminated against in the matter of securing government jobs even though we have the requisite qualification,
- We have become bonded laborers in the State confined to garbage collection and sweeper work, which amounts to slavery of a sort.
- To crown it all, our greatest peril lies in the fact that the State has (contrary to national and international human rights law) thwarted out any mechanism or procedure for us to achieve our fundamental rights, by implementing a farce called "Permanent Resident Certificate".

In the year 2015 a Public Interest Litigation was filed in the Supreme Court, challenging the constitutional validity of Article 35 A, which makes provision for the PRC. The community is very optimistic about the outcome of the P I L.

Besides this, they have now started talking to the media, they go to attend different conferences and seminars, so that the people at large get to know about their sufferings.

What do the Valmikis lose?

It is a known fact that due to Article 370, which despite being temporary, is still in effect, all the provisions of the

Indian Constitution are not implemented in the state of Jammu & Kashmir and hence the people of this state do not enjoy the fruits of all the provisions of Indian Constitution, unless accepted by the Assembly of Jammu & Kashmir. However, considering the fact that the Valmikis were brought to Jammu & Kashmir from Punjab, it is pertinent to list out the benefits and privileges which they would have enjoyed had they remained in Punjab.

The blatant violation of Fundamental Rights:

In the absence of the PRC the Valmikis are denied the Fundamental Rights, guaranteed to all the citizens of India, without any discrimination on any ground. Listed below are the rights violated/ denied to the Valmikis in Jammu & Kashmir-

Sl.No	Article No.	Provisions
1	Article 14-	Equality before the Law and equal protection of the law.
2	Article 15-	Equality of Status
3	Article 16-	Equality of Opportunity. Special provisions for the reservation in employment.
4	Article 17-	Prohibits Untouchability
5	Article 19-1 (g)-	Right to choose profession, trade, business
6	Article 20-	Right to Life (Livelihood)
8	Article 23-	Right Against Exploitation
9	Article 29-	Cultural and Educational Rights

The Constitution of India makes the following provisions for the persons belonging to Scheduled Castes:

Sl.No	Article No.	Provisions
1	Article 15 (4)	Reservation in Educational Institutions
2	Article 15 (5)	Reservation in Pvt. Educational

Institutions

- | | | |
|----|------------------|---|
| 3 | Article 16 (4) | Reservation in Govt Employments |
| 4 | Article 16 (4A) | Reservation in Promotions |
| 5 | Under Article 38 | State should secure social order for the promotion of welfare |
| 0 | | f people |
| 6 | Article 46 | The educational and economic interest of the Scheduled Casts and Scheduled Tribes be protected and promoted |
| 7 | Article 243 D | Reservation of seats for Scheduled Castes in Panchayats |
| 8 | Article 243 T | Reservation of seats in Municipalities |
| 9 | Article 325 | Prohibition of Disenfranchisement in election, based on caste, religion,sex etc |
| 10 | Article 330 | Reservation of seats in the Lok Sabha |
| 11 | Article 332 | Reservation of State Legislative Assemblies |
| 12 | Article 335 | Requirement of state to acknowledge the claims of Scheduled Castes/Scheduled Tribes while making appointments to posts and services |

Some of the Missed Opportunities:

Education Related Provisions-

Pre-Matric Scholarship to SC Student

Pre-Matric Scholarship to the Children of those engaged in occupations involving Scavenging, Tanning and Flaying cleaning and prone to health hazards

Post Matric Scholarship for Scheduled Caste Students
(PMS-SC)

Scholarships for obtaining Higher Education and
Coaching Scheme- full financial support for –

- 1- IITs, NITs, IIMs, reputed Medical/Law and other institutions
- 2- National Fellowship for M. Phil, Ph. D and equivalent research degrees
- 3- National Overseas Scholarship- for Master's degree and Ph. D.
- 4- Free Coaching for SC and OBC Students

Schemes for Economic Empowerment of Scheduled
Caste Persons-

- Punjab Scheduled Castes Land Development and Finance Corporation-
- Punjab Scheduled Castes Land Development and Finance Corporation (PSCFC) works towards improving economic conditions of the members of the Scheduled Castes (SC) in the state.
- National Scheduled Castes Finance and Development Corporation (NSFDC) especially for B P L category
- National SafaiKaramcharis Finance and Development Corporation (NSKFDC) for the SafaiKarmacharis and their dependents
- Special Central Assistance (SCA) to Scheduled Castes Sub-Plan (SCSP)
- Scheme of Assistance to Scheduled Castes Development Corporations (SCDCs)
- Venture Capital Fund for Scheduled Castes
- Credit Enhancement Guarantee Scheme for Scheduled Castes.

Despite repeated petitions by the Valmikis to the state and central govt regarding the violation and denial of rights, no action has been taken so far.

Conclusion:

Preamble to Indian constitution is based on the principles of Equality, Liberty and Justice. The rights are guaranteed to all without any discrimination. But the Valmikis in Jammu & Kashmir are denied the rights and the ideals of Equality, Liberty and Justice mean nothing to them. Because, they are marginalized, they do not exist for anybody. The politicians pay no heed to their demands as their number is very small. Those swearing by the teachings of Dr. Ambedkar, are not even aware of the subhuman conditions of the Valmikis. The human right activists, running from one court to another, from one media house to another, crying foul when the army takes action against the terrorists; have nothing to say about the systematic exploitation and denial of rights to the Valmikis, created by law and implemented by the govt. No suo-moto actions are taken by judiciary. The Dalit rights activists are busy shaping up their political career, but they have no time or inclination to stand by the Valmikis in Jammu & Kashmir, even when the Valmikis have come out in the open and have gone to the court challenging this discriminatory law, not even a single statement has been made to support this extremely marginalized, suppressed and exploited community.

Four generations have suffered at the hand of the center and state laws, they have been deprived of fundamental rights, overall growth, development and prosperity and above all they lost human dignity. How will the loss of four generations be compensated? It is important to note the fact that the Valmikis were brought to help the state and the people of Jammu and Kashmir. Instead of being rewarded the community is punished, not one but four generations have led a life of misery, denial and dignity in their own country. The valmikis

are victims of state managed, systematic discrimination and abuse. It is the legislature that has deprived the Valmiki of their rights, it is ironical that the corrections to be made by the legislature are reaching the Judiciary. The onus is on the center to get their dignity back and on the state of Jammu and Kashmir to make necessary changes in the state laws to give them their rights.

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