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# Development and validation of novel HPTLC method for the simultaneous estimation of Amlodipine Besylate and Telmisartan in tablet dosage form using ICH Q2 (R1) directions

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## ABSTRACT

A new simple, specific, accurate, precise and robust normal phase high performance thin layer chromatography (HPTLC) method were developed and validated for simultaneous estimation of two antihypertensive drugs Amlodipine Besylate (AMB) and Telmisartan (TEL) in pharmaceutical dosage form. Chromatographic separation of the drugs was performed over aluminium plates precoated with silica gel 60F<sub>254</sub> as the stationary phase and solvent system comprised of chloroform: methanol: formic acid (8:2.5:0.5 v/v/v). Densitometric evaluation of the separated zones was performed at 251 nm. Analytical performance of the suggested HPTLC method was validated according to the ICH guidelines with respect to the linearity, accuracy, precision, detection and quantitation limits, robustness and specificity. The two drugs were satisfactory resolve with  $R_f$  values  $0.57 \pm 0.02$  and  $0.77 \pm 0.02$  for AMB and TEL, respectively. The linearity was studied in the concentration range 100–600  $\mu\text{g/ml}$  for both AMB and TEL with a correlation coefficients ( $r^2$ ) >0.9997 and 0.9999, respectively. Statistical analysis showed that the developed method is repeatable and selective for the estimation of AMB and TEL in its pharmaceutical formulations.

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High performance thin layer chromatography;  
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densitometry

## 1. Introduction

Amlodipine Besylate (AMB), chemically it is 3-ethyl 5-methyl (4RS)-2-[(2-aminoethoxy) methyl]-4-(2-chlorophenyl)-6-methyl-1, 4-dihydropyridine-3, 5-dicarboxylate benzene sulphonate.[1] It is in class of drugs called  $\beta$ -blocker,[2] affect the heart and circulatory system (arteries and veins). It is used to lower blood pressure, lower heart rate, reduce chest pain (angina) and to reduce the risk of recurrent heart attacks.[3]

Telmisartan (TEL), chemically it is 4-[[4-methyl-6-(1-methyl-1H-benzimidazole-2-yl)-2-propyl-1H-benzimidazole-1-yl]methyl]-2-biphenyl carboxylic acid.[4] It is an

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## Original Research Article

## Ecological notes on roosts of *Pteropus Giganteus* (Brunnich, 1782) in eastern Vidarbha, Maharashtra



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### ABSTRACT

The Eastern part Vidarbha in Maharashtra state is sheltered by dense forest vegetation. It is enriched with massive amount of biodiversity of flora and fauna. The populations of *Pteropus giganteus* are found in a choice of places; they play a crucial role as forest pollinators and seed dispersers. As per IUCN (2008) listed as Least Concern. It is listed as vermin in Schedule V of the Indian Wildlife (Protection) Act. This species is listed on Appendix II of CITES meaning it is not currently threatened but could become so if protective measures are not taken. There is no official protection for Indian flying foxes in India. The roosts near the human habitat has found in immense risk of survival in their conventional camps. The present study was intended to recognize an assortment of roosting trees and surrounding ecological conditions of Indian flying foxes .

### KEYWORDS

Ecology | Roosts | Indian Flying Foxes | Threats | Conservation

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Original Research Article

## Identification of Tom Bat Species (*Taphozous Longimanus* Hardwicke, 1825) in the Field Based on their Morphological Characteristics

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### ABSTRACT

Bats are the most diverse and abundant group of small mammals, having great economic & ecological benefits. The specimen (n =1) of *Taphozous longimanus* was captured from an old dilapidated house on 9th June 2016 during a survey at Arjuni/Morgaon town in Gondia District of Maharashtra. External morphological parameters were examined and there after specimen were rescued at the same habitat. Bat is a very important keystone member in the ecosystem, play a vital role in maintaining eco-balance. Bats are threatened because of variety of reasons. Conservation of bats is essential; understanding its vital role in the ecosystem the present study was undertaken .

### KEYWORDS

Morphological Characters | *Taphozous* | Measurements | Identification

### CITATION

Paliwal G.T. and Bhandarkar S.V. (2018): Identification of Tom Bat Species (*Taphozous Longimanus* Hardwicke, 1825) in the Field Based on their Morphological Characteristics. *ESSENCE Int. J. Env. Rehab. Conserv.* IX (1): 182—184.

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## First distribution record of spider fauna (Aracnida: Araneae) in Navegaon National Park (NNTR) Gondia Maharashtra

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### Abstract

The paper presents a study on the diversity of spiders in Navegaon National Park of NNTR Gondia. Navegaon National Park is an important biodiversity conservation area in Gondia district of Maharashtra. Many of the other biological reports are known from this area except on spiders. The study was undertaken as an opportunistic survey for spiders in Navegaon National Park during the period from Jan. 2012 to Dec. 2017. Spider species were observed and identified with the help of standard literature. This study is aimed towards contributing to the biodiversity atlas for further management and development strategies. A total of 20 species belonging to 16 genera and 9 families were recorded from the study area. Among all these 9 families, high diversity was observed in the family Salticidae (6 species) while Sparassidae (3 species), Araneidae (3 species), Nephilidae (2 species), Tetragnathidae (2 species) Lycosidae (1 species) Hersillidae (1 species) Oxyopidae (1 species) Pholcidae (1 species).

**Keywords:** spider, diversity, Navegaon national park, gondia, Maharashtra

### Introduction

Spiders (Phylum: Arthropoda, Class: Arachnida, Order: Araneae) having a body structure composed by cephalothorax and abdomen joined by the thin pedicel, eight walking legs and no antennae and wings on body. There are various species and groups of spiders existing in India. They play a significant role in the regulation of insect and other invertebrate populations in most ecosystems (Wise, 1993; Russell-Smith, 1999; Raghavendra, 2001) [8, 4, 3]. But due to the lack of interest in spiders their study in some important ecosystems has always remained largely ignored. Spiders generally have humidity and temperature preference that limit them to areas within the range of their "physiological tolerances" which make them ideal candidates for land conservation studies (Riechert, Gillespie 1986) [5]. Therefore in the present paper the scientific documentation on spider diversity pattern was recorded for all season which will be helpful for further biodiversity assessment and conservation programme. According to the World Spider Catalogue (2018), 47761 species of spiders belonging to 4101 genera under 118 families are known from the world. A total of 1520 species of spiders as in 377 genera from 60 families are reported from India (Mathew et al., 2009) [2]. The present study was carried out in Navegaon National Park of NNTR, situated in Gondia district, Maharashtra. Navegaon National Park is an important biodiversity conservation area in Gondia district of Maharashtra. Many of the other biological reports

are known from this area except on spiders. This is a first record from this biological important area.

### Material and Method

Navegaon National Park is situated in Gondia district of Maharashtra (20°56'N 80°10'E). It is now recognized as Navegaon-Nagzira Tiger Reserve (NNTR) in 2013. Its 5th Tiger reserve of Maharashtra. It is situated in Gondia and Bhandara Districts in the North-Eastern corner of Maharashtra. Gondia district shares common boundaries with the states of MP and CG on North and Eastern side respectively. It has various type of vegetation ranging from dry mixed forest to moist forest. According classification of forest type, it is 5A/C3 southern tropical dry deciduous forest. In the present study the spiders were found in various places like forest edge, houses, road side bushes, bark of trees, etc. The identification of spiders is done by the standard literature of Tikader (1980) [6], Tikader & Malhotra (1980) [7] and Gajbe (2004) [1]. Spiders were only photographed for identification and no specimens were collected.

### Observation and Result

The following list of spiders was recorded from Navegaon National Park. A total of 20 species (Table-1) belonging to 16 genera and 9 families were recorded from the study area during year 2012-2017.



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## ROTIFER DIVERSITY OF A MANURE ENRICHED EUTROPHIC TROPICAL POND

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### ABSTRACT

Zooplanktons are one among the most important biotic components of any aquatic ecosystem. Their diversity and ecological linkages are considered important for the health and homeostasis of any system. The present work was carried out to have a base line data on the zooplankton biodiversity of a eutrophic freshwater pond situated in Itkheda of Gondia District, Maharashtra.

Zooplanktons were collected on a quarterly basis from two sampling points of the water body. For the study on rotifers, samples were collected using vertical hauling of a net made of 40 µm bolting silk cloth. The specimens were identified using standard procedures. The study revealed 28 species of rotifers belonging to 10 families and 03 orders. The present work will be useful for the preparation of an inventory on rotifers of the region for further monitoring programmes.

Key words: Zooplankton, Rotifer diversity, Eutrophication, Pond ecosystem.

### INTRODUCTION

Due to excessive nutrients, chiefly from nitrogen and phosphorus, eutrophic water bodies are able to support an abundance of aquatic plants. Usually, such systems are dominated by both macrophytes and microphytes. Algae, which are part of microphytes serve as good ecological indicators and have been used extensively for various monitoring purposes (Palmer, 1969). Some weedspecies are also acting as indicators of aquatic pollution. Likewise, many zooplankton species are good indicators of water quality and can be used for the ecological monitoring of water bodies (Reynolds, 1984). They are also considered as indicators of the trophic status of water bodies due to their specific qualitative features and their capacity to reproduce in large numbers under environmental conditions that are favorable to them. (Vollenweider and Frei, 1953). In freshwater pond ecosystems, zooplanktons mainly comprise of protozoans, rotifers, cladocerans, copepods and their larval forms. Rotifers are important groups of zooplanktonic organisms of freshwater ecosystems and their community structure can be used as bio-indicators of water quality. Presumably, the abundance of rotifers is strongly dependent on the trophic status of the water bodies. The biological and ecological adaptations of

rotifers grant them rich species diversity, which is important for the health and homeostasis of aquatic ecosystems. During the last couple of decades, considerable reports are available on rotifers. Studies by Sewell (1934), Ahlstrom (1940), Brehm (1950) and Arora (1962, 1966) are some of them. However their diversity and abundance varies with ecosystems. In this milieu, the present study was committed to identify most common types of freshwater Rotifers in a eutrophic pond ecosystem.

### MATERIALS AND METHODS

#### Study Site

The pond (N20°46'06.8", E80°01'22.9") selected for the present study is a natural one (Fig. 1 & 3), situated in the low lying area in Itkheda (Isapur) village of Arjuni Morgaon Taluka of Gondia District. This pond was primarily used for trapa cultivation and washing purposes. Due to an increase in anthropogenic activities and resultant dumping / runoff of organic waste, the pond has become nutrient enriched and eutrophicated. Zooplanktons were collected quarterly from two sampling points of the water body in the year 2016-17



# Rice husk derived nano-NiFe<sub>2</sub>O<sub>4</sub>@CAGC-catalyzed direct oxidation of toluene to benzyl benzoate under visible LED light



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## ABSTRACT

Here, we report an efficient and highly selective oxidation of primary carbon-hydrogen bond in toluene catalyzed by biomass, rice husk derived chemically activated graphitic carbon supported NiFe<sub>2</sub>O<sub>4</sub> (nano-NiFe<sub>2</sub>O<sub>4</sub>@CAGC) nanomaterial under LED light. The hybrid nanocatalyst showed excellent activity and selectivity towards direct oxidation of toluene to benzyl benzoate. The nano-NiFe<sub>2</sub>O<sub>4</sub>@CAGC has also demonstrated superior catalytic activity compared to its individual components. The catalyst was very robust and stable under the reaction conditions, and was separated from the reaction mixture by an external magnet and reused for subsequent reactions.

## 1. Introduction

Development of sustainable protocols for the selective oxidation of sp<sup>3</sup>(C)-H bond of alkyl aromatics is of significant interest due to the wide range of applications of the products in pharmaceutical, agricultural, and food industries [1]. For example, the simplest member of alkyl aromatics, toluene, can be converted into commercially important products such as benzyl alcohol, benzaldehyde, benzoic acid and benzyl benzoate via oxidation of sp<sup>3</sup>(C)-H. Traditionally, benzaldehyde was produced by chlorination of toluene followed by saponification [2a] or by selective oxidation of benzyl alcohol [2b–g]. Whereas benzoic acid was produced by liquid-phase, cobalt catalyzed oxidation of toluene using molecular oxygen at high temperature in acetic acid [3–9]. However, the low conversion rates achieved by these traditional commercial protocols is a major limitation. Alternatively, oxidation of toluene was achieved by vapour phase technique, but the consequent production of CO<sub>2</sub> and other by-products at high temperature restricted its practical applications [10]. Accordingly, the development of an economic, sustainable and efficient protocols based on the exploitation of heterogeneous catalysts which leads to the reduction of wastes harmful to human health and environment is essential. In this context, various copper and manganese [11–14], cobalt [15], and chromium [16] based heterogeneous catalysts were employed for the selective

oxidation of toluene. Also, Kesavan et al. [17] reported the synthesis of benzyl benzoate by solvent-free oxidation of primary carbon-hydrogen bonds in toluene using Au-Pd alloy nanoparticles (NPs). However, some of these catalysts were toxic, some were expensive and resulted in poor yield of products, and the reactions were performed at elevated temperature (190 °C). Thus, search for novel economic heterogeneous catalysts for the selective oxidation of toluene under milder reaction conditions should be given a proper attention (Scheme 1).

The above mentioned problems can be addressed by employing nanocatalysts which facilitate efficient reactions under milder conditions, owing to their higher activity associated with larger surface areas compared with bulk materials [18,19]. Accordingly, stable and readily available nickel ferrite NPs (nano-NiFe<sub>2</sub>O<sub>4</sub>) were extensively used as supporting materials for active catalysts owing to their added advantage of being easily separable by an external magnet [20].

On the other hand, and most importantly, visible light driven oxidation reactions have emerged as a sustainable and green pathway, where active oxygen species can be generated from the oxidant by irradiation with light under mild and environmentally benign reaction conditions [21]. Also, hybrid carbonaceous materials have demonstrated effectiveness as excellent light harvesting materials for the visible light driven photo-oxidation reactions [22–24]. Recently, the fabrication of chemically activated carbon supported nanocomposites

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## An efficient fabrication of polypropylene hybrid nanocomposites using carbon nanotubes and PET fibrils

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### ABSTRACT

In this particular study, Polypropylene (PP)/Polyethylene terephthalate (PET)-Multiwall carbon nanotubes and microfibrillar reinforced nanocomposites (MFNC-C) have been fabricated via melt mixing-extrusion-cold drawing-compression moulding. The electrical conductivity, static mechanical properties have been discussed. Microfibrillar morphology, synergetic effect on the electrical conductivity, tensile strength, tensile modulus of the MFNC-C and EBNC-C were investigated. Microstructure analysis confirms that selective localisation of MWCNTs and fibrils morphology plays a pivotal role to boost the overall performance of PP.

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### 1. Introduction

In-situ reinforced microfibrillar composite seems to be a tricky polymer-polymer composite from immiscible polymer blends, which is produced by extrusion-cold drawing-thermal processing [1]. In this system, the in-situ generation of reinforcing fibrils of a minor component of the blend is achieved. The minor component of the blend is mechanically stronger than the major matrix component. The minor component should have a higher melting temperature than the major component [2]. These are prerequisites for processing and preserving the fibrils morphology of the minor component of drawn blend and convert it into in-situ reinforced microfibrillar composite during post-processing (thermal processing) [3,4]. The chief benefit of the in-situ reinforced microfibrillar composite is that polymers are reinforced by polymer at micro or nanoscale without the inclusion of micro or nanofillers. Numerous possibilities exist for the processing of MFC based on the nanofil-

lers, wherein draw ratio and blend partners are the most important parameters [5].

Apart from in-situ fibrils reinforcement, nanofillers have also been incorporated into the in-situ reinforced microfibrillar composite to improve electrical and thermal properties. The localisation of nanofillers can alter the thermodynamics, interfacial compatibility and morphology of an in-situ reinforced microfibrillar composite [6]. In a previous study, authors systematically obtained the in-situ reinforced microfibrillar carbon nanotubes/polycarbonate/polyethylene composites via extrusion-hot stretching-quenching process, wherein the CNTs were distributed and dispersed in the polycarbonate microfibrils. Owing to the effect of the shear flow and hot drawing, the polycarbonate/CNT was converted into aligned conductive fibrils in the PE matrix; the prepared nanocomposite exhibited anisotropic conductivity in the drawing direction [7]. Conductive carbon black was fed into (polyethylene terephthalate)/polyethylene in-situ reinforced microfibrillar composite. The localisation of CB particles was observed on the surfaces of the PET microfibrils. The percolation threshold was triggered at 3.8 vol% carbon black [8,9]. In-situ fibrillated polytetrafluoroethylene (PTFE) was formed in thermoplastic polyurethane (TPU) followed by probing into its rheological and mechanical characteristics. Dynamic mechanical analysis (DMA)

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## Ni-doped ZnO nanocrystalline material for electrocatalytic oxygen reduction reaction

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### ABSTRACT

Less expensive catalyst is highly required for the ORR half-cell reactions in the fuel cell. From now, the progress of the less expensive, active, potential ORR catalysts are much needed for the fuel cell technology compared to expensive, less abundant Pt based materials. In our investigation, less expensive and easily abundant nickel (Ni) have been doped into the nanocrystalline ZnO architecture were synthesized for the use in ORR as electrocatalyst. Influence of nickel doping into nanocrystalline ZnO nanomaterials were investigated by Raman, Photoluminescence, FTIR spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM). XRD results proved that, the material is pure crystalline after and before doping. In our synthesized procedure, there is no significant changes in the morphology after Ni doped ZnO. The PL results also supported the integration of Ni into zinc oxide (ZnO) nanoscale material, increasing the vacancy of the synthesized ZnO nanostructured materials. After successful formation of the Ni doped ZnO and without doped ZnO has shown the heightened electrocatalytic bustle. Nanostructured Ni doped ZnO has shown significant ORR activity in alkaline solution (0.1 M KOH). The enriched movement of the Ni doped ZnO indicates that the synthesized materials in our process can be utilised as the cheap and effective electrocatalyst in the ORR fuel cell reactions.

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### 1. Introduction

Due to the minimization of the fossil fuel as the prime energy resources, along with their environment related issues have been arisen in last few years [1–4]. Owing to that, alternative energy resources like photochemical, electrochemical water splitting and fuel cells based technologies have been drawn a remarkable attention in last few years [5–12]. In which, fuel cell based, oxygen reduction reaction (ORR) is playing a significant role for the advanced energy conversions [13,14]. In general, the ORR reaction have been taken place in the cathode part of the fuel cell [15–17]. It is very noteworthy to note down that, the ORR reaction is six time

sluggish compared to the anodic reaction of the cell. Owing to this, it is needed to intercede with the using of efficient less expensive catalyst at nano level [14–16]. It is well known that, platinum (Pt) was used as best cathode catalyst for the ORR reaction in last few years [18,19]. Though, these type of catalyst (Pt based) are very expensive and less abundant. Because of the reduced kinetics of the ORR reactions it is also needed the high loaded of catalyst [20–23]. As a consequence of the use of expensive and less abundant metal based catalyst turn into the fuel cell technology as a critical for further commercialization at ground level [11,13,17,18,22]. From this time, the precious metal free catalyst at nano level with less expensive, abundant transition metals have been widely used now a days. But, still it is needed more progress for further improvement at atomic level for better results [11,15,16,18,19,21]. So, for that less expensive ORR catalyst with very high catalytic commotion is an impressive contest. Table 1.

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## Facile protocol for the synthesis of benzothiazole, benzoxazole and N-benzimidazole derivatives using rice husk derived chemically activated carbon

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### ABSTRACT

Here, we have demonstrated rice husk derived chemically activated carbon catalyzed synthesis of benzothiazole, benzoxazole and N-benzimidazole derivatives at room temperature in aqueous ethanol by the condensation of 2-aminothiophenol, 2-amino phenol and ortho-phenylene diamine with aromatic aldehydes respectively. The activated carbon showed excellent catalytic activity and furnished superior to excellent yields of desired products (95–98%). The catalyst was separated from reaction combination by simply filtration, washed with ethanol, dried and recycled able to at least eight runs.

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### 1. Introduction

Bioactive benzothiazole, benzoxazole and N-benzimidazole derivatives are naturally occurring products that can be used in the synthesis medicinally important molecules [1,2]. Structurally different thiazoles and oxazoles have demonstrated several medicinal activities as anti-tubercular, analgesic, anticancer, antihypertensive, anti-HIV, antiulcer and antithrombotic agents [3–6]. On the other hand, N-benzimidazole derivatives exhibited potential for a wide range of applications in the medical field, including but not limited to, treatment of Parkinson disease [7], inhibition of HIV-1 reverse transcriptase [8], topoisomerase-I inhibition and cytotoxicity [9]. Accordingly, these compounds have attracted the attention of researchers worldwide [10–12]. Derivatives of N-benzimidazole were synthesized by coupling of o-phenylenediamines with carboxylic acids [13], whereas the

condensation of o-phenylenediamine with aldehydes was widely used as an alternative protocol [14]. The compatibility of the latter approach with a wide variety of substituted aldehydes made it of special importance, and thus became more accepted in the scientific community for the direct synthesis of benzimidazole motifs. This opens the doors for the design of environmentally benign protocols for production of medicinally important compounds [15–16]. However, this design should be concerned with a sustainable development process involving reduction of energy consumption in a simple one pot reaction, avoiding toxic solvents, using recyclable catalysts, decreasing reaction time, employing mild condition, obtaining high purity of the target compound, and minimization of waste [17–21]. Accordingly, the use of water instead of other organic solvents is advantageous, being safe, environmentally friendly, freely available and easy to handle [22–27]. In comparison, the traditional acid catalysts such as H<sub>2</sub>SO<sub>4</sub>, HCl, H<sub>3</sub>PO<sub>4</sub>, HF etc., despite their high catalytic activity, are corrosive, toxic and difficult to recover and separate from products [28–29]. Thus, the development of a general and green protocol with mild and environment-friendly conditions for synthesis of medicinally

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# Biomass rice husk derived activated carbon catalyzed synthesis of 5-aryl-1,2,4-triazolidine-3-thione derivatives under metal-free aqueous medium

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## ABSTRACT

Here, we have demonstrated a green and efficient protocol for the synthesis of biologically important 5-aryl-1,2,4-triazolidine-3-thione derivatives in excellent yields (92–98%) *via* two components reactions of aryl aldehydes and thiosemicarbazide at room temperature using biodegradable rice husk derived chemically activated carbon as reusable catalyst under metal and other catalyst-free reaction conditions.

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## 1. Introduction

Over decades, one-pot multicomponent reactions (MCRs) have been used extensively in developing of biologically active organic scaffolds [1,2]. The versatility and diversity of these processes in synthesizing various bioactive heterocyclic makes one-pot MCR as one of the promising tool in organic synthesis and drug discovery [3,4]. Thus, development of environmentally benign one-pot MCRs is still in demand. In this connection, it can be facilitate by selecting a suitable catalyst and solvent to maintain the green aspects.

On the other hand, naturally occurring as well as synthetic nitrogen-containing heterocyclic molecules are attractive due their diverse applications [5]. Among others, triazole is an important class of heterocycles which found wide pharmaceuticals, agro chemicals and other applications [6]. These molecules have also exhibited several biological activities [7–14]. Again 1,2,4-triazolidine-3-thione derivatives is also reported as biologically important scaffolds. Thus, development of easy and eco-friendly protocols for the synthesis of triazoles in particular, 5-aryl-1,2,4-

triazolidine-3-thione derivatives is essential. Literature study reveals that 5-aryl-1,2,4-triazolidine-3-thiones have been synthesized *via* two component reactions of aldehydes and thiosemicarbazide using various catalysts [15–23]. However, most the methods have used acidic catalyst such as [C<sub>16</sub>MPy]AlCl<sub>3</sub>Br [15], sulfamic acid [16], PEG-400 [17], glycine nitrate [18], [2-HMPyBSA]HSO<sub>4</sub> [19], [(Py)<sub>2</sub>SO][HSO<sub>4</sub>]<sub>2</sub> [20], malononitrile [21], Sm<sub>2</sub>O<sub>3</sub>/Fluoroapatite [22] and CuO NPs [23] etc. Thus, introduction of a mild, efficient, reusable and inexpensive catalyst for the synthesis of 5-aryl-1,2,4-triazolidine-3-thiones is highly appreciated.

Rice mills usually generate huge amount of rice-husk as waste materials. These waste biomass feedstock are composed of carbon and silica as a major component [24]. Surprisingly, till date, catalytic activity of rice husk materials has not been investigated in depth. As a part of our interest in the development of green synthetic methodologies [21,25–36], herein, we report biodegradable rice husk derived activated carbon (RHAC) as metal-free reusable catalyst for the synthesis of 5-aryl-1,2,4-triazolidine-3-thione derivatives *via* two-component reaction of aldehydes and thiosemicarbazide (Scheme 1).

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## REVIEW ARTICLE

**Metal/Metal Oxide Nanoparticles: Toxicity, Applications, and Future Prospects**

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**Abstract:** The ever-growing resistance of pathogens to antibiotics and crop disease due to pest has triggered severe health concerns in recent years. Consequently, there is a need of powerful and protective materials for the eradication of diseases. Metal/metal oxide nanoparticles (M/MO NPs) are powerful agents due to their therapeutic effects in microbial infections. In this context, the present review article discusses the toxicity, fate, effects and applications of M/MO NPs. This review starts with an introduction, followed by toxicity aspects, antibacterial and testing methods and mechanism. In addition, discussion on the impact of different M/MO NPs and their characteristics such as size, shape, particle dissolution on their induced toxicity on food and plants, as well as applications in pesticides. Finally, prospective on current and future issues are presented.

**Keywords:** Metal oxide nanoparticles, toxicity, microbial assay, callus poisoning, pest control, plant biotechnology.

**1. INTRODUCTION**

Nanotechnology is a revolutionary technique that can resolve major problems faced by humans worldwide [1]. Novel applications of nanotechnology in energy generation, conversion and storage, optics, microelectronics, mechanical, and ceramics engineering are increasing day-by-day. Currently, metal/metal oxide nanoparticles (M/MO NPs) are gaining substantial attention in diverse fields of solid-state chemistry, owing to their unique physico-chemical properties [2, 3]. Nanomaterials (NMs) are being fabricated purposefully using numerous techniques, which exposed to the atmosphere with no safety measurement. Nanotoxicology is the study of NMs' toxicity, which is impacted by the NMs' small particle size, very large surface/volume ratio, as well as their ability to diffuse freely as compared to the bulky particles.

Several approaches, including chemical, thermal, physical and chemical vapored position, precipitation photo-deposition, sputtering, and pulsed electro-deposition, are used for the synthesis of M/MO NPs [4-9]. Various NPs are being already used in commercial applications, including food and agriculture, but they accumulate intracellularly and face difficulty in eliminating from living organisms and because of their toxicity, they could impact the ecosystem [10-13]. Therefore, the present review starts with an analysis of the noxious impacts of NPs on the environment and their contributions to cellular damage. The exposure to NPs through food and its impact are discussed. Applications of M and MO NPs on

agriculture are a growing field of research; the effect of different M and MO NPs on plants is analyzed. Further applications of M/MO NPs in pesticides are comprehensively discussed. Finally, conclusions and prospective on applications and impact of M/MO NPs are presented.

**2. TOXICITY ASPECTS**

M/MO NPs are heterogeneous in nature and their impact on living being rests on their size and shape other than the chemical behaviour of specific metal ion used [11]. Metals having a high dissolution rate are considered highly toxic, while other characteristics such as composition, concentration, morphology, particle dimensions, chemical reactivity, agglomeration, and dispersal directly affect their behaviour and interactions with surroundings [8]. Moreover, NPs liberated ionic species is among the main sponsors to noxiousness.

Moreover, surface charges dictate the interactions between NPs and cellular components. Aggregation helps particles to bond *via* the weak interactive forces and they are predominantly reliant on the charge, concentration and ingredients of the nearby environment. Agglomeration disturbs the bio-distribution plus interactions of NPs, when exposed to the cells. Agglomeration can be analysed by means of laser diffraction technique by measuring the *Brownian motion* in suspension and applying the *Stokes-Einstein* equation [12, 13]. The surface area and chemical composition of NPs are measured by *Brunauer-Emmett-Teller* (BET) adsorption-desorption behaviour under nitrogen. As the particle size declines, the relative surface area per unit mass inclines and as a consequence, the fraction of active atoms, those on the surface, increases, which can enhance toxic reactions [14]. Stable accumulation of NPs can remain energetic for a long time in the body. However, degradable NPs cause severe effects by releasing reactive oxygen species (ROS).

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# Mesoporous PbO nanoparticle-catalyzed synthesis of arylbenzodioxy xanthenedione scaffolds under solvent-free conditions in a ball mill†

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A protocol for the efficient synthesis of arylbenzodioxy xanthenedione scaffolds was developed via a one-pot multi-component reaction of aromatic aldehydes, 2-hydroxy-1,4-naphthoquinone, and 3,4-methylenedioxy phenol using mesoporous PbO nanoparticles (NPs) as a catalyst under ball milling conditions. The synthesis protocol offers outstanding advantages, including short reaction time (60 min), excellent yields of the products (92–97%), solvent-free conditions, use of mild and reusable PbO NPs as a catalyst, simple purification of the products by recrystallization, and finally, the use of a green process of dry ball milling.

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Recently, the ball milling technique has received great attention as an environmentally benign strategy in the context of green organic synthesis.<sup>1a</sup> The process of “ball milling” has been developed by adding mechanical grinding to the mixer or shaker mills. The ball milling generates a mechanochemical energy, which promotes the rupture and formation of the chemical bonds in organic transformations.<sup>1b</sup> Subsequently, detailed literature<sup>1c</sup> and books on this novel matter have been published.<sup>2a,b</sup> Several typical examples include carbon–carbon and carbon–heteroatom bond formation,<sup>2c</sup> organocatalytic reactions,<sup>2d</sup> oxidation by using solid oxidants,<sup>2e</sup> dehydrogenative coupling, asymmetric, and peptide or polymeric material synthesis, which have been reported under ball milling conditions.<sup>2e</sup> Hence, the organic reactions using ball milling activation carried out under neat reaction environments, exhibit major advantages,<sup>2f</sup> including short reaction time, lower energy consumption, quantitatively high yields and superior safety with the prospective for more improvement than the additional solvent-free conditions and clear-cut work-up.<sup>3–5</sup>

On the other hand, the organic transformations using metal and metal oxide nanoparticles<sup>6</sup> are attracting enormous interest

due to the unique and interesting properties of the NPs.<sup>7,8,9a</sup> Particularly, PbO NPs<sup>9b</sup> provide higher selectivity in some organic reactions<sup>9c</sup> and find applications in various organic reactions, like Paal–Knorr reaction,<sup>10</sup> synthesis of diethyl carbonate,<sup>11</sup> phthalazinediones,<sup>12</sup> disproportionation of methyl phenyl carbonate to synthesize diphenyl carbonate,<sup>13</sup> the capping agent in organic synthesis, and selective conversion of methanol to propylene.<sup>14</sup> In addition, the PbO NPs are also used in many industrial materials.<sup>15,16</sup>

However, till date, PbO NPs have not been explored in MCRs leading to biologically important scaffolds. Among others, the xanthene scaffolds<sup>17</sup> are one of the important heterocyclic compounds<sup>18</sup> and are extensively used as dyes, fluorescent ingredients for visual imaging of the bio-molecules, and in optical device technology because of their valuable chemical properties.<sup>19</sup> The xanthene molecules have conjointly been expressed for their antibacterial activity,<sup>20</sup> photodynamic medical care, anti-inflammatory drug impact, and antiviral activity. Because of their various applications, the synthesis of these compounds has received a great deal of attention.<sup>21</sup> Similarly, vitamin K nucleus<sup>22,23</sup> shows a broad spectrum of biological properties, like anti-inflammatory, antiviral, anti-proliferative, antifungal, antibiotic, and antipyretic.<sup>24a</sup> As a consequence, a variety of strategies<sup>24b</sup> have been demonstrated in the literature for the synthesis of xanthenes and their keto derivatives, like rhodomlyrtosone-B,<sup>25a</sup> rhodomlyrtosone-I,<sup>25b</sup> and BF-6<sup>25c</sup> as well as their connected bioactive moieties. Few biologically active xanthene scaffolds are shown in (Fig. 1).

Due to the significance of these compounds, the synthesis of xanthenes and their keto derivatives using green protocols is highly desirable. Reported studies reveal that these scaffolds are synthesized by three-component condensations using *p*-TSA<sup>26</sup>

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# Sulfamic acid promoted one-pot multicomponent reaction: a facile synthesis of 4-oxo-tetrahydroindoles under ball milling conditions†

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We report an efficient and facile one-pot synthesis of 4-oxo-tetrahydroindoles using sulfamic acid under ball milling conditions. The present protocol for preparation of biologically important 4-oxo-tetrahydroindoles offers several advantages such as mild reaction conditions, improved selectivity and higher isolated yields. Moreover, solvent-free reaction conditions and the use of ball milling make the present protocol environmentally friendly in nature.

## Introduction

Ball milling is a mechanochemical procedure that is mainly used to grind minerals and prepare and modify inorganic compounds.<sup>1a</sup> Nowadays, its application in synthetic organic chemistry has become an emerging field of research. Examples of the recent applications of ball milling in organic synthesis<sup>1b</sup> include C–C bond forming reactions, metal-catalyzed C–N, C–C and C–F bond development,<sup>1c,d</sup> organo-catalyzed C–C bond formation,<sup>1e</sup> cycloaddition reactions,<sup>1f</sup> synthesis of heterocycles,<sup>1g</sup> protecting group chemistry,<sup>1h</sup> redox processes,<sup>1i</sup> reactions with fullerenes and bromination reactions.<sup>1j</sup> Compared to conventional solution phase reactions, ball milling conditions commonly yield increased selectivity and reactivity, and thus there should be further exploration of applications of ball milling in organic synthesis.<sup>1k</sup>

On the other hand, multicomponent reactions (MCRs)<sup>2a</sup> provide attractive synthetic approach in the fields of organic and medicinal chemistry<sup>2b</sup> due to their higher atom economy, structural variability, selective bond formation ability and

simplicity to perform relative to the conventional multistep reactions.<sup>2c</sup> Further, the MCR is performed in a single step which does not require isolation of the intermediates, leading to a favourable reduction of the reaction time and energy. Additionally, solvent-free reaction is a promising approach in organic synthesis it does not produce unwanted solvent waste.<sup>2d</sup> Conventionally, solvent-free reactions have been performed *via* a mortar and pestle, but recently high-energy ball milling (HEBM) was realized as a more attractive alternative. Although ball milling is a technique that works according to the same principles as traditional mortar and pestle, its mechanical energy is usually high enough to facilitate a chemical reaction.<sup>2e</sup> Many reports have demonstrated the effectiveness of HEBM for organic transformations and development of environmentally benign synthetic processes.<sup>2f</sup> Due to the aforementioned advantages, MCRs found numerous applications<sup>2g</sup> in the synthesis of drugs and new biologically important active organic scaffolds.<sup>2h</sup>

Heterocyclic motifs are critical in drug discovery because of their vast array of applications in the agrochemicals, pharmaceuticals and veterinary fields.<sup>3a</sup> Among others, tetrahydroindole<sup>3b</sup> and indole related moieties<sup>3c</sup> impart distinct and interesting structural features with various biological characteristics such as progesterone receptor agonist,<sup>3d</sup> inhibitor at vanilloid receptor-1, MDM2-p53 interaction inhibitor,<sup>3e</sup> anti-malarial, antituberculous,<sup>3f</sup> CR TH<sub>2</sub> receptor antagonist and Satavaptan. Representative bioactive molecular structures are provided in (Fig. 1).

Because of these important applications of heterocyclic compounds, different synthetic methods were developed for their production.<sup>4a–d</sup> However, most the methods are metal catalysed<sup>4e</sup> and have several limitations such as harsh reaction conditions, employment of toxic and expensive metals as catalysts, longer reaction time, non-reusability of catalysts *etc.*<sup>4f,g</sup> The dimedone reacts with  $\alpha$ -chloroacetaldehyde in sodium

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## Synthesis, QSAR modeling and antimicrobial studies of 1-(4-phenyl) substituted tetrahydro isoquinoline derivatives

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### ABSTRACT

Quantitative structure activity relationship (QSAR) studies were performed to explore the biological efficacy of few tetrahydroisoquinoline derivatives. Using eight descriptors, training set was developed through QSAR modeling and activities were predicted through the developed QSAR model. To validate the model, the predicted activities were compared with experimental activities. Significant correlation was observed between the hydrophobicity (cLogP), Rotatable bond count (RBC), Molecular shape index and activity. The models developed can be used for drug designing of isoquinoline based scaffold molecules as antibacterial and antifungal agents.

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### 1. Introduction

It is reported that a single successful drug molecule development takes nearly 14–16 years of research and clinical trial. It involves tremendous cost. It is expected to be more than 800 million dollars for one single molecule. The answer to this problem lies in QSAR [1]. The QSAR signifies computerized statistical method which correlates the activity of the compound with changes in the structure. Compounds which have similar structures to a pharmacologically active drug are often themselves biologically active. QSAR gives the magnitude of relationship of various structural properties with the biological activity. The essence of Quantitative Structure Property Relationship (QSPR)/ Quantitative Structure Activity Relationship (QSAR) studies is to find a mathematical relationship between the activity and property under investigation, often termed as ‘descriptors’ [2]. Descriptors can themselves be experimental properties of the molecule, which can be derived mathematically from either the 2D or the 3D molecular structure from various programmes such as ChemDraw Ultra 8.0. These structurally related activities are commonly referred to as structure-active relationship (SAR) [3–5]. These descriptors are

then used to develop a QSAR models or equations based on the biological activities of known compounds which are generally called as training set. Compounds with unknown biological activities i.e. test set are then subjected to the derived QSAR model and their biological activities are predicted by equations. These predicted activities are then compared with the experimental activities to validate the derived model. The mathematical and statistical analysis of QSAR data finally helps to reduce the number of molecules with the potent biological activity. Agrawal et al. [6–9] have reported QSAR studies on different organic drug compounds. QSAR studies on isoquinoline and tetrahydroisoquinoline studied for their cytotoxic [10–11], antitumor [12–15] and neural activities [16–17] have been reported in the literature. Carrupt et al. [18–19] have studied the correlation of lipophilicity with neurotoxin activity. Exhaustive antimicrobial studies of against bacteria and fungi under study has been reported by Gharpure et al. [20–22]. Quinoline derivatives have also been studied for similar correlation activities [23–25]. Recent work has revealed the antibacterial activity of the tetrahydroisoquinoline derivatives [26]. In the present study, we have tried to develop novel model for prediction of the antibacterial and antifungal activities of the tetrahydroisoquinoline derivatives. This will prove important in designing new QSAR model to design potential antimicrobial drug entities. The models will reduce the time and expenditure in the process of drug development.

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## ICT ENABLED TEACHING: FUTURE OF TEACHING LEARNING PROCESS

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**Abstract:** ICT means Information and Communication Technologies. ICT which is now broadly used in educational world, ITC is a “scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters” (UNESCO, 2002)<sup>[1]</sup>. In modern science and technological era, education demands apt knowledge of teacher about ICT and knowhow to use ICT in teaching-learning process. So, development and increase of skills and competencies of teacher requires knowledge of ICT and Science & Technology. ICTs are changing schools and classrooms based on real world problems, providing tools for enhancing learning, projects, providing teachers and students more facilities for feedback. ICT also helps teachers, students and parents to converge. Continuous and Comprehensive Evaluation i.e. CCE helps teachers and learners to use technology for making teaching learning more attractive and effective. This article discusses the futuristic methods of ICT enabled learning process.

**Keywords:** ICT, Teaching-learning process, teacher training.

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### 1. Introduction :

**Background :** ICT can be used as a research tool, problem-solving, creative and teaching and learning tool Akbulut et al.,<sup>[2]</sup>. ICTs have the potential to enhance teaching and learning through: enriching the course, improving delivery, extending methods of presenting information and offering new opportunities through the techniques that ICT makes possible Becta ICT Research,<sup>[3]</sup>.

**Problem :** That most universities and institutions of higher education have computers. However, number of systems generally are few therefore, students generally find it difficult



## Some Eco-friendly Biolubricants

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### Abstract:

In this study efforts were made to synthesized biolubricants using crude mahua oil and karanja oil by esterification-trans-esterification and processed through trimethyopropane route to form biolubricants. Based on density, viscosity, viscosity index, pour point, flash point and acid value synthesized biolubricant better than commercial lubricant. Effect of selected biolubricants and commercial lubricants has been studied on blood of *Clarias gyriepinus* by analyzing blood samples for biochemical study. Study reveals prominent variation in titer of cholesterol and triglycerides of blood of *Clarias gyriepinus* tested with commercial lubricant than biolubricant. This shows biolubricant are less harmful to fish than commercial lubricant. The proposed compositions can be easily prepared and eco-friendly.





## First distribution record of spider fauna (Aracnida: Araneae) in Navegaon National Park (NNTR) Gondia Maharashtra

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### Abstract

The paper presents a study on the diversity of spiders in Navegaon National Park of NNTR Gondia. Navegaon National Park is an important biodiversity conservation area in Gondia district of Maharashtra. Many of the other biological reports are known from this area except on spiders. The study was undertaken as an opportunistic survey for spiders in Navegaon National Park during the period from Jan. 2012 to Dec. 2017. Spider species were observed and identified with the help of standard literature. This study is aimed towards contributing to the biodiversity atlas for further management and development strategies. A total of 20 species belonging to 16 genera and 9 families were recorded from the study area. Among all these 9 families, high diversity was observed in the family Salticidae (6 species) while Sparassidae (3 species), Araneidae (3 species), Nephilidae (2 species), Tetragnathidae (2 species) Lycosidae (1 species) Hersillidae (1 species) Oxyopidae (1 species) Pholcidae (1 species).

**Keywords:** spider, diversity, Navegaon national park, gondia, Maharashtra

### Introduction

Spiders (Phylum: Arthropoda, Class: Arachnida, Order: Araneae) having a body structure composed by cephalothorax and abdomen joined by the thin pedicel, eight walking legs and no antennae and wings on body. There are various species and groups of spiders existing in India. They play a significant role in the regulation of insect and other invertebrate populations in most ecosystems (Wise, 1993; Russell-Smith, 1999; Raghavendra, 2001) [8, 4, 3]. But due to the lack of interest in spiders their study in some important ecosystems has always remained largely ignored. Spiders generally have humidity and temperature preference that limit them to areas within the range of their "physiological tolerances" which make them ideal candidates for land conservation studies (Riechert, Gillespie 1986) [5]. Therefore in the present paper the scientific documentation on spider diversity pattern was recorded for all season which will be helpful for further biodiversity assessment and conservation programme. According to the World Spider Catalogue (2018), 47761 species of spiders belonging to 4101 genera under 118 families are known from the world. A total of 1520 species of spiders as in 377 genera from 60 families are reported from India (Mathew et al., 2009) [2]. The present study was carried out in Navegaon National Park of NNTR, situated in Gondia district, Maharashtra. Navegaon National Park is an important biodiversity conservation area in Gondia district of Maharashtra. Many of the other biological reports

are known from this area except on spiders. This is a first record from this biological important area.

### Material and Method

Navegaon National Park is situated in Gondia district of Maharashtra (20°56'N 80°10'E). It is now recognized as Navegaon-Nagzira Tiger Reserve (NNTR) in 2013. Its 5th Tiger reserve of Maharashtra. It is situated in Gondia and Bhandara Districts in the North-Eastern corner of Maharashtra. Gondia district shares common boundaries with the states of MP and CG on North and Eastern side respectively. It has various type of vegetation ranging from dry mixed forest to moist forest. According classification of forest type, it is 5A/C3 southern tropical dry deciduous forest. In the present study the spiders were found in various places like forest edge, houses, road side bushes, bark of trees, etc. The identification of spiders is done by the standard literature of Tikader (1980) [6], Tikader & Malhotra (1980) [7] and Gajbe (2004) [1]. Spiders were only photographed for identification and no specimens were collected.

### Observation and Result

The following list of spiders was recorded from Navegaon National Park. A total of 20 species (Table-1) belonging to 16 genera and 9 families were recorded from the study area during year 2012-2017.

## MISCELLANEOUS NOTES

NEW DISTRIBUTION RECORD OF BLYTH'S HORSESHOE BAT *RHINOLOPHUS LEPIDUS*  
BLYTH, 1844 (CHIROPTERA: RHINOLOPHIDAE) FROM EASTERN VIDARBHA,  
MAHARASHTRA, INDIA<sup>1</sup>

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### Introduction

Blyth's Horseshoe Bat *Rhinolophus lepidus*, a member of family Rhinolophidae, is widespread in Southeast Asia and South Asia and distributed widely across the Indian subcontinent. This species can be found in both dry and moist forest and fringe areas (Bates and Harrison 1997). In Malaysia and Thailand, it appears to be associated with intact lowland tropical moist forest. It roosts in caves, tunnels, old and ruined buildings, and old temples (Bunrungsri *et al.* 2008). Its flight is slow and low and it feeds on lepidopterans, coleopterans, dipterans, and hymenopterans (Bates and Harrison 1997). It is distributed in 20 states in India. It has been reported from Rajasthan (Prakash 1963; Senacha 2003; Sinha 1979), Madhya Pradesh (Brosset, 1962; Khajuria 1980; Wroughton 1913), Southern Gujarat (Chakraborty and Agrawal 2000). In Maharashtra state, Helwak (Wroughton 1916); Kanheri caves, Nashik Road (Brosset 1962); Pune (Talmale 2007); Khandala, Lonavala, Lohagad fort, Karnala, Ratnagiri, Panchgani, Mahabaleshwar (Brosset 1962); Khopoli (Tiwari *et al.* 1971); Mulshi, Junnar, Bhimashankar, Mahabaleshwar (Korad 2005; Korad *et al.* 2010).

Decreasing forest cover and increasing tourism in caves may be threats to this species (Molur *et al.* 2002) which is at present in the Least Concern category of IUCN. Here, we present the first record of this species from eastern Maharashtra.

### Material and Methods

**Study area:** Pratapgarh Fort Cave (20° 47' 43" N; 80° 6' 50" E; Fig. 1) is situated near Pratapgarh village in Arjuni/Morgaon taluka in Gondia district of Maharashtra state. This site lies in Nagpur division of Vidarbha region, 87 km south



Fig. 1: Cave mouth at Pratapgarh Fort

of the district headquarters at Gondia. It is famous for a Lord Shiva temple, which draws visitors in large numbers on the occasion of Maha Shivaratri.

**Methodology:** In April 2012, an opportunistic survey was undertaken at the cave site to assess the diversity of bats. A dead bat specimen (n=1) was found near the mouth of the cave. It was photographed and carefully preserved in 4% formalin. The specimen was forwarded to Zoological Survey of India (ZSI), Central Zone Regional Centre, Jabalpur, Madhya Pradesh, India for further study and identification. A skull of a specimen of the same bat was prepared for study according to Agrawal (1990).

### Results and Discussion

Three bats were observed in a cave in Pratapgarh Fort, roosting on the ceiling. Before we could recognize and identify

## Observations on Habitat Use and Breeding Biology of Indian Nightjar: *Caprimulgus asiaticus* (Latham, 1790): Caprimulgidae

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**Abstract:** Nightjars are medium sized nocturnal or crepuscular birds belongs to the family Caprimulgidae, characterized by long wings, short legs and very short bills. From 98 species of nightjars in the world, the true nightjar species belongs to Caprimulgidae is 38. These nightjar species are distributed in Afghanistan, Iran, Myanmar, Thailand, Cambodia, Vietnam and Laos. These birds are difficult to locate and identify due to well camouflage of body coloration with the habitat. This species found to lay 1-3 eggs on an open land camouflaged with the habitat. To keep them in the camouflage is the principal defense mechanism. Nightjars are insectivores, prefers moths (Lepidoptera). They produce typical chirping (chik..chik..). These birds are one of least studied in the world hence present work is intended to find out Indian Nightjar, *Caprimulgus asiaticus* with respect to its habitat use and breeding biology.

**Keywords:** Nightjar, Habitat, Breeding, biology, Gondia, Maharashtra

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### I. INTRODUCTION:

Nightjars are nocturnal birds mostly active only at dawn and dusk, when it flies about searching for tiny insects. You can only realize it hidden on the ground if you hear the distance chik..chik.. call it produces. Nightjars are classified under order Caprimulgiformes & family Caprimulgidae. Nightjars have typical plumage colour pattern that camouflages with its habitat and surrounding hence, it is one of the land birds difficult to site (Parasher et al., [1]). Indian Nightjar, *Caprimulgus asiaticus* is closely related to Madagascar nightjar. The two recognized subspecies of *Caprimulgus asiaticus* are: *Caprimulgus asiaticus* Latham, 1790 and *Caprimulgus asiaticus* Peters, 1940. All the species are nocturnal in feeding (Jathar et al., [2]). They fly into the swarms of insects attracted to artificial light with their bill wide open. They are seen frequently resting on roads, during the night and feeding on insects under lights. Their bright reflective eye-shine makes them easy to spot in the beams of vehicle headlights. They may however be surprised by bright lights, and many are killed by vehicular traffic (Saxena) [3]. Human activity has always had an impact on biodiversity, but in recent centuries this impact has increased to a point, where we are in danger of declining the primary functions of the natural systems and therefore an extent that could ultimately threaten our own future. The needs of the surrounding biodiversity are forgotten by mankind and hence our knowledge is limited. The remaining natural habitats and the species living there may get disappeared from the globe before they are being discovered. Nightjars are one of the least studied land birds in the world (Luis et al., [4]). In this context the present study was planned.

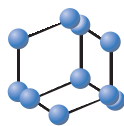
### II. MATERIAL AND METHODS

The study area situated near a small village Morgaon which is 5 Km far away from Arjuni town in Gondia district of Maharashtra State. The study area (20.8179° N and 80.0395° E) is near the lake and it is a kind of mixed plantation managed by State Forest Department. The plantation mostly of the Teak and rich diverse flora especially small bushes, grasses etc. Surveys were conducted weekly in morning 5am throughout the year during 2018-19. Our results are based on the visual observations, no nets or traps were used during the study. The nesting sites identified were flag marked. Birds were observed by using spotting scope (10x45 X) and binocular (07x50). They were identified using physical features with the help of guides and reference books, Ali and Ripley [5]; Manakadan [6]; Grewal [7]. During the breeding season nests were closely monitored by making hide-outs near the site. Photographs were taken by Canon 1200 D digital camera (Plate.I).

### III. RESULT AND DISCUSSION

The Indian Nightjar, *Caprimulgus asiaticus* is a small bird, measuring about 24 cm in length. There is a great variation in the plumage of these Indian Nightjar species. A bird with a plumage that is mottled barred and streaked with grey, rufous, black and white, and gives an overall effect of a complicated, but very effective





## Biogenic Synthesis of Metal/Metal Oxide Nanostructured Materials



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**Abstract:** Nanotechnology is an emerging outlet of nanoscience in which the atoms are encompassed in nanoscale dimensions and become more receptive compared with their distinctive counterparts. Recently, the utilization of synthetic designs and physicochemical approaches has received special attention; nevertheless, the generation of noxious impressions on the eco-system has raised serious concerns of the scientific community worldwide. Presently, environment-friendly green synthesis routes are promising venues for the arrangement of Metal/Metal Oxide (M/MO) nanostructured materials by using plants and their corresponding alliances. This revolution is predominantly recompensing as far as the reduction of toxic emissions and wastes is concerned. Accordingly, material scientists have adopted various renewable naturally-occurring eco-friendly materials, and biogenic processes to fabricate the functional M/MO nanostructured materials. The current review article recapitulates and assimilates the present state of knowledge on different strategies for biogenic fabrication of M/MO nanostructured materials.

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**Keywords:** Biogenic synthesis, metal/metal oxide, nanostructures, bioinspired nanoparticles, greener reduction, sustainable process.

## 1. INTRODUCTION

Nanotechnology and its possible technological applications are the division of a modern discipline, which covinants with the investigation of nanostructure matter [1-4]. This branch of science is concerned with the properties and applications of nanoscale materials and expands their domain into the dissimilar arenas of modern science like chemical-pharma, construction industries, bioengineering, and so forth [3-7]. Currently, green approaches are noteworthy for the forthcoming employment of Metal/Metal Oxide (M/MO) nanostructures in diverse prospective applications. This should lead to further expanding the role of non-toxic, environmentally friendly M/MO nanostructure in a wide variety of nano-technological applications [8-13].

Different types of environment-friendly solvents and reducing agents were employed for the synthesis of nanostructured materials with reduced dimensions, and

demonstrated efficient tuning of their morphological features, and modification of their exceptional physicochemical properties, thus, enhancing the potential impact of further utilization of nanostructured materials [9-12, 14, 15]. Generally, the well-known top-down and bottom-up processes are two distinctive approaches to the synthesis of nanostructured materials [16-18]. In the top-down process, large particles of the materials are broken down into smaller fine particles *via* size reduction techniques, such as grinding, milling, sputtering, thermal/laser ablation, *etc.* (Scheme 1). However, the bottom-up approach employs several chemical and physical synthesis techniques for the production of highly effective nanostructured materials, including sol-gel, aerosol, hydrothermal, physical and chemical vapor deposition, precipitation photo-deposition, sputtering, and pulsed electro-deposition [19-26] (Scheme 1). Countless nanostructured materials are currently produced commercially for applications including catalysis, water purification, biomedical, energy storage, food, and agriculture, but they tend to accumulate intra-cellular, making it difficult to be removed from living tissues, in addition to the drawback of their negative impacts on the eco-system due to their noxiousness [13-17, 27, 28].

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## Sustainable Chemistry

# Microwave Assisted One-Pot Multicomponent Synthesis Using ZnO- $\beta$ Zeolite Nanoparticle: An Easy Access to 7-Benzodioxolo[4,5-b]xanthene-dione and 4-Oxo-tetrahydroindole Scaffolds

Trimurti L. Lambat,<sup>\*[a]</sup> Sami H. Mahmood,<sup>[b]</sup> Pankaj V. Ledade,<sup>[c]</sup> and Subhash Banerjee<sup>\*[d]</sup>

ZnO- $\beta$  zeolite nanoparticle has been introduced as, an inexpensive and efficient heterogeneous catalyst for the one-pot multicomponent synthesis of 7-benzodioxolo[4,5-b]xanthenedione and 4-oxo-tetrahydroindole derivatives under micro-

wave (MW) irradiations. The method offers several advantages such as excellent yields of the products (>90%), simple work-up procedures, faster reactions, use of MW as source of energy and recyclability of the catalyst.

## Introduction

$\beta$ -zeolite is a high silica zeolite,<sup>[1]</sup> comprising an intersecting three-dimensional structure of twelve-member ring channels.<sup>[2]</sup> Due to this voluminous channel structure, it has a potential to catalyze numerous reactions.<sup>[3]</sup> Moreover, the acidic properties of  $\beta$ -zeolite are adjustable to affect a susceptible reaction.  $\beta$ -zeolite was reported to be an effective catalyst for the synthesis of organic transformations like carbon-carbon bond forming reaction,<sup>[4]</sup> aromatization, dehydrogenation reactions<sup>[5]</sup> and trans-esterification to synthesize various products.<sup>[6]</sup> The trans-esterification proceeds at the Brønsted acidic sites of the  $\beta$ -zeolite. The Brønsted acid sites of the  $\beta$ -zeolite have been tuned by altering the metal cations for preparing the modified catalysts with acidity suitable for diverse trans-esterification reactions.<sup>[7]</sup> Interestingly,  $\beta$ -zeolite modified with zinc oxide (ZnO) is an efficient catalyst for a variety of bioactive moieties like 5-arylidene-2,4-thiazolidinedione,<sup>[8]</sup> quinoxaline derivatives,<sup>[9]</sup> benzothiazole,<sup>[10]</sup> tetrahydrobenzo[b]pyrans,<sup>[11]</sup> and polyhydroquinoline.<sup>[12]</sup>

On the other hand, multicomponent reactions (MCRs)<sup>[13]</sup> provide attractive features such as improved efficiency, waste

reduction, atom economy, as well as simple and relatively fast synthesis of bioactive motifs.<sup>[14]</sup> In addition, MCRs are more economical than the conventional multistep sequences considering the cost of materials required for the reaction, and purification and isolation of the products.<sup>[15]</sup>

Again, synthesis of important medicinal heterocycles using microwave-assisted organic synthesis routes<sup>[16]</sup> is receiving an increasing attention due to its advantages compared with conventional reaction, especially eco-friendliness.<sup>[17]</sup> This synthesis route can reduce the reaction time significantly, and satisfy a number of principles of green chemistry.<sup>[18]</sup> The development of cleaner synthesis techniques is of a major importance for green chemistry, and the application of microwave irradiation provides an opportunity for rapid synthesis of biologically relevant heterocyclic molecules under solvent-free conditions.<sup>[19]</sup> Therefore, microwave-assisted synthesis of novel bioactive molecules has drawn a growing interest of both technologists and academics working in the medicinal and pharmaceutical sectors.<sup>[20]</sup> Some of the attractive features of this synthesis are: (i) selectivity toward the target compound, (ii) rapid synthesis, (iii) higher product yield, and (iv) elimination or reduction of hazardous solvents/ catalysts/ reagents, etc. In the sequence of the reaction, inter-coordination between the reactants, solvent and catalyst is crucial for the success of MCRs.<sup>[21]</sup> Consequently, with a proper choice from a diversity of molecular species as reactants, MCRs are considered valuable in designing a variety of organic blocks that are essential for the preparation of various fascinating heterocyclic structures.<sup>[22]</sup>

In this context, ZnO- $\beta$  zeolite has not been much explored in MCRs most important to pharmacologically significant scaffolds.<sup>[23]</sup> In the present work, we employed ZnO- $\beta$  zeolite in MCR for the synthesis of the xanthenediones and the oxo-tetrahydroindoles. This study was motivated by the fact that Xanthenedione molecules<sup>[24]</sup> are crucial heterocyclic compounds<sup>[25]</sup> that were extensively used for their antibacterial activity,<sup>[26a]</sup> antifungal,<sup>[26b]</sup> anti-inflammatory drug<sup>[26c]</sup> and antiviral activity.<sup>[26d,e]</sup> Because of the variety of their applications, the synthesis of xanthenedione compounds has received a

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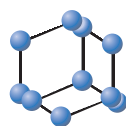
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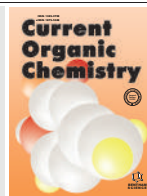


Supporting information for this article is available on the WWW under <https://doi.org/10.1002/slct.202002160>

## REVIEW ARTICLE


**BENTHAM  
SCIENCE**

# Microwave: A Green Contrivance for the Synthesis of *N*-Heterocyclic Compounds


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**Abstract:** Microwave Mediated Organic Synthesis (MMOS) is typical on the proficient heat shift carried out by dielectric heating, which in turn, is primarily dependent on the capability of the reagent or solvent to take up microwave energy. The employment of microwave energy has witnessed a fast expansion in the past two decades, with novel and pioneering applications in peptide and organic synthesis, material sciences, polymer chemistry, biochemical processes and nanotechnology. This review summarizes current MW-mediated catalytic reactions in use for the synthesis of a diversity of *N*-heterocycles by Multi-Component Reactions (MCRs) and a variety of miscellaneous reactions. In addition, the review addresses some aspects of the use of nanoparticles for a diversity of applications in microwave chemistry.


**Trimurti L. Lambat**

**Keywords:** Microwave, organic synthesis, multi-component reaction, *N*-heterocycles, nanotechnology, dielectric heating.

**1. INTRODUCTION**

The implementation of the Microwave (MW) heating normally employed for cooking food has received great attention in several fields of chemistry, including nanotechnology [1] and organic synthesis (Microwave-Assisted Organic Synthesis, MAOS or Microwave-Enhanced Chemistry, MEC) [2]. Using appropriate microwave irradiation conditions, organic reactions with improved product selectivity can be accelerated [3]. This technique has several advantages compared with conventional heating techniques, including and not limited to, rapid and deep internal heating, high-temperature homogeneity, and selective heating [4]. Microwave-assisted organic synthesis was widely employed in solid-phase synthesis, biopolymer synthesis, proteomics, parallel processing in microwave reactors and automated library generation [5].

The employment of microwave-assisted syntheses of medicinally privileged heterocycles is recognized as an advantageous, and eco-friendly methodology compared with the conventional reactions [6-8]. This technique requires significantly reduced reaction time compared to conventional heating, and can be employed without, or with reduced amounts of hazardous solvents and catalysts, thus satisfying a number of principles of green chemistry [9]. The development of cleaner technologies has a major emphasis on green chemistry [10].

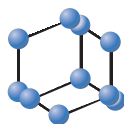
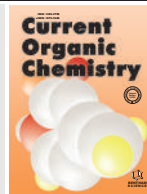
The application of microwave technology for the rapid synthesis of biologically significant heterocyclic molecules under solvent-free

conditions is very promising and challenging [11]. Microwave-assisted reaction, the green heating, to synthesize novel bioactive molecules has drawn growing attention of the medicinal and pharmaceutical sectors, both from the academic and industrial sides [12]. The attraction towards this methodology is driven by several factors, most important of which are: (i) selectivity toward the target compound, (ii) shorter reaction time (rapid synthesis), (iii) higher yield of the product, and (iv) removal or reduction of hazardous solvents/catalysts/reagents. To meet the increasing demand of modern drug discovery research for automated microwave reactors to synthesize more potent and less toxic drug like/lead-like molecules, several manufacturers demonstrated interest in manufacturing automated multiport microwave reactors. These are essential for parallel synthesis, which is considered as an intimate part of high-throughput screening targeted to fragment/ligand-based drug discovery [13]. In this context, the drug synthesis can be carried out *via* the multicomponent reaction (MCR) route with the appropriate choice of reactants, solvent and catalyst [14]. A variety of organic blocks pertaining to interesting *N*-heterocyclic frameworks were successfully designed from a diversity of reactants using MCRs [15]. Heterocyclic compounds are essential components in a wide range of bioactive organic compounds [16-22], and are often the starting materials for the synthesis of a variety of important drugs [23-29]. MCR synthesis [30-34] of these heterocycles is recognized as efficient, more green, and cost-effective compared with traditional routes [35-40]. An important class of heterocycles, namely, the nitrogen-based *N*-heterocycles [41], is essential as a class of basic components in several pharmaceutical and agrochemical products due to their favorable properties. The development of a one-pot MCR synthesis of these *N*-heterocycles provides a sustainable approach for the discovery of new molecules in a benign fashion [42].

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## REVIEW ARTICLE

## CO Surrogates: A Green Alternative in Palladium-Catalyzed CO Gas Free Carbonylation Reactions



BENTHAM SCIENCE

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**Abstract:** Carbonylation reactions with carbon monoxide (CO) provide efficient and attractive routes for the synthesis of bulk and fine chemicals. However, the practice of using a large excess of an inflammable, lethal and greenhouse CO gas is always a concern in this chemistry. The development of CO surrogates has gained substantial interest and become a green alternative to gaseous CO. Many of the recent studies have focused on the development of other benign and safe reagents to work as a CO source in carbonylation reactions, and the assortment of feasible CO surrogates for specific reaction can be accomplished by the literature data. This review describes the recent developments in palladium-catalyzed carbonyl insertions without the direct use of gaseous CO.



Mayur V. Khedkar

**Keywords:** Palladium, heterogeneous and homogeneous catalysis, coupling reaction, CO surrogates, carbonylation, CO gas free, green synthesis.

## 1. INTRODUCTION

The use of gaseous carbon monoxide (CO) in the organic transformation was demonstrated by Otto Roelen for hydroformylation reaction in 1938 and the Reppe for hydrocarboxylation reaction in 1939 [1-5]. However, Heck and co-workers developed the first palladium-catalyzed carbonylation reaction in 1974 [6]. Their discovery laid a milestone in the field of catalysis by employing gaseous CO for palladium-catalyzed carbonylation reactions [7-10]. Since then, palladium-catalyzed insertion of CO as the C1 source turned out to be one of the most important industrial processes [11-14]. Thus a wide range of Pd-catalyzed carbonylation reactions [15-18] were developed for the synthesis of a variety of valuable chemicals [19-21].

Despite large scale applications and its demand in industries, experimental organic chemists are reluctant to use CO gas [22]. The major safety issue associated with gaseous carbon monoxide includes its storage and transport, furthermore, CO, being a colorless, odorless, and toxic gas, which requires specialized equipment like autoclave to handle the high pressure, remains a big concern [23-25].

A suitable way to circumvent these problems is to use alternative to gaseous carbon monoxide called "CO surrogate", which is

either in solid or liquid form (except CO<sub>2</sub>) and releases carbon monoxide *in situ* during the reaction [26]. In this context, various CO surrogates are developed to carry out CO free carbonylation reactions (Fig. 1). The use of these CO surrogates provides a green and convenient method for the production of various important carbonyl compounds circumventing the requirement of CO gas [27]. Hence the development of Palladium-catalyzed CO free carbonylation using CO surrogate has gained importance recently [28, 29].

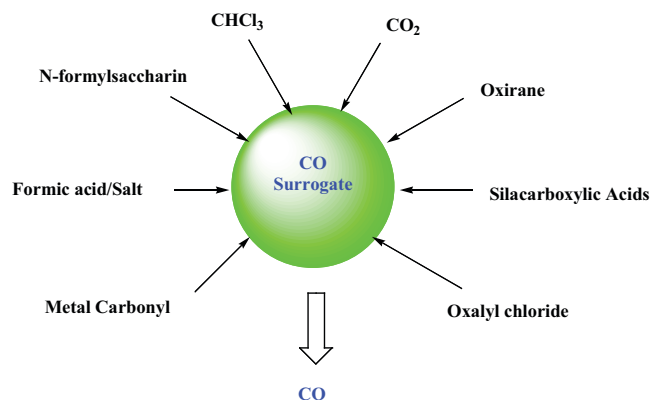


Fig. (1). Various alternative CO sources (CO surrogates).

In 2004, Morimoto and Kakiuchi concise the use of CO surrogates in carbonylation reactions [30]. Since then, many researchers developed novel approaches and carbonyl precursors [31-33].

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Short Communication

# Simultaneous determination of $\beta$ -sitosterol and gallic acid in *Nigella Sativa* seeds using reverse phase high performance liquid chromatography

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## Abstract

HPLC determination of  $\beta$ -Sitosterol and Gallic acid in seeds of *Nigella sativa* was carried out using reversed-phase Grace C18 column (250 mm  $\times$  4.6 mm id, 5  $\mu$ m particle size), with UV detection at 210 nm. The mobile phase for column consisted of 60:40 v/v acetonitrile–water at a flow rate of 0.5 ml/min. The pH of the mobile phase was adjusted to 3.00, with 0.05% ortho-phosphoric acid. The linear response was examined in the concentration range of Gallic acid and  $\beta$ -Sitosterol between 0.5 and 2.5  $\mu$ g/mL, and linear correlation coefficients of 0.9983 for Gallic acid, and 0.9993 for  $\beta$ -sitosterol, respectively, were observed. The detection limit was 4.8  $\mu$ g/mL, and the recovery test in the determination of  $\beta$ -Sitosterol and Gallic acid revealed 98–101% for both compounds.

**Keywords** RP-HPLC ·  $\beta$ -sitosterol · Gallic acid · ICH guidelines · *Nigella sativa*

## 1 Introduction

Spices extracted from the edible parts of a plant are widely used in food for flavoring, giving aroma, pungency, or coloring. These spices are normally extracted from fruits, seeds, bark or roots of plants [1]. Spices have huge contribution not only to the food industry, but also to medicine or herbal drug formulation due to their medicinally important properties [2], and being a rich source of essential oils.

*Nigella sativa* (Fam. Ranunculaceae), also called black cumin, is a herbaceous, dicotyledon annual flowering plant, and a miraculous herb with a rich historical and religious background. The fruit provides several seeds that are black or gray from outside and white inside. The seeds of a typical size of 2–3.5  $\times$  1–2 mm are angular, stimulant, diuretic, and are used in puerperal fever. These seeds showed

antispasmodic, analgesic, and CNS depressant activities [3, 4]. In one of the Prophetic hadith, black seeds were mentioned in connection with the cure of all diseases [5]. The seeds and their oil exhibited favorable medicinal activities as immunomodulatory [6], anticancer [7, 8], antimicrobial [9, 10], analgesic, anti-inflammatory [11], gastroprotective [12], hepatoprotective [13], antioxidant [14] and renal protective properties [15]. The seeds can also be used for the treatment of several diseases such as diarrhea, bronchitis, rheumatism, asthma, skin diseases, and liver problems. In addition, they can be used as appetite stimulant, agent to increase the milk of pregnant women, and support of the overall immune system [16]. Also, methanolic extract of *Nigella sativa* exhibited strong antifungal activity on different strains of *Candida albicans* [17].

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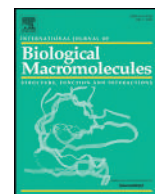
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# Immunostimulatory and anti-allergic potential of novel heterotrimeric lectin from seeds of *Zizyphus mauritiana* Lam

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## ABSTRACT

*Zizyphus mauritiana* Lam. seeds (ZMS) have been used medicinally as sedative or hypnotic drugs in most of Asian countries. ZMS has significant benefits to the human health. Therefore, we have evaluated immunomodulatory effect of lectin extracted from these ZMSL in both in vitro and in vivo study. Anaphylaxis is a severe life-threatening allergic reaction and Arthus reaction is deposition of immune complex and complement system activation, so we hypothesized that if ZMSL can protect these severe allergic diseases. We have studied the effect of ZMSL on macrophages and Wistar albino rats and confirmed its protective effect against anaphylaxis and Arthus reaction. Results of this study suggest ZMSL have immunostimulatory and antiallergic activity.

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## 1. Introduction

Immunity determines the body structure which makes it possible to protect the body against an eclectic array of pathogens [1]. The pattern of the immune system has a relatively fixed structural design of specific organs, cells, tissues and chemicals [2,3]. However, an incongruously active immune system can lead to hypersensitivity [4]. Anaphylaxis is a hypersensitivity reaction caused when free antigen binds to IgE, on mast cell and basophils resulting in release of numerous mediators, like histamine, leukotrienes, and cytokines. [5,6]. Anaphylaxis believed to be severe and sometime life threatening. Onset of this disease is likely to be increasing and almost 2% population is affected. It could be fatal without any proper medical assistance. [7–10]. Arthus reaction is a kind of local immune complex-mediated type III hypersensitivity reaction and involves the accumulation of immune complexes mostly in the glomeruli, serosa, vascular walls etc. [11,12]. Reaction is characterized by severe pain, edema, swelling and sometime hemorrhage. The duration of beginning of immunization typically reaching a crest up to 12 to 36 h [13].

There are natural and synthetic immunomodulatory agents available in the market which has strong immunostimulatory or immunosuppressive action, but they cause several adverse effects starting

from muscular pain to organ failure [4,14–18]. Specifically, synthetic immunomodulatory drugs are costly, and the patient may face health problems related to its side effects. In India, owing to indigence and escalating populace, it is unfeasible to gratify health related requirements of every individual. Consequently, isolation of immunomodulatory compounds from natural sources, which are both economical and without detrimental effects, is becoming of prime importance. Therefore, researchers are studying several medicinal plants which has shown substantial immunomodulatory effect including inhibitory effect on suppression of cellular and humoral immunity which could be cost effective and has less adverse effect [4,16,17].

The use of traditional Indian medicinal plants and its biomolecules like phytochemicals and lectins causes minor side effects compared to synthetic immunomodulatory agents [19]. Several plant lectins are known to exhibit potent immunomodulatory activity [20,21], such as in vitro stimulation of splenocytes [22], apoptotic activity [23] and mitogenic activity [24–25]. In addition, plant lectins induce nitric oxide (NO) production [26], increase phagocytic activity in macrophages and NK cells [27–29], stimulate antibody responses [30], induce the expression of pro-inflammatory and other multiple cytokines [31,32], anti-allergic activity [33], pro-healing activity [34], antibacterial and antifungal activity [35,36], etc.

The literature survey indicates medicinal value of the genus *Zizyphus* [4,17,18]. *Zizyphus mauritiana* Lam. (ZM) was found to be a nutritious fruit crop and was further used by rural and tribal peoples of Gadchiroli district region (Maharashtra, India) as the medicinal plant in the

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Section A: Green Chemistry



Research Article

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## Synthesis and Transport Properties of Polyaniline-Nickel Sulfide Nanocomposite

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**Abstract:** Intercalation of transition metal salts into polyaniline matrix significantly transformed their optical and electronic properties to greater extent. Interactions of nickel sulfide into polyaniline matrix were synthesized by simplest route via oxidation method. Effect of nickel sulfide nanoparticles on the electrical properties of polyaniline was studied. Product were characterized through FT-IR, NMR and TEM spectroscopy. It has been also observed that successful incorporation of nickel sulfide into the polymer matrix along with a strong interaction between the nickel sulfide and polyaniline matrix. Electrical conductivity was enhanced significantly analogues to semiconducting materials, which could be used in variety of electronic devices.

**Keywords:** *Polyaniline; Nickel sulfide; nanocomposites, transport properties.*

### 1. INTRODUCTION

In the present context, there are worldwide growing interest on conducting polymer-metal composites. <sup>[1]</sup> Environmental stability and appreciable electrical conductivity of polyaniline imparts it's wide applications in electronic sectors <sup>[2-4]</sup>. However intercalation of transition metal nanoparticles in polyaniline matrices enhances their electronic properties to the greater extent. <sup>[5-7]</sup> Several researchers have reported the synthesis of polyaniline nanocomposites with inorganic metals such as silver <sup>[8]</sup>, nickel



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## Road kill of Snakes (Squamata: Serpents) on state highway 276: a case study in protected forest area of Deori Forest range Gondia

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### ABSTRACT

Reptiles and amphibians are biological significant as they provide priceless services to the ecosystems, now they are endangered organisms in the world. They often affected by killing on road by traffics. As they are cold blooded organism but eventually they prefer the open area for basking and try to cross the roads, ultimately they might killed by vehicular activities on roads. Number of specimens was found killed abruptly in the morning or early morning in the cold days. Very few studies on mortality of snakes were done in India. Snakes mortality rate becomes faster due to chief source road kill and contributing for global decline of diversity. The present paper is deals with the road killing mortality of snakes on a State Highway segment SH 276 near Deori to Amgaon which is passing along the NNTR's eastern boundary Maharashtra India. The study is conducted from November 2018 to October 2019. The Snakes was killed more than that of other organisms. The present paper in short time period of observation indicates that the local reptilian fauna is damaging vastly. This study is thoughtful to document of these endemic snakes species for which usually unreported because of nocturnal habit of organism. In the present paper the total of 75 road kills of snakes belongs to 12 species and 05 families were recorded.

**Key words:** Road kill, snakes, vehicular movements, Deori, SH 276, mortality.

### INTRODUCTION

The snakes play a vital role in the natural environs and integral of food chain. These are the successful hunters as well as ambush predators. Many species of snakes are globally affected by anthropogenic habitat fragmentation; constructions and widening of roads are the major threat for snakes and other reptiles. According to United Nations Food and Agriculture organization, more than seven million hectares of forest are destructed every year, eventually it affects biodiversity including snakes. It is one of the most integral components in the food web. Road traffic affects the adjacent environment in many ways that are damaging to the adjoining flora and fauna (Forman and Alexander, 1998).

Roads are the barriers for many wild animals. The snakes due to their sluggish movement on roads can cause killed by the fast running vehicles. Moreover, the rates of crossing roads by snakes vary significantly, suggesting that snakes may suffer a greater range of road morbidity and mortality than other group of animals (Andrews and Gibbons, 2005). The increasing traffic on roads can cause decline or turn down the reptile population. Some workers have attended this matter of road kill of snakes (Chittaragi and Hosetti 2014; Vijayakumar et al. 2001). Eastern Maharashtra, especially Vidarbha region is rich in herpetofauna (Paliwal and Bhandarkar 2017a&b; Bhandarkar et al. 2012). Many of unrecorded evidences and snakes kills on roads were occurred on roads but not recorded yet as the scientific document.





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# International Journal of Fisheries and Aquatic Studies

## A report of epizootic ulcerative syndrom (EUS) In *Channa punctata* (Bloch, 1793) from freshwater fisheries lake in Gondia district Maharashtra

**Sharad Deshmukh, Gopal Paliwal, Sudhir Bhandarkar, Sanjeev Patankar  
and Manish Rajankar**

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### Abstract

Bhandara and Gondia districts are popularly known as lakes district. Many of the water bodies being exploited for capture fisheries, contributing towards the livelihood of thousands of people; live around and depend on paddy and fish production. However occurrence of disease has become a primary problem to sustainable aquaculture production, thereby affecting the socioeconomic status of fishermen communities in the district. Different opportunistic bacterial pathogens and parasites causing a great deal of losses to the fish industry in terms of high mortality and therefore prevention of fish diseases are of paramount importance in terms of sustainable growth of aquaculture. The present investigation reveals the source of fish mortality due to the severe bacterial infestation of *Aeromonas* causing red spotted disease and death of fishes in the Kokna Jamidari Lake of the Kokna village.

**Keywords:** EUS, *Channa punctata*, infection, aeromonas, ulceration, fisheries, Kokna, gondia

### 1. Introduction

India is endowed with vast freshwater consisting 45,000 km of rivers, 26,334 km of canals, 2.36 million hectares of ponds and tanks, 2.05 million hectares of reservoirs and 5,82,86,000 hectares of wetlands (Bhakta and Bandyopadhyay, 2008; Kumar *et al.*, 2015) <sup>[1, 2]</sup>. Fisheries in India are a progressively growing sector with varied resources. There are thousands of traditional lakes in the eastern vidarbha region of Maharashtra, these are also known as ex-malgujari tanks widely used for irrigation and fisheries. Fishes as the keystone species determine the abundance and distribution of ecosystem biodiversity representing indicators of ecosystem health. The freshwater bodies are depleting alarmingly due to the cultural eutrophication. Bacterial infections to the fishes are most catastrophic thing in this area, locally it is known as 'Mata' (Ulcerative Syndrome); a contagious disease mostly affected to the local fishes, spread during winter than summer; affect on any part of the body and it penetrates through the body of fish (Bhandarkar *et al.*, 2020) <sup>[3]</sup>. The development of research on fish diseases is gaining importance in India for the successful implementation of fishery development program. The recent outbreaks of fish disease, 'Epizootic Ulcerative Syndrome' (EUS) in fishes from rivers, canals, lakes, ponds of east and north eastern states of India has seriously affected fishery activities (Jhingran and Das, 1990) <sup>[4]</sup>. Epizootic Ulcerative Syndrome (EUS) spread through south East Asia and extended widely into Indian subcontinent over past decade (Rodgers and Burke 1981) <sup>[5]</sup>. A similar type of disease characterised by dermal ulcer from the rivers of south India during 1975-76 and north during 1982-88 (Haines, 1983) <sup>[6]</sup> and gradually spread in the fresh and brackish water fishes of different states of India. EUS is commonly known as red spot disease primary etiological agents of EUS are bacteria, viruses and fungi (Jhingran and Das, 1990) <sup>[4]</sup>. In the context of bacterial disease in fish, the present investigation on Epizootic Ulcerative Syndrom (EUS) is the first report in the Gondia district. The present paper deals with the occurrence and distribution of causative agent of EUS is discussed.



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# New Report of Occurrence of Greater False Vampire Bat *Megaderma lyra* (Geoffroy, 1810) (Megadermatidae: Chiroptera) in Gondia District, Maharashtra, India

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## ABSTRACT

Bats are the most diverse group of small mammals, having great economic and ecological benefits. Bat is an important keystone species in the ecosystem, plays a vital role in maintaining ecosystem balance. In the present survey, a colony of *Megaderma lyra* were observed, total of 149 in roosting in a dark, wooden roofed room of old dilapidated house at Arjuni-Morgaon town in Gondia district of Maharashtra state. The said bats were primarily identified through its unique facial features such as -erect and elongated nose-leaf, large ears that joined above the forehead and no tail. A specimen was captured carefully with help of hand net; some external morphological parameters were examined and thereafter the animal was rescued in a good condition at the same habitat. As bats are now becoming threatened, their conservation is of major importance; understanding its role in the sustenance of ecosystem; present survey was undertaken. Through the findings of this piece of work, its essential morphological parameters of this bat are examined and the new report of occurrence is discussed.

**Key words:** Bat, Chiroptera, Megadermatidae, *Megaderma lyra*, occurrence, Morphology.

## INTRODUCTION

Chiroptera (Bats) are nocturnal organism; usually roosted in caves, rock crevices, foliage and various manmade structures in daytime. They are known for their considerable influence on ecosystem health and human economics; controlling insect pest population, helps in pollination, seed dispersal of many economically and ecologically significant plants. Relatively they have been less studied, primarily due to difficulty in direct observations (Findley 1993). Chiroptera (Bats), the group of small mammals is among the 29 extant mammalian orders (Wilson & Reeder 2005), most species order of mammals (Eick et al. 2005); more than 1300 species, constitutes over 20% of all mammalian species and is second to Rodentia in species richness (Simmons 2005a). Bats

are cosmopolitan in distribution, devoid of Arctic, Antarctic and certain oceanic islands (Simmons 2005a & 2005b). Etienne Geoffroy, French naturalist studied the bats species and gave first scientific description in India. Now in India, according to Talmale & Pradhan (2009), Chiroptera (Bats) includes eight families, 39 genera, 117 species, and 100 subspecies. In this context the diversity of bat fauna in Maharashtra state is elevated; it show 08 families, 23 genera and 41 species. Order Chiroptera comprises 31% of the overall mammalian species reported from Maharashtra state (Pradhan & Talmale 2012). The members of family Megadermatidae are confined to the old world tropics (Bates & Harrison 1997). This family is represented in India by two species *Megaderma lyra* and *Megaderma spasma*, roosted in caves, temples, forts, old ruined buildings, houses, underground tunnels and shallow

## Observations on Habitat Use and Breeding Biology of Indian Nightjar: *Caprimulgus asiaticus* (Latham, 1790): Caprimulgidae

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**Abstract:** Nightjars are medium sized nocturnal or crepuscular birds belongs to the family Caprimulgidae, characterized by long wings, short legs and very short bills. From 98 species of nightjars in the world, the true nightjar species belongs to Caprimulgidae is 38. These nightjar species are distributed in Afghanistan, Iran, Myanmar, Thailand, Cambodia, Vietnam and Laos. These birds are difficult to locate and identify due to well camouflage of body coloration with the habitat. This species found to lay 1-3 eggs on an open land camouflaged with the habitat. To keep them in the camouflage is the principal defense mechanism. Nightjars are insectivores, prefers moths (Lepidoptera). They produce typical chirping (chik..chik..). These birds are one of least studied in the world hence present work is intended to find out Indian Nightjar, *Caprimulgus asiaticus* with respect to its habitat use and breeding biology.

**Keywords:** Nightjar, Habitat, Breeding, biology, Gondia, Maharashtra

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### I. INTRODUCTION:

Nightjars are nocturnal birds mostly active only at dawn and dusk, when it flies about searching for tiny insects. You can only realize it hidden on the ground if you hear the distance chik..chik.. call it produces. Nightjars are classified under order Caprimulgiformes & family Caprimulgidae. Nightjars have typical plumage colour pattern that camouflages with its habitat and surrounding hence, it is one of the land birds difficult to site (Parasher et al., [1]). Indian Nightjar, *Caprimulgus asiaticus* is closely related to Madagascar nightjar. The two recognized subspecies of *Caprimulgus asiaticus* are: *Caprimulgus asiaticus* Latham, 1790 and *Caprimulgus asiaticus* Peters, 1940. All the species are nocturnal in feeding (Jathar et al., [2]). They fly into the swarms of insects attracted to artificial light with their bill wide open. They are seen frequently resting on roads, during the night and feeding on insects under lights. Their bright reflective eye-shine makes them easy to spot in the beams of vehicle headlights. They may however be surprised by bright lights, and many are killed by vehicular traffic (Saxena) [3]. Human activity has always had an impact on biodiversity, but in recent centuries this impact has increased to a point, where we are in danger of declining the primary functions of the natural systems and therefore an extent that could ultimately threaten our own future. The needs of the surrounding biodiversity are forgotten by mankind and hence our knowledge is limited. The remaining natural habitats and the species living there may get disappeared from the globe before they are being discovered. Nightjars are one of the least studied land birds in the world (Luis et al., [4]). In this context the present study was planned.

### II. MATERIAL AND METHODS

The study area situated near a small village Morgaon which is 5 Km far away from Arjuni town in Gondia district of Maharashtra State. The study area (20.8179° N and 80.0395° E) is near the lake and it is a kind of mixed plantation managed by State Forest Department. The plantation mostly of the Teak and rich diverse flora especially small bushes, grasses etc. Surveys were conducted weekly in morning 5am throughout the year during 2018-19. Our results are based on the visual observations, no nets or traps were used during the study. The nesting sites identified were flag marked. Birds were observed by using spotting scope (10x45 X) and binocular (07x50). They were identified using physical features with the help of guides and reference books, Ali and Ripley [5]; Manakadan [6]; Grewal [7]. During the breeding season nests were closely monitored by making hide-outs near the site. Photographs were taken by Canon 1200 D digital camera (Plate.I).

### III. RESULT AND DISCUSSION

The Indian Nightjar, *Caprimulgus asiaticus* is a small bird, measuring about 24 cm in length. There is a great variation in the plumage of these Indian Nightjar species. A bird with a plumage that is mottled barred and streaked with grey, rufous, black and white, and gives an overall effect of a complicated, but very effective



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# The occurrence of Kelaart's Pipistrelle Bat *Pipistrellus ceylonicus* (Kelaart, 1852) (Chiroptera: Vespertilionidae) in Gondia District, Maharashtra, India

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## ABSTRACT

Bats are most diverse and essential small mammals as a part of ecosystem having vast ecological and economic benefits as well many of the bat species are considered as keystone species. The information of the diversity, distribution and biology of bats is incomplete in this region as they are facing the impacts of climate change, anthropogenic disturbance and other crucial grounds. Gondia district harbors diverse flora and fauna as it is densely covered by the forest canopy. In the survey of diversity and distribution of bats (Mammalia: Chiroptera) in forest fragments and forest outskirts in Gondia district the specimen (n=1) of *Pipistrellus ceylonicus* was observed on the floor of open roof of MB Patel College building in Deori of Gondia district. The distribution of *P. ceylonicus* bat species in Deori region of Gondia district is having not previously recorded. The sighting of this bat species, its morphometrical properties compared with standard literature for identification, and its distribution is discussed.

**Key words:** Bat, Occurrence, *Pipistrellus ceylonicus*, Distribution, Morphometry, Gondia.

## INTRODUCTION

Bats are diverse animal facing threats, population declining around the world. Loss of biodiversity is a comprehensive crisis in which the bat facing many anthropogenic activities (Pimm et al. 2014) particularly land use change (Foley et al. 2005.), overexploitation of species (Ripple et al. 2016), introduction of invasive species (McCreless et al. 2016) and climate change (Maclean and Wilson, 2011). According to IUCN Red Data Book the bat (Chiroptera) Listed as Least Concern, wide distribution, presumed large population, occurs in a number of protected areas, has a tolerance of a degree of habitat modification and because it is

unlikely to be declining fast enough to qualify for listing in a more threatened category (Srinivasulu and Srinivasulu 2019). Altogether 1116 species of bats are globally known (Wilson and Reeder 2011). Talmale and Saikia (2018) reported 127 species of 41 genera under 9 families from India while 40 species of 20 genera from Maharashtra by Pradhan and Talmale (2012) which is relatively high in diversity. A number of taxonomical and histological studies in Maharashtra state have done by various workers. Some prominent work on bat species in Maharashtra state is existing by Ellerman and Morrison-Scott (1951), Corbet and Hill (1992), Bates and Harrison (1997), Molur et al. (2002), Simmons (2005), Talmale and Pradhan (2009),





## **Ichthyofaunal Diversity and Fisheries of Pangdi Dam Reservoir, Gondia, Maharashtra**

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#### **Keywords:**

Pangdi Dam Reservoir, Fish Diversity, Fisheries.

### **Abstract**

An Ichthyofaunal diversity or fish diversity of any water body is the manifestation of its physical status. The present study is conducted with respect to the fish diversity of Pangdi dam reservoir during the period January 2019 to December 2019. A total of 26 species of fishes belonging to 10 families and 5 orders were recorded. The present investigation indicates that the reservoir has fair amount of species diversity of fish reflecting healthy physical status of it. In spite of considerable amount of fishing, many of the species of fishes recorded were found throughout the year. Obtained data in present study is important to know the current status of fish fauna in local region which will be helpful for the researchers and fishermen's, to get an idea about tolerance and diversity of fish found in Gondia region and select exact variety of fish species for the culture so as to get maximum yield.

### **1. Introduction**

Fishes are the key indicator of aquatic ecosystem and occupy a significant position from a socioeconomic point of view (Bera et al., 2014). Fish is a rich source of protein and occupied a very important place in the diet of people of South Asian countries. India is one of the twelve-mega diversity nations of the world, contributing 2,546 species of fishes (Kalbande et al., 2007). As far as fish production and natural water resources are concern, Maharashtra is an important state which has immense scope for developing fisheries. A total of 165 fish species have been documented and confirmed by various authors in Maharashtra, belonging to 09 orders, 26 families and 82 genera (Pawara et al., 2014).

Gondia district is popularly known as the district of lakes and Reservoirs. In Gondia district, about 1397 water bodies are present, which occupied 16375 hectares of water spread area. The fishing is a major source of earnings of many fisherman and tribal in the area, about 60,000 people are directly involved in fishery activity (Paliwal et al., 2013). According to literature survey majority of work related to fish fauna available in lotic waters and dam (Pradhan, 2017). Major contributors of freshwater fish study in India are Talwar and Jhingran (1991), Menon (1999) and Mishra et al., (2003). As no information regarding ichthyofaunal diversity of Pangdi dam reservoir available, the present study was conducted.

## Remote Sensing and GIS Based Comparative study of watershed of different Physiographic Conditions, Wainganga Sub Basin, Maharashtra

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### ABSTRACT

The present study carried by a Wainganga river basin is of critical importance for Maharashtra to preserve its watershed, drainage, relief, soil, forests, wildlife, and tribal population dependent on it. Protecting the basin however does not seem to be priority for the state. The very lifeline of the Wainganga River is being subjected to growing pressure. Its flow has already been obstructed at several places with dams and barrages. By 2012 there were as many as 149 dams built in Wainganga basin. The river in its initial reaches flow westwards and thereafter southwards in M.P. State and continues to flow Southwards in Maharashtra State. Several studies related to different aspects of channel cross section and longitudinal profile river have been carried out from different parts of the country and abroad. Recent emphasis is placed on quantitative geomorphology of drainage basin by various methods and measures to establish the interrelationship of cross section and longitudinal profile river and to impact on river morphology. Water is not only for sustains of life but also determines the quality of life. Assessing water quality is important as quantity in water resources planning and management. It may be observed that the existence of human being a lot of serious problem to disturbance of quality and quantity of water. There are several reasons for scarcity of water and most important things to the increasing population and changing environment condition in the local as well as world level. For sustainable development requirement to that fresh water is indispensable for human survival. Water is being transferred to irrigation and urban industrial uses, putting additional stress on the performance of the irrigation sector. Keeping in mind the scarcity of water resources to cater to the multi various needs of the growing population along the Wainganga River with the vagaries of monsoon precipitation and dearth for quality of water. The purpose of the present research work is to describe the physical condition in Wainganga drainage basin as a system unit resulting from the interaction between landuse & landcover and topography, which is an impact of socio economic condition and surrounding area or region.

**Keywords** – Wainganga River, GIS, RS, Physiographic Condition

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## सिक्स सिग्मा का प्रभाव एवं पुस्तकालय प्रबंधन और उपयोगकर्ता की संतुष्टि डॉ० चंद्रमणी कैलास गजभिये\*

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**सारांश :** सिक्स सिग्मा का मौलिक उद्देश्य उपयोगकर्ताओं को संतुष्ट करना है। इस पेपर में शैक्षणिक पुस्तकालय प्रबंधन में सिक्स सिग्मा के उपयोग की समीक्षा की है। कीस क्रम में आवश्यक महत्वपूर्ण सफलता और पुस्तकालय के लिये उपयोगकर्ताओं को महत्वपूर्ण बेहतर सेवा प्रदान कर रहे हैं इस तरह के मुद्दों के लिये महत्व दिया है। इस पेपर का उद्देश्य शैक्षणिक पुस्तकालय प्रबंधन में छह सिग्मा का उपयोग विस्तार से करने में मदद करता है।

**मुख्य शब्द :** वैज्ञानिक सिद्धांत, व्यापार, पुस्तकालय, व्यवसाय प्रबंधन आदि।

**प्रस्तावना :** सिक्स सिग्मा आधुनिक पुस्तकालय प्रबंधन प्रणाली के द्वारा प्राप्त किये जा रहे उद्देश्यों को प्रभावशाली बनाता है। पुस्तकालय और सूचना केंद्रों का अग्रणी उद्देश्य पुस्तकालय उपयोगकर्ताओं की जरूरत को पूरा करने के लिये है। इस लक्ष्य को उचित पुस्तकालय वैज्ञानिक सिद्धांतों पर आधारित प्रबंधन को प्राप्त करना बहुत महत्वपूर्ण लक्ष्य है। सिक्स सिग्मा एक व्यवसाय प्रबंधन की रणनीति को पहचाना और दोष को हटाने का कारण बनता है और निर्माण और व्यापार की प्रक्रिया में कम से कम निष्कर्ष रूप में परिवर्तनशील प्रक्रिया कि गुणवत्ता में सुधार करने के लिये है। किसी भी पुस्तकालय का अंतिम लक्ष्य उपयोगकर्ता की संतुष्टि है। सिक्स सिग्मा को लागू करने से मुल्यांकन करना और पूरे उपयोगकर्ता की आवश्यकताओं को पूरा कर सकता है। पुस्तकालय, इस पुस्तकालय प्रबंधन में सिक्स सिग्मा को लागू करने के लिये जोर देता है कि जिससे गुणवत्ता में सुधार हो। इस अध्ययन के सिद्धांत को अच्छी तरह से सिक्स सिग्मा के प्रबंधन के परिणाम के लिये तलाश है। इसके अलावा यह जानकारी प्रतियोगी दुनिया में और गुणवत्ता सेवा संसाधनों का शुभारंभ करने के लिये है। उपयोगकर्ताओं की संतुष्टि के लिये 6 सिग्मा के कुशल पुस्तकालय सेवा पद्धति के लिये एक उपकरण के रूप में लागू करने के लिये है। सिक्स सिग्मा पुस्तकालय की गुणवत्ता में सुधार करने के लिये, उपयोगकर्ताओं की संतुष्टि और कुशल पुस्तकालय प्रबंधन को अधिकतम प्रयोग में लाया जाता है।

**परिभाषा :** सिक्स सिग्मा एक तत्व है। यह एक उपाय है, और एक पद्धति है कि जो परिप्रेक्ष्य और दोनों उत्पाद और सेवा प्रदान के लिये प्रदर्शन के उच्च स्तर को प्राप्त करने के लिये आवश्यक उपकरणों के साथ उपयोगिता प्रदान करता है।

छह सिग्मा को हैरि और श्रोएडर ने इस प्रकार से परिभाषित किया है – "अत्यंत कठोर डेटा एकत्र करने और सांख्यिकीय विश्लेषण का उपयोग करना यह त्रुटियों के स्रोतों और उन्हें नष्ट करने के तरीके को पहचानने का एक अनुशासित तरीका है"।

सिक्स सिग्मा के माध्यम से छह मानक विचलन के लिए खडा है। यह उत्पाद की गुणवत्ता में सुधार करने के लिये उपयोगकर्ता की आवश्यकताओं को पूरा करने के लिए सांख्यिकीय पद्धति आधारित है। सिक्स सिग्मा प्रक्रिया निष्कर्ष के दोषों के कारणों की पहचान करना और हटाना और विनिर्माण और व्यावसायिक प्रक्रियाओं में कम से कम गुणवत्ता में परिवर्तनशीलता से सुधार करना चाहता है।

सिक्स सिग्मा यह एक अच्छी तरह से संरचित, अनुशासित, बेकार, विनिर्माण क्षेत्र में सभी प्रकार के या गुणवत्ता नियंत्रण की समस्याओं, सेवा, वितरण, प्रबंधन और अन्य व्यावसायिक कि यह एक व्यापार रणनीति है कि कर्मियों को काफी डिजाइन द्वारा अपने प्रदर्शन में सुधार करने की अनुमति देता है और रोजमर्रा के व्यापार की निगरानी करता है।

सांख्यिकीय तरीकों सहित गुणवत्ता प्रबंधन के तरीकों, का एक सेट का उपयोग करता है, और संगठन के भीतर लोगों के एक विशेष बुनियादी ढांचे "ब्लैक बेल्ट" "ग्रीन बेल्ट" आदि जो इन तरीकों में विशेषज्ञ है, प्रत्येक सिक्स सिग्मा एक संगठन के भीतर बाहर के परियोजना कदम की एक परिभाषित क्रम, इस प्रकार है और मात्र निर्धारित लक्ष्य है। इन लक्ष्यों को वित्तीय लागत में हानी या लाभ में वृद्धि कर सकते हैं या जो कुछ भी है कि प्रक्रिया के उपयोगकर्ता के समय चक्र, सुरक्षा, वितरण, आदि के लिए महत्वपूर्ण है सिक्स सिग्मा को और परिभाषित किया जा सकता है इसको समझने के तीन अलग स्तर पर है। मीट्रिक पद्धति और दर्शन सरल शब्दों में हम कह सकते हैं कि सिक्स सिग्मा एक गुणवत्ता में सुधार है।

**सिक्स सिग्मा के लाभ :**

1. उपयोगकर्ता की जरूरतों का प्रबंधन करने में मदद करता है।
2. जरूरत आवश्यकताओं को प्राप्त करने के लिए महत्वपूर्ण प्रक्रिया को समझता है।
3. डेटा विश्लेषण में सटीकता का दोहन करने के लिए प्रक्रिया में दोष को कम करता है।
4. तेजी से विकास लाने और प्रबंधन की प्रक्रिया में सुधार करता है।
5. न्यूनतम और अधिकतम उपयोगकर्ताओं की संतुष्टि का प्रयास करता है।
6. बजाय स्मार्ट कठिन काम में मदद करता है।



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## **Contemplations of Annabhau Sathe and hard work of Today's Woman**

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### **Abstract:**

Annabhau Sathe was enraged about the general public what splits people between cast, race, religion and sexual orientation. His writing laments for this cruel and unfair social framework. Through his writing he predominantly emerge his voice against unapproachability just as pull of ladies in social framework. He imagined that lady is likewise a person and she should be regarded as an individual. He needed to end the sexual orientation abuse. The current examination paper will going to examine his considerations about ladies and its significance to the present ladies issues.

**Keywords:** Annabhau Sathe; Cruel and unfair social framework; Sexual orientation abuse; Ladies issues

### **Introduction**

Annabhau Sathe is a significant name in Marathi writing as well as in the entire Indian scholarly world. He explains contemplations of human pride. He battled for the foundation of qualities like equity, equity, opportunity and fraternity. He composed with the position to build up these qualities. At the point when we contemplate present day Marathi Literature we understand that Annabhau Sathe dealt with numerous methods of writing like anthems, stories, books, assortment of stories, Lavani, folkdrama and he alone composed with the position of liberation of human structure his anguish. His all writing uncovers progressive contemplations, preventing any sort from getting double-dealing. He needed to change current social framework.

Annabhau Sathe : Writer, dissident and thinker. Annabhau was brought into the world in Mang people group, an unapproachable cast in India. He was unable to learn due to





## The Role of Bal Gangadhar Tilak In Indian Freedom Fight

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### Abstract :

Tilak claim that 'Swaraj is my birth right' his priority to *swaraj* is rational and not emotional, Tilak guarantee of good human life, ideas. Tilak was the first Indian leader to understand the full importance of organized public opinion, moral justification for the struggle. For Swaraj-Political Emancipation, contribution is lost. Tilak has developed his own programme for building up the freedom struggle. Tilak had pivotal role in the Indian Freedom Struggle.

*Keywords : freedom movement, british rule, swaraj*

### Introduction :

Lokmanya Tilak was one of the main architects of India's Freedom movement. Lokmanya Tilak, in his long political career, organized mass-movements, and involved people in different struggles against the British. When there was famine in Maharashtra, in 1886, he organized the peasants and pressurized the British government to give relief to farmers, according to the 'Famine Code' passed by the Government. When Bengal was partitioned by Lord Curzon, Tilak, along with Lala Lajpat Rai and Bipin Chandra Pal, converted the agitation against the injustice to Bengal into an all-India struggle. In order to enable the common man to participate in this struggle. Tilak gave the nation his famous four-point programme: Swadeshi, Boycott, National Education and Swaraj. The British Government leveled the charge of sedition against Tilak, and he had to suffer two terms of imprisonment one of eighteen months and the other of six years. Tilak's unflinching courage and great sacrifice made him a symbol of India's aspiration for freedom.

Tilak played a key role as an activist, agitator and a thinker in Indian freedom struggle. In Indian freedom struggle Tilak's image built as 'Father of Indian Unrest', as an ardent

## ■ Catalysis

# Sulfamic Acid as Versatile Green Catalyst Used For Synthetic Organic Chemistry: A Comprehensive Update

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In recent times, synthetic organic reactions have gained significant attention as they are becoming a versatile tool in the synthesis of pharmaceuticals, agrochemicals and their intermediates. Sulfamic acid (SA) is an acid catalyst that demonstrated high efficiency in various organic transformations that will be highlighted in this review. These include efforts to develop green approaches using SA catalyst for the C–C bond formation reactions and functional group trans-

formations, as well as the synthesis of various O- and N-heterocyclic compounds and other miscellaneous reactions including multicomponent reactions. The easy recovery (for subsequent reuse) of the catalyst by filtration without the need for solvents is an important advantage of SA catalyst. In this review, SA promoted greener methodologies that were developed and the applicability of these methodologies are addressed.

## 1. Introduction

Sulfamic acid (SA) having the chemical formula ( $\text{H}_2\text{NSO}_3\text{H}$ ) was long recognized as a commercially important amino acid exhibiting mild acidity compared to other strong acids such as sulphuric acid. Even though SA was probably known more than a century ago,<sup>[1]</sup> successful isolation and identification of this acid was signalled by the work of Berglund<sup>[2]</sup> about eighty years ago. Sulfamic acid now available as a commercially inexpensive, odourless white crystalline solid is non-hygroscopic and non-volatile, making it possible to store in the lab over prolonged periods of time. It is moderately soluble in water and formamide, exhibiting high ionization and formation of

strongly acidic aqueous solutions. However, the solubility of SA in other media such as methanol, ethanol, acetone and hydrocarbons is almost negligible. This acid exhibits outstanding physical properties and stability, making it suitable for a wide variety of applications including its use as a trimetric standard,<sup>[3]</sup> and the use of its derivatives such as ammonium sulfamate in herbicides and flame proofing agents for combustible materials.<sup>[4]</sup> Other derivatives, namely, N,N'-alkylidene bisamide, are used in pharmaceuticals.<sup>[5]</sup> Also, a variety of SA derivatives such as O-substituted-, N-substituted, or di-/trisubstituted derivatives are used in a wide range of therapeutic agents such as antibiotics, HIV inhibitors,<sup>[6]</sup> anti-cancer drugs, anti-epileptic drugs, and weight loss drugs.<sup>[7]</sup> In addition, the zwitterionic nature of sulfamic acid ( $^+\text{NH}_3\text{-SO}_3^-$ ) provides a safe, nontoxic alternative to hydrochloric acid in a large variety of cleaning products and rust removing agents.<sup>[8]</sup> This zwitterionic acid is also used as a heterogeneous catalyst that can be easily recovered for subsequent reuse by simple filtration.<sup>[9]</sup> Accordingly, SA is recognized as an efficient and economically feasible green catalyst in organic transformations,<sup>[10–14]</sup> including functional group protections and deprotections,<sup>[15]</sup> synthesis of isoamyl acetate,<sup>[16]</sup> polymeric ethers,<sup>[17]</sup> esterification,<sup>[18]</sup> acetylation of alcohols and phenols,<sup>[19]</sup>  $\alpha$ -amino nitrile formation,<sup>[20]</sup> tetrahydropyranlation of alcohols,<sup>[21]</sup> and transesterification of  $\beta$ -ketoesters.<sup>[22]</sup> Further, other important organic reactions such as Beckmann rearrangement,<sup>[23]</sup> inter- and intra-molecular imino Diels-Alder reactions,<sup>[24]</sup> and Pechmann<sup>[25]</sup> and Biginelli condensations,<sup>[26]</sup> were successfully realized by the employment of SA of particular importance, owing to its zwitterionic nature and ability to form soluble metal complexes, sulfamic acid is a highly ionized, non-volatile acid, which is safely and eco-friendly used while avoiding the precipitation of undesirable insoluble salts.<sup>[27–30]</sup>

In spite of the fact that review articles dedicated to SA are already available, the continuous and exponential growth of interest in this unique solid acid calls for frequent updates on

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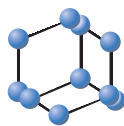
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# Biogenic Synthesis of Metal/Metal Oxide Nanostructured Materials



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**Abstract:** Nanotechnology is an emerging outlet of nanoscience in which the atoms are encompassed in nanoscale dimensions and become more receptive compared with their distinctive counterparts. Recently, the utilization of synthetic designs and physicochemical approaches has received special attention; nevertheless, the generation of noxious impressions on the eco-system has raised serious concerns of the scientific community worldwide. Presently, environment-friendly green synthesis routes are promising venues for the arrangement of Metal/Metal Oxide (M/MO) nanostructured materials by using plants and their corresponding alliances. This revolution is predominantly recompensing as far as the reduction of toxic emissions and wastes is concerned. Accordingly, material scientists have adopted various renewable naturally-occurring eco-friendly materials, and biogenic processes to fabricate the functional M/MO nanostructured materials. The current review article recapitulates and assimilates the present state of knowledge on different strategies for biogenic fabrication of M/MO nanostructured materials.

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## 1. INTRODUCTION

Nanotechnology and its possible technological applications are the division of a modern discipline, which covinants with the investigation of nanostructure matter [1-4]. This branch of science is concerned with the properties and applications of nanoscale materials and expands their domain into the dissimilar arenas of modern science like chemical-pharma, construction industries, bioengineering, and so forth [3-7]. Currently, green approaches are noteworthy for the forthcoming employment of Metal/Metal Oxide (M/MO) nanostructures in diverse prospective applications. This should lead to further expanding the role of non-toxic, environmentally friendly M/MO nanostructure in a wide variety of nano-technological applications [8-13].

Different types of environment-friendly solvents and reducing agents were employed for the synthesis of nanostructured materials with reduced dimensions, and

demonstrated efficient tuning of their morphological features, and modification of their exceptional physicochemical properties, thus, enhancing the potential impact of further utilization of nanostructured materials [9-12, 14, 15]. Generally, the well-known top-down and bottom-up processes are two distinctive approaches to the synthesis of nanostructured materials [16-18]. In the top-down process, large particles of the materials are broken down into smaller fine particles *via* size reduction techniques, such as grinding, milling, sputtering, thermal/laser ablation, *etc.* (Scheme 1). However, the bottom-up approach employs several chemical and physical synthesis techniques for the production of highly effective nanostructured materials, including sol-gel, aerosol, hydrothermal, physical and chemical vapor deposition, precipitation photo-deposition, sputtering, and pulsed electro-deposition [19-26] (Scheme 1). Countless nanostructured materials are currently produced commercially for applications including catalysis, water purification, biomedical, energy storage, food, and agriculture, but they tend to accumulate intra-cellular, making it difficult to be removed from living tissues, in addition to the drawback of their negative impacts on the eco-system due to their noxiousness [13-17, 27, 28].

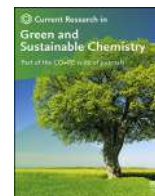
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## Green synthesis of cobalt oxide thin films as an electrode material for electrochemical capacitor application



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### ABSTRACT

In this study, we report on the fabrication and characterization of cobalt oxide (Co<sub>3</sub>O<sub>4</sub>) thin film that is potentially important for electrochemical capacitor applications. For that purpose, the precursor powder of Co<sub>3</sub>O<sub>4</sub> was prepared using the cost-effective sol-gel synthesis route and heat treatment at a relatively low temperature. A thin film of Co<sub>3</sub>O<sub>4</sub> was prepared on a fluorine-doped tin oxide (FTO) substrate using a simple doctor-blade method. X-ray diffraction and Raman spectroscopy confirmed the formation of pure Co<sub>3</sub>O<sub>4</sub> thin film on FTO, and scanning and transmission electron microscopy confirmed the nanoscale nature of the particles in the film. The electrochemical studies revealed a specific capacitance of 237 F g<sup>-1</sup> for the Co<sub>3</sub>O<sub>4</sub> electrode, with a remarkable cycling stability in 1 M NaOH electrolyte, and 77% capacity retention after 2000 cycles at 5 mA cm<sup>-2</sup> current density (833 mA g<sup>-1</sup>); this demonstrates that Co<sub>3</sub>O<sub>4</sub> is a promising material for electrochemical devices. Further, the electrochemical impedance measurements revealed an internal (solution) of 10 Ω, whereas the charge transfer resistance between the electrode and the electrolyte was roughly 40 Ω.

### 1. Introduction

The accelerated increase in energy demand to foster sustainable social and economic development, coupled with the inefficiency of fossil fuel to meet these demands and the global environmental objectives, are strong driving forces toward a new energy transformation era. To address these issues, search for clean energy sources and development of efficient designs for energy harvesting and storage had become of utmost importance. The electrochemical capacitor (EC), or the supercapacitor, emerged as a potentially important energy storage device that offers several advantages including high power density, fast charge/discharge rates, long cycle lifetime, wide range of operating temperatures, environmental friendliness and safety [1–3]. These features are expected to place ECs in the list of important solutions for future energy management and the provision of high-pulse power needed for a variety of applications [1–4]. ECs are used as power sources for emergency energy applications, low-voltage portable devices such as cameras, computers, and

mobile phones, and energy generating systems [3–5a]. To meet the requirements of a power source, appropriate electrode materials are needed to ensure satisfactory performance of a supercapacitor. To that end, several materials such as carbon materials, conducting polymers, metal<sup>5b-f</sup>, metal sulfides, metal hydrides, metal carbides, metal nitrides, metal hydroxides, metal oxides [1–5g] and metal oxyhydroxides<sup>5h-i</sup> were used. In the middle of these electrode materials, hydrous ruthenium dioxide (RuO<sub>2</sub>) finds a unique potential due to its high conductivity and substantial environmental, chemical and thermal stabilities. Nevertheless, several factors such as its high cost, scarcity, and toxic nature are prohibitive to commercial implementation [6]. Therefore, cheaper metal oxides with various oxidation states and excellent electrochemical behaviors, including nickel oxide [7], manganese oxide [8], cobalt oxide [9], iron oxide [10], etc., can be appropriate alternatives to RuO<sub>2</sub>. On the other hand, cobalt oxide (Co<sub>3</sub>O<sub>4</sub>) demonstrated suitable functionality as an electrode material in pseudo capacitors [11,12]. This spinel oxide material is one of the most important metal oxides due to its abundance

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## Remote Sensing and GIS Based Comparative study of watershed of different Physiographic Conditions, Wainganga Sub Basin, Maharashtra

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### ABSTRACT

The present study carried by a Wainganga river basin is of critical importance for Maharashtra to preserve its watershed, drainage, relief, soil, forests, wildlife, and tribal population dependent on it. Protecting the basin however does not seem to be priority for the state. The very lifeline of the Wainganga River is being subjected to growing pressure. Its flow has already been obstructed at several places with dams and barrages. By 2012 there were as many as 149 dams built in Wainganga basin. The river in its initial reaches flow westwards and thereafter southwards in M.P. State and continues to flow Southwards in Maharashtra State. Several studies related to different aspects of channel cross section and longitudinal profile river have been carried out from different parts of the country and abroad. Recent emphasis is placed on quantitative geomorphology of drainage basin by various methods and measures to establish the interrelationship of cross section and longitudinal profile river and to impact on river morphology. Water is not only for sustains of life but also determines the quality of life. Assessing water quality is important as quantity in water resources planning and management. It may be observed that the existence of human being a lot of serious problem to disturbance of quality and quantity of water. There are several reasons for scarcity of water and most important things to the increasing population and changing environment condition in the local as well as world level. For sustainable development requirement to that fresh water is indispensable for human survival. Water is being transferred to irrigation and urban industrial uses, putting additional stress on the performance of the irrigation sector. Keeping in mind the scarcity of water resources to cater to the multi various needs of the growing population along the Wainganga River with the vagaries of monsoon precipitation and dearth for quality of water. The purpose of the present research work is to describe the physical condition in Wainganga drainage basin as a system unit resulting from the interaction between landuse & landcover and topography, which is an impact of socio economic condition and surrounding area or region.

**Keywords** – Wainganga River, GIS, RS, Physiographic Condition



## **APPRAISAL OF TRIBAL DEVELOPMENT EFFORTS BY GOVERNMENT OF INDIA- A CASE STUDY**

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It is important to know the status of the Tribal population in India; its characteristics and distribution of the same in various part of India. But it is not easy to define a tribe, in general, the tribal are expected to possess some unique characteristics. In present era still lot to do for Tribal Population to bring them in main flow of overall development. Government of India continuously focused to upliftment of Economical, Social and Cultural values. Government has made policies to ensure the Tribal development. Before construct the solid structure of development it is important to study the characteristics of the Tribal population. Over all the characteristics of all tribal communities are different from each other. Therefore Government made policies for micro level to ensure the 100% success rate of implementation of policies. The Government of India has specified 427 communities and has included them in the Schedule Tribes and are entitled to Special protection and privileges under the constitution of India. According to census 2011 it shares 8.6% of the total population of India; which was 10.45 crore.

It is not easy to define a tribe, in general, the tribal are expected to posses some if not all the following characteristics:

1. Their roots in the soil date back to a very early period.
2. They live in relative isolation of the hills and forests
3. Their sense of history is shallow in the sense that after some generations, the remembered history tends to shade off into mythology.
4. They have a low level of techno-economic development
5. In terms of their cultural ethos (language, institution, beliefs and customs) they stand out from the other sections of the society and
6. Even if they are not egalitarian, they are at least non hierarchic and undifferentiated.

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## Study on butterfly diversity in and around Sakoli, District Bhandara, Maharashtra

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### ABSTRACT

A study on butterfly diversity was carried out in and around Sakoli dist. Bhandara, Maharashtra. Some selected areas in the city and nearby villages were surveyed. A total of 86 species belongs to the family Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperidae were recorded during the study period. Maximum of 33 species from Nymphalidae, followed by Lycaenidae (21), Pieridae (12), Hesperidae (12) while minimum Papilionidae (8) contributing 59 genera. Nymphalidae with 22 followed by Lycaenidae (18), Hesperidae (10) and Pieridae (8) are some of major genera. The minimum of genera reported from Papilionidae (3). In this study, the butterflies were categorized as very common, common, not rare, rare and very rare. The total of butterflies recorded as very common (38%), common (23%), not rare (8%), rare (19%) and found to be very rare (12%). From the present study, it reveals that the butterflies in and around Sakoli are rich in diversity.

**Key words:** Butterfly, Diversity, Abundance, Sakoli, Maharashtra.

### INTRODUCTION

The butterflies (Lepidoptera) are diverse in form of shape, size and color. They have a great significance of their great aesthetic value and ecological benefits. They found to be vanishing from the surrounding vicinity due to escalating urbanization and many of anthropogenic activities. Their presence in a habitat gives an information concern of host plant as they spend their developmental stages over there, also important in food chain, providing food for birds, reptiles, bats etc. Globally 19238 species were documented by Heppner (1998), 1504 species from Indian subcontinent (Gaonkar 1996; Smetacek 1992), 177 species from Central India (Vidharbha, Madhya Pradesh and Chhattisgarh) by D' Abreau (1931), Tiple (2011) reported 167 species of butterflies. Some of the important contribution in butterflies studies are de Niceville (1886), Marshall and Niceville (1882), Kunte (2000), Mathew and Rahamathulla (1993), Lewis

(1973), Sharma *et al.*, (2006), Kehimkar (2008, 2011), Tiple and Khurad (2009), Tiple (2011), etc. Fewer work on diversity of butterflies were recognized from Bhandara and Gondia district such as Bhandarkar and Paliwal (2015), Paliwal and Bhandarkar (2019), Ganvir and Khaparde (2018). The present study is a report of butterfly diversity from the urban and semi urban region in and around Sakoli. The study will be helpful to understand the current status to organize a checklist and further Environmental Impact Assessment studies in the region.

### MATERIALS AND METHODS

Sakoli city is located on NH 6 (N21.0776, E80.0132) surrounded by ponds, lakes and shrub forest. Navegaon-Nagzira Tiger Reserve is close to the city. The study was conceded from monsoon to late winter season in the year 2020. The survey carried out daily to every site during 08:00AM to 13:00 PM. The





## First Report of Square Spotted Gecko, *Hemidactylus gracilis* Blanford, 1870 (Squamata: Sauria: Gekkonidae) from Bhandara District Maharashtra, India

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### ABSTRACT

*Hemidactylus gracilis* is common to India and it has an extensive distribution in central India and northern Western Ghats but inadequately known for its distribution. Few distribution reports were available in Maharashtra. It is also known as common in eastern Vidarbha. The distribution reports of *Hemidactylus gracilis* are incomplete in the state of Maharashtra. In the opportunistic survey this species reported for the first time from the Bhandara district of Maharashtra. As per assessment report it is come under Least Concern by IUCN. The present paper deals with the Identification and locality/distribution of the *H. gracilis* species with reference to first report of locality/distribution in Bhandara district of eastern Vidarbha region.

**Key words:** *Hemidactylus gracilis*, New Location, Distribution, Bhandara District, Maharashtra, India.

### INTRODUCTION

The genus *Hemidactylus* Oken 1817 is one of the most species rich genus of the family Gekkonidae and widely distributed of all reptile genera, been found in the tropical and subtropical regions of the world and hundreds of continental and oceanic islands. However, the great majority of *Hemidactylus* species has relatively small distributions confined to southern Asia and Africa (Dandge and Tiple 2015). *Hemidactylus* geckos remain poorly known with a number of recent descriptions and taxonomic works significantly altering the view of both regional and local diversity (Zug et al. 2007; Giri 2008; Giri and Bauer 2008; Giri et al. 2009; Mahony 2009; Bauer et al. 2010a, 2010b; Agarwal et al. 2011). The genus *Hemidactylus* with 144 species were documented worldwide (Uetz and Hošek 2016).

*Hemidactylus gracilis*, Blanford, 1870 is also known as graceful leaf-toed gecko or square spotted

gecko. It is small sized gecko found in Indian sub-region, exclusively endemic and mostly from the climatically diversified geographical zones in India like plains of Ganga and Yamuna, Eastern Ghats, Western Ghats, Eastern Himalaya, Western Himalaya, Central and Peninsular India. This ground-dwelling gecko occurs in grasslands, scrubland and dry forest, with a preference for well-wooded areas, where it is reported to occur under rocks, cracks and crevices in the ground (Bauer et al. 2005). It has nocturnal and insectivorous in habit.

Blandford described the *H. gracilis* based on four collected specimens, two each from "S. E. Berar (Yawatmal District, Maharashtra) and Raipur Chhattisgarh (MP) (Bauer et al. 2005). Also recorded from Nagarjunakonda Hill of Nalgonda district in Andhra Pradesh, Mahavali of Pune district; Wai and Alandi in Satara district; Chanda, Berar, and Bilimora in Maharashtra (Tikadar and Sharma 1992).





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## A Report of Asian Long Tailed Tree Mouse *Vandeleuria oleracea* (Bennett 1932) In Agroecosystem of Surban Village, Gondia, Maharashtra

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### ABSTRACT

The small mammal found nearly all ecosystems, plays an important role in the environment which fills an important ecological niche. As a primary consumer in food chain they have impact on plant sources, also they become a food source for predators. The diversity of rodents and their distribution always be different habitats and depend on the different environmental factors. From the several reports it is seen that the rodent's abundance found to be high in modified habitat. The present report is based on the sighting of rodents in agro ecosystem of Surban village in Gondia district of Maharashtra in December 2021. The observation on the occurrence of Asian long tailed tree mouse, *Vandeleuria oleracea* reveals that the species prefer a specific habitat and spent its life span using complex environmental measures that define a particular habitat.

**Key words:** Vandeleuria, Rodentia, Agroecosystem, Gondia, Maharashtra.

### INTRODUCTION

Rodentia is a largest order of Mammals comprising 2277 species in 481 genera under 33 families (Wilson & Reeder 2005). Rodents include squirrels, rats, mice voles, gerbils, hamsters, dormices, porcupines etc. They are all mainly herbivores and their modes of feeding habits include gnawing, scraping or nibbling. Rodents are economically important as some of them are serious pests destroying crops, fruit gardens, orchards, stored food grains. They have high breeding rate and many show periodic increase in the population with the availability of food. Rodents are important link in food chain between plants and the carnivorous predators hence it plays an important role in ecosystems. One of the important things in the rodent species they always prefer a specific habitat throughout its life span using the complex environmental measures that define a particular

habitat. Hence, these can be used as indicator monitoring the distribution as well as the density to indicate the health of biotic system (William & Lidickes 1989). Out of 33 families of rodents found in the world, seven families namely Sciuridae, Dipodidae, Platacanthomyidae, Spalacidae, Cricetidae, Muridae and Hystricidae occur in India. Family Muridae is the largest family represented in India by 21 genera and 56 species followed by family Sciuridae having 13 genera and 27 species (Pradhan & Talmale 2009). Reports of rodents are scanty, only with few reports such as Pradhan, 1994; Paliwal & Bhandarkar 2015 documented 14 species of rodents from Navegaon National Park and its surroundings. In the present observation, the organism was found in the agriculture field particularly at junction box. On its occurrence, its morphology, habitat, distribution and treats is discussed in the paper.



## Physico-Chemical Parameters as Tool of Water Pollution Assessment with Reference to Aquatic Ecosystem

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### ABSTRACT

Ecologists have long been fascinated by the aquatic ecosystem. Many researches, water supply organizations, and pollution control authorities study stagnant and rushing waterways on a regular basis for a variety of reasons. The aquatic ecosystem is a great place to learn about different ecological roles. The study of these systems is not only fascinating, but also vital to human well-being and survival. Dissolved oxygen, Carbon dioxide, pH, temperature, Nitrogen, Phosphorus and Nutrients are some of physico-chemical properties which we are acquainted with. Toxicants like pesticides, herbicides, and metals are also measured with this. Physico-chemical analysis reveals what is affecting the ecosystem. Although physico-chemical analysis can pinpoint the source of the problem, they only provide a limited picture of how contaminants are affecting organisms and plants. Contaminants are lastly being absorbed by aquatic ecosystems. Anthropogenic activities such as urbanization, industrialization, and agricultural operations contribute to water pollution. Pesticides and fertilizers used excessively, as well as waste from residential and industrial sectors, end up in the aquatic environment. Contamination of aquatic environments is one of the most common kinds of pollution, and it has serious health and death consequences. Water has a natural ability to neutralize pollution, but when contamination becomes uncontrollable, water loses its ability to self-generate. As a result, pollution discharge into neighbouring aquatic environments must be monitored and controlled on a regular basis.

**Keywords:** Physicochemical parameter, Water pollution, Assessment, Aquatic ecosystem

### I. INTRODUCTION

#### 1.1. Background:

Water is everywhere on earth in the various forms, without water life can't exist over earth, in other words it is elixir of life. All form of life specifically the organism which acquire aquatic mode of life need a water of specific contents. The lentic or lotic form of aquatic ecosystem resources provides the good benefits of its vital nature of water to all the life forms. Water also used for various purposes viz. irrigation to agriculture and as



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## 19. Water and Water Resources Development in a Sustainable Way: Hope for the Future

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### Abstract

Reduced water use and waste water recycling for various applications such as cleaning, manufacturing, and agricultural irrigation are examples of sustainable water resource development. The value of water resource assessment and its foundation, hydrological measurements, for long-term development is established. Hydrological and water resource systems are only seen as a part of a larger, more complicated global system. As a result, a holistic approach is recommended, which considers existing interrelationships and interfaces with other subsystems, such as social, economic, and ecological ones. Rivers and lakes have been subjected to a variety of social, ecological, and economic pressures over time, making them susceptible to change. In the present paper the highlights on current scenario of water status and future strategies are discussed.

**Key words:** Water Resources, Sustainable Development, Conservation, Strategies

### Introduction

Water availability in sufficient quantity and quality is a need for long-term growth. Water, the most fundamental component of the planet's life support system, is required to maintain all forms of life and almost all human activities. Sustainable development is a term that has been used in the management of renewable natural resources to assure that the pace at which a resource is harvested is less than the rate at which it is renewed (Kundzewicz, 1997). World has the power to make development sustainable to assurance that it satisfies current demands without jeopardizing future generations' ability to satisfy their own needs (WCED, 1987). The Brundtland Commission (World Commission on Environment and Development) concentrated



## 18. Environmental Awareness for Water Conservation in India: Policies of Sustainable Approach

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Assistant Professor in Education, Punjabhai Patel College of Education,  
Gondia, Maharashtra

### Abstract

Understanding the weakness of our environment and the need of protecting it is the goal of environmental awareness. Promoting environmental awareness is a simple approach to become an environmental warden and help our community have a brighter future. Environmental awareness educates us to the urgent need to cease damaging the environment and begin repairing the damage we have caused. Water scarcity in many parts of India is familiar for us. The improper use of water and water resources, pollution, low rainfall, water requirement for industries and climate change are some of the key problems behind the scenario. There seems to be no action by the people, or at certainly any good action, until there is awareness. And this activity must begin at the personal level and expand to the individuals and organizations that we are familiar with. The Indian government also started campaign to save water and water resources before many decades ago. In the present paper, some of important schemes, policies, and campaigns regarding awareness for water conservation are involved.

**Key words:** Awareness, Water Scarcity, Water Conservation, campaigns, policies, India

### Introduction

Humans owe it to future generations to conserve the ecosystem and encourage the planet's long-term growth. The protracted health and welfare of animals, plants, and humans is threatened by environmental deterioration. It is more vital than ever to be aware of the environmental consequences of our actions. We must take steps to conserve the earth and, perhaps, repair some of the harm already done by human activities to become more sensitive to the environment. Water is an elixir of life forms. However, our planet's commodities are rapidly



## 14. A Study on Smart Energy Systems and Sustainable Future: Aspects, Challenges and Prospects

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**Sudhir V. Bhandarkar**

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### **Abstract**

This article is about the recent development in the field of Smart Energy System as related to the sustainable development. This is an effort to review scientific literature related to the field. A number of papers were referred to, elaborate on contribution to the scientific understanding as to design and implement appropriate and cost effective ways for future of sustainable energy. The idea of Smart Energy Systems (SES) accentuates on being coherent and multispectral to find out best solutions and active conventional and modern techniques.

Recently the terms "Smart Energy" and "Smart Energy Systems" are extensively used to replace the term "Smart grid. SES applies integrated holistic approach in order to include various sectors like electricity, industry, transportation, heating, cooling, and buildings. It identifies solutions which are affordable and feasible to transform renewable and sustainable energy. SES defines, identifies, models and integrates the storage of energy in smart way.

From the study it conclusion can be drawn development approach is vital for the enactment energy goals locally and globally for the sustainable development.

**Keywords:** Smart energy, Renewables, Sustainability, System integration

### **Introduction**

According to Lund<sup>[1]</sup> SES is "an approach in which smart electricity, thermal and gas grids are combined with storage technologies and coordinated to identify synergies between them in order to achieve an optimal solution for each individual sector as well as for the overall energy system". SES requires three types of studies First, "smart", which highlights control and management using the artificial intelligence approach. Second is the study of evolution of the



## Open Source Software in Library Dr. Chandramani Kailash Gajbhiye\*

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**Abstract :** Today's librarian is using a variety of open source software for various purposes such as library automation, digitization, institutional repository, content management. Libraries face huge challenges. The entire concept of the library has now changed from a collection of books to a single window knowledge bank. This paper discusses the definition and features of open source library management software; the paper briefly describes the features of some open source library management software such as Greenstone Digital Library, DSpace, Koha, e-Prints, etc. Which are useful. To develop a digital library and institutional repository. This paper also highlights initiatives taken to use open source library management software for the development of its digital libraries in India.

**Keywords:** Library, Software, Greenstone Digital Library, DSpace, Koha, e-Prints, etc.

**Introduction :** "Open source software is computer software whose source code was available under a license (or arrangement such as the public domain) that allows users to study, change, and improve the software, and to re-allocate it in modified or unmodified form (1)". "It is often developed in a everyone, collective manner. This is the most remarkable example of open source development and often related to user generated content. Organizing their books and other media can be a difficult task for many libraries, especially at the library grows with more material. The crude card catalogue system (remembers the Dewey Decimal System) of the years kept things organized, but difficult to maintain.(2)" With computing technology today, organizing our libraries has never been easier or more efficient. In card catalogues and in some libraries, it is much easier to find a book via an internet and internet connection and pick it up on your arrival, rather than wasting the time you spend looking for your next read. Now just because the world is stacked with amazing software solutions that make it easy to do everything, it doesn't mean that every library in the universe is using these solutions. More libraries do not have huge accounts of money to burn, and what they find usually goes to purchase additional resources.

### Open Source Software for Libraries

#### Library Automation :

**Koha: Integrated Library System :** Koha is a encouraging full featured open source integrated library system (ILS ) presently being used by libraries all over the world. For those of you out there unknown of what an integrated library system (ILS) is, well, it is a system of keeping track of the application of a library - payroll, purchases, expenses, and most essentially, keeping track of the different media being checked out by the librarians supporter. More smaller libraries cannot manage to purchase, install, and maintain an ILS, and Koha is a perfect substitute. Koha is created using library ILS standards and uses the open public access catalog (OPAC) combine. In addition, Koha has no vendorlock in, so libraries can receive tech support from any party they choose.

**New Gen Lib :** New Gen Lib (New Generation Library) is an Integrated Library Automation and Networking Solution Developed by Verus Solutions Pvt Ltd and The Kesavan Institute of Information and Knowledge Management, India. In March 2005, New Gen Lib version 1.0 was released and versions 2.0 and 2.1 have come up later. On 9th Jan. 2008, New Gen Lib has been declared Open Source Software under GNU GPL License by the Verus Solutions Pvt Ltd, Hyderabad, India.

**Evergreen :** Evergreen ILS is a different option when investigate open source ILS options. Developed by Equinox Software, Evergreen is a powerful, enterprise level ILS solution developed to be capable of promoting alliance, and offers many features including adjustable administration, work-flow customization, adaptable programming interfaces, and because its open source, cannot be locked away and can prosperify from any public contributions.

#### Digital Library :

**Greenstone Digital Library Software :** Open source software is Greenstone digital library for the structure and presentation of knowledge collections. It shape collections with impressive full-text searching and metadata-



**डॉ. बाबासाहेब आंबेडकर यांचे आधुनिक भारताचे स्वप्न****डॉ. चंद्रमणी कैलाश गजभीये**

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डॉ. बाबासाहेब आंबेडकर यांनी भारताविषयी विचार करित असतांना भविष्यात भारत कसा असावा याविषयी बरीच उपाययोजना सांगितल्या होत्या. पण आज प्रत्यक्षात डॉ. बाबासाहेब आंबेडकर यांचे स्वप्न काही प्रमाणात पूर्ण होतांना दिसत नाही. डॉ. बाबासाहेब आंबेडकर यांनी भाषा आणि प्रांतवार रचना, आधुनिक तंत्रज्ञानाचा उपयोग, शेतीचे राष्ट्रीयकरण, इंजिनियरींग, जलव्यवस्थापन, इलेक्ट्रीक, व्यापार, शिक्षण, सामाजिक, आर्थिक इत्यादि क्षेत्रातमधे विकास आणि उपाययोजना यावर सखोल अभ्यास करून आधुनिक भारताचे स्वप्न बघितले होते.

**डॉ. बाबासाहेब आंबेडकर यांच्याविषयी थोडक्यात आढावा—**

भारताचे पहिले कायदेमंत्री, भारतीय संविधानाचे शिल्पकार, न्यायशास्त्रज्ञ, अर्थशास्त्रज्ञ, राजनितीज्ञ, तत्वज्ञ, समाजसुधारक, पत्रकार वकील दलित बौद्ध चळवळीचे प्रेरणास्थान आणि भारतीय बौद्ध धर्माचे पुनरुज्जीवक महामानव भारतरत्न डॉ. बाबासाहेब आंबेडकर यांचा जन्म १४ एप्रिल १८९१ रोजी झाला. 'प्रचंड बुध्दीमत्ता, समाजासाठी असिम त्याग करणारे, तळगळतील समाजाला हक्क मिळवून देणारे, महाडचा सत्याग्रह, मनुस्मृतीचे देहन, मंदिर सत्याग्रह, शेतक—यांचे कैवारी, गोलमेज परिषद, पुणे करार, स्वतंत्र मजुर पक्ष, बहिष्कृत हितकारिणी सभेची स्थापना, महिलांसाठी कार्य, स्वातंत्र्य लढयात सहभाग अशा कितीतरी गोष्टी बाबासाहेब आंबेडकरांनी आपल्या जीवनात केल्या समाजासाठी आपले संपूर्ण आयुष्य खर्च घातले, समाजातील तळगळतील व्यक्तीचा प्रामुख्याने विचार केला शिक्षणासाठी समाजाच्या कल्याणासाठी आयुष्यभर संघर्ष केला. शिका, संघटीत व्हा आणि संघर्ष करा, असा गुरुमंत्र दिला. असामान्य कर्तृत्व गाजवणारे अस डॉ. बाबासाहेब आंबेडकर होते.<sup>(१)</sup>

डॉ. बाबासाहेब आंबेडकर यांच्या विचारातून आधुनिक भारत कसा असायला हवा हे आपल्याला त्यांच्या लेखनशैली आणि व्याख्यानानामधून दिसून येते याचा आढावा खालीलप्रमाणे घेऊया.

**भाषा आणि प्रांतवार रचना—**

आपल्या देशामधे विविध भाषा बोलल्या जातात, भाषेनुसार राज्याची संकल्पना मांडली यामुळे राज्याची मुख्यवस्था अगदी सुलभतेने राहिल. यामुळे व्यापार सहजतेने केला जाऊ शकतो. जर एखाद्या व्यापाराला एका राज्यातून दुस—या राज्यात जर व्यापार करावयाचा असेल तर त्याला सर्वप्रथम जीथे व्यापार करावयाचा असेल तेथील भाषा शिकणे आवश्यक असेल.<sup>(२)</sup> राज्याला काही अधिकार देऊन राज्याच्या विकास करणे. काळानुसार नव—नवीन योजनांचा अवलंब करावा.

**शेतीचे राष्ट्रीयकरण—**

डॉ. बाबासाहेब आंबेडकर यांनी शेतीचे व्यवस्थापन कशाप्रकारे करावयाचे यांची संकल्पना मांडली. शेतक—यांचा आर्थिक विकास करावयाचा असेल तर शेतीला उद्योग मानून पायाभुत सुविधा पुरविण्यात याव्यात. तळगळतील प्रत्येक व्यक्तीपर्यंत आर्थिक स्रोत पोहोचेल म्हणजे ग्रामीण व्यक्तींच्या मानसिकतेत सकारात्मक बदल घडतील. आर्थिक विपमता जितकी कमी होईल, तितकी जातीय भेदभावाची दरी कमी होईल असे डॉ. बाबासाहेबांना वाटत होते. डॉ. बाबासाहेब आंबेडकर यांनी सर्वात महत्वाची संकल्पना मांडली ती म्हणजे 'शेतीचे



## STUDY OF ROTIFER BIODIVERSITY DURING MONSOON SEASON IN MANDODEVI TEMPLE LAKE, GONDIA (MAHARASHTRA), INDIA

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### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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### ABSTRACT

Rotifer diversity gives a fair idea about the water quality of any lentic or lotic ecosystem. The present study was carried out in monsoon months at two sites of Mandodevi Temple Lake, which reveals that 20 species of rotifers reside in it. *Brachionus*, comprising 35% of the total, is dominant over all other taxa of rotifers. Different diversity indices like Shannon, Simpson, Margalef etc., indicate that Site-II is more rich in species composition of rotifers than Site-I. Site-I shows signs of eutrophication confirmed by the dominance of *Brachionus* species like *B. calyciflorus*, *B. angularis*, *B. falcatus*, *B. caudatus*, *B. forficula*, *B. diversicornis*.

**Keywords:** Diversity indices; lentic ecosystem; Mandodevi Temple Lake; rotifers; zooplankton.

### 1. INTRODUCTION

Lakes are freshwater bodies that generally enhance the aesthetic value of the place where they are situated. Lakes harbor a wide range of diverse aquatic organisms conspicuously include beautiful planktonic organisms such as Protozoans, Phytoplankton and Zooplankton. Zooplankton occupies the second position in the grazing food chain of the freshwater body as primary consumers and

helps in the transfer of energy from lower trophic level to higher trophic level.

The major contributor to Zooplankton is Rotifers. Most of our information on Rotifers is contributed by different researchers between the years 1880 to 1930 which is considered "Golden period of Rotifer Studies". The freshwater habitats of rotifers may include lentic ecosystems, such as ponds, lakes, reservoirs, as well as lotic ecosystems, such as rivers

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or streams [1]. Rotifers are pseudocoelomate, microscopic (100 to 1000  $\mu\text{m}$ ) aquatic organisms found in both freshwater as well as marine water bodies. They are classified under separate minor phylum Rotifera, consisting of about 2000 species worldwide [2]. Popularly, Rotifers are called as 'wheel animalcule' with transparent, soft, cylindrical body covered by thin cuticle with cosmopolitan occurrence.

Diversity of rotifers in lake water reflects the trophic status of a lake. The primary objective of the present study was to identify the variety of rotifers inhabiting the lentic ecosystem and based on our findings, we tried to assess the trophic status of two sampling sites of lake under study.

## 2. MATERIALS AND METHODS

During morning hours, rotifer samples were collected in the monsoon months of July, August and September 2021. About 200 liters of water was filtered through bolting cloth of 40 micron mesh size. The collected water sample was immediately fixed with 4% formalin and later it is concentrated to 30 ml of volume. Rotifer specimens were observed under Metzger-M-Co-axial trinocular digital camera research microscope vision plus-5000 DTM. Species were identified by using keys from Endmondson [3], Battish [4], Dhanpathi [5] etc. Species diversity of two sites was measured using PAST software with the help of different diversity indices like Shannon, Simpson, Margalef, etc.

### 2.1 Study Area

The Google coordinates of Mandodevi Temple Lake are 21°14'24.8"N 80°20'11.8"E (Fig. 1). The temple is very famous for its beautiful landscape, making it the most attractive tourist point in Gondia district. Lake is situated on the other side of the road, where the temple's trust has also built a garden for visitors. Lake is extensively utilized by devotees and neighboring villagers for immersion of Nirmalya and Ganesh idols. For the Zooplankton sampling, two sites of lake were selected, keeping in mind that people frequently utilize one site for various activities and the second site lies opposite the first site, where less interference of people occurs.

## 3. RESULTS AND DISCUSSION

The present study reveals that during the monsoon season, lake water possesses a total of 20 species (Table 1) of rotifers. All belong to order Ploima of

class Monogonata of Phylum Rotifera, distributed into 7 families viz. Branchionidae, Lecanidae, Asplankhidae, Trichotriidae, Trichocercidae, Synchaetidae and Notommatidae. Similarly, Tijare and Thosar [6] reported of 25 species from three lakes of Gadchiroli district. Virani & Makode [7] reported 12 species from Chilai dam water. Meshram and Tijare [8] observed 15 species from the Kannamwar reservoir. Rao [9] reported 17 species from Thandava Reservoir.

As it is apparent from the Table 1, 15 species were recorded from Site-I and a total of 18 species from Site-II during the study period. It is interesting to observe that despite the lesser number of species recorded from the site I, *Brachionus* species showed more diversity than site-II. Another observation was that *B. calyciflorus*, *B. angularis*, *B. falcatus*, *B. caudatus*, *B. forficula* and *B. diversicornis* are more abundant at site-I than site-II. Besides *Brachionus* species, *Asplanchna brighweilli* and *Keratella tropica* are found abundant at site-I. *Brachionus quadridentatus* is not recorded from site-II. As compared to site-II, Site-I is accessed frequently by many tourists and villagers. Various activities like religious immersions, washing, organic discharge of hotels around the area of the temple, cattle washing etc., are regular at site-I may lead to cultural eutrophication of water at this site. Site II is away from people's reach, hence showing more rotifer species richness with low to moderate numbers.

The most common attribute of the eutrophic water bodies is few dominant species with high density [10]. As suggested by many authors [11,12], a lesser rotifer species richness and high abundance of *Brachionus* species can be considered a biological indicator of eutrophication. Different species of *Brachionus* favour higher alkalinity of water [5]. Results of different species diversity indices (Table 2) are used to confirm that Site-II is showing more species richness with uniform abundance reflecting good limnological conditions for sustaining diverse life. It is very apparent from Table 2 that All the results of Shannon, Simpson, Margalef, Evenness showing species richness is Site-II > Site-I. The result of Berger-Parker index is always inverse of species richness. The dominance value at Site-I, is 0.2889 more than that of Site-II, 0.179. This is because the single genus *Brachionus* shows more diversity of species and abundance, reflecting its dominance at Site-I compared to Site-II. Similar results were also obtained by Jeelani & Kaur [13] in different sites of Dal Lake and Sarkar et al. [14] from two urban ponds of Chandannagar, West Bengal.



**Fig. 1. Google map showing study area**

*(Source-File: Gondia in Maharashtra (India).svg. (2021, June 6). Wikimedia Commons, the free media repository. Retrieved 14:05, September 25, 2021 from [https://commons.wikimedia.org/w/index.php?title=File:Gondia\\_in\\_Maharashtra\\_\(India\).svg&oldid=567559500](https://commons.wikimedia.org/w/index.php?title=File:Gondia_in_Maharashtra_(India).svg&oldid=567559500))*



Photo Plate 1. Mandodevi Temple Lake

Table 1. List of Rotifer species from Mandodevi Temple Lake

Phylum Rotifera	Order	Family	Species name	Site I	Site II
		Branchionidae	<i>Brachionus calyciflorus</i>	++	+
		Eherenberg, 1838	<i>Brachionus angularis</i>	++	+
			<i>Brachionus falcatus</i>	++	+
			<i>Brachionus caudatus</i>	++	+
			<i>Brachionus forficula</i>	++	+
			<i>Brachionus quadridentatus</i>	+	-
			<i>Brachionus diversicornis</i>	++	+
			<i>Keratella cochlearis</i>	+	+
			<i>Keratella tropica</i>	++	+
			<i>Anuraeopsis fissa</i>	-	+
		Lecanidae	<i>Lecane decipiens</i>	-	+
		Bsrtos, 1959	<i>Lecane bulla</i>	-	+
			<i>Lecane papuana</i>	+	-
		Asplanknidae	<i>Asplanchna brightwelli</i>	++	+
		Eckstein, 1883	<i>Asplanchna sieboldi</i>	+	+
			<i>Asplanchna priodonta</i>	+	+
<b>Class</b>		Trichotriidae	<i>Trichotria tetractis</i>	-	+
<b>Monogonata</b>	Ploima	Harring, 1913			
	Hudson & Glosse, 1886	Trichocercidae	<i>Trichocerca species</i>	+	+
		Remane, 1933			
		Synchaetidae	<i>Polyarthra vulgaris</i>	+	+
		Remane, 1933			
		Notommatidae	<i>Cephalodela species</i>	-	+
		Hudson & Gosse 1886			

\* - = Absence, + = Presence, ++ = Abundantly present



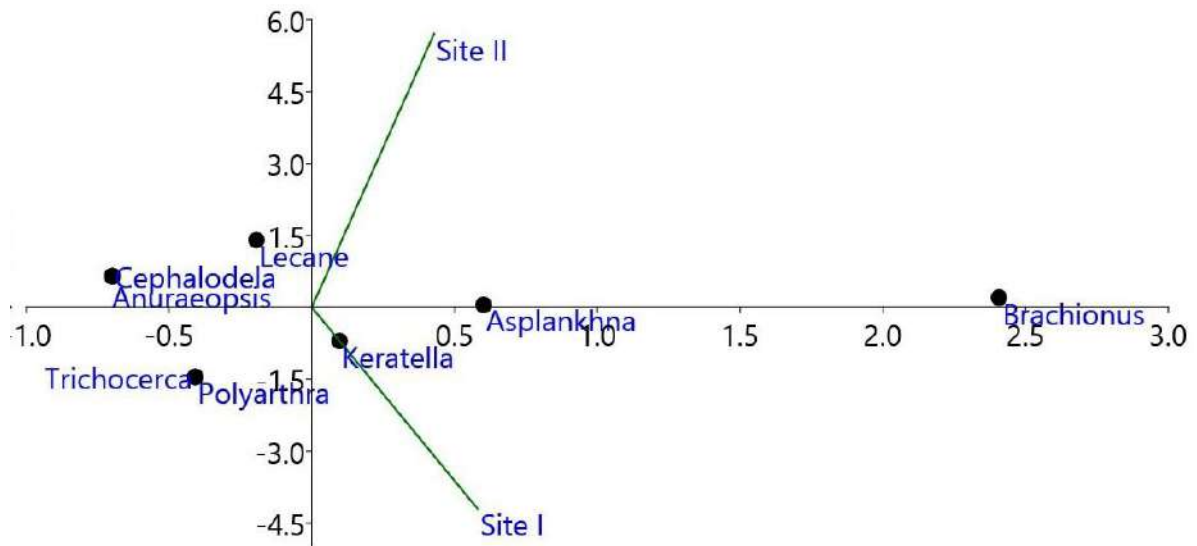


Fig. 2. Biplot showing co-relationship between different genera of Rotifers at both the sites

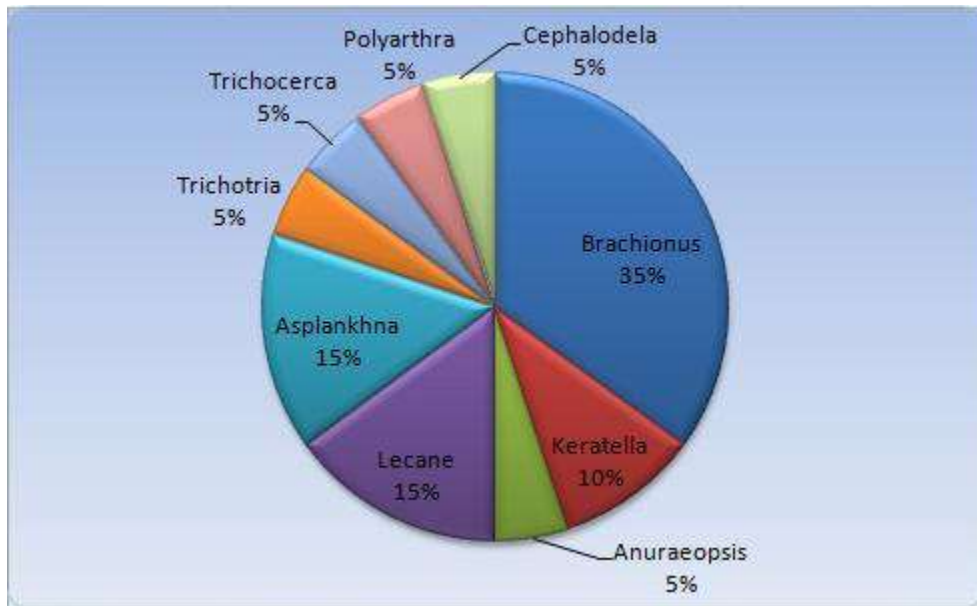
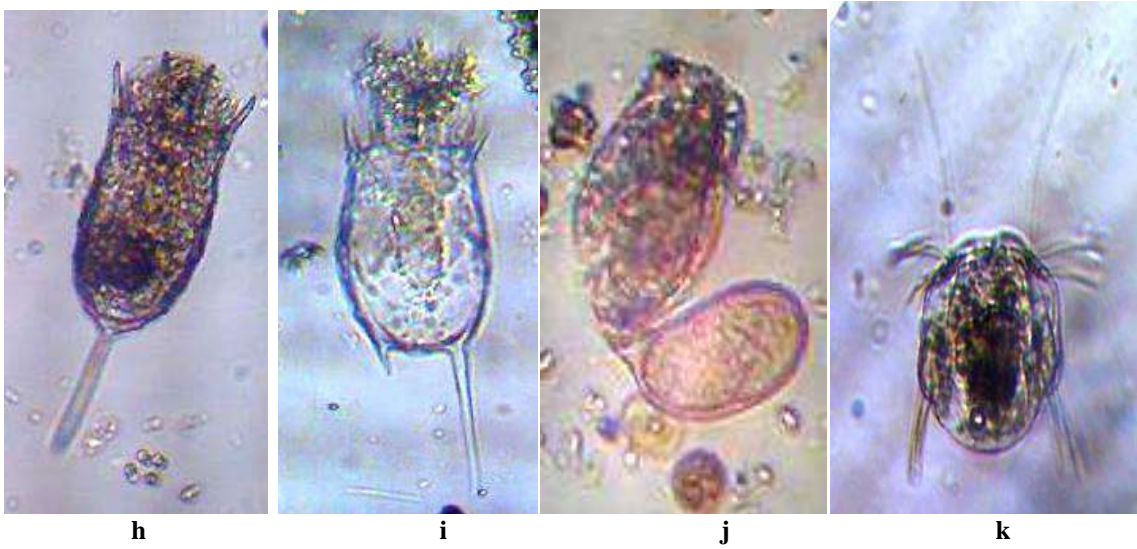
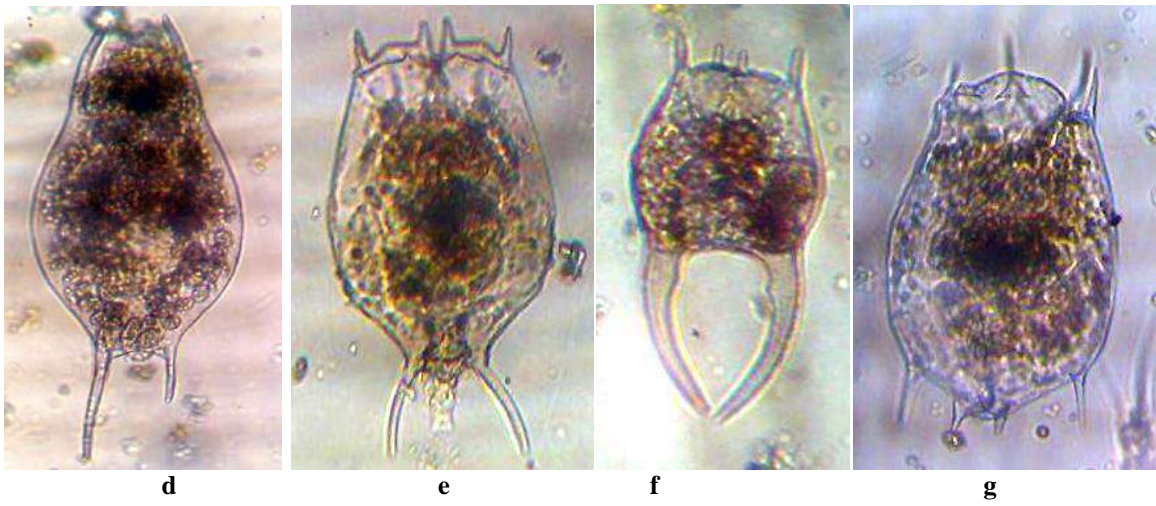
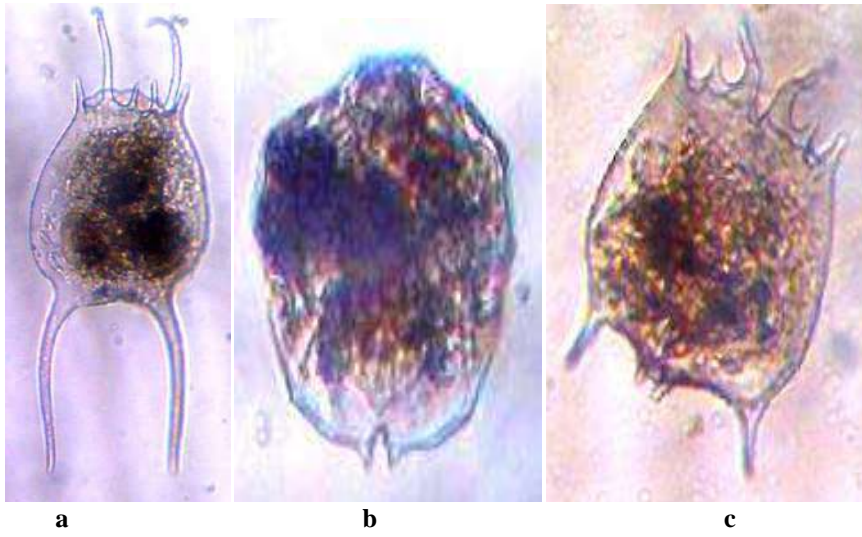
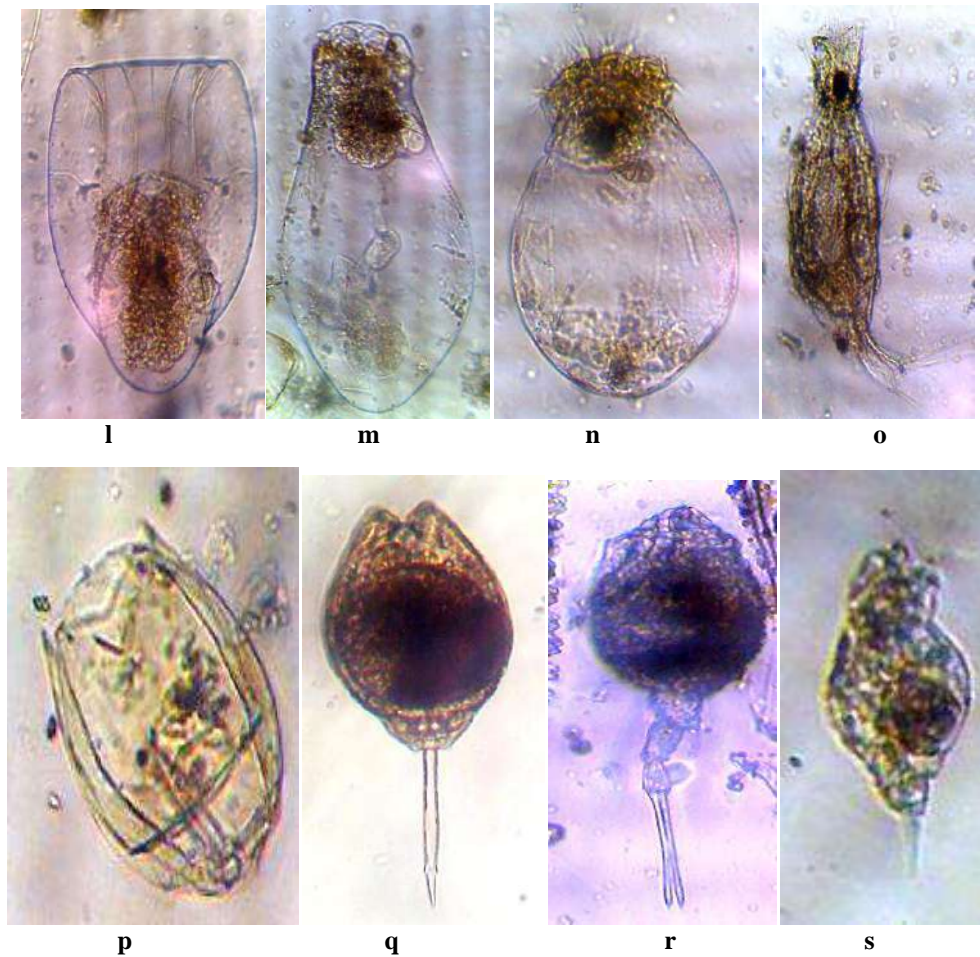


Fig. 3. Pie chart showing percentage contribution of different genera of Rotifers

Table 2. Past result of different biodiversity indices of Rotifer diversity at two sites

Biodiversity indices	Site I	Site II
Dominance	0.2889	0.179
Shannon H	1.488	1.956
Evenness e <sup>H/S</sup>	0.7379	0.7857
Simpson index	0.7111	0.821
Menhinick	1.549	2.121
Margalef	1.846	2.768
Equitability J	0.8304	0.8902
Fisher alpha	3.706	7.163
Berger-Parker	0.4667	0.3333





**Photo Plate 2. Original Photographs of different rotifers from Mandodevi Temple Lake**

**Names of Rotifers in Photo Plate 2**

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| a. <i>Brachionus falcatus</i>       | b. <i>Brachionus angularis</i>     |
| c. <i>Brachionus quadridentatus</i> | d. <i>Brachionus diversicornis</i> |
| e. <i>Brachionus caudatus</i>       | f. <i>Brachionus forficula</i>     |
| g. <i>Brachionus calyciflorus</i>   | h. <i>Keratella cochlearis</i>     |
| i. <i>Keratella tropica</i>         | j. <i>Anuraeopsis fissa</i>        |
| k. <i>Polyarthra vulgaris</i>       | l. <i>Asplanchna brightwelli</i>   |
| m. <i>Asplanchna sieboldi</i>       | n. <i>Asplanchna priodonta</i>     |
| o. <i>Trichocerca species</i>       | p. <i>Lecane papuana</i>           |
| q. <i>Lacane bulla</i>              | r. <i>Trichotria tetractis</i>     |
| s. <i>Cephalodella gibba</i>        |                                    |

**4. CONCLUSION**

The overall lake is showing good Rotifer diversity in monsoon season. Due to increasing human activities around lake, especially at site I, already showing some adverse effects of it. As *Brachionus* species is considered as bioindicator of eutrophication, its dominance at Site-I is warning signs of eutrophication at this site. Site II with lesser human activity, is showing more species diversity and richness.

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**COMPETING INTERESTS**

Authors have declared that no competing interests exist.



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## Cultural Elements and Identity in Post-Colonial Writings

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### Abstract

All languages work in accordance with their culture and numerical order. As for the Indians, English is a foreign language. Expressing emotions in an acquired language, to an Indian writer, seems to be a difficult task. Since every language is based on its indigenous culture, Indian writers who write in English face the challenge of mastering another language in order to succeed in their field. During this process, they succeed in imitating English only in grammar, structure and style but fail to convey the true spirit and soul in a foreign language. An effort was therefore made in this paper to analyze the dialogue elements identified in other Indian literary texts. Key words: Indian Writing, English, revival, culture, identity

Language helps a person to communicate with the world around him and express his feelings and emotions in the understanding of others. It is the only factor that separates mankind from animals. Both written and spoken forms of language are the most widely accepted forms of communication. Learning another language offers you the opportunity to learn more about your language, to broaden your horizons, to understand foreign cultures, and to find a competitive advantage in choosing a career. worldwide communication. Kachru notes that "English now has different national and international activities that are different and interdependent. English has thus gained new strength and new elitism. The current state of competition and growing global competition.

English is said to be a British language but is used in many parts of the world as a first or second language. India is used as the lingua franca of both the world and the governments of the world because it is the only language that includes the

diverse regions of India. Before independence English was considered a foreign language but after independence, the view changed and the number of people who began to read and write in English grew significantly. Although English has been with us for over 300 years, the number of people who speak English is very small. However, the industrial and economic progress in India is led by English-speaking people who have a role to play in the global market. However, it has been noted that the English language used in India is different from other English-speaking countries.

Early in the history of Indian literature, writers had adopted the language and style of English writers since they were not the only beauties present. One could see the use of the pure language in the original Indian texts because the text was intended only for the elite class who knew English. In addition, literature could be produced only in Britain. Bankim Chandra's wife Rajmohan, India's first novel belongs to this category even though the story is in an Indian story. Later, when the language

## SOCIO-CULTURAL ADVANCEMENTS IN CONTEMPORARY INDIAN ENGLISH LITERATURE

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### **Abstract:**

*Literature in India has not remained the same since its inception; gradual progress can be seen throughout the years. Indian literature since the Vedas and the Upanishads have produced more literary works than any other part of the world. The interdependence of many material and cultural factors has brought about significant changes in recent times. It has a profound effect on the way people live and think. The intervention of these influences has introduced new styles in emerging forms of art including literature. Books are no longer limited to specific national, ethnic, or cultural boundaries. Indian writers have made a significant and significant contribution to the writing of English and novels. Here are some new trends and developments in personality and literature. We have a gallery of writers who write and translate into English. Artistic translation, Dalit Literature, Diasporic writing, colonial writing, magical authenticity, contemporary and women's texts appear immediately in Indian English Fiction. We cannot ignore Indian English Literature because it shows a picture or a picture of our society. We can feel or enjoy the equal status of English Indian texts through foreign literature. India now has its own name in the world of literature. Therefore, we can say that Indian writers have been able to excel in all areas of literary and international literacy.*

**Keywords:** Socio-cultural, Advancements, Diaspora, Indian writing in English, World Literature.

### **I. Introduction:**

Books are a mirror to society. The texts reflect cultural life, conservation life and human history. Modern English writing by Indian writers has come of age. They have gained equality at home and abroad. Because of this, we have many Indian writers who usually publish their songs in English, be it poems, short stories or novels. Their work represents the social, political and historical perspective of enriching literature around the world. An Indian novel has increased value, diversity, and maturity. The growth of the Indian novel follows certain patterns, and it is not difficult

to trace its gradual progression from the imitation phase to the realities to the psychological to the experimental phase. In the growth and development of the English novel of India, the 1980s occupied a unique position. During this time, some promising female novelists published their first works. Some older masters also came out with jobs, indicating that their creative power has always been in good working order. It was in the 80's that Indian female novelist gained recognition and recognition not only in India but also in other countries. The art of these Indian female novelists, as third-generation novelist assistants, speaks well of their departure. English literature has now become a reality, which cannot be ignored. In recent decades, it has attracted widespread interest in India and the rest of the world.

### **II. Expansion and Development of Indian Novel:**

The 21st century has proved to the world that English literature is not the only province of the British Empire. Although English literature began and flourished in England, it continued to sow the seeds of art in English in other parts of the world. It is interesting that the English people themselves have closed the way for the unexpected developments we see today in English English Books. English mythology has been in response to the real-life changes of the story and theoretical theories that have influenced and guided its study since its inception. In the first section, the fictional works of the great English writers of India such as Mulik Raj Anand, R. K. Narayan and Raja Rao were very concerned about the oppressed society and the middle class in India and the cultural expression of Indian culture. At that time, even after the time when writers such as KS Venkataramani, Kamala Markandaya, Bhabani Bhattacharya, Chaman Nahal, Ruth Praver Jhabvala, Nayantara Sahgal, Arun Joshi, and Khushwant Singh wrote, English-language myths focused on the true social manifestations of the times. Indian writers have expressed the role and position of men and women in their writings in English, illuminating the text with its quality and excellence. Indeed, it represents the culture, history, and all the diversity needed for the



## DEPICTION OF INDIA IN JAYANTA MAHAPATRA'S POETRY

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HHH

### Abstract

*Jayanta Mahapatra, a contemporary of A.K. Ramanujam, Nizzim Ezekeil and R. Parthasarathy stands out distinctly as a great Indian poet, in the domain of contemporary Indo-Anglican poetry. The poetry of Mahapatra describes what he sees around him. His creative mind changes the incidents into poetry. He comments on the social behaviour of people and the issues which affect them. While dealing with socio-cultural and political issues, he does not sacrifice the artistic quality. Yet, he is more concerned with the survival of man rather than creating a utopian world for the people. His characters are cobbler, hungry street children, slum dwellers, prostitutes and a woman in pain. Like the English Romantics, Mahapatra anchors his poetry in the sights sounds, and experiences of ordinary life and ordinary man. He portrays the people of Orissa and their Hindu religion with all its rituals and beliefs of the ancestors at the same time. Similarly, he embraces the genre of poetry because of its exploratory nature and beautiful rhyme structure.*

**Keywords:** Mahapatra, Indian Poet, Indianness, Contemporary reality, Indian Milieu

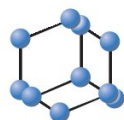
"Literature has been the means of giving form and utterance to the hopes and despairs, the enthusiasm and apathy, the thrill of joy and the stab of pain, in a nation's history as it moves from freedom to Slavery, from slavery to revolution, from revolution to independence and again from independence to the tasks of reconstruction involving further experiences of success and elation or futility and failure." (Indian Writing in English 694)

Jayanta Mahapatra, a contemporary of A.K. Ramanujam, Nizzim Ezekeil and R. Parthasarathy stands out distinctly as a great Indian poet, in the domain of contemporary Indo-Anglican poetry. He was born on 22nd October 1923 in Cuttack, Orissa. He was born in a lower middle-class family. He had his early education in English medium at Stewart school, Cuttack. His post graduation was in Physics and he joined as a teacher in 1949 and worked in different Government colleges of Orissa. Though Mahapatra was born in a Christian family; he was surrounded by Hindu neighbours. He began writing poems rather late in his life. The publication of his first book of poems, *Svayamvara and Other Poems*, in 1971

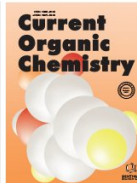
was followed by the publication of *Close the Sky Ten* by Ten. He has written seventeen volumes of poetry that include, *A Father's Hours* (1976), *A Rain of Rites* (1976), *Waiting*, *Dispossessed Nests* (1986), *Selected Poems* (1987), *Burden of Waves and Fruit* (1988), *Temple* (1989), *A Whiteness of Bone* (1992), *Shadow Space* (1997), *Bare Face* (2000) and *Random Descent* (2005). He received the prestigious Jacob Latstein Memorial Award in 1975. He has the great honour of being the first Indian English poet to receive Sahitya Akademi Award in the year 1981 for his long poem *Relationship*. The most coveted and prestigious "Padmashree Award" for civilian citizen was also awarded to him for his outstanding contribution in the field of literature.

The poetry of Mahapatra describes what he sees around him. They are temples, beaches and the crowded streets of Orissa. His poetic world does not reproduce the incidents that influenced him. His creative mind changes the incidents into poetry. He supplies the aesthetic pleasure as well as the social behaviour of people and the issues which affect them. While dealing with socio-cultural and political issues, he does not sacrifice the artistic quality. Yet, he is more concerned with the survival of man rather than creating a utopian world for the people. His characters are cobbler, hungry street children, slum dwellers, prostitutes and a woman in pain. Like the English Romantics, Mahapatra anchors his poetry in the sights sounds, and experiences of ordinary life and ordinary man. He portrays the people of Orissa and their Hindu religion with all its rituals and beliefs of the ancestors at the same time. Similarly, he embraced genre of poetry because of his exploratory nature and beautiful rhyme structure. His own notion of poetry is thus:

Mahapatra deals with variety of themes ranging from nature to death. His early poems deal with the themes like the nature of his childhood, his relationship with his father, his aloofness from the Hindu tradition, personal longings, infatuation, love towards women. His poetry is deeply rooted in Indian heritage. In the next phase, he is more concerned with the problems of the people and the contemporary reality, myth, ritual and cultural background. Whatever may be the theme, his sensibility



## Nitrogen-containing Fused Heterocycles: Organic Synthesis and Applications as Potential Anticancer Agents



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**Abstract:** The fused Nitrogen heterocyclic compounds and their derivatives have grown in prominence over the past several decades as a result of their significant medical value. The adaptable and easily synthesized N-Heterocyclic scaffolds are particularly exciting in both synthetic organic chemistry and the biological sector due to their powerful pharmacological properties, which are taken into consideration while considering their numerous uses. For the synthesis of N-heterocycles and their derivatives, several attempts were undertaken to create a variety of synthetic protocols. The N-Heterocyclic compounds provide a variety of adaptable structures for specific biological applications and represent novel, broad-spectrum antibacterial and anticancer agents. They typically have minimal toxicity profiles. The majority of these N-Heterocycles have demonstrated more cytotoxicity than the effective anticancer medication cisplatin. The design, synthesis, structural characterisation, and biological uses of N-Heterocycles are reviewed in this work. In this article, the developments made in this specific field are comprehensively examined.



Trimurti L. Lambat

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**Keywords:** Organic synthesis, N-heterocycles, anti-cancer agents, novel synthetic protocols, fused N-heterocycles, biological activities.

### 1. INTRODUCTION

Heterocyclic compounds [1-8] are a fundamental branch of organic chemistry that has its origins in organic synthesis and medicinal chemistry [9-14]. The physicochemical qualities are greatly influenced by the kind and size of the ring structures, as well as the substituent groups of the core scaffold [15-23]. Heterocyclic compounds play an important role in a variety of medicinal applications, including antibacterial [24-26], antiviral [27], antifungal [28], anti-inflammatory [29], and anti-tumor drugs [30-33].

The ongoing identification of novel heterocyclic scaffolds gives new tools for modulating or modifying a variety of disease states [34-38]. A novel scaffold has the advantage of disrupting a signal pathway or blocking an enzyme's active site [39-43]. Synthesis of novel heterocycles using better and easier methodologies [44-50], therefore, attracts synthetic organic chemists' attention. A medium-sized ring-fused heterocycle has a variety of biologically significant properties [51-53]. Furthermore, attaching a suitable substitute as well as adding another fused five- or six-member ring to the scaffold has greatly increased activity [54].

N-containing heterocycles [55-58] are compounds with a distinct structural motif that is abundant in natural products including

hormones, alkaloids, and vitamins [59-62]. Pharmaceuticals, natural goods, pigments, organic materials, and biologically active compounds all contain N-heterocycles [63]. For their various actions, heteroaromatic chemical compounds such as benzimidazole, benzothiazoles, indole, acridine, oxadiazole, imidazole, isoxazole, pyrazole, triazoles, quinolines, and quinazolines have sparked a lot of interest in the development and pharmacology in recent years [64-68]. By suppressing cell growth and inducing cell differentiation and apoptosis, these N-heterocyclic compounds have anticancer effects in a variety of cancers [69-72].

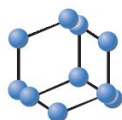
The N-heterocycles are the most commonly used structural skeletons of medications in the market. Indeed, at least one nitrogen atom can be found in 84 percent of all molecules, while at least one nitrogen heterocycle being found in 59 percent [73]. Furthermore, the use of heterocycles in drug discovery was stressed in a recent study published by Martins and collaborators [74] on oncological medications approved by the FDA between 2010 and 2015. During that time, 26 of the 40 newly approved chemotherapeutic medicines have heterocyclic fragments in their molecular structure. Nitrogen-based heterocycles accounted for 73 percent of these heterocycles, vastly outnumbering nitrogen-oxygen (15%), oxygen (8%), and nitrogen-sulfur (4%) heterocycles.

Despite their broad spectrum of biological activities, including anticancer activity, there is still a need for creative, practical, and effective methods for nitrogen-containing heterocyclic synthesis,

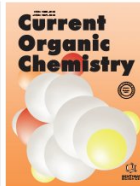
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# Synthesis of Oxygen and Nitrogen Containing Heterocycles using Zirconium Dioxide/Mixed Oxide Nanoparticles as Reusable Green Catalysts: A Comprehensive Update



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**Abstract:** The remarkable improvements in organic synthesis facilitated by zirconium dioxide-based nanoparticles are updated and summarized in this review. The ZrO<sub>2</sub> acts as a versatile heterogeneous nanocatalyst and is used in various elementary organic reactions and many multicomponent reactions. The employment of these catalysts in organic synthesis leading to bio-active scaffolds provides the opportunity to carry out the reactions using facile synthetic protocol under mild environments that furnish the equivalent products in high yields and shorter reaction times. According to reports in the literature, ZrO<sub>2</sub>-based catalysts were removed from the reaction mixture and recycled many times.



Trimurti L. Lambat

**Keywords:** Green chemistry, ZrO<sub>2</sub> nanoparticles, heterogeneous nanocatalyst, O & N-heterocycles, bio-active scaffolds, reusable green catalyst.

## 1. INTRODUCTION

Green synthesis routes have recently attracted significant attention leading to important developments in the fields of click reactions [1] and green chemistry [2-9], with the advances of environmentally and proficient benign protocols [10-15] being in focus. As catalysts, nanoparticles (NPs) demonstrated superiority to conventional catalysts in several aspects relevant to sustainable development [16-18]. Additionally, NPs were extensively investigated for potential use in nanomedicine, particularly for drug delivery [19] and early detection of cancer cells. Mesoporous nanomaterials were also employed for a variety of organic reactions [20]. The high specific area and active surface sites in nanomaterials render these materials more important than their bulk counterparts for a wide range of science and technology applications [21].

Metal oxides are frequently employed as solid catalysts that can either function as the active phase or the supports [22], exhibiting favorable catalytic activity and providing perhaps the largest class of heterogeneous catalysts [23-30]. In addition to metal oxides, metals are also widely employed in chemical synthesis [31-40]. The catalytic activity of transition and noble metals is attributed to the electronic configuration of the outer valence electrons [41]. Further, mixed metal oxides account for many solid catalysts frequently used in the pharmaceutical industry [42, 43].

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Zirconium dioxide (zirconia, ZrO<sub>2</sub>) demonstrated efficacy and potential for a number of significant applications, including catalysis, fuel cell electrolytes, buffer layers for superconductor development, oxygen sensors, gate dielectrics, and ceramics wear-resistant optical coatings [44-55]. This oxide can exist in three structural phases, monoclinic, tetragonal, and cubic [56], which exhibit different catalytic activities.

The surface of ZrO<sub>2</sub> NPs [57] can support active hydroxyl groups and oxyanions and contains Zr<sup>4+</sup> ions, enabling zirconia to function as a dual acid-base catalyst [58]. Even though the employment of ZrO<sub>2</sub> NPs for the preparation of biologically active blocks *via* solvent-free multicomponent reactions was rarely addressed [59, 60], the development of green synthesis methods and research on the synthesis of isatin-based heterocycles were reported. [61-75]. The interesting properties of sulfated zirconia, including its cost-effectiveness, thermal stability, and super acidity, render these materials industrially important for a number of reactions [76]. In addition, zirconia NPs were reported to improve the mechanical properties of ceramics [77] and modify their electrical, thermal, magnetic performance and optical properties [78]. Further, nanoscale zirconia exhibited catalytic activity for the dehydration of alcohols, the selective synthesis of dimethyl carbonate, the selective oxidation of methanol, and redox activity [79-85]. For creating zirconia NPs, several synthesis methods have been used, including but not limited to hydrothermal, sol-gel, chemical vapour deposition (CVD), and sputtering approaches [86-90].







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## Recent developments in polypyrrole/manganese oxide-based nanocomposites for thin film electrodes in supercapacitors: a minireview

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This review article highlights the recent developments in the synthesis and electrochemical performance of polypyrrole/manganese oxide thin-film electrodes synthesized by various chemical methods for supercapacitor applications. In the class of conducting polymers for electrode applications, polypyrrole (Ppy) is considered an important polymer due to its low cost and abundance. Ppy's polymeric composition and structural properties, however, pose stability concerns and have a drawback of a short life cycle over long-term charge–discharge processes, limiting its potential for industrial and commercial utilization. Recently, manganese oxide (MnO<sub>2</sub>) has been actively explored as a supercapacitor electrode material due to its low cost, high theoretical specific capacitance and abundance. Ppy/MnO<sub>2</sub> thin film electrodes revealed high specific capacitance and stability, making them excellent candidates for next-generation supercapacitor electrode materials.

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### 1. Introduction

The global economy has relied significantly on the extraction and use of fossil fuel resources such as coal, natural gas, and petroleum. With the increasing demand for fossil fuels, the depletion of fossil fuel resources has produced a slew of economic and societal issues.<sup>1–4</sup> Years ago, the extensive development of diverse energy sources such as hydro, biomass, wind, and tidal energy greatly decreased energy and environmental challenges.<sup>5–7</sup> The produced electric energy is normally stored for redistribution and future use. To accomplish effective energy storage, there was an urgent need to develop a reliable electrochemical energy storage technology, such as a supercapacitor.<sup>8–11</sup> Supercapacitors have a higher energy density than conventional capacitors and a higher power density than batteries. Furthermore, supercapacitors offer high reversibility and long life cycles.<sup>12–16</sup> Supercapacitors are classified into two types based on the electrode materials used and the charge storage mechanisms: (1) electric double-layer capacitors (EDLCs), which use carbon with a large surface

area as electrodes<sup>17–19</sup> and (2) pseudo-capacitors, which use electroactive materials such as transition metal oxides or conducting polymers as electrodes.<sup>20–23</sup> In concept, literature evaluations of metal oxide electrodes revealed that these electrodes may exhibit a high specific capacitance and high rate capability. However, one of the metal oxide material's fundamental flaws is its low electrical conductivity. To circumvent this drawback, hybrid supercapacitors were developed by combinations of EDLC materials with conductive polymers or metal oxides. Also, thin films and layered structures of composites were proposed for improvement of the supercapacitor performance. On the other hand, conducting polymers have a lower cost than metal oxides and a higher charge density than carbon.<sup>24–28</sup>

Exhibiting the highest inherent conductivity among any known conducting polymer, Ppy had attracted considerable attention since the monomer (pyrrole) is easily oxidized and is water-soluble. In addition to its high conductivity, Ppy has a strong redox reversibility and environmental stability.<sup>11,29,30</sup> Several Ppy-based products were commercialized including fuel cells, secondary batteries, sensors, supercapacitors, photocatalysts and corrosion prevention compounds.<sup>31–40</sup> Nano-sized materials with a large surface area and porosity could perform admirably as electrode materials for supercapacitors. Furthermore, nanostructured materials such as nanoparticles, nanowires, nanosheets, nanotubes, and nanoribbons show promise for improving electrode electrical conductivity.<sup>41,42</sup> However, Ppy's polymeric composition and structural features cause issues with stability and loss in life cycle during long-term charge–discharge processes which limit its performance in supercapacitors. Because of their strong electrochemical

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# Assessment of Fish Diversity of Keshori Lake, Deori, Gondia, Maharashtra, India

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## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

Diversity of fishes found in particular water body reflects the health status of it. Lakes are exploited by local fishermen for their livelihood. Keshori Lake is situated in close vicinity of human habitation in Deori, tahsil of Gondia district. Present investigation was carried out from July 2022 to December 2022. Regular catches of the fishes from Keshori Lake revealed its diversity. Total 28 species of Fishes found in water body belonging to 12 families and 8 orders. As expected, family Cyprinidae is the dominant among all the families. Overall diversity of fishes is satisfactory. The local fisherman's cooperative society is not functional properly. The proper management and implementation of rotation policy for the catches are required. Also, a strict check on overfishing and water pollution is necessary by the concern authority.

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## Rotifer Diversity in Shivdham Temple Pond Fulchur, Gondia District, Maharashtra

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### ABSTRACT

*In the evaluation of the condition of Shivdham temple pond, a monthly survey and sampling were carried out for over a year. The water sampling to collect zooplanktons in which the representative samples were segregated, identified and their role as a biological indicator is discussed. In the present paper the specific group viz. rotifer is used to assess the condition of the water environment in Shivdham Temple pond Fulchur. Zooplanktons are varied in community structure as per nutrient input or surrounding environment or the anthropogenic practices in that water. Rotifera, among all planktonic groups comprises a significant constituent of freshwaters whose inhabit with aquatic weeds and varied nutrients compositions. They linked with transforming energy in subordinate trophic level to advanced trophic level and also considered as valuable ecological indicator of trophic status of the freshwater ecosystem. In the present findings the total of 30 rotifer species were recorded from the 07 families of 02 orders and their trophic significance is discussed from the Shivdham Temple pond Fulchur Gondia.*

**Key words:** Diversity, Rotifer, Shivdham Temple Pond, Fulchur, Gondia

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### INTRODUCTION

Rotifer is one of the groups of planktonic microorganism; as a primary consumer in its ecosystem nurturing on pelagic phytoplankton and available organic substances. Simultaneously, Rotifers and other group member are acting as natural fodder of fish, exhibit links in food web and inhabit diversity of trophic level [1] also responding to any change in its habitat ecology [2]. The variation of rotifer assemblages varies from water to water is due to abiotic variables viz. temperature, salinity and biota as food availability, predation etc [3-5]. Generally small population of rotifer due to the low oxygen content can affect the abundance and high carbon dioxide in water, they prefer more alkaline water, Brachionus species with higher population in the period of high alkalinity [6] while Rotifer shows outstanding growth peak of population in summer with high macrophytes abundance [7]. According to Saksena, [8], certain living organism serve the purpose of monitoring the environmental pollution as they are tolerant to adverse environmental condition and therefore considered as bio-indicator in depicting the trophic status of water quality [9-14]. Bhandarkar *et al.*, [15] and Bhandarkar and Paliwal, [16, 17] observed the rotifer diversity in different productive water bodies and manure enriched tropical pond. Bhandarkar, [18] observed that the dominance of Brachionus species in culturally eutrophied polluted water. Gondia district is popularly known as 'Lake district'. Owing to this fact only few workers like Meshram [19], Gadekar, [20, 21], Bhandarkar, [18, 22] and Gadwe *et al.*, [23] contributed limnological study on few water bodies of Gondia district. The present study deals with the diversity of rotifer from Shivdham Temple pond which is used as recreational and fisheries activities, even though various anthropogenic activities found adjoining residential viz. cloths washing, cattle washing, dumping sewage, immersion of idols etc, which led to nutrient enrichment in water. In addition to this, the agricultural runoff also added to that water, which leads to nutrient enrichment in water. Rotifer diversity from this pond is helping to understand the trophic status of water, for further assessment of other abiotic and biotic properties of this pond.



## एकविसाव्या शतकातील 'समूहकेंद्री' कथा :फिनिक्सच्या राखेतून उठला मोर — जयंत पवार

प्रा.सौ. सुनिता प्रदिप रंगारी

सहाय्यक प्राध्यापिका—मराठी विभाग  
मनोहरभाई पटेल महाविद्यालय, देवरी,  
त.देवरी, जि.गोंदिया

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### प्रस्तावना —

'फिनिक्सच्या राखेतून उठला मोर' हा कथासंग्रह २०१० साली 'लोकवाङ्मय गृह' प्रकाशनाने प्रकाशित केला.जयंत पवार यांच्या या पहिल्याच कथासंग्रहाला २०१२ या वर्षीचे साहित्य अकादमीचे पारितोषिक मिळाले.या कथासंग्रहात एकूण सात कथा आहेत, आणि या सातही कथांना महाराष्ट्र टाईम्स व विविध दिवाळी अंकांतून पूर्व प्रसिद्धी लाभलेली आहे.आपला हा पहिला कथासंग्रह जयंत पवार यांनी आपल्या 'कधीही न पाहिलेल्या आईसर्' अर्पण केला आहे.ते म्हणतात, 'तू नसतीस तर जल्माची कथा इथवर आली नसती, तू असतीस तर आशयासाठी इतकी वणवण झाली नसती.'

जयंत पवार यांचा पिंड मुळचा नाटककाराचा. या कथासंग्रहापूर्वी 'नाटककार' आणि 'पत्रकार' म्हणून ते परिचीत होते.आपण कथालेखनाकडे कसे वळलो याचा उल्लेख त्यांनी 'ऋणनिर्देशात' केला आहे.या कथेच्या जन्माची कथा सांगतांना ते म्हणतात, 'फिनिक्सच्या राखेतून उठला मोर' हे शीर्षक कथाकार सतीश तांबेचे (बाबा).त्याला ते सुचलं होतं. फिनिक्स मिल या मुंबईतील गिरणगावातल्या एका मोठ्या गिरणीच्या तीन मोठ्या स्थित्यंतराविषयी मला लेख लिहायचा होता, तेव्हा बाबा मला म्हणाला, 'मी काही यावर लिहिणार नाही. हे टायटल तू घे.प्रत्यक्षात लेख न होता ती कथाच

झाली.'

निखिलेश चित्रे या प्रसिद्ध समीक्षकाने या कथासंग्रहाला प्रस्तावना लिहिली आहे. आपल्या प्रस्तावनेत ते म्हणतात, "जयंत पवार हे 'कथा' या माध्यमाच्या नव्या शक्यता तपासून पाहणारे गंभीर लेखक आहेत. कोणत्याही चांगल्या लेखकाला पछाडणार्या जन्म, मृत्यू, दुःख, क्रौर्य, हिंसा या गोष्टी पवारांच्या कथेत निव्वळ 'थीम्स' पुराया मर्यादित राहत नाहीत, तर लेखकाच्या सतत सुरू असलेल्या चिंतनाचे विषय म्हणून समोर येतात.'या कथा म्हणजे व्यक्तीच्या समाजात जगण्याचे दस्तऐवज आहेत."१

जगण्याचे दस्तऐवजीकरण असणार्या सात कथा या कथासंग्रहात आहेत. 'टिंगशेच्या स्वप्नात ट्रेन', 'साशे भान्तर रूपयांचा सवाल अर्थात युद्ध आमुचे सुरू!', 'फिनिक्सच्या राखेतून उठला मोर', 'जन्म एक व्याधीर्षी', 'चंदूच्या लग्नाची गोष्ट अर्थात सडुम में टडुर्मा', 'एका रोमहर्षक लढयाचा गाळीव इतिहास', 'छटाकभर रात्र तुकडा तुकडा चंद्र' अशा काहिशा वेगळ्या शिर्षकांच्या हया कथांमधून जयंत पवारांनी मुंबई या महानगरातील गिरणी कामगार व इतर श्रमजिवी वर्गांच्या जगण्यासंदर्भातील चित्रण केलेले दिसते. 'फिनिक्सच्या राखेतून उठला मोर' या कथासंग्रहातील कथांबाबत विवेचन करतांना त्यातील अनुभवविश्व, जीवन जाणिवा, व्यक्तिचित्रण, निवेदन व भाषाशैली हे घटक विचारात घेतले आहेत.

### जयंत पवार यांच्या कथालेखनामागील प्रेरणा व आशयसूत्रे —

१९९० नंतर जागतिकीकरणाची एक मोठीच लाट आली.मध्यम व नवमध्यम वर्गसमूह त्यातून तयार झाला.पैसा हाच सुखी जीवनाचा मंत्र मानला जाऊन त्यासाठी सततचा संघर्ष व स्पर्धा सुरू झाली. स्वतःचे अस्तित्व टिकवून ठेवण्यासाठी वाटेल ती तडजोड, अर्थकेंद्री जीवनव्यवहार यातून अनेक सामाजिक व आर्थिक प्रश्न निर्माण झाले. या सर्व घटना—घडामोडी ही जयंत पवारांच्या कथेची प्रेरणा आहे. महानगरातील हे वास्तव, संवेदना, बदलते संदर्भ त्यांच्या कथेतून व्यक्त होतात. मुंबईत झालेले बॉम्बस्फोट, दहशतवादी कारवाया, स्त्रियांवरील अत्याचार, भाषिक व धार्मिक



## **Rotifer Diversity in Shivdham Temple Pond Fulchur, Gondia District, Maharashtra**

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### **ABSTRACT**

*In the evaluation of the condition of Shivdham temple pond, a monthly survey and sampling were carried out for over a year. The water sampling to collect zooplanktons in which the representative samples were segregated, identified and their role as a biological indicator is discussed. In the present paper the specific group viz. rotifer is used to assess the condition of the water environment in Shivdham Temple pond Fulchur. Zooplanktons are varied in community structure as per nutrient input or surrounding environment or the anthropogenic practices in that water. Rotifera, among all planktonic groups comprises a significant constituent of freshwaters whose inhabit with aquatic weeds and varied nutrients compositions. They linked with transforming energy in subordinate trophic level to advanced trophic level and also considered as valuable ecological indicator of trophic status of the freshwater ecosystem. In the present findings the total of 30 rotifer species were recorded from the 07 families of 02 orders and their trophic significance is discussed from the Shivdham Temple pond Fulchur Gondia.*

**Key words:** Diversity, Rotifer, Shivdham Temple Pond, Fulchur, Gondia

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### **INTRODUCTION**

Rotifer is one of the groups of planktonic microorganism; as a primary consumer in its ecosystem nurturing on pelagic phytoplankton and available organic substances. Simultaneously, Rotifers and other group member are acting as natural fodder of fish, exhibit links in food web and inhabit diversity of trophic level [1] also responding to any change in its habitat ecology [2]. The variation of rotifer assemblages varies from water to water is due to abiotic variables viz. temperature, salinity and biota as food availability, predation etc [3-5]. Generally small population of rotifer due to the low oxygen content can affect the abundance and high carbon dioxide in water, they prefer more alkaline water, Brachionus species with higher population in the period of high alkalinity [6] while Rotifer shows outstanding growth peak of population in summer with high macrophytes abundance [7]. According to Saksena, [8], certain living organism serve the purpose of monitoring the environmental pollution as they are tolerant to adverse environmental condition and therefore considered as bio-indicator in depicting the trophic status of water quality [9-14]. Bhandarkar *et al.*, [15] and Bhandarkar and Paliwal, [16, 17] observed the rotifer diversity in different productive water bodies and manure enriched tropical pond. Bhandarkar, [18] observed that the dominance of Brachionus species in culturally eutrophied polluted water. Gondia district is popularly known as 'Lake district'. Owing to this fact only few workers like Meshram [19], Gadekar, [20, 21], Bhandarkar, [18, 22] and Gadwe *et al.*, [23] contributed limnological study on few water bodies of Gondia district. The present study deals with the diversity of rotifer from Shivdham Temple pond which is used as recreational and fisheries activities, even though various anthropogenic activities found adjoining residential viz. cloths washing, cattle washing, dumping sewage, immersion of idols etc, which led to nutrient enrichment in water. In addition to this, the agricultural runoff also added to that water, which leads to nutrient enrichment in water. Rotifer diversity from this pond is helping to understand the trophic status of water, for further assessment of other abiotic and biotic properties of this pond.



## Research Paper

# Wading Birds in Lacustrine Wetland of Shrungarbandh Lake, District Gondia, Maharashtra

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**Abstract-** This Shrungarbandh Lake becomes increasingly productive as nutrients from the neighboring watershed collect in the form of compost, sediments, and other items. The Lake provides as an ideal wetland habitat for a variety of wading birds due to organic materials' enrichment that stimulate the growth of aquatic weeds, algae micro zooplanktons. By keeping a record of wading birds as per IUCN as well as Residential status, the present work of this wetland contributes in the protection and restoration of the existing condition of the wetland. The purpose of this study is to illustrate the state of wading bird biodiversity so that this habitat may be designated as a significant habitat for bird conservation. Anthropogenic activities have been shown to have an influence on this ecosystem. Wader tracking is a valuable method for emphasizing the significance of wetlands and its ecological values since it provides essential information on the condition of wetlands. From 2019 to 2021, a wading bird research was carried out in Shrungarbandh Lake. 16 families of wading birds recorded a total of 79 species. In the current findings, the birds were categorized using the IUCN Red Data Book for 2022, 07 species were identified as near threatened (NT), with the number of species decreasing (D). While 03 species were identified as vulnerable, their numbers were determined to be decreasing (D). Out of a total of 79 wading birds, 44 are determined to be residential, while 44 are winter migrants. The findings of this observations show that the avifauna in this area is plentiful, indicating the wetland is in good condition. The abundance is owing to the plenty of protein-rich invertebrates and other food, as well as safe environment. Long-distance migrants utilize the lake as a feeding area, while local migrants use it as a nesting site. Nesting colonies of grey herons, as well as other local migrants including cormorants, large egrets, and others, found here. For migrating birds, the lake looks to be ideal. But due to increasing anthropogenic activities around the lake creates disturbances to bird's habitats. The attempt of this study of wading birds is to conserve the habitat.

**Keywords-** Wading birds, Shrungarbandh Lake, Lacustrine water, Wetland, Conservation

## 1. Introduction:

Wetlands play a crucial role in preserving biodiversity. As a result of their location in the area between terrestrial and aquatic ecosystems, they provide exclusive hydrological and biological conditions, as well as perfect habitat for many endangered plant and animal species. Due to man-made pressures and natural succession, they are the planet's most sensitive habitats [1]. Wetlands are a type of integrated ecosystem that coexists with terrestrial and aquatic habitats. Less than 9% of the earth's surface is made up with wetland areas, yet they nonetheless offer a variety of biological functions that are regenerative [2]. Wetlands in tropical and subtropical locations are regarded to be rich avifauna hotspots, yet they are under enormous human pressure to maintain and safeguard biodiversity [3]. There are approximately 242 wetland bird species and 67 wetland

supported bird species among the 1300 species of birds that have been documented on the Indian subcontinent. 102 species migrate during the winter, 10 during the summer, and 3 during the passage period [4],[5]. 1,186 bird species, or 13% of the world's avifauna, are presently considered to be endangered, with 182 of them being considered Critically Endangered and at imminent risk of extinction. Wetlands are particularly important since 20% of Asia's threatened bird species live there. This number exceeds the 10% of aquatic birds that are endangered worldwide. Due to habitat loss or modification, intense hunting pressure, and other factors, several species are in risk of going extinct [6]. Habitat modification became the primary cause of long-term changes in bird distribution as consecutive environmental changes reached the species' tolerance threshold. In India, there are 67 species of birds that depend on wetlands and are associated to wetlands, in addition to 243 species of water birds, according





## A Nutritional Profile of an Asian Catfish, *Clarias Batrachus* (Linnaeus, 1758) for Fundamentals of Intensive Culture and Conservation

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### ABSTRACT:

*Clarias batrachus* (Linnaeus, 1758) is a highly prized and healthful indigenous freshwater fish in India. This fish is extremely healthy because to its high protein content, vitamins and minerals, and a significant amount of Poly Unsaturated Fatty Acids. The species has medicinal/therapeutic importance and is in great demand due to its nutritional content. It is exceptionally wholesome, not only as a food product with high protein content, vitamins, and minerals but also as a rich source of Poly Unsaturated Fatty Acids. This fish has traditionally been used to heal numerous illnesses. It is one of the most important species of local food fish. Under the wild, it may flourish in any situation. The Asian catfish population is suffering as a result of overfishing in the wild. To maintain this species' genetic resources, habitat conservation, intensive culture, and sustainable consumption of this great fish species are all required. In the present paper, a nutritional profile of this catfish along with its dietetic value, conservation status, and essentials of intensive culture is discussed.

**Key words:** *Clarias batrachus*, Biological profile, Nutritional value, Conservation, Intensive culture

### Introduction:

The Asian catfish, commonly known as the walking catfish and in Maharashtra as the 'Magur' *C. batrachus* (Linnaeus, 1758) is a highly valued endemic to India that is now in severe decline in the majority of its native habitat. One of the 16 Asian species that has attracted the greatest attention is *C. batrachus* (Ng and Kottelat, 2008). This fish favors slow-moving, frequently sluggish waters such as those found in ponds, marshes, streams, and rivers, flooded rice fields, and temporary pools that may dry up. One of the most significant local food fish species is the Asian Catfish. This fish has traditionally been used to cure anaemia, as well as those suffering from childbirth and chicken pox. This fish species is exceptionally nutritious, not only as a food product with high protein content, vitamins, and minerals (Paul et al., 2015; Thorat, 2017), but also as a rich source of Poly Unsaturated Fatty Acids (PUFA) (Jakhar et al., 2012). *C. batrachus* is an ideal species for dietetic food and its consumption would help prevent nutritional deficiencies. The species has medicinal/therapeutic significance and is in high demand, notably in India's North East (Borah, 2020). Capturing fish from natural resources by the local fishermen community is a common practice in peninsular India. In Vidarbha region, Maharashtra particularly in Gondia, Bhandara, Chandrapur, and Gadchiroli districts having both lacustrine waterways, lentic and lotic freshwater, utilized for capturing naturally existing fish by local fisherman community for livelihood. This activity is crucial to the economical growth of this fishing community. It demands a significantly higher market price in India and Bangladesh than carps and other economically important food fishes (Chakraborty et al., 2021). Globally it is listed as Least Concern in IUCN (Ng and Low, 2019), due to lack of major threats to this species population (Froese and Daniel, 2011), while in India it is listed as 'Vulnerable' (CAMP, 1998). According to FAO estimates, global demand for catfishes is growing, and *C. batrachus*, with its several benefits, continues to be popular among Asians in particular. This study highlights the considerable content of serum HDL (High Density Lipoprotein) and summarizes the important research conducted throughout the world that has contributed to our understanding of the life and biology of *C. batrachus*. To maintain this species' genetic resources, habitat conservation, vigorous culture, and sustainable consumption of this fish species are all required. In the present paper the nutritional value, conservation status, and essentials of intensive culture is discussed.

- A. Characteristics of Asian Catfish:** The Asian catfish has an elongated body form and may grow to be about 0.5 m or 1.6 ft long and 1.2 kg or 2.6 lb in weight. The body is mostly grey or grayish brown, with little white patches on the sides. This catfish has long-based



## Monitoring on Aquatic Birds in The NNTR'S Navegaonbandh Reservoir with Reference to Ecological Niche

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### ABSTRACT

*Navegaonbandh Reservoir is one of the tourist point of Gondia districts. It is a part of Navegaon National Park situated in Arjuni Morgaon subdivision. This is one of the important bird areas in the district and also for diversity of flora and fauna. The Reservoir has a great history, right from construction of the reservoirs to conservation of the biodiversity; allied ecosystem and its habitat niche. Among the varied biodiversity, the avian diversity is one of the important elements to study for assessing the quality of habitat with reference to conservation of that habitat niche. The monitoring and survey on aquatic birds, this crucial ecosystem for avian biodiversity will helps to understand the status of aquatic ecosystem and habitat niche, which acts as a pilot role in maintaining the diverse population of aquatic organism as a trophic level to becomes ecosystem healthy. Because of many anthropogenic activities are found regularly in all the study points, and it seems to be a declining the status of ecosystem therefore the present work was carried out to know the status of habitat. The present study was a long term regular monitoring from 2018 to 2021. In the present investigation the total 84 species of birds belongs to 15 families from 5 orders of aquatic birds are given with their sighting sites in which birds prefer to acquire for feeding habits.*

**KEY WORDS:** Monitoring, Aquatic birds, Navegaonbandh, Ecological Niche, Gondia

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### INTRODUCTION

The Navegaonbandh reservoir is a beautiful freshwater body and one of the best picnic spot of Gondia district of Maharashtra. Though this reservoir has esthetic and recreational values, it has one among the best ecosystem for various aquatic flora and fauna. This is oldest ecosystem and rich in nutrients culturally, abundant of all essentialities regarding healthiness of the ecosystem, so that the biodiversity of aquatic birds are attracted in all the seasons particularly in the winter season for migratory birds. This Reservoir traditionally a community asset, which was used as focal point of socio-cultural and economic activities but on the end of twentieth century, the water body getting gradual degradation might be due to the various anthropogenic disturbances, and/or unplanned development; also affect on the biodiversity of flora and fauna of the region. Some of important regulators of ecological consequences are extraordinary population growth, large scale industrialization and intensive agriculture based on large scale input of synthetic fertilizer and insecticide. These factors have adverse impact on the freshwater biodiversity directly due to increasing pollution and unbalance physicochemical aspects of water. The most important the invertebrates present in the littoral zone of water like the insect larvae, pupae, small fish, tadpoles, and benthic biodiversity either littoral or profoundly, have great role to attract the water birds in any ecosystem. In benthic macro-invertebrates, gastropods and pelecypods as a fodder, the birds have always interested in them. The benthos is vital source of food for birds and mammals, reptiles and amphibians. The changes if occur in aquatic habitat leads to changes in invertebrates assemblages which may directly impact over the habitat niches of various organism whose been depends over on it, particularly birds. Birds are always sensitive for their habitat change, any consequent environmental changes exceeded the tolerance limit of species habitat niche change also become an ultimate cause for long term changes in the bird distribution. The population of bird is a sensitive indicator of pollution [1,2] or best indicators of ecosystem, health function as early warning system [3,4]. The present study is to focus on diversity of aquatic birds visited and sighted to the particular sites, the long term regular monitoring for diversity of birds to understand the richness of bird's food source where they visited most.





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### Histological Investigation of Cyclic Variation in Secretory Activity of Seminal Vesicles in Emballonurid Bat, *Taphozous kacchensis* (Dobson)

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**Abstract:** The present study describes the cyclical changes in the secretory activity of the seminal vesicle in the emballonurid bat, *Taphozous kacchensis*. The secretory activity in the seminal vesicles during the quiescence cycle was not well marked in *T. kacchensis*. During the sexually quiescent period (May to August), seminal vesicles were regressed, the tubules were lined by cuboidal to low columnar epithelial cells with round to elongated darkly stained basally to centrally placed nuclei. Cytoplasm was basophilic containing fine or coarse secretory granules in the cytoplasm. The lumina of the tubules were devoid of secretion. During the pre-breeding (September to January) period, the tubules were enlarged and were lined by tall columnar epithelial cells with large spherical basally situated nucleus. The secretory blebs were seen arising from the apical surface of the cells and were seen releasing into the lumen. Lumina of the tubules were filled with homogenous eosinophilic secretion. During the breeding period (February to March), the seminal vesicle showed hypertrophy resulting in the increase in the tubular diameter as compared to that of quiescent period. The epithelial lining of the tubules was cuboidal with centrally placed nuclei. The tubular lumina were full of homogenous secretion during active pre-breeding and breeding period as the secretory material released into the lumen by both apocrine and merocrine modes. Regressive changes in the seminal vesicle were evident from April. The tubules showed gradual hypotrophy as the quiescent period approaches in May.

**Keywords:** Chiroptera, Bat, *Taphozous kacchensis*, Seminal vesicle, Epithelial cells, Tubule, Apocrine, Merocrine

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### Introduction

Bats (Chiroptera) are among the most diverse and widely distributed group of mammals and can be

found in most continents. Bats are the only flying mammals and they have a wide range of feeding



**Geo-Spatial Modeling in the Assessment of Environmental Resources for Sustainable Water Resource Management in a Semi- Arid Region : A Case Study of Bhandara District, India**  
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**ABSTRACT**

The present study is geospatial modeling in the assessment of environmental resources for sustainable water resource management in a Bhandara district, India, using by geographical information system (GIS) and remote sensing (RS) techniques. The study will be based on secondary data. Secondary data was collected during the time period between are 1971 to 2013. After data collection the data were edited and coded. Then all the collected data were scrutinized carefully and recorded in master sheets. The monsoon rains in district are concentrated in the four months from June to September and receive 90.81% rainfall, post-monsoon 1.86% pre-monsoon 4.83% and winter 2.48%. Sandy red soil has covered 31% area; median black soil has covered 47% and Lomi red soil 22% covered the area of district. There are 580 large and 13,758 small and medium sized lakes in the district. The percentage of total area under forest 12.25%, especially during 2001 to 2011 periods it was in Bhandara (12.33%), Mohadi (19.89%), Tumsar (13.27%), Lakhani (11.13%) and Lakhandur (16.24%) decreased on large scale. There is a tremendous increase in the forest area in Sakoli (9.31%). Well irrigation is very important, in 1981; the total irrigated area was 66009 hect. of these 7.67% area is under well irrigation in 2011, the total irrigated area was 128165 hect; of these, 19605 hect. (15.30%) area was under well irrigation in the district. The aim of this present study was to evaluate environmental resource units that have been delineated based on the geospatial modeling of environment parameters with appropriate weights in GIS and RS techniques. The data can be used for area management, utilized in restoration and conservation of natural resources studies in the future.

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## Study of Zooplankton Diversity of Small Lentic Ecosystem, Lohara, Gondia, Maharashtra, India

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**Abstract:**

Zooplankton ubiquitously present in all the freshwater bodies of World. The study of Zooplankton structure of the fresh water body reflects the ecological health of it. The study of Zooplankton biodiversity is helpful in evaluating the trophic status of that water body. The present study is carried out in the small lentic ecosystem present at village Lohara of Gondia district. Study reveals that pond harbours total 29 genera of Zooplankton among which 17 genera belongs to group Rotifera followed by Cladocera with 7 genera and 5 genera of Copepoda. High dominance of Rotifers in the water body especially genus *Brachionus* indicating presence of high percentage of suspended particles in it which leads to slight Eutrophication. The present investigation may help the concerned authorities to conserve the water body for the future.

**Keywords:** Zooplankton, Lentic Ecosystem, Rotifers, Diversity.

**Introduction**

Fresh water lentic ecosystems are probably the most productive wetlands in the world. One of the most inseparable biotic components of this ecosystem is the Zooplankton. They are the most heterogeneous miniscule organisms found in any aquatic ecosystem. This taxonomic group of organisms comprises protozoa, Rotifera, Copepoda, Cladocera and Ostracoda which are usually equipped with body spines that protect them from their enemies (Verma *et al.*, 2013). Due to high densities, drifting nature, high species diversity and stress tolerance they become inevitable part of aquatic food chain where they efficiently transfer energy from lower trophic level i.e. autotrophs to the higher level i.e. heterotrophs (Bhat *et al.*, 2014). They add significantly to aquatic biological productivity in fresh water ecosystem (Nimbalkar *et al.*, 2013). Zooplanktons are Susceptible for any changes in climatic conditions and Physico-chemical properties of water and plays a pivotal role in indicating presence or absence of fish species (Koli and Muley, 2012; Babre *et al.*, 2019). Zooplankton are excellent fish food, rich in proteins, vitamins and fatty acids (Akin-Oriola, 2003). Zooplanktons are very good indicators of aquatic pollution therefore their abundance, diversity and indicator species dominance can be used for the assessment of water pollution. Zooplankton community structure reflects the ecological status of the freshwater body as they indicate the health of an aquatic ecosystem (Dede and Deshmukh, 2015). A very few studies have been done on the water bodies of Gondia district of Maharashtra. The most notable

contributors are Meshram, 2011; Gadekar, 2014; Bhandarkar, 2015. Work is very scanty; therefore, the present investigation has been carried out to assess zooplankton diversity of a small lentic ecosystem near village Lohara of Gondia district.

**Material and Methods:**

**Study Area:**

The present water body (Photoplate I) is situated in the village Lohara of the Gondia district. It lies between 21° 10' 42.08813"N and 80° 23' 7.83247"E. The water body is extensively used by villagers for the various activities such as washing of clothes, vehicles and cattle. It is also extensively used to dump Ganesh idols. The village has dominant population of adivasi tribe 'Gond'. Therefore, lots of Gond rituals take place around the lake. This resulted in cultural eutrophication of water body. Apart from this it also receives heavy agriculture run off from surrounding fields.

**Zooplankton Sampling:**

The sampling was carried out for period of one year from October 2020 to September 2021. The samples were collected in every first week of the month by using zooplankton bolting cloth of mesh size of 40 microns. About 200 litres of pond water is filtered through it. The collected water sample was immediately fixed with 4% formalin and later it is concentrated to 30 ml of volume. Zooplankton specimens were observed under Metzger-M-Co-axial trinocular digital camera research microscope vision plus-5000 DTM. Zooplankton species were identified by using keys from Endmondson, 1959, Battish, 1992, Michael and Sharma, 1998, etc.

**Table I: Abundance of Zooplankton in a small pond at Lohara, Gondia, Maharashtra**

Zooplankton	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
<b>ROTIFERA</b>												
<i>Brachionus sp.</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lecane sp.</i>	+	+	+	+	+	-	+	+	+	+	-	-
<i>Lepadella sp.</i>	-	+	+	+	+	+	-	+	+	+	-	-



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# JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

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## STRESS MANAGEMENT FOR LIBRARY PROFESSIONALS

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### Abstract

Present paper discusses the concept, definition, types and sources of stress management in the workplace of Library Professionals and some remedies are suggested to overcome this problem.

Stress has become a major issue for all people in society. The mental, physical, situational, and emotional state of mind is referred to as stress. This paper on stress management in libraries examines various aspects of stress in library professionals. It discusses library stress and the causes of it. It also discusses stress types, stress causes and symptoms, and stress management strategies. It also looked at the best ways for LIS professionals to deal with stress. However, there are numerous motivators as well as bottlenecks that influence professionals' participation in continuous professional development (CPD) activities. As a result of this topic, he must ensure that library professionals are well prepared and up to date on current trends in their jobs and duties.

**Keywords:** *Stress Management, Management, Library Professional*

### Introduction:

In our day to day life, we hear the word 'Stress' frequently. Every person we meet seems to be stressful due to certain circumstances. It has no relation with age, it is common in adults, senior citizens even in children. Modern life equipped with technology is full of hassles, deadlines, frustrations and demands.. Generally, Stress is considered as something unrespectable happening or demands due to which we feel miserable and does not want to do. Biologically stress is said to be what happens to our body system while giving response to an event. The word stress was laid by Dr. Walter B. Cannon, a well known psychologist at Harvard almost 150 years ago. Stress is a way of responding to any kind of situation or demand.

Stress is defined as the mental, physical, situational, and emotional reactions you have as a result of life's demands. Everyone suffers from stress. Since the twenty-first century, LIS professionals have faced ongoing challenges in the workplace. This is especially true for LIS professionals working in the digital library environment, not only because of the role they play within their libraries, but also because user expectations always seem to outstrip the library's capacity in terms of document, infrastructure facilities, finance staff, and so on. It is simply not possible to eliminate all sources of stress in the digital library workplace; however, library managers can manage stress among their teams to help reduce some of its consequences, such as poor performance. It is simply not possible to eliminate all sources of stress in the digital library workplace; however, library managers can manage stress among their teams to help reduce some of its consequences, such as low morale, poor performance, and team conflict.

The best way to manage stress is to foster a supportive environment, recognise signs of stress, and address issues as they arise.



## Disruptive Technology in Higher Education, with a Focus on Library and Information Science

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### Abstract:

The role of "disruptive" modern technology in higher education is examined in this research, with a focus on Library and Information Science. Higher Education Institutions (HEIs) have invested substantial sums in learning technologies in this country and abroad, with Virtual Learning Environments (VLEs) being more or less universal, but these technologies have not been uniformly adopted and utilized by students and faculty. Instead, other technologies are frequently employed to enhance learning and teaching that are not owned or controlled by HEIs.

This study examines data on the impact of disruptive technology using Activity Theory and Expansive Learning. The information was on technology awareness and use.

Learners employ a limited set of technologies to support their learning, but they have a proclivity to use resources other than those provided by their HEIs, according to observation.

This research uncovers a discrepancy between learning technology made available by higher education institutions and those used in practice. Students and lecturers rely on their higher education institutions to help them learn and teach. Outside of HEIs, the use of technology has ramifications for learning and teaching monitoring, as well as the role of HEIs, which are no longer the gatekeepers to knowledge. Confronting reality; issue solving; VLEs; online learning; informal learning; disruptive innovation; disruptive technology; activity theory; expanded learning; disruptive innovation; disruptive technology.

**Keywords:** confronting reality; problem solving; VLEs; online learning; informal learning; disruptive innovation; disruptive technology; activity theory; expansive learning.

### Introduction:

These disruptive technologies, according to Christensen's theory of Disruptive Innovation, are not specifically designed to enhance learning and teaching in higher education, but they do have educational potential. A disruptive technology is either a ground-breaking product that generates a completely new industry or one that displaces an established technology and shakes up the industry. Clayton M. Christensen, a Harvard Business School professor, developed the term disruptive technology. Christensen divides new technology into two groups in his best-selling book "The Innovator's Dilemma," published in 1997. Technology that is sustainable is based on incremental enhancements to an existing technology<sup>(1)</sup>. Because disruptive technology is new, it frequently has performance issues, appeals to a