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Inorganic Chemistry

A Highly Selective "On-Off-On" Optical Switch for Sequential Detection of Cu^{2+} and S^{2-} Ions Based on 2, 6-Diformyl-4-methyl Phenol and Catecholase Activity by Its Copper Complex

Sankar P. Parua,* Debopam Sinha, and Kajal K. Rajak*[a]

A new highly selective chemosensor for Cu^{2+} and S^{2-} ions, Ethyl 2-cyano-3-(2-hydroxy-5-methyl-3-(p-tolylimino)methyl) phenyl)acrylate) (HL) based on 2, 6-diformyl-4-methylphenol was designed and synthesized. The ligand exhibited excellent sensitivity towards copper ion by the emission quenching even in the presence of other biologically important metal ions. Once HL combine with Cu^{2+} it can display a rapid response and high selectivity toward sulfide anion resulting in off-on sensing *via* Cu^{2+} displacement assay. The signal transduction happen via reversible formation–separation of complex L–Cu and CuS and the complex L–Cu was synthesized by the reaction of HL and Cu^{2+} and characterized by single-crystal X-ray diffraction and DFT optimization studies. The catecholase like activity for L–Cu complex have been studied by using 3,5-di-tertbutylcatechol (3,5-DTBC) as the substrate.

Introduction

The development of selective and sensitive molecular sensor for different species including cations, anions, amino acids, or small neutral molecules of environmental and biological significance is an important research topic for chemists.[1,2] Spedally, the transition metal ions are earned great concern about their toxicity, because they can lead to serious environmental and health problems.[3,4] Off the different transition metal ions, copper is an essential trace element that plays significant role upon environmental, biological and chemical systems.[5] Copper is usually present at low levels in living system but it becomes toxic when the level of Cu^{2+} ions exceeds the cellular requirements. Whereas, excessive accumulation of Cu^{2+} in the neuronal cytoplasm can cause oxidative stress and neurological disorders including Alzheimer's, Parkinson's and Wilson's diseases.[6] Therefore, the selective detection and monitoring of Cu^{2+} ion by simple system is urgently needed. In this regard, several examples of fluorometric as well as colorimetric sensors for copper ion with remarkable changes in their absorption or emission properties have been reported during recent years.[7,8] However, upon binding with Cu^{2+} some sensors undergo fluorescence quenching due to the inherent paramagnetic nature of Cu^{2+} and this issue is generally considered as a defect in fluorescent Cu^{2+} sensing.[9–11] More interestingly, the non-fluorescent Cu^{2+} complex has potential utility in the selective recognition of anion by the displacement approach through the implication of the Cu-complex as secondary molecular sensor.[12,13]

Among different anions, Sulfide ion, as a toxic conventional pollutant, is widely spread in the environment.[14] As one of the biologically and environmentally important anions, Sulfide is usually released as a byproduct from paper, petrochemical and leather industries.[15] In addition, it is also produced in biosystems due to the microbial reduction of sulfate by anaerobic bacteria or formed from the sulfurcontaining amino acids in meat proteins.[16–18] However, continuous exposure to high concentration level sulfide would lead to various physiological and bio-chemical problems. It can irritate the mucous membranes by intake of food or water contaminated with sulfide and even causes suffocation, unconsciousness and respiratory paralysis.[16,19] Once sulfide anion is protonated it becomes even more toxic due to the formation of either HS^- or H_2S.[20] Therefore, sulfide anion detection has become very important for monitoring its toxicity as well as signalling function in biological systems and the exploitation of Cu-complexes in this domain is highly stimulating.[10,12,13]

Literature survey reveals that, although a large quantity of detection strategies have been developed for sulfide anions,[21] such as titration,[22] fluorimetry,[23] chemiluminescence,[24] spectrophotometry,[25] inductively coupled plasma atomic emission spectroscopy,[26] hydride generation atomic fluorescence spectrometry,[27] an electrochemical method,[28] and ion chromatography[29] among these reported detection strategies, fluorimetric probes have superior advantages due to its simple operation and high sensitivity.[30–33] Moreover, the design of fluorescent probes for sulfide anions in aqueous solution is still a challenging task because of their strong propensity for hydration which weakens the interactions of the sensor

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Synthesis and characterization of acrylate cyanide bridged dimeric fac-Rhenium(I) complex: Photophysical, selective CO_2 adsorption and theoretical studies

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ABSTRACT

Reaction of ethyl 2-cyano-3-(2-hydroxy-5-methyl-3-(p-tolylimino)methyl)phenyl)acrylate) (HL) based on 2, 6-diformyl-4-methylphenol with $[Re(CO)_5Cl]$ in toluene afforded a product of composition $[Re_2(CO)_6(L)_2]$. X-ray structure of the representative complex $[Re_2(CO)_6(L)_2]$ was determined to confirm the molecular species unequivocally. The molecular structure of the rhenium complex exhibited distorted octahedral geometry around the Re(I) center, consistent with the d^6 configuration. The complex exhibited excellent photoluminescence behavior in acetonitrile solution. To gain a deeper insight into the ground and excited-state geometries, absorption, and emission properties of the binuclear Re(I) core, complex was further scrutinized by DFT and TDDFT methods. In addition, the synthesized binuclear Re(I) complex was used as a porous material for the selective adsorption of CO_2 gas at low temperature (273 K), as well as at ambient condition (298 K). To the best of our knowledge, this compound is the first Re(I)-based binuclear complex which efficiently adsorbs CO_2 selectively.

1. Introduction

The research on the field of photophysical and photochemical properties of the coordination complexes of transition metals has received an increasing interest since the last few decades due to their potential application in chemical biology and materials chemistry [1–5]. In connection with this different transition metal complexes of heavier metal ions, especially those with d^6 electronic configuration, such as rhenium(I) [6], ruthenium(II) [7], osmium(II) [8], rhodium(III) [9] and iridium(III) [10] were studied by various spectroscopic as well as by the electrochemical techniques. In comparison to the other transition metal complexes with d^6, MLCT system, rhenium(I) complexes of general formula *fac*-$[Re(CO)_3]^+$ were found to show intense luminescence and its origin has been attributed to the triplet metal Re(I) to ligand charge transfer(^{3}MLCT) excited state and/or intra ligand charge-transfer (ILCT) states [11,12].

The Re(I) complexes has wide applications due to their unique characteristics of chemical stability, strong visible absorption, excited state reactivity and catalytic properties. The behavior of such types complexes has received increasing interest to exploit these materials for solar energy conversion, organic light-emitting devices, electron transfer reaction, reduction of CO_2 in a homogeneous solution as well as at the electrode surfaces and in the field of bioimaging [13–23]. Moreover, the photophysical properties of the metal complex can widely be tuned by modification of both the metal center and the ligand structure [24].

In this context the main challenge is to design and synthesis of the chromophoric ligands with suitably donor sites which induce the formation of the stable metal complex with a concomitant increase in their r.t. luminescence lifetime [25]. Pyridine and its derivatives are among the most widely used ligands due to their efficient coordination to transition metals [26] but there are no reports on the studies of rhenium(I) complexes having the *fac*-$[Re(CO)_3]^+$ moiety with bidentate N,O donor Schiff base ligands bearing ethylcyano-vinyl fragment.

Herein, we have reported the synthesis of a hitherto unknown phenyl acrylate cyanide bridged binuclear Re(I) complex using the bidentate (N,O donor) Schiff base ligand, HL [27].

The complex formation has been authenticated on the basis of single crystal X-ray studies and 1HNMR spectroscopy. The

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ORIGINAL ARTICLE

IGF2 is Deregulated During the Development of Uterine Cervical Carcinoma in Indian Patients

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Abstract

Uterine cervical carcinoma (CACX) is one of the leading causes of deaths in Indian women. Chromosomal alterations including 11p15.5 locus were reported in CACX. Consequently, we strived for the first time to understand the molecular status of the candidate gene Insulin-like growth factor 2, *IGF2* (11p15.5) in Indian CACX patients ($n = 128$). DNA copy number (CN) analysis using CGH-SNP analysis showed no genetic alteration and it was further validated by comparison with publicly available CN datasets. But promoter hypo-methylation during the progression of CACX was observed and also found to be concordant with publicly available DNA methylation datasets. Interestingly, we found diverse expression of *IGF2* transcript in both normal cervical epithelium (NCE) and CACX tumors. Similar heterogeneous expression pattern was seen in publicly available expression datasets as well. Finally, protein expression analysis in NCE showed concordance with transcript expression but tumors showed frequent low expression. Log-rank test showed a difference (p-value = 0.057) in overall survival between cases with and without alteration for *IGF2* in Indian CACX patients. Collectively, our study proposes that regulation of *IGF2* expression in NCE appeared to be multifaceted and deregulation during the development of CACX resulted in the differential expression.

Keywords Insulin-like growth factor 2 (IGF2) · Cervical cancer (CACX) · Normal cervical epithelium (NCE) · Gene regulation · Methylation-specific PCR (MSP)

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

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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 [1]. 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 [2], 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 [3, 4, 5]. As per Ali and Ripley [6], 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 [7].

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 [8].

In recent years, the wetlands in India, as elsewhere, are facing tremendous anthropogenic pressures [9]. 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 [10]. 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 [11]; although a vast array of works are there for Chilika lake [12]. 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

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COMMERCE & RELATED AREAS

ECONOMICS & RELATED AREAS

LITERATURE

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 13th September, 2008, and seeks for protection from American Treasury on 15th. 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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OPEN ACCESS

Report of the early winter migrants and resident birds in an inland wetland near Tundi Camp, Bajana, Gujarat

Abhishek Chatterjee [1], Sudeshna Ghoshal [2], Soumyajit Chowdhury [3] & Pinakiranjan Chakrabarti [4]

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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 - Ophidiovore; 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.

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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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

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15. The Red Fort: An Exquisite Theater of India's Struggle for Independence

Dr. Samiparna Rakshit
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India's struggle for independence was undoubtedly a significant event ofmodern Indian history. Starting from the first battle of independence in 1857 till the achievement of freedom, Delhi has been the epicentre of political incidents. The Red Fort, a historic fort in the city of Delhiis intimately connected with the important events of nationalist movements of India. It was the main residence of the emperorsof the Mughal dynasty for nearly 200 years, until 1856.It is located in the centre of Delhi and at present houses a number of museums. In addition to accommodating the emperors and their households, it was the ceremonial and political centre of the Mughal state.

The Red Fort can be considered a vital historical monument associated with the Indian national movement. From the First War of Independence of 1857 to India's achievement of freedom from the British, the Mughal citadel continues to be the centre stage of most of the historical events of nineteenth as well as twentieth centuries. The construction of this fort began under the rule of the Mughal emperor Shah Jahan in 1638 and was completed in 1648. The fort's importance and glory waned with the falling fortunes of the Mughals.

The fort shot into limelight again and became the epicentre of political developments during the Revolt of 1857. It was the residence of the Mughals till the last royal Bahadur Shah Zafar was arrested for his role in the mutiny of 1857. After the revolt was suppressed, the fort was captured by the British East India Company. It later became the headquarters of the British Indian Army. The fort was the scene of important events associated with the Indian freedom struggle. The joint court-martial of officers of Subhash Chandra Bose's Indian National Army – Colonel PremSahgal, ColonelGurubaksh Singh Dhillon and Major General Shah Nawaz Khan – was held at the Red Fort. The trio was defended by the INA Defence Committee which included legal luminaries like Jawaharlal Nehru, Bhulabhai Desai, KailashnathKatju and Asaf Ali. In the

A Critical Historical Study of the Rights of the Girl Child and her Chilhood : 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 unfortunatelymost 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

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Production of α-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, α-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 α-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: α-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 α-amylase. Glucoamylase (exo-1,4-á-D-glucan glucanohydrolase, E.C. 3.2.1.3) that hydrolyze single glucose units from the non-reducing ends of amylase and amylopectin (Anto *et al.* 2006) and α-amylases (endo-1, 4-α-D-glucan glucohydrolase. E.C. 3.2.1.1) are extracellular enzymes that can randomly cleave 1, 4-α-D-glucosidic linkages between adjacent glucose units inside the linear amylase 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 α-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 α-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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Bioremediation of Arsenic by Microbes and Plants-A Review

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Abstract : Arsenic is a toxic metalloid existing everywhere in the nature. It is toxic to most organisms and considered as human carcinogen. Arsenic contamination leads to severe health problems with diseases like damage of skin, lungs, bladder, liver, kidney as well as central nervous system. As arsenic can be found everywhere in nature it may come in contact with food chain very easily through either water or cultivated crops. A number of mitigation attempts including application of fertilizers have been suggested to reduce the toxicity of arsenic in soils, plants and animals. Bioremediation process in this regards is an option that offers the possibility to destroy contaminants using plants and microbes. Amongst the various bioremediation processes, phytoremediation and bioremediation by microbes are quite effective. Phytoremediation includes the removal of contaminants with the help of green plants, while the microbial bioremediation includes the removal of heavy metals by microorganisms (bacteria, fungi, yeast and algae) as sorbets. The aim of this article is to give an overview of the mechanism of removal of arsenic from the contaminated sources by the potent application of plants and microbes.

Key Words: Arsenic, Microbial Bioremediation, Phytoremediation

Introduction

Arsenic contamination in the groundwater has been reported from many countries, with the most severe problems occurring in Asia, namely West Bengal, India [1, 2], Bangladesh [3, 4], China [5, 6], Vietnam [7] and Taiwan [8]. It is now recognized that millions of people from India have been endangered by the prospect of consuming water contaminated with arsenic at levels greater than the guideline value of acceptable level set by the World Health Organization [9] (10 ìg/liter); of which more than 95 % of them live in West Bengal [10]. Adverse health effects of arsenic depend strongly on the dose and duration of exposure. Chronic intake of drinking water with elevated arsenic concentrations can cause the development of arsenicosis, the collective term for diseases caused by chronic exposure to arsenic. It includes several kinds of skin lesions and cancers, like hyperpigmentation, keratosis, gangrene, cancer of different internal organs [11-13]. A number of mitigation attempts including application of fertilizers have been suggested to reduce the toxicity of arsenic in soils, plants and animals [14]. Among various methods, bioremediation of arsenic has the advantages over other technologies due to a number of reasons including cost and environmental safety. However, success of bioremediation depends largely on the adequate knowledge about the appropriate use of the method to be applied to a particular crop or field under consideration. Bioremediation is a natural process which relies on bacteria, fungi, and plants to alter contaminants

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CONTENT

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A Critical Study of the Official Policies on Child Labour in India 1947-1979

Dr. Samiparna Rakshit[1]

ABSTRACT

This article essentially analyses the different constitutional provisions, all the laws and regulations, committee resolutions regarding child labour during the period from 1947(the year of India's Independence) to 1979 (International Year of the Child) to tease out the actual official attitudes of the post-colonial Indian nation-state to the problem of child labour. We have also resorted to critical reading and deconstruction of texts as official policies are largely reflected in the drafts and final texts of the Five Year Plans, other policy documents and the wrings, speeches and comments of ministers, legislators and policy-makers. In order to situate the Plans, policies and official programmes discussed in this article in their appropriate economic and political context, we have also drawn upon the relevant gamut of social-scientific literature. The child labourers were obviously elided by the State's policy makers as they were exposed to successive links in a chain of exploitation. The poorer sections were being systematically exploited because an unequal economic system was pinning the lower classes down to poverty.

Key words: Child labour, exploitation, constitutional provision, laws, parliamentary debates

The term 'child labour' is often defined as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical-mental development. It refers to work that is mentally, physically, socially or morally dangerous and harmful to children, and interferes with their schooling by depriving them of the opportunity to attend school, obliging them to leave school prematurely or requiring them to attempt to combine school attendance with excessively long and heavy work. The statistical figures about child workers in the world have variation because of the differences in defining categories of age group and engagement of children in formal and informal sector.[2]

Despite a number of important constitutional provisions and legislations prohibiting child labour, even today the child labour scenario in India presents an alarming picture. According to the Census 2001 figures there are 1.26 crore working children in the age group of 5-14 as compared to the total child population of 25.2 crore. There are approximately 12 lakhs children working in the hazardous occupations/processes which are covered under the Child Labour (Prohibition & Regulation) Act i.e. 18 occupations and 65 processes. As per survey conducted by National Sample Survey Organisation (NSSO) in 2004-05, the

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