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# Antimicrobial Potential of Marine Organisms Collected From The West Bengal Coastal Region of India Against Multiresistant Microorganisms

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**Abstract :** Marine natural products are increasingly receiving attention in the search for new and effective medicinal compounds. The aim of this study was to investigate the antimicrobial potential of some marine organisms against multi-resistant human pathogens. The sample extracts of a total of seven marine flora and fauna were tested against four standard multi-resistant bacteria and a fungi. Among the marine organisms screened, sea anemone and sundari tree fruit extracts had shown antibacterial activity. The extracts (both aqueous and methanolic) of sample pellets of cyanobacteria, hermit crab and white shelled clam had shown antifungal properties. These findings are encouraging for further investigation for discovery of new therapeutic agents.

**Keywords:** Marine Organisms, Antimicrobial Activity, MIC

## Introduction

The marine environment consists of oceans, seas, coastal backwaters, estuaries, and bays. It is considered to be a unique source of earth's biological diversity, as it covers 70.8% of earth's surface and comprises more than 200000 described species of invertebrates and algae (Winston, 1988). However, it represents only a small percentage of the marine biodiversity (Malakoff, 1997). Due to their particular environment many marine invertebrates such as sponges, jelly fish, sea anemones, bryozoans and corals exhibit unique physiological and structural characteristics which enable them to survive in extremes of pressure, salinity and temperature (Bhakuni and Jain, 1990). Marine natural products are increasingly receiving attention in the search for new and effective medicinal compounds. Competition for space and nutrients led to the evolution of antimicrobial defence strategies in the aquatic environment. Therefore, aquatic organisms, offer a particularly rich source of potential new drugs (Bansemir *et al.*, 2006). The chemical ecology of marine microbes is vastly unexplored even though microbes produce metabolites that can have significant effects on target organisms (Hay, 1996). Marine macro-organisms use metabolites from microbial symbionts to deter consumers, subdue prey, and defend their embryos from pathogens (Hay, 1996). Beside marine animals, plants of this habitat (such as mangroves) are also of great importance. Therefore, a knowledge of the biological activities of plants of the marine environment is desirable, not only for the discovery of new therapeutic agents, but because such information may be of value in disclosing new sources of already known biologically active compounds (Bandaranayake 1998).

Secondary metabolites as natural products provide greater structural diversity than standard combinatorial chemistry and so they offer major opportunities for finding novel low molecular weight lead structures that are active against a wide range of assay targets (Harvey, 2000). Direct tests in both the field and laboratory show that secondary metabolites of marine origin commonly function as defences against consumers. Some metabolites also diminish fouling, inhibit competitors or microbial pathogens, and serve as gamete attractants; these alternative functions are less thoroughly investigated (Hay, 1996).

Because of the evolving resistance of microorganisms to existing antibiotics, there is an increasing need for new antibiotics (Bansemir *et al.*, 2006). Attachment and growth are two major processes in bacterial colonization of surfaces in the sea. By inhibiting either or both of these processes, marine macro organisms may defend themselves against bacterial infection and fouling (Nylund *et al.*, 2005).

A few of the investigation regarding marine natural products as antimicrobial agents reported antibacterial

# Vinayak Damodar Savarkar and His perception of Nationalism

Ruma Ray

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**Abstract :** Vinayak Damodar Savarkar(1883-1966), as an ardent Hindu nationalist a heroic revolutionary represented an unconventional stand of political thought in India in so far as his theory of cultural nationalism in contrast to the theory of territorial nationalism propounded by the leaders of mainstream nationalist movement. The uniqueness of the personality and thinking of Savarkar may be gauged from the fact that while one school of thought calls him an anarchist nationalist , heroic revolutionary and terrorist who won immortal fame by his daring political exploits in the early decades of the twentieth century, the other demonises him as an angry, resentful, vengeful, violent and intolerant person. Infact, Savarkar gave a systematic articulation of the opinions held by many people in the country that the true resurgence of India could be facilitated only by rooting Indian nationalism in the cultural ethos of the Hindu religion .

This paper aims to appeared, the political philosophy of Savarkar- appeared as a distinct ideological formulation having its focus on the homogeneity of the Hindu population living in a particular tract of land and having the urge to create a nation based on the cultural moorings of the majority people.

**Key Words :** Nationalism, Hinduism, Ideological Formulation

## Introduction

Vinayak Damodar Savarkar(1883-1966), as an ardent Hindu nationalist a heroic revolutionary represented an unconventional stand of political thought in India in so far as his theory of cultural nationalism in contrast to the theory of territorial nationalism propounded by the leaders of mainstream nationalist movement. Savarkar was one of the earliest exponents of the view that the so called sepoy mutiny of 1857 was, really , the first war of independence. The distinction made by Savarkar between Hinduism and Hindutva is remarkable . The movement for independence was witness to different phases of leadership up to 1947, amidst which Hindu nationalism prevailed strongly between the 1920s and 1930s under the wing of prominent political thinkers and leaders like Vinayak Damodar Savarkar and Bhai Parmanand to name a few. Savarkar however had the most influence in the spread of Hindu nationalism with his concept of 'Hindutva' which he speaks about in his book 'Hindutva: Who is a Hindu?' that was first published anonymously at Nagpur in 1923. Savarkar wrote this book in prison, after he had meet with Khilafatists whose attitude apparently convinced him that Muslims were the real enemies, not the British.'Savarkar came to believe that Hindus were weak as compared to Muslims, who had ruled India before the British colonised India. It is this idea that drove Savarkar to write about the origin of Hindus and Hindustan, thereby making his work the constitution for Hindu Nationalism. This chapter seeks to comprehend and analyse Savarkar's Hindutva and its effects on nationalism, socialism and democracy during Indian's struggle for freedom.

Savarkar in his earlier days was a part of the struggle for independence but was not anti-Muslim in nature, this was seen in his first book 'The First Indian War of Independence: 1857' that he wrote in 1909, where Savarkar speaks of the sepoy mutiny and the existence of Hindu-Muslim unity against the common enemy, the British. The reasons for the mutiny according to Savarkar were much deeper than grease cartridges and the undermining of the Talukdars by the British, he said that it was due to the principles of 'Swadharma'

<sup>1</sup> D. Keer, Veer Savarkar Bombay: Popular Prakashan, 1988, p. 161.

# Removal Of Chromium From Waste Water By Fungal Biomass-A Review

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**Abstract :** Industrial effluents especially leather tanneries discharge very high amount of heavy metals especially chromium. These effluents released in rivers or canals or dumped in ground water lead to contamination of chromium due to its accumulation and may result in a higher chance of chromium exposure. Chromium can replace other metals in biological systems with toxic effects and its accumulation throughout the food chain leads to serious ecological and health problems as chromium (VI) is a known human carcinogen. There is a great danger to man and livestock particularly from the high chromium content and it has been found to be toxic to humans at levels as low as 0.1 mg/L. The traditional methods for removing heavy metals have several disadvantages. Biological methods of metal removal from aqueous solution known as biosorption have been recommended as cheaper and more effective process. This method is based on the use of the metal binding capacities of various biological materials including algae, fungi and bacteria. Fungi are the most studied microbe for a variety of fermentation processes from which a constant supply of biomass can be obtained for metal removal. Hence, fungal biomass could serve as an economical method for effective removal of toxic metals. In general, biosorption takes place by inactive, dead and immobilized microbial biomass but there are differences in the efficiency and mechanisms involved. In this review paper an attempt has been made to study the various processes of biosorption of hexavalent chromium by fungal biomass tannery effluent.

**Key Words :** Hexavalent Chromium, Biosorption, Fungal Biomass.

## Introduction

The increasing trend towards artificial high life standards are compelling the people towards misuse of resources which ultimately result in environmental pollution in a large scale. Incidentally, increased industrialization has also affected the ecosystem through waste disposal which contains toxic metal contaminants. The presence of heavy metals in aquatic environments is known to cause severe damage to aquatic life, beside the fact that these metals kill microorganisms during biological treatment of waste water with a consequent delay of the process of water purification [1]. These metals exert a deleterious effect on the flora and fauna that grow in lakes and streams and rivers [2]. Ground water contamination can also occur when such waste water and chemicals seep through the soil from unlined ponds, pipes and drains or from dumps and spills. Ground water may take a long time to cleanse itself because it moves slowly and is out of contact with air [3]. So, heavy metals are among the worst group of pollutants of the environment and among all the heavy metals chromium (VI) is considered to be highly toxic, which is often present in industrial waste waters as chromate and dichromate [4]. The discharge of chromium (VI) into aquatic ecosystems has become a matter of concern in all the tannery areas in India over the last few decades. This pollutant is introduced into the aquatic systems significantly from the effluents of leather processing units as a result of chrome tanning of leather [5]. Other than the leather industry chromium is also released from steel, aluminium, metal processing, electroplating, iron sheet cleaning, chrome plating, water cooling, pigments, electric, battery manufacturing and a variety of other industries [6-8]. Chromium, a highly reactive element with an oxidation state of 6 exhibits stability as Cr (III) and Cr (VI). But hexavalent chromium is more toxic to living organisms than the trivalent chromium. Trivalent chromium has limited hydroxide solubility making it relatively immobile and less available for biological uptake [1]. Cr (VI) being

# Establishment of Pigment Producing *Pseudomonas* as Biomarkers for Plant Growth Promotion in Vermicompost

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**Abstract :** Vermi-composting principally involves bio-oxidation and stabilization of organic material in garbage, by the joint action of earthworms and microorganisms to generate a 'miracle plant growth promoter' to be applied in garden. Earthworms acts as aerator, grinder, crusher, chemical degrader, and a biological stimulator. They host millions of decomposer (biodegrader) microbes in their gut (as they devour them) and excrete them in into degraded compost materials along with the nutrients nitrogen (N) and phosphorus (P) in their excreta. The nutrients N and P are further used by the microbes for multiplication and vigorous action. Various species of the genus *Pseudomonas* has been reported earlier to be principal member of the microbial community in vermicompost. They can actively degrade organic wastes to generate mature and stable compost rapidly. Production of pigment (like pyoverdine (fluorescent yellow), pyocyanin (blue), pyorubin (reddish brown), pyomelanin (black)) has been considered as one of the diagnostic traits of some species of *Pseudomonas*. Pigment production in media could be positively correlated with the number of its producer strain. If any correlation could be established between pigment production and PGP activities, it would be a fast hassle free indication of plant growth promoting activities in soil.

We herein had made an attempt to study microbial population at various stages of vermicomposting with special emphasis on *Pseudomonas* population. Selected plant growth promoting (PGP) activities like Indole acetic acid (IAA) production and phosphate solubilization of *Pseudomonas* community was studied and also production of various pigment of *Pseudomonas* origin in various stages of vermicomposting by the microbial community was analyzed. It was found that PGP by P-solubilization and IAA production was principally carried out by non-fluorescent *Pseudomonas* as evident from their quantitative taxon specific pigment production.

**Key Words :** Vermicompost, *Pseudomonas*, Pigments, Plant Growth Promotion.

## 1. Introduction

Composting and vermicomposting are two of the best-known processes for the biological stabilization of solid organic wastes. Composting involves the accelerated degradation of organic matter by microorganisms under controlled conditions with simultaneous sanitization of the waste by the elimination of pathogenic microorganisms (Lung *et al.*, 2001). Organic farming systems with the aid of 'Vermiculture Biotechnology' were visioned centuries ago by Sir Charles Darwin calling them as 'friends of farmers'. It is an ecofriendly approach of resolving diverse problems related to safety, security and productivity of food, protection of farmlands and the farmers in an economical way.

Vermicomposting involves the bio-oxidation and stabilization of organic material by the joint action of earthworms and microorganisms. Earthworms [Red Wigglers (*Eisenia foetida* or *Eisenia andrei*) and European nightcrawlers (*Eisenia hortensis*)] act as mechanical blenders and by comminuting the organic matter they modify its physical and chemical status by gradually reducing the ratio of C:N and increasing the surface area exposed to microorganisms – thus making it much more favourable for microbial activity and further decomposition (Dominguez *et al.*, 1997).

Subhankar Barua, Anushree Hait, Rupak Ghosh and Dr. Shilajit Barua

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**Abstract:** Biomineralization involves biologically induced extracellular chemical precipitation of mineral phases. "Silicate" bacteria, one of the mediator of biomineralization, are group of microorganisms that has been reported to removes silicon from low-grade bauxites (containing aluminosilicates, mainly kaolinite as impurities) and feldspar. Fly ash, a byproduct waste of incinerators and thermal power plants is a potential ecological hazard and difficult to dispose. Reports regarding their usage as raw material for ceramic production are widespread. However, a major drawback of this fly ash based ceramic production technology is inability to impart flexibility and plasticity to fly ash based products at green stage (prior to smelting). Silicate bacteria are uniquely characterized by a "mucilaginous phase" during the growth. Mucilagenous extracellular polymeric substance (EPS) produced during active growth of silicate bacteria acts as resins during drying, reportedly increasing the bending property of kaolin or other similar fine clay like substances in ceramic production. We herein had made an attempt to isolate and study such silicate bacteria and analyze parameters that would be beneficial for ceramic production. Isolation was primarily carried out from soil samples overlayed by flyash in area near a thermal power plant, West Bengal. Screening of efficient strains was based on slime production and silicate solubilization from feldspar. Mixed culture with best silicate solubilizer and slime generator was developed and compared with individual strain. Also, growth and activity of both the mixed culture and individual strains were studies in presence of various carbon sources including industrial wastes like whey, molasses and corn steep liquor. This is merely a primary investigation where in it can be considered that Silicon, solubilized out of feldspar is amended with the mucilaginous EPS of silicate bacteria might help in inculcating plastic property in flyash.

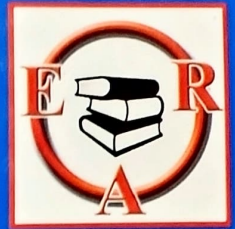
**Keyword :** Ceramic, Fly Ash, Silicate Bacteria, Mucilage.

## Introduction

Biomineralization is defined as a biologically induced process in which an organism creates a local micro-environment with conditions that allow optimal extracellular chemical precipitation of mineral phases (Hamilton, 2003). "Silicate" bacteria are group of microorganisms are able to remove silicon from low-grade bauxites (containing aluminosilicates, mainly kaolinite, as impurities) (Malinovskaya et al., 1990, Zhou et al., 2006) and feldspar (Sheng et al., 2008). Silicate bacteria are uniquely characterized by a "mucilaginous phase" during the growth. Mucilagenous extracellular polymeric substance (EPS) produced during active growth of silicate bacteria acts as resins during drying, thereby increasing the bending property of kaolin in ceramic production (Groudev 2001).

Fly ash, a byproduct waste of incinerators, thermal power plants is a potential ecological hazard and difficult to dispose. Hence, research in relation to utilization of fly ash has been extensively carried out throughout the world. Such problem can be overcome by developing technologies for generating value added products from flyash. Beside, different products that have been developed from fly ash, ceramic are the most useful products, with high market demand for construction and decorative purpose.

Several technologies have been employed for improving the tensile strength of fly ash based ceramic. Often, feldspars are added to improve the quality and tensile strength of ceramic. Silicate solubilizing



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# Isolation and Biochemical Characterisation of Microorganisms from Meat : Study of Antimicrobial Activity and Phytochemical Study of Bromelain

Mainak Deb Mondal and Dr. Sampa Debnath

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**Abstract :** The aim of this study is the assessment of antimicrobial effect of Bromelain on microbial flora of meat. Bromelain is a crude, aqueous extract from the stems and fruits of pineapples (*Ananas comosus*) derived from Bromeliaceae family. Bromelain was extracted from pineapple fruit by homogenizing in cold sodium acetate buffer (pH-4.5) solution. Bromelain has a number of medicinal importances. Antimicrobial activity is one of them. Crude bromelain was estimated by folin-lowry method. Various Phytochemical studies were also done of various compounds which are beneficial for our health. Anti microbial activity of bromelain was studied by determination of MIC and MIC was 400µg/ml. After isolation of microorganism from meat sample, Gram Staining of that microorganism and biochemical tests of that microorganism was performed. Isolated microorganism was Gram negative. In addition effect of bromelain in tissue softening was also observed.

**Key Words:** Meat Microbial flora, Bromelain

## Introduction

Bromelaine is a crude protein extract obtained from pineapple fruit and stem, which comprises a variety of proteolytic enzymes. It is applied for reduction of muscle and tissue inflammation and as an aid in digestion. The important application of bromelaine includes meat tenderization, antimicrobial activity etc.. Bromelain is a general name for a family of sulphhydryl containing; proteolytic enzymes obtained from *Ananas comosus*, the pineapple plant. It can function in the pH range 3 to 9. The effective temperature range is 40-65 °C with the optimum being 50 °C. Bromelain can be activated by calcium chloride, cysteine, bisulfate salt, NaCN, H<sub>2</sub>S, Na<sub>2</sub>S and benzoate. Hg<sup>2+</sup>, Ag<sup>+</sup>, Cu<sup>2+</sup>, α-1-antitrypsin, estatin A and B, idoacetate, inhibits bromelain. First introduced as a therapeutic compound in 1957(R.M. Heincke and W.A. Gortner, 1957), bromelain's actions include: (1) inhibition of platelet aggregation; (2) fibrinolytic activity; (3) anti-inflammatory action; (4) antitumor action; (5) modulation of cytokines and immunity; (6) skin debridement properties; (7) enhanced absorption of other drugs; (8) mucolytic properties; (9) digestive assistance; (10) enhanced wound healing and (11) cardiovascular and circulatory improvement(R. Dubey et al, 2011) etc.

**Materials and Method :** In our study we have focussed on isolation of meat microbial flora and antimicrobial activity of bromelain on meat microbial flora. For this study we have prepared the bromelaine extract.

Preparation of bromelaine extract: Experiment-1: Extraction of Enzyme Bromelain from pineapple and Study of its antimicrobial effect on meat microbial flora:

- **Extraction of Bromelain:** Bromelain is a general name for a family of sulphhydryl containing, proteolytic enzymes obtained from *Ananas comosus*, the pineapple plant.
- **Process:**

Homogenate was prepared by using Chopped Pineapple in Sodium Acetate Buffer (pH: 4.5)

Extracted was filtered by filter paper

The filtrate was centrifuged at 6000 rpm for 10 minutes

Bromelain is being extracted (concentration 1gm/ml)



# Transfer of Education Over Generations in India

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**Abstract :** In this paper we use a nationally representative data set from India to examine one aspect of mobility: that of educational attainment across generations. Specifically, we examine role of father's education on two aspects of child's educational attainment i) years of schooling attained and ii) progression across different schooling levels. We have taken India Human Development Survey data (2011-2012) in this paper and tried to find out the effect of father's education on the educational attainment level of son particularly for different social groups. General Caste(GC), Other Backward Castes(OBC), Scheduled Castes(SC), Scheduled Tribes(ST) in India. Intergenerational transfer takes place in three ways : Persistence (Same level of education between generations) , Downward Mobility (if education level falls from one generation to another) , Upward Mobility (if education level increases from one generation to the other). We focus particularly on upward mobility and persistence because only through these mechanisms human capability formation takes place.

JEL Classification: O12, I21, C31

**Key Words :** Intergeneration, Education, Transfer, Mobility

## Introduction

In most of the growth processes across the world, rapid economic growth has taken place along with increased inequality in outcomes such as income, wealth, and education. One of the main reasons behind this inequality roots from intergenerational persistence in outcomes. Higher the level of persistence in outcomes between generations high will be the inequality problem. In this sense a measure of intergenerational mobility is intrinsically connected to the extent of economic inequality in a society. This issue of intergenerational mobility is very important in the context of India. Among developing countries India stands out in terms of the remarkably low levels of mobility (Gupta, 2004; Munshi and Rosenzweig, 2009). This lack of mobility means that many sections of the society are unable to derive the advantages of the economic growth that the country has experienced over the past few years.

Part of this could be due to the fact that in a society characterized by lack of mobility, the gains from growth accrue disproportionately across the population and in particular some sections of the population like the less advantaged low income group people, are unable to reap the benefits that the growth process in the country has provided. For the benefits of the growth process to be distributed much more equally, the population needs to be mobile. In this paper, we focus on intergenerational mobility in educational attainment. Education plays a major role in the expansion of capabilities. By 'expansion', we mean two aspects of capabilities, although they are mutually related. One is the expansion of a person's capacity or ability. The other is the expansion in opportunities that the person has. Education has a multiplier effect that increases the quality of human resource of an economy for many generations. There is a vast literature that shows that higher education is associated with higher earnings, better health, and other economic outcomes (see Black and Devereux, 2011), rendering a measure of intergenerational mobility based on education a reasonable proxy for mobility in overall economic status.



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# The History and Evolution of Social Media: An Overview

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**Abstract:** Today, social media is a term that everyone knows. Even the most remote areas of the world have at least heard of Facebook and Twitter, and are probably using them on a regular basis. But it wasn't always that way. Rather than fixing a year or a web portal as the point of origin, the formation of World Wide Web and the subsequent increase in instantaneous connectivity of the Internet is regarded as the starting point of social media. The rise of Internet gave the world the power of near-instant communication, which, in the subsequent years, opened up a world of possibilities, and the landscape of social media. Here, we try to trace the roots of where it all began, how it took the eventual course of evolution, and everything that influenced the rise of social media from chat windows with tacky backgrounds to the thriving, connected world that it is today.

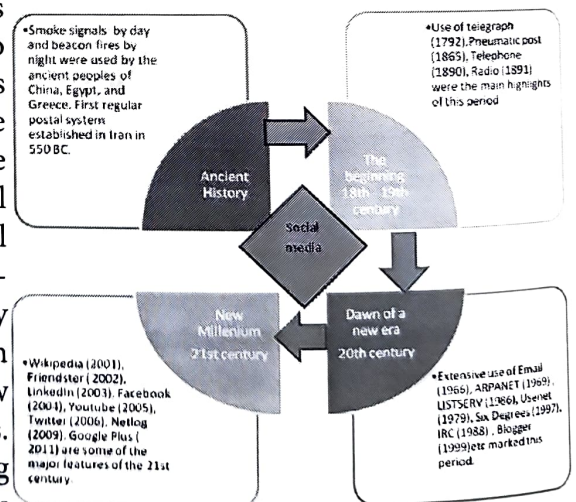
**Key Words :** Social Media, Facebook, Twitter, History of Social Media, Virtual Reality, Future of Social Media, Types of Social Media

## Introduction

Social media is typically defined in Oxford Dictionaries as:-

“Websites and applications that enable users to create and share content or to participate in social networking”

It can be argued that social media is nothing new; in fact it is as old as long distance communication itself. People used to communicate through smoke signals by day and beacon fires by night in ancient China, Egypt, and Greece. Drums were used in many parts of the world to extend the range of the human voice for communication as well. The seeds of social media were sown during 550 BC when the regular postal system was established in Iran where horse riders and horse-drawn wagons carried mail. 1 The 18th and 19th century were breakthrough period where devices like the Telegraph (1792), Telephone (1890) and Radio (1891) ushered in a new era of the sending and receiving messages over long distances. The invention of telephone and radio took the meaning of communication to another level2. The 20th century was marked by the growth and development of internet. With the growth and development of internet, there



came era of exchange of messages from one person to another digitally or via web.

## CompuServe, BBS, Usenet And AOL: The Infant Years

The earliest social media can be traced back to the 1970s, with the likes of CompuServe and Bulletin Board System (BBS).

Compu Serve's 40-year history from 1969 to 2009 spans a vast array of connectivity efforts, from its early use as a support network for an insurance company to its latter days in email and forums3. Admittedly, connectivity was scarce and the technology was limiting. Individuals on CompuServe could only send and

# Staphylococcus Aureus in Milk: A Review

Dr. Gargi Saha Kesh

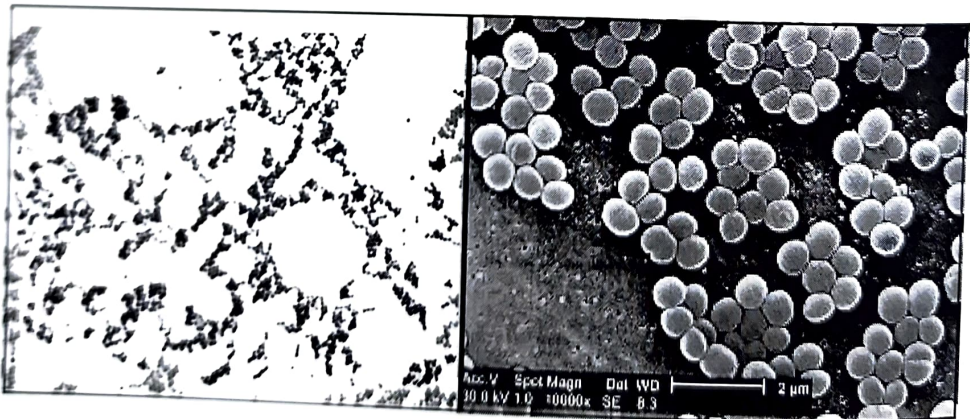
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**Abstract:** Food born diseases are defined by the World health Organization (WHO) as “disease of infectious or toxic nature are caused by, or thought to be caused by the consumption of food and water”. More than 250 food borne diseases have been recorded. Depending upon the infecting microbe, the symptoms vary, though mostly the symptoms are diarrhoea and vomiting. In most countries, food borne diseases are caused by bacteria in more than two third of the cases. *Staphylococcus aureus* causes severe animal diseases, and for humans, this organism is an important cause of food poisoning, pneumonia, postoperative wound infections, and nosocomial bacteremia. Human isolates of *S. aureus*, unlike animal isolates, are frequently resistant to the penicillinase-resistant penicillins. Several cases have been reported where antibiotic resistant and or pathogenic *Staphylococcus aureus* has been detected in milk.

**Key Words :** Food Born Diseases, *Staphylococcus*, Milk.

## Staphylococcus- The Bacteria

Staphylococci (staph) are Gram-positive spherical bacteria that occur in microscopic clusters similar to grapes (*staphylo* means grape in greek). Although more than 20 species of *Staphylococcus* are described in Bergey's Manual (2001), only *Staphylococcus aureus* and *Staphylococcus epidermidis* are noteworthy in their interactions with humans. The genus *Staphylococcus* comprises of several species and subspecies. The genus is largely grouped into two, namely, coagulase-positive and coagulase-negative *Staphylococcus* (CNS). CNS consists of a group of different *Staphylococcus* species that have an effect on diverse host ranges. Staphylococci are facultative anaerobes that grow by aerobic respiration or by fermentation that yields chiefly lactic acid. The bacteria are catalase-positive and oxidase-negative. (Y.L. Loir *et al*) Staphylococci are normal residents of the skin and mucous membranes of animals and humans.



*Staphylococcus aureus* causes severe animal diseases, such as suppurative disease, mastitis, arthritis, and urinary tract infection with the production of numerous virulence factors, such as extracellular toxins and enzyme. For humans, this organism is a significant basis of food poisoning, pneumonia, postoperative wound infections, and nosocomial bacteremia (Takele Beyene *et al*).

## Milk

An outstanding growth medium, milk is used by a great number of micro-organisms, including *S. aureus*. Milk contains excluding exceptions, all the nutrients needed for the growth and development of the new

# Status of Women in Higher Education in 21<sup>st</sup> Century India

Dr. Rajyasri Neogy

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Ms. Shumonika Gangoly

[College Full-Time Teacher (College Management Appointed), Department of Economics,  
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**Abstract :** Education is an art of imparting knowledge to others for betterment of their life and preparing them for achieving their aim, as a profession. Higher education means education beyond the level of secondary education, i.e. education at degree level and above. Indian education system is one of the oldest and largest in the world. But it is a common feature in India that since birth girls are discriminated in subtle and crude ways. But despite this, it is a great advancement that presence of women in colleges and universities are growing. In recent years, India has progressed much in women's education to change the social face of country, although much remains to be done in this regard. This paper attempts to study the status of women in Higher Education in India since the Vedic Period and how it has changed since then to culminate into its current form.

**Key Words :** Women's Higher Education, Empowerment, Women Colleges, Stream-wise Enrolment, Degrees Awarded, Teachers, etc.

## Introduction

It is often argued that education is a powerful tool in the emancipation and empowerment of women. Experts on women's liberation argue for women's education as the basic step in women's equality. Education is a milestone for women empowerment because it enables them to respond to opportunities, to challenge their traditional roles and to change their lives. Education is one of the most important means of empowering women with knowledge, skills and self confidence required to participate fully in the development process. The role of education is not only learning of three R's, ("Reading, Writing, and Arithmetic") but also includes raising awareness and critical analysis of various structures and acquiring knowledge for empowerment at all levels.

Education plays a crucial role in social- economic development of a country through improvement of human resources. Educating women, therefore, occupies top priority among various measures taken to improve the status of women in India. In recent years, the focus has shifted from their traditional roles towards recognizing their worth as producers, making a major contribution to family and national income. Today India's higher education system is the World's third largest education system after U.S and China. But the educational statistics in higher education is not as per expectation.

## Historical Background

Indian mythology is rich with stories of highly educated and evolved women. One can trace the historical evidence of ancient Indian education to the 3rd century B.C. when education was imparted orally and many women scholars were part in it.

In the Vedic period of ancient India, education was open equally to men and women. Many females distinguished themselves not only as Vedic scholar but also as great philosopher, sages and teacher among whom Gargi, Sulabha, Lopamudra, Maitrai, Apala, Vishivavare, Sikata, Ghosha are worth mentioning. There are several references in the epics, smritis and puranas, where women enjoyed an elevated status in society. It is also interesting that girls like boys underwent the upanayana ceremony before entering into the

# Microbial Biodegradation may be A Positive Solution Against The Environmental Disaster Created by Plastic in Future

Dr. Sampa Debnath

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**Abstract :** Plastic is a synthetic polymer. Since last few decades the uncontrolled use of plastics for various purposes such as packaging, transportation, industry and agriculture in rural as well as urban areas, has elevated serious issue of plastic waste disposal and its pollution. The efficient decomposition of plastic bags takes about 1000 years. Plastic causes pollution and global warming not only because of increase in the problem of waste disposal and land filling but also release CO<sub>2</sub> and dioxins due to burning. Commonly used methods for plastic disposal were proved to be inadequate for effective plastic waste management, and hence concern is growing regarding the procedure to overcome the environmental disaster created by plastic. Much interest is generated by the degradation of existing plastics using microorganisms. It seems that biological agents and their metabolic enzymes can be exploited as a potent tool for polymer degradation. This review has covered the areas: (1) the level of polythene pollution; (2) source of polythene degrading microbes; (3) the mechanism of polythene degradation; (4) methods used for the biodegradation of the polythene, (5) discussion of the future aspects of polythene degradation

**Key Words:** Plastic, Synthetic Polymer, Biodegradation

## Introduction

The Level of polythene pollution: Plastic is a synthetic polymer. It consists of carbon, hydrogen, silicon, oxygen, chloride and nitrogen. It is derived from different sources such as oil, coal and natural gas. Plastics are extensively used because of their stability and durability. They are different types such as polyethylene (PE), Poly Ethylene Terephthalate (PET), nylons, Poly-Propylene (PP), Polystyrene (PS), Polyvinyl Chloride (PVC), and Polyurethane (PUR) [1]. Due to the absence of efficient methods for safe disposal of these synthetic polymers, they often end up accumulated in the environment, posing an ever-increasing ecological threat to flora and fauna. Due to the presence of plastics in municipal wastes, many countries do not allow the incineration of these wastes. Instead, plastics are disposed of through open, uncontrolled burning and land-filling. Various health problems can be present as a result of open burning of these wastes which release pollutants into the air. In addition, the burning of Polyvinyl chloride (PVC) plastics produces persistent organic pollutants known as furans and dioxins, and the burning of polyethylene, polyurethane, polyvinyl chloride and polystyrene produces toxic irritant products that lead to immune disorders and lung diseases, and are classified as possible human carcinogens [2]. Plastic can be degraded by a variety of mechanisms such as chemical, thermal, photooxidation and biodegradation, all of which take an extremely long time depending on the molecular weight of polymer, it could take up to 1000 years for some types of plastics to degrade [3]. While some plastics are lucky enough to be recycled, most are sent to landfill, and the rest is left to its own devices, free to roam our environment clogging up streams, rivers, lakes and oceans, polluting forests and soils. This environmental disaster is designated by a term 'white pollution'.

(2) Source of polythene degrading microbes: Microorganisms can also play a vital role in this process, as over 90 genera of bacteria, fungi and various species of bacteria and fungi such as *Bacillus subtilis*, *Aspergillus niger*, *Aspergillus nidulance*, *Aspergillus flavus*, *Aspergillus glaucus*, *Penicillium* species,

# A Study of Child Health Status (Malnutrition) in the localities of Jadavpur, Kolkata

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**Abstract:** India with a population of 1.37 billion stands at the second position as the most populous country in the world after China. India comprises almost 13.1 per cent of child population aged 0-6 years. Children of today are tomorrow's citizens; hence it is very necessary to provide better health care facilities to them. This paper attempts a Study of Child Health Status (Malnutrition). The area of present study is in the localities of Jadavpur, Kolkata.

**Key Words :** Overnutrition, Toxic Food Environment, Lifestyles, Nfhs

## Introduction

As of 2012 an estimated 162 million children under 5 years of age, or 25%, were stunted due to malnutrition. More than 90% of the world's stunted children live in Africa and Asia, where respectively 36% and 56% of children are affected.<sup>(1)</sup> Malnutrition is a condition that results from eating a diet in which nutrients are either not enough or are too much such that the diet causes health problems.<sup>(2)</sup>

It may involve calories, protein, carbohydrates, vitamins or minerals. Lack of enough nutrients is called undernutrition or undernourishment while too much is called overnutrition. Malnutrition is often used to specifically refer to undernutrition where an individual is not getting enough calories, protein, or micronutrients. If undernutrition occurs during pregnancy, or before two years of age, it may result in permanent problems with physical and mental development.<sup>(3)</sup> Undernourishment is most often due to not enough high-quality food being available to eat. This is often related to high food prices and poverty. A lack of breastfeeding may contribute, as may a number of infectious diseases such as: gastroenteritis, pneumonia, malaria, and measles, which increase nutrient requirements.<sup>(4)</sup> In some developing countries, overnutrition, in the form of obesity is beginning to present within the same communities as undernutrition.<sup>(5)</sup>

Overnutrition caused by overeating is also a form of malnutrition. Many parts of the world have access to a surplus of non-nutritious food, in addition to increased sedentary lifestyles. Yale psychologist Kelly Brownell calls this a "toxic food environment" where fat and sugar laden foods have taken precedence over healthy nutritious foods. Not only does obesity occur in developed countries, problems are also occurring in developing countries in areas where income is on the rise. Overeating is also a problem in countries where hunger and poverty persist. Overeating leads to many diseases, such as heart disease and diabetes, that may result in death.<sup>(6)</sup>

Worldwide in 2016, 41 million, or 6 per cent, of children under age 5 were overweight. Eastern Europe and Central Asia had the highest overweight prevalence in 2016 with 12.8 per cent affected, followed by Middle East and North Africa at 10.7 per cent and North America at 7.8 per cent. The lowest overweight prevalence in 2016 was seen in West and Central Africa, at 3.7 per cent, followed by Eastern and Southern Africa at 4.2 per cent. East Asia and the Pacific had the highest number of overweight children in 2016 with 8.6 million affected, followed by South Asia with an estimated 7.4 million overweight. Overall these two Asian regions account for nearly two out of every five overweight children in the world. Eastern Europe and Central Asia is the only region that has seen a statistically significant increase in number of overweight children between 2000 and 2016.<sup>(7)</sup>

With one of the highest rates of child malnutrition in the world, India has won notoriety as one of the nutritional basket cases of the world over the past few years. Although India has witnessed significant progress in its battle against child malnutrition over the past decade, the progress has been quite uneven, and child malnutrition rates still remain high in many parts of the country, data from the latest round of the National Family Health Survey (NFHS) shows.<sup>(8)(11)</sup>



## **A brief survey of the migratory and resident water-birds of Mangalajodi village, Odisha**

**Ipsita Maity, Sudeshna Ghoshal**

Department of Zoology, Vijaygarh Jyotish Ray College, Kolkata, West Bengal, India

### **Abstract**

Wetlands provide a vast variety of faunal diversity among which avian diversity is much important as wetlands offer them a variety of habitats and they occupy these habitats according to their niches. We conducted a study during the winter season in Mangalajodi wetland, which is located in the northern part of Chilika Lake, an important Ramsar site of Orissa, India. During this study, the diversity of the waterbird community was observed in Mangalajodi Wetland and in total, 50 species of water birds belonging to 37 genera and 17 families were recorded. Among them, the families Anatidae and Ardeidae both have recorded the highest observed number of species; as well as the highest percentage of occurrence (16%) in the avian community. The family Scolopacidae has recorded the second highest observed rate of relative abundance (14%); mostly due to the huge abundance of its sole member, the Black-tailed Godwit (*Limosa limosa*). The community consists of 52% Resident; 42% Resident-migrant and 6% Migrant water bird species. In the feeding guild analysis, the Insect and other terrestrial invertebrate feeder (I) and the Aquatic invertebrate feeder (IN) guilds have the most number of recorded avian species. The feeding guild affiliations also point out that the overall community of the wetland site is fairly rich in its composition as it houses bird species belonging to various feeding guilds.

**Keywords:** water-birds, poaching, eco-tourism, Mangalajodi, Odisha

### **Introduction**

Wetlands are complex ecosystems that share the characteristics of both wet and dry environment and can be defined as lands between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water<sup>[1]</sup>. They exhibit enormous floral and faunal diversity and are the most productive life support systems with great ecological importance to mankind, but at the same time, ecologically fragile, liable to degradation and degeneration under the prevailing anthropogenic pressure<sup>[2]</sup>, which in turn affects the biodiversity around them. Among faunal diversities, wetlands can support a congregation of a large number of bird species both migratory and resident<sup>[3,4,5]</sup>. As per Ali and Ripley<sup>[6]</sup>, 273 species of birds in India can be considered as waterfowls; the birds that depend on wetland habitats either throughout or during a certain part of their life preciously for breeding, nesting, and rearing young ones<sup>[7]</sup>.

Besides bird species is one of the crucial components of a wetland in its functions as bio-reserve as well as recreation and ecotourism because bird viewing is now becoming a major component of wildlife tourism activities. Thus, the relationship between wetland and bird species could be said to be bidirectional because the water-bird species provides an array of services to the wetland. These services range from ecosystem balance through insect and rodent population control, seed dispersal, bioindicator of habitat health and so on. Wetlands are also found to play an important role in shaping bird species richness<sup>[8]</sup>.

In recent years, the wetlands in India, as elsewhere, are facing tremendous anthropogenic pressures<sup>[9]</sup>. The wetland which we have surveyed in this study is also no exception. Being a

part of the Chilika lake, one of India's Ramsar sites, this wetland is blooming into a prominent wildlife tourism destination. This blooming tourism industry brings along with it an ever-increasing anthropogenic pressure to the habitat; which can greatly influence the structure of their bird communities<sup>[10]</sup>. By extensively studying the bird community of this region over a timeline, one can sufficiently investigate the adverse effects brought about by such anthropogenic disturbances.

Besides, the avifaunal diversity of a region can be considered as a very prompt indicator of the environmental conditions of the concerned place. Ornithological survey data can be used to indicate the effects of environmental changes on its biodiversity which eventually helps in monitoring biodiversity of the said area and can also be useful in future planning for environmental management.

Keeping all these views in mind, the present study has been undertaken to produce a scientific report on the avifaunal diversity with emphasis on water birds of the Mangalajodi wetland. We chose to study only the bird community since they are identified as indicators of aquatic and terrestrial habitat quality, changes in landscape pattern, composition and function.

There are not many published scientific records regarding the avifaunal diversity of the Mangalajodi wetland<sup>[11]</sup>; although a vast array of works are there for Chilika lake<sup>[12]</sup>. So, our work is aimed at filling in this gap. Besides, this study may also be justified for establishing a baseline data on the water-bird species of this wetland which in turn reveal the composition of the ecological community present in the region and may also help in assessing the effects of wildlife tourism on the bird





श्रद्धावान लभते ज्ञानम्

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# Global Meltdown and its Impact on Select Indian Companies-Pharmaceutical as a Case

Prof. Mitasi Das

## Abstract

The paper is based to study on the impact of global meltdown on the pharmaceutical companies. Though it was a common macroeconomic analysis that India has suffered less for the global financial crisis took place in 2008, still there are industries which depend on the international finance and market has been distinctly affected. Pharmaceutical companies are of that nature. So it will be interesting to study the impact of meltdown on those. The study has been done in two parts. The first one is regarded with the quantitative issues with some financial indicators and the other part deals with the perceptions about the meltdown of the people who are related with the industries. The inferences show that in some aspects the growth is negative in the performance yardstick and the availability of finance was not plausible in that period. The perception of the employees is very poor about the derivatives and modern fund raising techniques. It may create barriers to guard themselves in future from such occasions. The research may be more fruitful if it can be done throughout all major industries and for a long period. As a part of a UGC based minor project the study is done with ten export oriented major pharmaceutical companies for seven years covering the meltdown years. It is relevant to mention here that financial debacle is a repetitive phenomenon and there are several crises already occurred after the meltdown in different countries. It could be a further scope of study to analyse.

## Introduction:

Global meltdown has hit India too. As recorded, the economic activity of the developing nation has declined by 15% and those of the developed nations by almost 23%. So India is safe by (23-15) 8%. After the World War II first time GDP declined by 5% below the usual growth. It was the world financial crisis in the last 80 years where over 5, 00,000 jobs were lost in just three months of 2008 in export oriented sector alone (Pamecha and Sethi, 2011). Lehman Brother (LB) went bankrupt on 13<sup>th</sup> September, 2008, and seeks for protection from American Treasury on 15<sup>th</sup>. At that point of time it was the fourth largest investment bank of the world suffering a profit of \$639 bn. due to wrong policy measures. Founded in 1850 it has been the primary dealer in the US Treasury Security Market when the global recession started. Interestingly, we are not talking about other two banks, those filed for bankruptcy, Merrill Lynch and Goldman Sachs. The Bank of America, the largest bank in the US bought Merrill Lynch in \$46 billion. Today BOA is the biggest bank of the world. Only the mortgage sector creates the disaster in the financial side of the US economy. Loans were given by mortgaging the properties as collateral securities. Mortgage papers are converted to mortgaged back securities, centralised debt obligations (CDOs), after rating it by the agencies like S&P, Fitch and Moodys etc. Those securities are sold to financial institutional investors, banks and pension funds. It was the largest fixed income market in the world worth \$8 trillion. There was no problem initially where

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### SHORT COMMUNICATION

#### REPORT OF THE EARLY WINTER MIGRANTS AND RESIDENT BIRDS IN AN INLAND WETLAND NEAR TUNDI CAMP, BAJANA, GUJARAT

Abhishek Chatterjee, Sudeshna Ghoshal, Soumyajit Chowdhury & Pinakiranjan Chakrabarti

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## REPORT OF THE EARLY WINTER MIGRANTS AND RESIDENT BIRDS IN AN INLAND WETLAND NEAR TUNDI CAMP, BAJANA, GUJARAT

Abhishek Chatterjee<sup>1</sup>, Sudeshna Ghoshal<sup>2</sup>, Soumyajit Chowdhury<sup>3</sup> & Pinakiranjan Chakrabarti<sup>4</sup>

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**Abstract:** The study is based on the avian community observed in the region. In total, 1,079 individuals, 62 genera and 79 species of birds belonging to 35 families have been recorded. Among them, the family Anatidae with 20.42% incidence is the most frequent; immediately followed by the family Phoenicopteridae (10.59% of occurrence). Little Cormorant *Phalacrocorax niger* is the most abundant avian species observed. The community consists of 44% resident; 36% resident-migrant and 20% migrant bird species. It was observed that the concerned community shows a considerable diversity and a correspondingly low value of dominance. In the feeding guild analysis, the insectivore guild has the most number of recorded avian species. The feeding guild affiliations also point out that the overall community is fairly rich in its composition as it houses bird species belonging to various feeding guilds.

**Keywords:** Avifaunal diversity, Gujarat, Tundi camp, water-birds, wetland.

**Abbreviations:** NT - Near Threatened; LC - Least Concern; RM - Resident-Migrant; R - Resident; M - Migrant; FU - Frugivore; N - Nectarivore; P - Piscivore; G - Granivore; I - Insect and other terrestrial invertebrate feeder; PL - Plankton feeder; IN - Aquatic Invertebrate feeder; A - Amphibian feeder; OP - Ophidiivore; RP - Reptile feeder; W - Weedivore; H - Herbivore; C - Carrion feeder; PD - Predatory.

Wetlands are defined as lands transitional between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water (Mitsch & Gosselink 1986). Wetlands are among the most productive ecosystems in the world and play vital role in flood control, aquifer recharge, nutrient absorption and erosion control. In addition, wetlands provide a home for a huge diversity of wildlife such as birds, mammals, fish, frogs, insects and plants (Buckton 2007). Thus wetlands help in maintaining biodiversity of flora and fauna. Wetland supports congregation of large number of migratory and resident species of birds as it has high nutritional value as well as productivity (Whittaker & Likens 1973; Gibbs 1993; Paracuellos 2006). As per Ali & Ripley (1983), 273 species of birds in India can be considered as waterfowls, the birds that depend on the wetland ecosystem. These birds use wetland habitats either throughout or during

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# An Account of the Early-winter Migrant and Resident Birds in a Wetland Habitat of the Indian Wild Ass Sanctuary in the Dasada Taluka, Surendra Nagar, Gujarat

*The Indian Wild Ass Sanctuary, although famous for conserving the endemic Asiatic Wild Ass, is also an Important Bird and Biodiversity Area (IBA site) as it is a wintering and breeding site for many migrant birds. This study aims to record the structural aspects of the regional bird community during early migration season. Authors have surveyed a particular site during November-December months for three consecutive years (2013-2015). A total of 79 bird species belonging to 63 genera and 36 families have been recorded using point count, line transect, night surveys and opportunistic encounters. Among all recorded species, the Lesser Flamingo was most abundant. An increase in species richness is likely to occur later in the migration season upon further arrival of immigrant avifauna. The recorded species abundance distribution of this community is a perfect fit with the log-normal model. This proves an equitable distribution of individuals among different species of this community and also testifies of its high diversity. After studying the feeding guild composition, fourteen different shared feeding guilds were identified, among which the insectivorous guild was most abundant. Through this study, it can be said that this habitat has been well conserved over the years. Extensive surveys in different sites of this sanctuary need to be conducted, to assess the need for revising current conservation protocols.*

**Key words:** Avian diversity; Wetland; Water-birds; Migratory birds; Indian Wild Ass Sanctuary, Gujarat.

## Introduction

Geophysical cycles viz., the diurnal and annual periodicity play a major role in defining the environmental conditions for most living beings on our planet. In order to survive and reproduce, migration has become a common response among birds to the Earth's periodic changes in environmental conditions (Berthold, 1993). The Indian Wild Ass Sanctuary acts as a breeding and wintering ground for many such migratory avifauna. The role of this region in supporting migrant avifauna is so crucial that it has been recognized as an IBA site under the Important Bird and Biodiversity Areas (IBA) Program launched by the Bird Life International organization (Bird Life International, 2018).

The Indian Wild Ass Sanctuary is one of the more popular tourist destinations in the state of Gujarat. The Wild Ass Sanctuary is a vast, flat desert, which gets filled up in many areas during monsoon and attract water-birds of numerous varieties. During good rainfall years, in many low-lying areas, water remains till winter in the form of seasonal wetlands. Vast flocks of ducks and waders are found in the many temporary wetlands for brief periods. The region is inhabited by huge flocks of Lesser and Greater Flamingos, Great White Pelican, Painted Stork, Spoonbill, Northern Shoveler, Pied Avocet and Black-tailed Godwit (Mundkur *et al.*, 1989; Singh *et al.*, 1999).

Being the ideal bio-indicators, the bird community are useful models for studying a variety of environmental problems (Newton, 1995). A basic approach in doing this is to measure diversity through time; as then any species gain or loss could be used to gauge the trends in biodiversity (Van, 1977). The reason for such gain or loss can also be chalked out by

*This article is the first scientific documentation of early-winter avian diversity for the surveyed region of the Indian Wild Ass Sanctuary in the Little Rann of Kutch, Gujarat.*

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## A Critical Historical Study of the Rights of the Girl Child and her Childhood : 1947-1979

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### Abstract

*India has one of the fastest growing youth populations in the world. Girls below 19 years of age comprise one-quarter of India's rapidly growing population. But unfortunately most of the girl children specifically of the rural part of India are out of school and have limited choices available for their future. They are almost trapped in the vicious cycle of illiteracy, early marriage, repeated pregnancy, malnutrition, domestic violence, maltreatment, poverty and so on.*

*Though on the one hand the Government of India has taken several legislative measures relating to issues from female foeticide, practice of child marriage, widow re-marriage to women's right to property etc., which have impacted the Indian family system and society in many ways and on the other hand the twenty-first century witnessed huge changes in the Indian way of life under the influence of modernization, westernization, industrialization, technical advancement, and population mobility across the globe. Still however, the moment a baby is born in India, the first thing that comes to our mind is "boy or girl?" and the issue is beyond just the biological one. Therefore, it seems that gender is one of the most dominant variables that influence human development from conception to death, particularly in Indian society. Apart from class, race, age, religion, and ethnicity, gender is another vital dimension of social stratification, putting the female at a level of discrimination and disadvantage.*

*In this context my paper would use the critical tool of gender to tease out the question of the girl child if only to demonstrate that childhood was defined by the planners and policy makers in India since 1947 in a way that effectively made the girl child the second sex in India. The ground reality, however, was that the girl child, while sharing with the boy child similar forms of discrimination as a child, was additionally discriminated against as a female, thus even within the more universal picture of the violation of the rights of children, girl children constituted a special case.*

*This article would contain a crucial section that would probe the world of anti-colonial nationalism to identify the way in which the upper classes in India, in their reaction to the colonial discourse, perceived the girl child in its nationalist cultural project. The critical discussion of this section is essential because anti-colonial nationalism seems to have deeply determined post-colonial policy-making in India.*

*The overall thrust of this paper would be to examine whether the girl child emerged in policy-making as a rights-bearing entity from the post-independent era right from 1947 onwards or in later phases. Therefore, the girl child would be at the centre of our discussion. The article would try to act as a counterpoise against the silence about the girl's childhood in the male-authored discourse – whether governmental or historical – on childhood, child welfare and child rights.*

**Key words:** Gender, girl child, childhood, child welfare, child rights, discrimination, legislative measures.

This paper uses the critical tool of gender to tease out the question of the girl child to demonstrate that childhood was defined by the planners and policy makers in India during 1947 (The year of India's Independence) to 1979 (International Year of the Child) in a way that effectively made the girl child the second sex. Thus the Indian state's attitude to child welfare during the period from 1947 to 1979 was based, as this paper will show, on the assumption that experience of childhood was shared between the sexes and that the generic use of the term child somehow equally included the girl child. The ground reality, however, was that the girl child, while sharing with the boy child similar forms of discrimination as a child, was additionally discriminated against as a female,

thus even within the more universal picture of the violation of the rights of children, girl children constituted a special case. The Indian nation-state's elision of this special, sex-specific discrimination against the girl child, made its child welfare policies gender-insensitive. If a rights perspective in relation to the child as such did not emerge from within state perspectives and initiatives as late as the 1970s, nor did one relating to special rights of the girl child, as analysed in this article. A consciousness about the plight of the girl child in India did start emerging particularly from the Second Five Year Plan onwards. But, as the subsequent sections will bring out, the perspective was merely welfarist; a rights perspective was as yet largely

## Production of $\alpha$ -amylase by *Aspergillus niger* NCIM 1342 from rice waste water using submerged fermentation technology

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Microorganisms have the ability to secrete enzymes when they are grown in the presence of certain substrates. Amylases are among the most important industrial enzymes and are of great significance in biotechnological studies. Amylases have potential application in a wide number of industrial processes such as food, fermentation, textile, paper, detergent and pharmaceutical industries. Starch is an important storage product of many economically important crops such as rice, wheat, maize, tapioca and potato. In the present study,  $\alpha$ -amylase was produced from rice waste water by *Aspergillus niger* NCIM 1342 using submerged fermentation technology. Utilization of rice waste water as the substrate for amylase production reduces the production cost and disposal problem of organic wastes. Result showed that in submerged condition maximum  $\alpha$ -amylase was produced when only rice waste water and distilled water was used in the ratio 3:1 after 3 days of incubation at 30°C.

**Key words:**  $\alpha$ -amylase, *Aspergillus niger*, submerged fermentation, rice waste water

### INTRODUCTION

Amylases are a group of hydrolases which can specifically cleave glycosidic bonds in starch. There are two important groups of amylases which includes glucoamylase and  $\alpha$ -amylase. Glucoamylase (exo-1,4- $\alpha$ -D-glucan glucohydrolase, E.C. 3.2.1.3) that hydrolyze single glucose units from the non-reducing ends of amylose and amylopectin (Anto *et al.* 2006) and  $\alpha$ -amylases (endo-1, 4- $\alpha$ -D-glucan glucohydrolase, E.C. 3.2.1.1) are extracellular enzymes that can randomly cleave 1, 4- $\alpha$ -D-glucosidic linkages between adjacent glucose units inside the linear amylose chain (Castro *et al.* 2010; Anto *et al.* 2006; Pandey *et al.* 2005). Spectrum of applications of  $\alpha$ -amylase has widened in many sectors such as clinical, medicinal and analytical chemistry. Besides their use in starch saccharification, they also find applications in baking, brewing, detergent, textile, paper and distilling industry (Ramachandran *et al.* 2004).

Industrial enzymes have been produced from plant, animal and microorganisms. The concentration of

enzyme in plant source is generally low but starch processing industries requires large quantities of enzyme. On the other hand if the enzyme is from animal source it is generally obtained from the by-product of meat industry and so its supply is limited. However the  $\alpha$ -amylase from microbial source can be produced in abundant quantities. Amylase has been derived from several fungi, yeasts, bacteria and actinomycetes, however, enzymes from fungal and bacterial sources have dominated applications in industrial sectors. Major advantage of using fungi for the amylase production is the economical bulk production capacity (Shah *et al.* 2014). Many species of *Aspergillus* and *Rhizopus* are used as a fungal source of  $\alpha$ -amylase (Pandey *et al.* 2005). Usually production of amylase from fungi has been carried out using well defined chemical media by submerged fermentation (SmF) and solid state fermentation (SSF) (Miranda *et al.* 1999), although traditionally these have been obtained from submerged cultures because of ease of handling and greater control of environmental factors such as temperature and pH. Due to the increasing demand for this enzyme in various industries, there is enormous interest in developing enzymes with better properties such as raw starch degrading

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## Antimicrobial potential of marine cyanobacteria collected from the West Bengal coastal region of India against multiresistant microorganisms

Prasenjit Das\*

### Abstract

This study focuses on some cyanobacteria collected from the Bakkhali, a coastal town of West Bengal, India. The aim of this study was to investigate the antimicrobial potential of some marine cyanobacteria against some standard microorganisms. The sample extracts were tested against four standard multiresistant bacteria and a fungi such as *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Klebsiella pneumoniae* and *Aspergillus niger*. Cyanobacterial extracts have shown varied levels of antimicrobial properties with *Calothrix sp.* being the most effective as evidenced from MIC and MBC values. These findings are encouraging for further investigation for discovery of new therapeutic agents. Such information may also be of great use in disclosing new sources of already known biologically active compounds.

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### Keywords:

Cyanobacteria;  
Inhibition zone;  
MIC;  
MBC;  
*Calothrix sp.*

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### 1. Introduction

Oceans, seas, coastal backwaters, estuaries, and bays are part of the marine environment. It covers 70.8% of earth's surface and comprises more than 200000 described species of invertebrates and algae [18]. However, it represents only a small percentage of the marine biodiversity [10]. Yet, marine natural products are increasingly receiving attention in the search for new and effective medicinal compounds. Competition for space and nutrients led to the evolution of antimicrobial defence strategies in the aquatic environment. Therefore, aquatic organisms, offer a particularly rich source of potential new drugs [2]. The chemical ecology of marine microbes is vastly unexplored even though microbes produce metabolites that can have significant effects on target organisms [8]. Marine macro-organisms use metabolites from microbial symbionts to deter consumers, subdue prey, and defend their embryos from pathogens [8]. Therefore, a knowledge of the biological activities of marine microorganisms is desirable, not only for the discovery of new therapeutic agents, but because such information may be of value in disclosing new sources of already known biologically active compounds [1].

Marine bioactive compounds, many of which are secondary metabolites, are produced for the purpose of greater survivability or fecundity [11]. Secondary metabolites are adaptive and play a key role in the host's defence against pathogens, parasites, predators, competitors and epibionts [6]. Secondary metabolites as natural products provide greater structural diversity than standard combinatorial chemistry and so they offer major opportunities for finding novel low molecular weight lead structures that are active against a wide range of assay targets [7].

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