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RAMA DEVI WOMEN'S UNIVERSITY,  
VIDYA VIHAR, BHUBANESWAR-22

Proceeding of the meeting of the Board of Studies

In Industrial Microbiology

held on 28.8.19 at 11 A.M / P.M. in the University Office,

Bhoi Nagar, Bhubaneswar-22.

Members Present :



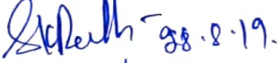

1. Prof. Chandni Charan Rath, Coordinator.
2. Dr. Shikha Singh, Assoc. Prof., Life Sc.
3. Dr. Sakshi Kanta Rath, Assoc. Prof., Life Sc.
4. Prof. Saemita Mohanty, Prof., Biotechnology
- 5.
- 6.
- 7.
- 8.

Prof./ Dr. Chandni Charan Rath is selected as Chairman of the Board for the Academic year 20.....

The recommendations of the Board in respect of the Regulations, Detailed Syllabus, Text Books and other items are appended the prescribed form.

Signature of the Members :-

CHAIRMAN

1.  28/8/2019
2.  28/8/19
3.  28.8.19.
4. 
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RAMA DEVI WOMEN'S UNIVERSITY, BHUBANESWAR

Proceeding of the meeting of the Board of Studies

21  
of Industrial Microbiology

held on 6.6.2019 at 11:30 A.M / P.M. in the University Office,

Bhoinagar, Bhubaneswar-22.

Members Present :

1. Prof. Chandni Charan Rath -
2. Dr. Shikha Singh.
3. Dr. Sakti Kantar Rath -
4. Prof. Sarmita Mohanty.
- 5.
- 6.
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- 9.
- 10.

Prof./ Dr. Chandni Charan Rath is selected Chairman of the Board for the Academic year 2019-20

The recommendations of the Board in respect of the Regulations, Detailed Syllabus, Text Books and other items are appended the prescribed form.

Signature of the Members :-

  
CHAIRMAN

1. ~~S. Mohanty~~
2. Shikha Singh
3. Sakti Kantar Rath -
- 4.
- 5.
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- 8.
- 9.
- 10.

22

**Syllabus**  
**M.Sc. Industrial Microbiology**  
**(2019 onwards)**



**P.G. DEPARTMENT OF LIFE SCIENCES**  
**RAMA DEVI WOMEN'S UNIVERSITY**  
**VIDYA VIHAR, BHUBANESWAR-751022**

S.S.

*[Handwritten signature]*



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RAMA DEVI WOMEN'S UNIVERSITY, VIDYA VIHAR  
BHUBANESWAR-22

Proceeding of the meeting of the Board of Studies Industrial Microbiology

held on 15/07/21 at 11 AM A.M / P.M. in the University Office,  
Bhoi Nagar, Bhubaneswar-22.

Members Present :

1. Prof. C.C. Rath - Prof, Dept of Life Science, RDWU, BBSR
2. Dr. S. Singh, Assoc Prof, Dept. of Life Science, RDWU, BBSR
3. Dr. P.C. Mohanty, Asst. Prof. of Botany, Odisha Univ., BBSR
4. Dr. S. Mohanty, Prof, Dept of Biotechnology, RDWU, BBSR
5. Dr. S.K. Rath, Assoc Prof, Dept of Life Science, RDWU, BBSR
- 6.
- 7.
- 8.

✓ Prof./ Dr. Chandi Charan Rath is selected as Chairman of the Board for the Academic year 2021-22

The recommendations of the Board in respect of the Regulations, Detailed Syllabus, Text Books and other items are appended the prescribed form. The content of the course syllabus has been modified. The modified syllabus will be applicable for the session 2021-22.

Signature of the Members:-

CHAIRMAN 15/7/2021

- 1.
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- 8.

103

**M.Sc. INDUSTRIAL MICROBIOLOGY**  
**2 YEARS SEMESTER COURSE (2021-22)**

**COURSES OF STUDY**  
**CHOICE BASED CREDIT SYSTEM**



**P.G. DEPARTMENT OF LIFE SCIENCES**  
**RAMA DEVI WOMEN'S UNIVERSITY**  
**BHUBANESWAR, ODISHA**

*Approved for 2021-22 session.*

*S.S.*  
*15/7/21*

*Adithy*  
*15-7-21*



RAMA DEVI WOMEN'S UNIVERSITY, VIDYA VIHAR  
BHUBANESWAR-22

Proceeding of the meeting of the Board of Studies ..... *Industrial Microbiology*  
held on 17.5.22 ..... at 11 am ..... A.M / P.M. in the University Office.  
Bhoi Nagar, Bhubaneswar-22.

Members Present :

1. *prof. A.C. Mohanty.*
2. *prof. Sarmita Mohanty.*
3. *Sakti Kanta Rath*
4. *prof. P. Ray*
- 5.
- 6.
- 7.
- 8.

Prof./ Dr. *S.K. Rath* ..... is selected as Chairman of the Board for the Academic year 20.....

The recommendations of the Board in respect of the Regulations, Detailed Syllabus, Text Books and other items are appended the prescribed form.

Signature of the Members:-

*S.K. Rath*  
CHAIRMAN 17.5.22

1. *R. Mohanty* 17.5.22 (A.C. Mohanty)
2. *Sarmita Mohanty* 17.5.22
3. *S.K. Rath* 17.5.22 (S.K. Rath)
4. *P. Ray* 17/5/22
- 5.
- 6.
- 7.
- 8.

The chairman approved the committee about the agenda of the meeting on deliberation, the following was resolved:

- 1) Committee recommended the name of experts for board of conducting, examination moderation board and paper setters for PG in Industrial Microbiology (IIMB) 2022-23. as per newly modified structure of PG IIMB.
- 2) The committee recommended the list of examiner (external and internal) along with contact details.
- 3) Committee examined the structure of PG syllabus. The objectives and learning outcomes of each unit of each paper was discussed and finalized to include newly structured syllabus.
- 4) The committee discussed the structure of PG syllabus in IIMB and unanimously modified the structure by adding the following new modified papers in syllabus:
  - Sem 1: Dist to Industrial Microbiology and Microbial techniques, Immunology and Microbial Transformation, Bioprocess Technology, practical and comp. application course by clearing centre
  - Sem 2: Fermentation technology, Microbial physiology and genetics, Food micro biology, practical, Recombinant DNA Tech / Bioremediation, Human health Hygiene / HCC Cs. (Switzerland) NPTFL)
  - Sem 3: Env. Microbial Technology, Microbial disease and their control, practical, Microbes, Biofertilizer, Bioinsecticide / Virology, Res. Methd., waste management, Field Internship.
  - Sem 4: - Subject Area overview, seminar, Dissertation, Dissertation evaluation and Women and society.
- 5) It was resolved that following Non-credit skill based certificate course will be introduced for the PG IIMB course:
  - Scientific manuscript writing from paper to publication
  - Integrated pest management
  - Biofertilizers.
- 6) The committee recommended and passed the newly structured PG IIMB syllabus.
- 7) It was resolved that chairman BOS and COE are authorised to make any change in list of examiners, paper setter, Moderators and board of conducting examiners.
- 8) It was resolved that last unit of all Head core and core elective papers of each semester will be guided self study (blended learning) for students. These units will have introductory class and students will study themselves. There will be a doubt clearing class for these units and students will be provided with study materials for the same.

Rimothy  
17/5/22  
(A.C. Mohanta)

Silpathy  
17/5/22

17-05-22

SM Mohanta  
17/05/22

Department of Life Science,  
Skilled Based Certificate Course  
(2022-23)

PG in Life Sciences  
and  
Industrial Microbiology

Rama Devi Women's University  
Bhubaneswar, Odisha

M. K. Saha  
12/05/22

C. R. Nayak  
17/5/22

S. K. Das  
17-5-22

P. K. Das  
17-05-22



**Name of the Department:** Life Sciences

**Title of SBCC:** Skilled based course on Scientific manuscript writing from paper to publication

**SBCC Code:** SMW

**Semester of offering:** 3<sup>rd</sup> Semester

**Course Coordinator:** Dr. Alok Prasad Das and Dr. Shikha Singh

**Applicable to class:** PG Life Sciences/ Industrial Microbiology, RD Women's University

**Full mark:** 50

**Exam pattern:** Theory (25) + Practical (25)

**Course Overview And Out Come:** Publishing articles in peer-reviewed high impact factor journals is increasingly important for students who intend to pursue careers in academic and research. In this course we will introduce students to the different types of scientific articles and provide an outline of how to write a original research and review article. This course is designed around a system to help post graduate students and PhD research scholars in a field of science to develop their skills on scientific manuscript writing. The course combines weekly classes, workshop sessions involving students, scholars and experts and manuscript preparation and presentation by students.

**Detailed Syllabus**

**Module 1:** Introduction to Scientific Writing, Structure of a research article, Scientific writing style, how to write a title, abstract and list keywords? Providing Authors and Affiliations, writing 'Methods' section, designing effective tables and graphs, Describing the 'Results' section

**Module 2:** Art of scientific writing, Choosing the right journal for publication, how to submit papers in journals? highlight your research, Common mistakes, error in Language, sharing policy, Reviews, commentaries, responding to peer-review, Submitting a revised manuscript.

**Mod 1-2-3:** Softwares for Reference Management, Introduction to Mendeley, Publication and Citiles, Data application, checking paper for Plagiarism, Conflict of Interest, Acknowledging the funding agency, Contribution of authors, conducting a peer review, Sharing and collaborating

**Practical's:** Workshop, Seminars, Hands on practice, Paper writing, Use of Software, Team teaching, Submission of review papers, Submission of abstracts for conferences, seminars

#### Referred Books

1. Style and Ethics of Communication in Science and Engineering by Jay D. Humphrey; Jeffrey W. Holmes
2. A Field Guide for Science Writers by Deborah Blum (Editor); Mary Knuds (Editor); Robin Marantz Henig (Editor)
3. The Handbook of Technical Writing by Gerald J. Alred; Charles T. Brusaw; Walter E. Oliu

S. Mohanty  
12/05/22

P. Das  
12/05/22

S. Shikha  
12/05/22

## Integrated Pest Management

SIBCC Code: IPM

### Objective

1. To explore the basic themes and methods of pest management.
2. To understand the challenges that modern pest management programs face
3. To gain an appreciation for management techniques that balance the need for pest control

Unit-1 Insects, their abundance and diversity in nature; insects as pests in agriculture, reasons for outbreaks causing crop loss; concept of pest status, types of pests; methods of sampling and surveillance of pests; Principles of pest management, history/definition etc. IPM and its concepts.

Unit-2- Components of IPM: legal approach, ecological management, diverting pest population away from the crop; managing insects with resistant plants; history, mechanism of resistance and use of plants as resistant means in pest management. Pest management by modifying insect development and behaviour; insect growth regulators like repellants, attractants, inhibitors.

Unit -3 -Sterile insect technique. Biological control: using predators, parasitoids and microbes. Botanical pest management; chemical means of pest management. Integration of different IPM techniques; pros and cons. Adoption of IPM; pros and cons. Importance of AESA in pest management. Successful implementation of IPM in cereals, pulses and commercial crops, oilseed, vegetable crops and fruit crops

### Practical's

Case studies, video lectures, seminars, field visits etc

### Learning Outcomes

*At the end of the course, students will be able to*

1. Define the IPM concept and its components
2. Describe the themes and methods of pest management
3. Describe the challenges faced by modern pest management programs
4. Demonstrate different techniques of pest management
5. Enumerate the successful application IPM in different crops.

### Reference Books

1. Integrated Pest Management: Potential, Constraints and Challenges (Text) edited by Opendra Koul, G S Dhaliwal, G W Cuperus CABI Publishing.
2. Insect Pest Management by David Dent - CABI Publishing.
3. Insect Pest Management and Ecological Research by Gimme H Walter - Cambridge University Press.

S. Mohan  
12/05/22

Dr. Anurag  
17-05-22  
4/5/22

S. K. Pathy  
12/05/22

## Biofertilizer

SBCC code: BF

### Course Objectives:

To demonstrate the low cost media preparation and impart training of eco-friendly agricultural inputs in biofertilizer production.

Unit-1: Introduction, Chemical fertilizers and its demerits, History and concept of Bio fertilizers, status scope and importance of Bio fertilizers, Classification of Bio fertilizers, Advantages of Biofertilizers and its environmental impacts.

Unit -2: Structure and characteristic features of bacterial Bio fertilizers: Nitrogen fixation, Nitrogen Biofertilizers (Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cyanobacterial biofertilizers- Anabaena, Nostoc, Azolla), Phosphate solubilizing Microorganisms, fungal biofertilizers- Mycorrhizae.

Unit -3: Production technology: Strain selection, Strain Improvement, mass production of carrier based and liquid bio fertilizers (Bacterial and Fungal), FCC specifications and quality control of bio fertilizers, Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio fertilizers

### Practical:

1. Isolation of Nitrogen Fixing Bacteria from soil (Rhizobium, Azospirillum, Azotobacter)
2. Isolation and culture of Phosphate and sulphate Solubilizing bacteria
3. Isolation and culture of Cyanobacteria (Anabaena from Azolla; Nostoc from soil)
4. Laboratory scale production of Bacterial, algal, and fungal Biofertilizer.

### Learning Outcomes

At the end of the course, students will be able to

1. Ability to distinguish the types of biofertilizers and methods of application in field.
2. Development of integrated management for best results using nitrogenous and phosphate biofertilizers.

### Reference Books

Motsora, M.R., P. Bhattacharya and Beena Srivastava (1995). Biofertilizer Technology, Marketing and Usage-A Source Bookcum-Glossary  
Subbarao, N.S. 1993. Biofertilizers in Agriculture and Forestry (Oxford and IBH Pub. Co., New Delhi)

General Microbiology- Dubey and Maheswari

SM Hanu  
17/05/22

Dr. Anshu  
17/05/22

Dr. Anshu  
17/05/22

**M.Sc. Industrial Microbiology**  
**2 YEARS SEMESTER COURSE (2022-23)**



**COURSES OF STUDY**  
**CHOICE BASED CREDIT SYSTEM**

**P.G. DEPARTMENT OF LIFE SCIENCES**  
**RAMA DEVI WOMEN'S UNIVERSITY**  
**BHUBANESWAR, ODISHA**

*SM Chandra*  
17/05/22

*Ranjana*  
17/5/22

*Dr. P. K. Sahoo*  
17-5-22

*Dr. P. K. Sahoo*  
17.05.22



RAMA DEVI WOMEN'S UNIVERSITY, VIDYA VIHAR  
BHUBANESWAR-22

Proceeding of the meeting of the Board of Studies Industrial Microbiology  
held on 21-4-23 at 11:30 A.M / P.M. in the University Office,  
Bhoi Nagar, Bhubaneswar-22.

Members Present:


1. Prof. Chandni Charan Rath, Prof. Life sc, RDWU
2. Prof. R.C. Mohanty, Prof. Engg, UV, BBSR
3. Prof. Sasmita Mohanty, Prof. Botany, RDWU, BBSR
4. Dr. Shikha Singh, Assoc. Prof, Life sc, RDWU
5. Dr. Sakti Kantar Rath, Assoc. Prof, Life sc, RDWU.
- 6.
- 7.
- 8.

Prof./ Dr. Chandni Charan Rath is selected as Chairman of the Board for the Academic year 2023-24.

The recommendations of the Board in respect of the Regulations, Detailed Syllabus, Text Books and other items are appended the prescribed form.

Signature of the Members:-


  
CHAIRMAN

1. 
2. SMohanty 21/4/23
3. Scheth 21-4-23
4. S.S 21/4/23
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- 7.
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## Recommendation


1. Recommended the name and contact no. of Board of conducting member, Moderation board and paper setter for PG Ind. Mir. 23-24 examination.
2. Recommended the list of examiners (external and Internal) for PG Ind. Mir. 23-24 examination
3. PG Ind. Mir 200 syllabus was examined and following modifications were incorporated:
  - (i) paper HF-104 - practical  
Added No. 15 Estimation of total sugar.
  - (ii) paper OE-201A Human Health and Hygiene  
Unit I - "and lifestyle disorders" - Deleted.  
Unit II - "cardiovascular disorders" changed to "Lifestyle disorders"  
"Myocardial infarction (Causes, treatment and prevention)" - deleted
  - (iii) HC 303. practical - two practicals added.  
14. To study profitability of drinking water.  
15. Deletion of bacterial DNA
4. PG syllabus has been deemed as per the new structure and PG regulation (attached)
5. Non-credit skill based certificate has been introduced and approved in 22-
6. suggestions as per NEP-2020 will be introduced in the curriculum, time to time as per the directions.
7. chairman is authorised to make any changes if required.

S. M. K. Bhat  
21/04/23

  
21/4/23

  
S. M. K. Bhat  
21/4/23

  
21/4/23

  
S. M. K. Bhat  
21/4/23

**Unit-I:** Human health, disease and ~~lifestyle disorders~~: WHO definition of health, disease, disorder and classification of diseases based on source of pathogens, terminologies used in infectious disease (etiology, epidemiology, vector, incubation period, infective period, causative agent, carrier, notifiable disease, epidemic, endemic, pandemic, signs, symptoms, prevention/prophylaxis, treatment). Vaccination: Definition of vaccine, types of vaccines, vaccination programmes in India

*Lifestyle disorders.*

**Unit-II:** ~~Cardiovascular disorders~~: blood pressure and heart attack (causes, treatment and prevention). ~~Myocardial infarction (cause, treatment and prevention)~~, Cancer: Definition, Types, causes of cancer, prevention and control, Diabetes mellitus: Types (Type I and Type II); Type II diabetes- causes, clinical symptoms, treatment, control and prevention. Obesity: Definition, cause, prevalence, effect and preventive measures.

**Unit-III:** Communicable Diseases: Water borne diseases: Typhoid (causative agents, transmission, signs and symptoms, treatment and prevention). Air borne disease: Influenza, H1N1 (causative agents, transmission, signs and symptoms, treatment and prevention). Vector borne disease: Malaria (causative agents, transmission, signs and symptoms, treatment and prevention, eradication). Food-borne disease: Botulism (cause, epidemiology, clinical symptoms, treatment, control and prevention). Animal-borne disease: Rabies (cause, epidemiology, clinical symptoms, treatment, control and prevention). STDs: AIDS (causative agents, transmission, signs and symptoms, treatment and prevention, eradication).

**Unit-IV:** Implications of climate change and management of communicable diseases, Climate Change: Meaning, causes and impact on human health; Management of communicable diseases: Disinfectants, antiseptics and antibiotic; Definition, various types of antiseptics (hypochlorite, phenol, ethanol, isopropanol, aldehydes, detergents, chloroxylenol), antibiotics, types (biostatic, biocidal) and most commonly used antibiotic, antibiotic resistance

### Objectives

1. To understand the major life style diseases affecting each organ system.
2. To understand common infectious communicable diseases and their specific symptoms
3. To understand management of communicable diseases

### Learning Outcomes

*At the end of the course, students will be able to*

1. Describe the major life style diseases affecting each organ system.
2. Explain the common infectious communicable diseases and their specific symptoms.
3. Explain the Implications of climate change and management of communicable diseases.

### Reference Books:

1. Nandini N, Sunitha N and Sucharita Tandon, (2007), Environmental Studies, Sapna Book House, Bangalore
2. Park, K. (2011). Preventive and Social Medicine. Benarsi Das Publications
3. Sekhsaria, P. (2007). Conservation in India and the Need to Think Beyond 'Tiger vs. Tribal'. Biotropica
4. Tyler Miller and Scott E. Spoolman 'Environmental Science' (2012) 13th Edition First Indian Reprint

*S. Mohan*  
21/04/23

*S. K. Reddy*  
21.4.23

*S. S. L.*  
21/4/23

HC-104	PRACTICAL BASED ON PAPERS HC 101, HC 102, HC 103	6CH	100 Marks
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1. Learning the equipments of a common microbiology laboratory.
2. Learning the techniques of sterilization (Autoclave, Laminar air flow).
3. Preparation of culture media (agar/ broth).
4. Isolation of pure culture by spread plate, streak plate and pour plate.
5. Study of colony morphology and counting.
6. Gram staining
7. Estimation of proteins.
8. Paper chromatography.
9. Precipitation method – Immunodiffusion
10. ELISA method
11. SDS PAGE Electrophoresis
12. Western Blotting
13. Affinity purification
14. To perform the experiments using following instruments
  - a. pH Meter (to measure the pH of the supplied sample)
  - b. Microscope (to identify the morphology of the supplied sample)
  - c. Spectrophotometer (to determine the absorption maxima, measure the concentration of the supplied sample)
  - d. Chromatography (to separate the supplied sample on the basis of mass, charges)
  - e. Centrifuge (to separate biomass of the supplied sample)

**Objectives** 15. Estimation of total sugar.

1. To understand the practical skills using instruments in biology.
2. To perform and evaluate practical methods for identification and isolation of microbes.
3. To have hands on working experience of basic instruments of biology.

**Learning Outcomes**

**At the end of the course, students will be able to**

1. Demonstrate knowledge and practical skills using instruments in biology and life sciences.
2. Perform and evaluate methods used to identify microbes and their activity.
3. Analyse microbial physiology including metabolism, regulation and replication.
4. Evaluate and apply knowledge of microbiology in various field.
5. Execute various basic instruments of life sciences.

S. M. M. M. M.  
21/04/23

S. K. K. K. K.  
21-4-23

S. S. S. S. S.  
21-4-23

S. S. S. S. S.  
21/4/2023

S. S. S. S. S.  
21/4/23



HC 303	Practical related to paper HC-301, HC- 302 and CE-301 A/B, CE-302 A/B	6CH	100 MARKS
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1. Isolation of microorganism from waste water samples.
2. Isolation of multi metal resistant bacteria from heavy metal polluted soil samples.
3. Isolation of bacteria from contaminated food samples.
4. Isolation of Nitrogen Fixing Bacteria from soil (Rhizobium, Azospirillum, Azotobacter)
5. Isolation and culture of Phosphate and sulphate Solubilizing bacteria
6. Isolation and culture of Cyanobacteria (Anabaena from Azolla; Nostoc from soil)
7. Laboratory scale production of Bacterial, algal, and fungal Biofertilizer.
8. Problems relate to mean, median, mode, SD, SE, ANOVA and Correlation.
9. Testing the difference between two samples by t-test.
10. Testing the difference between expected value and observed value by Chi-square test.
11. Testing the interaction of factors by F-test.
12. Determination of antibody concentration in the given sample using ELISA.
13. Determination of microbial proteins molecular weight in given sample using SDS PAGE.

14. To study palatability of drinking water  
 15. Isolation of bacterial DNA.

**Objectives**

1. To have handson experience in Isolation of microorganism from waste water samples
2. To demonstrate Isolation of Nitrogen Fixing Bacteria from soil.
3. To carry statistical experiments in research.

**Learning Outcomes**

At the end of the course, students will be able to...

1. Demonstrate Isolation of microorganism from waste water samples.
2. Demonstrate Molecular biology experiments like ELISA and SDS PAGE
3. Solve Problems related to mean, median, mode, SD, SE, ANOVA and Correlation
4. Isolate Nitrogen fixing, phosphate and sulphate solubilising bacteria from soil.

**Reference Books**

5. Prescott, M.J., Harley, J.P., Klein, D.A. (2002). Microbiology. 5th Edition. New York: WCB Mc GrawHill publication.
6. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5 Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
7. Salle, S.J. (1974).Fundamental Principals of Bacteriology. Tata McGraw Hill Publication Co. Ltd. New Delhi.
8. Purohit, S.S., Microbiology-Fundamentals and Applications-6 th Edition. Agrobios Publications. Delhi.

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