**Activity(2017-2018)**

**Title:** "Biodiversity and Concentration of Airborne Fungi in different locations of Indore city."

**Aim and Objectives:**

**A. Aim:** To investigate the Air mycoflora of different outdoor environment of Indore city and find their role in allergic diseases.

**B. Objectives:**

i. Selection of sampling sites in Indore city.
ii. To perform Air monitoring in selected locations by passive sampling method.
iii. Collection of soil samples from selected locations.
iv. Calculation of CFU of Air samples and soil samples.
v. Isolation and identification of bacteria and fungi.
vi. Assessment of Antibiotic resistant strains of bacteria.

**Context:** The study of aeromycoflora of particular region provides the clear view about interaction of fungal spores in the form of disease on plants as well as occurrence of allergy in human being. It is of great clinical value to know the identity of the dominant airborne fungi in a particular area, as the fungal population varies from one place to another. Fungi live as saprophytes on organic material or as parasites (mainly plant pathogens), so the majority of fungal spores in the air outdoors come from farms, forest stands and decomposing plant matter. When sensitive individual inhaled the aerial fungal spores, allergic symptoms are noticed. In order to identify the dominant fungi, an aero mycology investigation had been conducted in the atmosphere of Indore.

In2017-2018 the outdoor environment of Indore city was investigated for the occurrence and biodiversity of fungal flora which may be responsible for the allergic diseases and also find out the concentration of Air borne fungi after Swachh Bharat Abhiyan.

Department of Microbiology, Govt. Holkar Science College, Indore had conducted a study which included microbiological assessment of air to monitor the presence of several species of fungi that are effectively used as pollution indicators for detecting the faecal contamination, human activity waste, heavy metals and crude oil. This study was conducted to evaluate the impact of Swachhta Abhiyan on local environment of Indore.

**Study:** Present study was carried out between the months of December 2017- February 2018.Total 12 outdoor locations were selected as sampling sites which includes Temple campus, crowded areas, public places of Indore city. Air sampling of different locations was done by using passive sampling method (Settled plate method). Meterological parameters effecting fungal distribution and diversity were also monitored. Different fungi were identified on the basis of colonial morphology and microscopic studies by using standard literature. Then the Petri plates were brought into the laboratory and percentage frequency and percentage contribution of the total fungal flora were assessed.

% Frequency = (No. of observations in which a species appeared / Total no. of observations) × 100

% Contribution = (Total No. of colonies of species in all the observations taken together / Total No. of colonies in all the species) × 10

**Evidence of Success:** Total 155 colonies of fungi belonging to 7 different genera were studied from different locations of Indore. The highest prevalence of *As per gillus sp*. and *Alternaria* sp. were found in all selected sampling sites which are one of the known causes of allergic problems. The prevalence of fungal spores found more in the month of December and January as compare to February which proves that low temperature favors the growth of fungi.

**Problems Encountered and Resources Required:** The students were divided under team leaders who performed area monitoring exposing microbiological agar media plates at the allotted locations of Indore.

**Notes :**This activity helped in making the students participated in solving the present issues of environmental changes. It aims in making the students aware about their environment, their social responsibilities as science students and would help them in continuing these practices for the best future of the coming generations as well.

## Students performing Area monitoring at different locations.


**Activity(2019-20)**

**Title**: "Research Studies On Unknown Foul Odour Of Indore City-2019"

**Aim and Objectives :**

**A. Aim:** To investigate the foul odour reported in Indore city and to find its probable reasons.

**B. Objectives:**

i. To perform survey of affected localities to know the details of foul odour.
ii. To get Questionnaires filled from local residents to get their views on foul odour.
iii. To visit the affected regions of the city.
iv. To perform Sampling of soil from affected regions and its analysis.
v. To perform Sampling of water from Khan river from affected region and its analysis.
vi. To perform Microbiological analysis of air of affected region.
vii. To observe of wind flow directions during hours of foul odour.
viii. To interpret the data for probable reasons of foul odour.

**The Context:** Indore has been awarded with the title of "the cleanest city of India" for the last three successive years. City is well known for its cleanness and waste management. The Indore Municipal Corporation (IMC) has worked hard for the maintenance of cleanness and their efforts have led to the way for the cleanest city in the country for three consequent years. During the late months of 2019 the residents of Indore reported a foul smell in some areas of the city specially in evening hours. They claimed that the smell was very intense and unbearable.

Department of Microbiology, Govt. Holkar Science college, Indore had taken initiative to deal with this problem as their social responsibility. The Head of the department Dr. Sanjay Vyas along with four professors of the department Dr. Shweta Hardia, Dr.Anita Mukati, Dr. Deepti Khare& Asst. Prof. Anuja Sharma and about 16 students of the department have worked and produced the report.

**Study:** Studies had been performed at different levels. At first local survey was done around 20 different sites from where foul smell was reported. This survey was done with the help of questionnaire and the result of the survey showed that local residents of certain areas are continuously facing this problem since last 1.5 months. As per residents, the smell was similar to decomposition or fermentation. The smell usually came in the evening hours around 6-10 pm. Residents also complained health problems like headache, vomiting and eye disorders due to the smell. Residents residing in Devguradia and near by places suspected that the smell might be coming from trenching ground.
Team had done studies on airflow, which showed change in air direction responsible for foul smell in different areas. Studies were done with the help of "wind finder application" and had shown that when the wind direction was toward south-east, the eastern regions of the city were affected while when the direction was towards south-west, the western regions where affected. It was observed that no foul smell was felt when the wind direction was south-north. This indicate that cause of the foul smell may be in southern parts of the city.
In the second level of studies, sampling was done from 06 different of suspected locations. Water and soil samples were collected from Kahn river which was suspected as a possible waste disposing area resulting in foul smell.

**Evidence of Success:** Different tests were performed with water such as temperature, pH, Alkalinity, BOD, TDS, Chloride, Hydrogen Sulphide and ammonia content. It was analysed that all the samples had not shown any unusual results regarding above parameters. The samples taken from borewell of trenching ground showed very high content of ammonia and fluoride. Microbial analysis suggested normal contamination of sewage water like faecal*coliforms* and faecal*Streptococci*. Soil was analysed for physical parameters and

microbial contamination and results does not showed any suspects regarding cause of foul smell.
Microbial examination of air flora was done which showed presence of normal contaminants like *Bacillus, Streptococci, Aspergillus, Penicillium, Alternaria, Rhizopus, Candida, Micrococcus* etc. these studies showed that none of the microbial species was related with the possible reasons for foul smell.
The report helps in concluding that soil and water were not the possible cause for foul odour in affected areas.

**Problems Encountered and Resources Required:-**The team had to travel to different locations to collect survey data from the local population. The sampling kits for soil and water analysis were required to collect samples from most affected areas.

ी पैरोल

सीसीटीवी कैमरे चेक किए। अंधेरा और फुटेज अस्पष्ट होने से आशंका है कि ऑटो रिक्शा जैसे वाहन से टक्कर हुई थी।

ने बाइक को टक्कर मार दी। सिर के बल गिरने से बाबूलाल की मौत हो गई। पुलिस ट्रक चालक को तलाश कर रही है।

ही खाली थी कि डीआरएम ने पाइ कहा। जब वे मिलने पहुंचे तो वो

# साकेत, गुलमोहर और मनीषपुरी पहुंची जांच टीम, लोगों ने कहा- इ चार से छह बजे के बीच ज्यादा दुर्गंध; सिरदर्द, घबराहट होती है इ

## होलकर कॉलेज की टीम ने शुरू की जांच, लोगों से सर्वे फॉर्म भरवाए

इंदौर | शहर के पूर्वी और मध्य इलाकों में परेशानी का कारण बनी दुर्गंध का पता लगाने के लिए मंगलवार से होलकर कॉलेज की टीम ने सर्वे शुरू किया। टीम सबसे पहले साकेत, गुलमोहर कॉलोनी और मनीषपुरी पहुंची और लोगों से बात की। शुरुआती सर्वे में ये बात सामने आई कि शाम को 4 से 6 के बीच सबसे ज्यादा दुर्गंध आती है। इसकी वजह से लोगों को सिरदर्द और घबराहट की शिकायत होने लगी है। टीम ने लोगों से एक फॉर्म भी भरवाया, जिसमें पूछा है कि जो दुर्गंध आ रही है, वह किस तरह की है। सबसे ज्यादा किस समय आती है और किसी खास हिस्से में इसका असर ज्यादा है क्या। इन सवालों के आधार पर टीम रिसर्च करेगी। टीम के पास जांच के लिए पोर्टेबल गैस डिटेक्टर, एयर सैंपलर और माइक्रोबल एनालाइजर भी मौजूद है। इन उपकरणों के जरिए हवा में फैली गैरजरूरी अतिरिक्त गैस का पता लगाया जा रहा है।

### पड़ताल... 15 दिन में रिपोर्ट दे

सर्वे टीम में रिसर्च साइंटिस्ट डॉ. श्वेता हा अनिता मुकाती, डॉ. दीप्ति खरे, डॉ. अनुज डॉ. नेहा शर्मा के अलावा 16 पीजी रिसर्च शामिल थे। कॉलेज के माइक्रोबायलाजी वि एचओडी प्रो. संजय ब्यास के मुताबिक, ड इलाकों में जांच करेंगे, जहां से दुर्गंध की शि आ रही। 15 दिन में रिपोर्ट सौंप देंगे।

# छात्र-छात्राओं की शिकायतों का निराकरण करने के लिए राज्य स्तरीय लोकपाल की होगी नियुक्ति

भास्कर संवाददाता | इंदौर/भोपाल

उच्च शिक्षा विभाग द्वारा विश्वविद्यालय अनुदान आयोग (छात्रों की शिकायतों का निवारण) विनियम 2019 लागू किया जा रहा है। इसके तहत छात्र-छात्राओं की शिकायत की सुनवाई के लिए राज्य स्तर पर लोकपाल की नियुक्ति की जाएगी। शिक्षा अथवा अनुसंधान क्षेत्र में प्रख्यात पूर्व कुलपति ही लोकपाल के लिए पात्र होंगे। अभी विधि स्तर पर लोकपाल नियुक्त होते हैं। वहीं हर संस्थान को अधिसूचना जारी होने की तिथि से तीन माह की अवधि में ऑनलाइन पोर्टल तैयार करेगा जहां कोई भी पीड़ित छात्र अपनी शिकायत निवारण के लिए आवेदन कर सकेगा। ऑनलाइन शिकायत प्राप्त होने के 15 दिनों के भीतर संस्थान अपनी टिप्पणियों सहित शिकायत को संबंधित छात्र शिकायत निवारण समिति को भेजेगा। यह समिति सुनवाई के लिए एक निर्धारित तिथि तय कर संस्थान और पीड़ित छात्र को जानकारी देगी।

## की बीमारी का शुरुआती दौर में ही लग जाएगा पता, एमजीएम के डॉक्टर ने बनाई डिवाइस

# ी यूरिन में प्रोटीन की जांच, खर्च मात्र 40 रुपए

### स्ट्रिप्स के इस्तेमाल से प्रारंभिक अवस्था में बीमारी पकड़ नहीं पाते

यूरीन में प्रोटीन का पता लगाने के लिए स्ट्रिप्स-पद्धति का भी इस्तेमाल किया जाता है। उसे यूरीन में डुबाते

खतौर ट्रायल एम्स में
की गई मरीजों की जांच

## नहीं मिला बदबू का जरिया

# होलकर की टीम ने लिया नाले के पानी का सैंपल, रहवासियों से की पूछताछ


छात्रों ने प्रभावित क्षेत्रों से पानी, हवा व मिट्टी के सैंपल लिए।

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इंदौर. शहर के पूर्वी क्षेत्र के बड़े हिस्से में बदबू ने रहवासियों का जीना मुहाल कर रखा है। प्रदूषण नियंत्रण बोर्ड भी मशक्कत के बाद इसकी वजह पता नहीं कर सका। इधर, होलकर साइंस कॉलेज के माइक्रोबायोलॉजी विभाग ने इससे निजात का बीड़ा उठाकर मंगलवार से सर्वे शुरू किया। एमएससी के छात्रों ने प्रभावित क्षेत्रों में जाकर जानकारी जुटाई। नाले के पानी का सैंपल भी लिया। हवा और मिट्टी के नमूने भी लिए जा रहे हैं।

टीम सदस्य शीतल नगर, पुष्प नगर, मनीषपुरी, साकेत नगर पहुंचे और लोगों से बात की। पता चला, शाम 6 से रात 10 बजे तक बदबू असहनीय हो जाती है। ये सड़े कचरे की लग रही है। ज्यादातर को सांस लेने में दिक्कत हो रही है। रिसर्च साइंटिस्ट डॉ. श्वेता हार्डिया, डॉ. अनिता मुकाती, डॉ. दीप्ति खरे, डॉ. अनुजा शर्मा व एमएससी के 16 छात्रों की टीम इस काम में जुटी है। विभागाध्यक्ष प्रो. संजय व्यास ने कहा, सर्वे-जांच का निष्कर्ष 21 दिन में निकल सकता है।

टापरी में थे।

379 में केस दर्ज किया।

## घटनाओं में चोरी का केस दर्ज नहीं होना चाहिए

एसपी रोचवर्धन मिश्र का कहना है लूट की घटनाओं में चोरी का केस दर्ज नहीं होना चाहिए। आपसे ये जानकारी मिल रही है। अभी तक ऐसे किसी व्यक्ति ने शिकायत नहीं की है। फिर भी मैं इसे चेक करवाती हूं। पुलिस अपनी सीआर नहीं, जनता के लिए ही काम कर रही है। जिनके साथ लूट हुई है, वहां धारा 392 की लगना चाहिए।

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हते हैं।

# दुर्गंध की जांच; होलकर कॉलेज
# इंद्रपुरी समेत 6 इलाकों से मिट्टी-

## रहवासियों ने टीम से कहा- शाम चार से छह बजे के अलावा सुबह

भास्कर संवाददाता | इंदौर

शहर में जगह-जगह हवा में फैली दुर्गंध की जांच कर रही होलकर साइंस कॉलेज की 21 सदस्यीय टीम गुरुवार को इंद्रपुरी, विष्णुपुरी और जीएसीसी (गवर्नमेंट अटल बिहारी वाजपेयी कला एवं वाणिज्य कॉलेज) परिसर पहुंची। टीम ने लोगों और छात्रों से बात की। यह जानकारी सामने आई कि सुबह 9 से 11.30 बजे के बीच भी हवा में दुर्गंध आती है, जबकि शाम को 4 से 6 बजे के बीच अकसर ऐसा होता है। यहां भी लोगों ने उसी तरह की दुर्गंध की जानकारी दी जो साकेतनगर, गुलमोहर और बिचौली मर्दाना क्षेत्र में लोगों ने बताई थी। इधर, टीम ने इन सभी क्षेत्रों में मिट्टी और पानी के सैंपल लेना भी शुरू कर दिए हैं। इन सैंपल को लैब में भेजा गया है। इन सभी इलाकों में जहां भी पानी के स्रोत हैं और खाली जगह मिट्टी है, वहां से सैंपल लिए गए। सभी सैंपल कॉलेज की माइक्रोबॉयोलॉजी लैब भेजे हैं। अब रिसर्च टीम इसकी जांच शुरू करेगी। उन इलाकों से भी सैंपल लिए हैं, जहां दुर्गंध की शिकायत नहीं आती।

### हवा के भी सैंपल लेंगे, फिर उसकी भी

जांच दल के सदस्यों ने नाले के पानी के भी सैंपल लिए।

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प्रधान श्रेणी का, चिंताजनक स्थिति नहीं

स

# दुर्गंध जांचने विष्णुपूरी और इंद्रपुरी पहुंची होलकर कॉलेज की टीम

होलकर कॉलेज के विशेषज्ञों की 21 सदस्यीय टीम गुरूवार सुबह साढ़े 11 बजे इंद्रपुरी पहुंची। यहां सर्वे शुरू किया। लोगों ने कहा कि रोजाना चार से छह बजे के बीच अजीब सी दुर्गंध आती है। अब तो उससे परेशान हो गए हैं। यह सिलसिला कई दिनों से चल रहा है। बता दें कि शहर के कई इलाकों में दुर्गंध से रहवासी परेशान हैं। यह दुर्गंध आ कहां से रही, यह अब तक पता नहीं चला है। मंगलवार से होलकर कॉलेज की 21 सदस्यीय टीम ने जांच शुरू की है। यह जांच 15-20 दिन में यह जांच पूरी हो जाएगी। इसके पहले

**Activity(2019-20)**

**Title**: "Assessment of prevalence of drug resistant *Escherichia coli i*n Khan River, Indore"

**Aim and Objectives :**

**A. Aim:** The present investigation is regarding occurrence of antibiotic resistant *E.coli*in the Khan river.

**B. Objectives:**

i. Sample collection from different sites of Khan river in Indore city.

ii. Antimicrobial Susceptibility Testing for isolated bacterial species.

**Context:** Emergence of bacteria resistant to multiple antibiotics is a serious matter of concern. Multidrug resistant (MDR) pathogens pose a significant threat to public health due to their high levels of resistance to most available antibiotics. Common microbial infections like urinary tract infections, sexually transmitted infections and respiratory tract infections are becoming untreatable. In some cases, it has been observed that bacteria have become resistant to most of the available antibiotics and are on the edge of becoming untreatable. Presence of antibiotic resistant microorganisms have been reported in aquatic environments, including rivers, hospital and municipal wastewater, surface water and drinking water systems. It is required to examine water quality parameters frequently to get essential information that can be used for the efficient water management.

**Study :** Water samples were collected from river Khan in sterilised glass bottles from different sites located between Limbodi and Kabitkhedi.Total aerobic heterotrophic bacterial counts were estimated in each sample as 'colony-forming units (CFUs) per unit volume of sample' by using Standard Plate Count Method. Dilution series were prepared using sterile saline water blanks. Appropriate dilutions were plated on Nutrient agar medium and after incubation colonial counts were determined. The samples were processed on selective and differential media for the isolation of *E.coli* bacteria. Isolates were purified by serial sub-culturing and conformation of *E.coli* isolates were done by staining and standard biochemical tests. The confirmed *E.coli* isolates were further subjected to antibiotic susceptibility test by standard Kirby-Bauer disc diffusion method.

**Evidence of Success:** In total 9 water samples were taken from 9 different sites of river Khan between Limbodi and Kabitkhedi of Indore city. Out of 24*E.coli* isolates, 19 showed resistances to ampicillin which comprises 79.2% of the total isolate. Resistance to clarithromycin and cefadroxil was observed in 13 (54.16%) and 14 (58.33%) isolates respectively. Nine (37.5%) isolates showed resistance to cefuroxime. The current study showed the presence of high percentage of MDR bacteria in Khan river which is a serious matter that must be addressed to control the entry and spread of antibiotic resistant microorganisms.

**Problems Encountered and Resources Required:** It was reported that faecal contamination and antibiotic resistant bacteria in ground water samples from bore wells present in colonies along the Khan river belt. They suggested that due to seepage of the highly polluted water of the Khan river, ground water has been getting contaminated with antibiotic resistant bacteria.

**Notes :** The pattern of drug resistant bacteria in Khan river is alarming which may contaminate ground water. It is a very serious matter and must be addressed appropriately. Efforts are required to discourage non-therapeutic use of antibiotics and to design effective methods to eliminate resistant bacteria and residual antibiotics from wastewater.

Govt. Holkar Science Collegebeing the most renowned centre for excellence in central India known for its heritagehas a motive of "widening the horizon for the people" by means of imparting them adequate education. The college envisions overall development of its students as mature and thoughtful human beings and responsible citizens of our country. Keeping this

in mind the department of microbiology conducted the above practices which aimed at preserving and restoring the water bodies of Indore.

In the past department had worked on a project regarding conservation of Lakes of Indore in the session 2015-2016. Continuing this practise, the department had studied drug resistant bacteria in Khan river which has made us aware about the increasing number of harmful drug resistant bacteria in our city's water body. The students who volunteered in this study were made aware about the future challenges with respect to the availability of safe sources of water.

**Activity(2016 to 2020)**

**Title**: "Microbial analysis of Water samples from different locations on GHSC campus"

**Aim and Objectives:**

A. **Aim:** To provide facility of safe and healthy drinking water on campus.
B. **Objectives:** The main objective behind this project is to provide facility of safe and healthy drinking water. This study will help in following ways:
    - Identifying existing problems
    - Ensuring whether water is suitable for the intended use, especially if used for drinking purpose
    - Tracking changes over time
    - Determining the effectiveness of a treatment system

The quality of a water source may change over time, even suddenly. Changes can go unnoticed as the water may look, smell, and taste the same.

**Context:** The college has drafted its research policy to ensure a safe and healthy environment for everyone who visits the campus for various reasons. One of the best practices initiated for the betterment of facilities provided by the college is to check the water quality on campus to provide safe drinking water on campus for all.
The Department of Microbiology has undertaken the project for water analysis. Dr Sanjay Vyas, Head and faculty members Dr. Deepti Khare, Prof. Anuja Sharma, Dr. Radhika Waghmare along with research scholar Neha Sharma, M.Sc. final students and staff will be working on this project.
Standard Drinking Water Checks will be performed quarterly every year from various departments and drinking points on campus regardless of the water source.
Water used by public municipalities and private homeowners must be tested regularly in order to keep the source of water safe and free from environmental risks and potential health disorders. When the water is tested it offers the knowledge; required to address the problem that is currently involved with the water quality. It will also ensure that the water quality is protected from every potential cause of contamination and an appropriate approach is involved with the treatment system.

**Study :** Water testing is carried out to meet the regulatory requirements and adhere to the safety procedures that are needed for pollutant-free water.

1. Sampling of different water sources- tube well and R.O drinking water units on campus
2. Coliform bacteria- Indicate the presence of microorganisms in the water that are potentially harmful to human health.
3. Total dissolved solids- Represent the amount of inorganic substances (i.e. sodium, chloride, sulphate) that are dissolved in the water. High total dissolved solids (TDS) can reduce the palatability of water.

**Evidence of Success:** A total of 15 drinking water samples collected from various water sources on campus were analyzed every three months since the year 2016- till date in the Department of Microbiology. It was observed that out of 15 samples, 07 samples which includes the locations – Red Building, Gate 1 (R.O), Gate 1 (outer), Geology department, Examination department (outer) and Library shown contamination by Coliforms in the session 2016-17.

| S.N. | YEAR | TOTAL NO. OF SAMPLES | CONTAMINATED SAMPLE NO. | TOTAL CONTAMINATED SAMPLES |
|---|---|---|---|---|
| 1 | 2016-2017 | 15 | 03,04,05,06,07,08,10 | 07 |
| 2 | 2017-2018 | 15 | 03,04,05,07,10 | 05 |
| 3 | 2018-2019 | 15 | 03,04,05 | 03 |
| 4 | 2019-2020 | 15 | 03,04 | 02 |

**Problems Encountered and Resources Required:** -The M.Sc. Students collected the samples from different water sources on campus and performed MPN for detecting the coliform using resources available in the department lab.


Fig. 1: Sample 3- Red building, growth of coliforms on EMB agar and MacConkey agar plates.


Fig. 2. Sample 4 - Gate 1 (R.O), growth of coliforms on EMB agar and MacConkey agar plates.


Fig. 3. Sample 5- Gate 1 (outer), growth of coliforms on EMB agar and MacConkey agar plates.


Fig. 4. Sample 6- Geology department, growth of coliforms on EMB agar plate.


Fig. 5. Sample 7- Examination department (outer), growth of coliforms on EMB agar and MacConkey agar plates.

Fig. 6. Sample 8- Examination department (R.O), growth of coliforms on EMB agar and MacConkey agar plates.