



Government of West Bengal
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Kabi Jagadram Roy Government General Degree College
MEJIA – 722143

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**1.3.2 Percentage of students undertaking project work/field work/
internships (Data for the latest completed academic year)**

**PROJECT REPORT & PROJECT COMPLETION CERTIFICATE
OF THE FOLLOWING STUDENTS ARE GIVEN BELOW**

1) SOMA MONDAL

2) SUMAN DAS

3) CHAITALI DAS

4) SHREYA BHATTACHARYA

5) PRITI KANA DUBEY

Muaji

Co-ordinator, IQAC
Kabi Jagadram Roy Government
General Degree College
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Shri

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PROJECT REPORT OF 1) SOMA MONDAL

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KABI JAGADRAM ROY GOVT. GENERAL DEGREE COLLEGE

PROJECT TITLE: ENVIRONMENT POLLUTION

SUBJECT: ENVIRONMENT STUDIES (ACSHP/ 104/ AECC-1)

NAME: SOMA MONDAL

PROGRAMME NAME: ENGLISH (HONS)

CLASS: 1ST SEM

ROLL NO.: 2214041

A. Chandra 05/11/2022
EXAMINED
Kabi Jagadram Roy Govt. General Degree College,
Mejia-722143 Dist-Bankura, W.B.

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পরিবেশ দূষণের কারণ, ঘটনাস্থল ও প্রতিকার

১। হুমিকার: আমাদের চারপাশের বাতাস, মাটি, অদ্বিতীয় জল, মানুষজন, পশুপাখি সবকিছুর অদ্বিতীয় অংশবিশেষ হল পরিবেশ। জীবের অল্প পরিবেশের অঙ্গক যে রকমই তাই তাই তাকে পরিবেশ বলা যায় না। তাই সুস্থভাবে বেঁচে থাকার জন্য বিশুদ্ধ বাতাস বেঁচে থাকার জন্য বিশুদ্ধ পরিবেশের একান্ত প্রয়োজন। মনুষ্য সভ্যতার দ্রুত বৈচিত্র্য মানে মানব জাতির জীবিকা সূত্র, সাম্রাজ্যের আশ্রিত রূপ বৃদ্ধি পেয়েছে। মনে প্রাকৃতিক বিশ্বদত্ত নষ্ট হয়েছে। এই প্রক্রিয়াকে আমরা পরিবেশ দূষণ নামে অভিহিত করি। পরিবেশ দূষণের তরিতর মানব সভ্যতা আত্ম সংকটের মুখোমুখি। দ্রুত জনসংখ্যার বৃদ্ধি এবং বিজ্ঞানের নিরঙ্কুশ প্রবল প্রতিদ্বন্দ্বিতা মর্যাদাতন্ত্র পৃথিবীর একে অন্য হলো জাতি সাম্রাজ্য-তন্ত্র ও নানারকতন্ত্র সভ্যতার অবব্যাপী পচন ও বিকৃতি নিবিচার্য প্রকৃতি অংশের এবং কাণ্ডজ্ঞানহীন দূষণ পৃথিবীতে একে অন্যে ক্ষয় ও অবক্ষয়ের অংশাংশ।

২। দূষণের প্রকারভেদ: পরিবেশ দূষণের কারণে বিনষ্ট হয়। তাছাড়া জীবজন্তুর স্বাভাবিক জৈবসম্মত বিনষ্ট হয়। উচ্চতর জীব-জন্তুর স্বাভাবিক এবং স্বতঃস্ফূর্ত বিকাশ ব্যাহত হয়। উচ্চতর জীব-জন্তুর স্বাভাবিক এবং অধীনভাবে পরিবেশ দূষণকে দুটি শ্রেণিতে ভাগ করা হয়। একটি প্রাকৃতিক দূষণভূমি হল আগ্নেয়গিরির অন্তঃস্ফূটন, দাবানল, পরমানবের অস্ত্রাশ্রয় প্রকৃতি কারণে পরিবেশ দূষণ হয়। কিন্তু অনুরূপ দূষণ আনয়নক। মানব সভ্যতার বৈজ্ঞানিক, কলকারখানার দূষিত বর্জ্যপদার্থ পারমাণবিক পরীক্ষা নিরাপত্তা, বিবিধ সামাজিক ব্যবহার যুক্ত প্রকৃতি কারণে পরিবেশের আবেদন দূষণ স্রষ্টা চলেছে। পরিবেশ দূষণ প্রধানত চার প্রকারে-
সংঘটনিত হয় -

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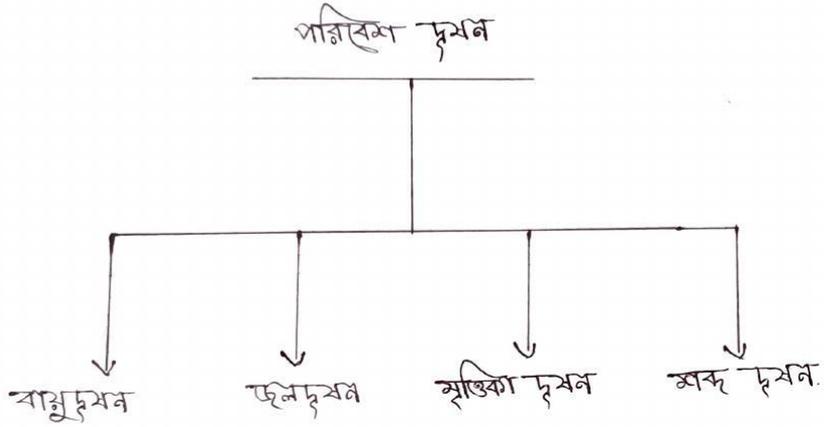
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- ৩) বামুদ্রম
২) ফলদ্রম
৩) মৃত্তিকা দ্রম
৪) স্নান দ্রম



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বায়ুদূষণ

পরিবেশে বিস্তৃত রাসায়নিক দূষণ ঘটানোর পাঁচটি কারণ হল।
আমরা তিন বিশ্বের বায়ুতে মিলে মিশে গুলি। এই বায়ুতে বিভিন্ন ধরনের
করকারগুণনা ও জাল-খালের বিভিন্ন বায়ুকে দূষিত করে। অর্থাৎ
দূষণ - বস্তু কোথাও নিক্ষেপিত বায়ুতে চলেছে। যখন পরিবেশে কার্বন
ডাই অক্সাইড, কার্বন মনোক্সাইড, অক্সিজেন, সালফার ডাই অক্সাইডের
মাধ্যমে বায়ুকে দূষিত করে। বায়ু মাধ্যমে ছড়ানোর মাধ্যমে
দূষণের পরিমাণ। প্রধানত দুটি কারণে বায়ু থেকে বায়ু দূষণ
হচ্ছে। মিলিত কারগুণনা থেকে নিজে বীজা এবং মানবীয়
থেকে নিজে বীজা। শিল্প কারখানা, গাছ, চিনি কারখানা, পাটকাঠ, বহুকারগুণনা
খনিজ মিল, বিভিন্ন অ্যাক্সিড ও কারগুণনা প্রধানত বায়ুদূষণ হচ্ছে।
এই সকল বায়ু থেকে প্রচুর পরিমাণে বীজা, বাষ্প, ন্যাস ও সিলিকা
উৎপন্ন হয়। যা বায়ুতে ও বীজা দূষণ পরিবেশে স্থায়ী করে বায়ুতে
এই সকল কৃত্রিম পদার্থ বা ন্যাস জুলির অপেক্ষিত প্রাকৃতিক
ও মানব স্বাস্থ্য দু-রকম কারণেই হতে পারে। প্রাকৃতিক কারণের
একটি দোহরন আন্তর্জাতিক অনুপাতের মাধ্যমে বায়ু দূষণ ও বিস্ময়
ন্যাস মিলে যায়। মানুষের আগের বায়ুদূষণের দোহরন হল
করকারগুণনা থেকে নিজে দূষিত বীজা বায়ুতে মিলে বায়ুকে
অনেক দূষিত করে। মানবীয় থেকে নিজে বীজা বায়ুতে মিলে
যায় বায়ুদূষণ হচ্ছে। তবে আধুনিক যুগে মানব স্বাস্থ্য বায়ুদূষণের
বেশ বেদনজনক হয়ে বসেছে।

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বায়ুদূষণের সমস্যা

বায়ুদূষণের মানে বায়ুতে কার্বন দিঅক্সাইডের পরিমাণ বৃদ্ধি পাওয়া যায়। প্রাথমিক বায়ুদূষণের থেকে বিকিরণের মাধ্যমে আয়নিকরণের শর ক্রমশ হ্রাস পাচ্ছে। কার্বন দিঅক্সাইডের মত তাস শোষন করে প্রাথমিক তাপমাত্রাকে ক্রমশ কমিয়ে দিচ্ছে। প্রাথমিক বায়ুদূষণের এবং অবাঞ্ছিত পদার্থ সংগ্রহের ক্ষেত্রে মানে বায়ু ময়ান মানুষের তথা অন্যান্য জীবজন্তুর পক্ষে অতি-কারক হলে বৈ, বায়ুদূষণে অবাঞ্ছিত প্রাণি জ্যাস একটি নির্দিষ্ট পরিমাণে থাকে। এই জ্যাসগুলি ব্যতীত আনসিক কারণে হয় অন্যান্য জীবজন্তুর পক্ষে ক্ষতিকারক হলে বৈ। বায়ুদূষণের অবাঞ্ছিত প্রাণি জ্যাস একটি নির্দিষ্ট পরিমাণে থাকে। এই জ্যাসগুলি ব্যতীত আনসিক কারণে হয় অন্যান্য ক্ষতিকৃ জ্যাস ও অতি সূক্ষ্ম, সূক্ষ্ম পদার্থ বায়ুতে মিশে নিলে বায়ুকে দূষিত করে তোলে। এই বায়ুদূষণ জীব প্রজাতির ওপর ক্ষতিকারক প্রভাব ফেলে। বায়ুদূষণের মানে সাস্থ্যের ক্ষতি হয়, সূক্ষ্মজন্তুর নানান ধরনের জটিল জটিল সংক্রমণ হ্রাস হয়, স্প্রায়কম জীবিত অসিক জাডমা, ক্যানসার স্নায়ুতন্ত্রের হ্রাস ইত্যাদি। এছাড়া অ্যাসিড বৃষ্টি এবং ব্রীংসালো হৃষ্টির একটি প্রধান কারণ বায়ুদূষণ। পরিবেশ এবং সম্পত্তি নষ্ট হয়। এর মানে বায়ুদূষণের ওজন স্তরও পাতলা হয় মাছে।

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জলদূষণ

জলদূষণ হলো জলাশয়ের দূষণ (দেয়ান, নদী, মঠাশয়ন, খাল) থেকে। এটি জলকে এবং সমস্ত জীব-জন্তু দূষিত করে। পরিবেশের দূষণের প্রধান কারণ হলো অসংযত ব্যবহার বা পরিবেশের সৌন্দর্য ও জল দূষণের কারণ। অসংযত জলে মিশ্রণের ফলে মানব ব্যবহারের জন্য উপযুক্ত হয় না। এতে বলা হয় জলদূষণ। জলের অপর নাম 'জীবন'। কিন্তু এই জল নানা দূষণে দূষিত হচ্ছে। কারণেই পরিবেশের দূষণের কারণে নদী বা খালের জলকে দূষিত করা হচ্ছে। অসংযত ব্যবহারে রাসায়নিক সার ও কাঁচা মালের গুঁড়ি বৃষ্টির জলে মিশেছে। কখনও কখনও তেলবাহী জাহাজ থেকে তেল পড়ে গেলে তেল সমুদ্রের জলের সাথে মিশে সমুদ্রের জলকে দূষিত করে তুলেছে। এবং এর ফলে অসংযত সার ছেলেছে।

প্রদূষণ ও প্রতিমা বিসর্জনের ফলে প্রতিমা ব্যবহারে মাটি, সার, ফল, মূল, রক্ত প্রভৃতি উপকরণ জলাশয়ের বা নদীতে পড়ে গেলে জল দূষণ হয়। গৃহস্থের প্রদূষণ কারণে আমাদের ব্যবহার্য পানীয় জলের উৎসগুলি জাহাজ দূষিত। ফলে স্যানিটেশন ও জলচর বর্জ্য পানি নদীর সংকটের কারণে পোষিত হয়েছে।

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ফলদ্রবণের সংলগ্ন

দ্বিমিত ফলের একটি বিচিত্র বৈশিষ্ট্য হল ফলদ্রবণে স্তন্যপুত্রি-
-ছড়িয়ে থাকে। যখন কলেরা, আমাশয়, হুজি, মল্লা
প্রভৃতি ফলের মাধ্যমে দ্বিমিত পদার্থ জন্মানের অপকারী অণু
হলে বিচিত্র বৈশিষ্ট্য পোড়ার অসুখ ক্যান্সার ও পোকের
কামিনী মুকু অসুখের সৃষ্টি হয়। তাছাড়া ফলদ্রবণ জন্ম
বগারে ফলদ্রবণের অতিরিক্ত বৃদ্ধি, পুষ্টি উপাদান সৃষ্টির
মাধ্যমে প্লাস্টিকের অংশের অতিরিক্ত বৃদ্ধি ঘটে। ফলে ফলের
জন্মানের সীমিত দেয়া যায়। এছাড়াও ইন্ডিয়াকম্পান
বলে। এছাড়া ফলের স্বচ্ছতা কম যায়। অতিরিক্ত স্বেদনের
মুহুর পর ফলদ্রবণ দ্বারা বিস্ফোজন মাথা বৃদ্ধি পায়। ফলে
ফলের অসুস্থ অক্ষিফলের ব্যবহৃত হয়, অক্ষিফলের সীমিত
ফলে ফলদ্রবণের মাছ ও অন্যান্য প্রাণীর মৃত্যু ঘটে। বিচিত্র
স্বেদন ক্ষমিকারক চক্কির যেমন হেপাটোপেক্টিন উপাদান করে।
এই চক্কির জুনি প্রাণী, মাছ, মিনুকা ও অন্যান্য ফলদ্র প্রাণীর
মৃত্যু ঘটায়। এছাড়াও দ্বিমিত ফলদ্রবণের কাছ ব্যবহার করলে
অনেক উপকারী ব্যাকটেরিয়া ও ফলদ্র বৃদ্ধি হয়। ফলে
মাটির স্থানের পরিমাণ বৃদ্ধি ও মাটি উর্বর হয়।

Muaji

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শিক্ষা দূশন

শাশ্বত বিদ্যা রক্ষণ দৃষ্টি পদার্থের বিভিন্ন দ্রবিত কারণে শাশ্বত বৈশিষ্ট্য থাকে ও জ্ঞানময় প্রায় পলে আক শাশ্বত দূশন বা অধিকা দূশন বলা হয়। আধুনিক কৃষির অন্যতম একটি উপাদান হল রাসায়নিক সার ও কীটনাশকের ব্যবহার। এই সার ও কীটনাশকের ব্যবহার অতিরিক্ত হওয়ার ফলে অধিকা দূশন বেড়ে চলেছে। এই দূশনের পাশে সবচেয়ে ক্ষতিকারক সার্বিক দূত বস্তু পদার্থ, এছাড়াও কলকারখানার বস্তু পদার্থ, শহর ও গ্রামের মানুষের দূশনো কারণে শাশ্বত দূশিত করে।

এছাড়াও কিছু তেজস্ক্রিয় পদার্থ ও সিনা, দুষ্টা, ক্যান্সারজনক প্রকৃতি বিষাক্ত বাতু কারণে সার্বিক শাশ্বত অধিকারিত হয়। তাছাড়া সার, ব্যাটারি ও সার্বিক শাশ্বত বা মিশ্র শাশ্বত বৈশিষ্ট্যকে নষ্ট করে। সার ফলে শাশ্বত বিষাক্ত হয়ে পড়ে। অধিকার জ্ঞানময় মানবের অবনমনের সাথে সাথে অধিকার দূশন ক্রমশ বেড়ে চলেছে।

সমস্যা :-

- ① বৃষ্টিদূশন
- ② অতিরিক্ত পলুচারণ
- ③ প্রাকৃতিক বৈশিষ্ট্য
- ④ অতিরিক্ত দূশন
- ⑤ দূশ পদার্থের পরিমাণ প্রায়
- ⑥ অধিকারিক শাস্ত্রাবর্তন।

Muaji



(Signature)



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স্থিতিকা দুস্পের সন্ধান

পরিবেশের তত্ত্ব অনুসরণে জিটি বন্দান হচ্ছে মাটি, জল এবং প্রয়োজনীয়। কিন্তু বর্তমানে প্রাকৃতিক বাঁচ থাকার জন্য তত্ত্ব মলে দুয়া মাছে নানা ঝুঞ্জিগরক প্রভাব। এমন দুসিত মাটিতে উপর ফসল প্রাদ্য হিসাব শিলে মানুষ ক্যানসার সহ বিভিন্ন রোগে আক্রান্ত হয়। দুসিত মাটিতে নাচপানা ফলান বা মলে পরিবেশের অক্সিজেনের সচতি দুয়া ময়, মাটিতে বেদ্বিদে বসকারী ব্যাকটেরিয়া অকার্যকরন হলে পড়ে। মাটি দুস্পের মলে দুসিত বেরত প্লাস পায়। মানুষের জনসংখ্যান দ্রুত বর্ধনের সাথে সাথে আমাদের মে পরিমান প্রাদ্য প্রয়োজন ছিল সেখানে সচতির সৃষ্টি হচ্ছে। মলে মানুষ তাদের পরিমিত প্রাদ্য সামগ্রি থেকে সঞ্চিত হচ্ছে। নাচপানা মাটি থেকে মিক্রোবের মাঝে পানি সোমন বগল এবং পক্ষুপাতি ও মাটি থেকে তাদের প্রাদ্য সমগ্রি হুঁড়ে বের। কিন্তু মাটি যদি কিস্বাণ্ড হয় তহলে তা প্রানীদের ও বেদ্বিদ এবং পক্ষুপাতিদেরও মৃত্যুর কারণ হলে হুঁড়পন।

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শব্দদ্রবণ

পরিবেশ দ্রবণের একটি দিক হল শব্দদ্রবণ। শব্দদ্রবণ শব্দরাষ্ট্রে বাস, ন্যাস, ক্রম, বিমান চলাচল ও শ্রমের অর্থ অর্থাৎ কখন যোগাযোগ বাড়ির আওলাত ফলদ্রবণকে বিপর্যয় করে হয়েছে। যেহেতু নাইচ লক্ষ্যে অহু অপর্যায়নিত ও বাস, পান, বিক্রয়, বিক্রয় হওয়াই তাদের জলের স্নাত যেই শব্দের সাথে বেশি অপর্যায়নিত রয়েছে। এটি একটি একই ফোলা ভুলির তাগা পাশে থাকে মানুষদের হুম্মাত অসুবিধার সৃষ্টি করে। বিজ্ঞানের অগ্রগতির সাথে সাথে তেজস্বিতার অধিকাংশ দিকগিত হয়, যা আমাদের পরিবেশের স্নাতককে সৃষ্টি করে। এছাড়াও বিজ্ঞানী ও অন্যান্য অধিকাংশে আছে, প্রতিটি বিজ্ঞানের অমরা ক্রমিত, মার্গিক, সাথে এমনকি বাড়ি যোগাযোগ মর্মে দিলেও প্রচুর পরিমাণে বায়ু-দ্রবণের সাথে সাথে শব্দদ্রবণও পরিবেশ দ্রবণও অর্থাৎ।

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প্রাঙ্গিকার

ভারতবর্ষে পরিবেশ দূষণ বিপজ্জনক অবস্থার পৌঁছেছে। এই দূষণের
থাত থেকে প্রাঙ্গিকার পোচে দ্বারা সর্বপ্রথম সমস্ত মানুষের মাঝে
পরিবেশ সম্পর্কে সচেতন করে তুলতে হবে। সচেতন হাওয়া পরিবেশ
দূষণের বিরুদ্ধে লড়াই করা সম্ভব নয়। কলকারখানা মানবাতন
প্রকৃতি আর্থনিক জীবনের উপকরণ তুলি আড় বর্জন করা সম্ভব নয়।
কিন্তু প্রকৃতিক বর্জ্য রূপে দূষণ হ্রাস করা সম্ভব। পরিবেশের
শরাসম্ম বক্ষার্থে বৃক্ষরোপন ও বনসংরক্ষন করা উচিত। কলকারখানা
বর্জ্যপদার্থ মাত্রে পরিবেশ দূষণ না করতে পারে তার দিকে নজর
দিয়ে আর্থনিক জবাবদা প্রয়োজন। মাত্রে কলকারখানার নিমিত্ত
বর্জ্যপদার্থ অন্য কোনো ঐকনিক উপায় ব্যবহার করা যায়। দূষণ
প্রতিরোধের জন্য সরকারি ও বেসরকারি প্রতিষ্ঠানগুলিকে নানা
কাজক্রম গ্রহন করতে হবে। সরকারকে আরও বেশি আর্থনিক
প্রদান করতে হবে। পারমাণবিক পরীক্ষা নিষিদ্ধা ও মুক্তি ব্যাপক
পরিমাণে পরিবেশ দূষণ করে। সুতরাং ও কিমান বিশ্বের প্রতিটি
দেশকে সহযোগিতার হাত বাড়িয়ে দিতে হবে।

NAME: SOMA MONDAL
Signature: Soma Mondal

A. Chandra 05/11/2022

EXAMINED
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PROJECT COMPLETION CERTIFICATE OF 1) SOMA MONDAL

Certificate of Participation



Project Work

on

"ENVIRONMENT POLLUTION"

in Environmental Studies

A.Y. 2022-23

Kabi Jagadram Roy Government General Degree College

This is to certify that SOMA MONDAL, student of SEM-1 of English Honours, of Kabi Jagadram Roy Government General Degree College has successfully completed the project work in Environmental Studies (ACSHP/104/AECC-1).

Debray Das

Course-Coordinator

Environmental Studies, ACSHP/ 104/ AECC-1
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PROJECT REPORT OF 2) SUMAN DAS

KABI JAGADRAM ROY GOVT. GENERAL DEGREE COLLEGE

PROJECT TITLE: Environment Pollution
SUBJECT: ENVIRONMENT STUDIES (ACSHP/ 104/ AECC-1)
NAME: Suman Das
PROGRAMME NAME: Bengali (Hons)
CLASS: 1ST Sem
ROLL NO.: 2212128

A. Chatterjee
05/11/2022
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Muaji

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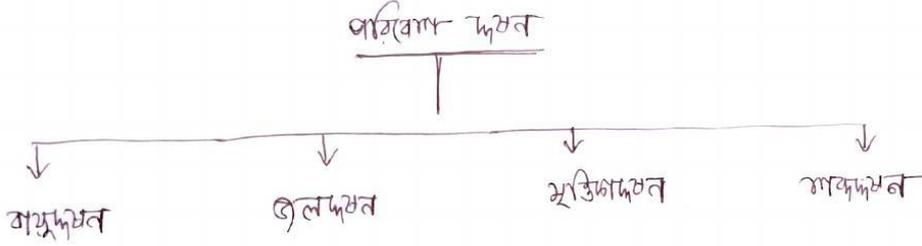
Chatterjee

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অঙ্কলি ষল :-

- (১) মাদ্দদধত ।
- (২) জুলদধত ।
- (৩) মুক্তিগদধত ।
- (৪) মাকদধত ।



Page - 2

Muaji



Officer-in-Charge



কবিজগদ্রামর অফিস

শিক্ষকদের একটি সম্মেলন আয়োজন করে যা ডায়ালগ সীমিত
এক আনুষ্ঠানিক উপায়ে প্রায়শঃ বেশ কিছুদিন ১। শিক্ষকদের অভিযোগ
সময় সম্পর্কে জিজ্ঞাসা এবং প্রায়শঃ জালক উপর নির্ভর করে বিশ্ব
প্রায়ঃ অক্ষর (০১০) নির্দেশিত সম্পর্কে নিয়মিত জিজ্ঞাসা লেভেল ৩৯
৬৫ ডেমিবেল। সম্পর্কে জিজ্ঞাসা ৬৫ ডেমিবেলের (০১) এবং ৩
প্রায়শঃ বেশ কিছুদিন ১। ৪৫ ডেমিবেল শিক্ষক জালক অভিযোগ ১১০
ডেমিবেল শিক্ষক প্রায়ঃ অক্ষর এবং ১৫০-১৬০ ডেমিবেলের
অন্যান্য 'আমাদের চিরদিনের যত্ন' করে দিতে পারে।
আনুষ্ঠানিক প্রায়শঃ শিক্ষক আমাদের কিছুদিন উৎসাহিত করে, অনেক
একজন নর্থ করে এবং বিশ্বতা অক্ষর করে। শিক্ষকদের অর্থ
ইনসোল, রক্ষণ, প্রায়শঃ দুর্বলতা, 'অক্ষর'; প্রায়শঃ দুর্বলতা
প্রায়শঃ অক্ষর, নর্থ ২৫। কখনো কখনো অক্ষর অক্ষর প্রায়শঃ
অন্যান্য অক্ষর যা করে পরে অক্ষর রোল লেভেল ০৫ এবং
অক্ষর অক্ষর ও অক্ষর অক্ষর ৩ ৩ প্রায়শঃ জালক প্রায়ঃ
ইউরোপ করে না।

Muaji



[Signature]



জল দূষণ

জল দূষণ হল জলাশয়ের দূষণ। পরিবেশগত অবনতির ফলে
দূষকবাহী উপাদান বা পোষণ্যবাহী অণুজীবের দ্বারা জল অপদ্রব
রূপে জল তা জলে বিলীন হলে ফলে জীবের ক্ষতি হতে পারে।
কিছু-কিছু জলও-নাশ হতে পারে। জলের অপকৃষ্টতা
বর্জ্য পদার্থ বা পুষ্টি জলকে দূষিত করে। অল্প পরিমাণে
ব্যক্তিগত সামগ্রিক জল ও পরিষ্কার পুষ্টি-পুষ্টি জল
দূষণ-দূষণ জল বাইরে রাখলে জল পড়ে পড়ে জল
পুষ্টি জলকে জল-মিশ্রণ পুষ্টি জলকে দূষিত করে।
এই-এই জল অপকৃষ্ট জল। এছাড়া-পানীয় পানীয়
জল পুষ্টি-পুষ্টি জল, জল, পুষ্টি, বর্জ্য পুষ্টি-
উপাদান জলাশয় ও বর্জ্যপুষ্টি জলকে দূষিত করে।
পুষ্টি জলকে জলাশয় পুষ্টি জলকে উদ্ভিদ জল
দূষিত। জল পুষ্টি ও জলকে উদ্ভিদ পুষ্টি-পুষ্টি
জলাশয় উদ্ভিদ জল।



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PROJECT COMPLETION CERTIFICATE OF 2) SUMAN DAS

Certificate of Participation



Project Work

on

"ENVIRONMENT POLLUTION"

in Environmental Studies

A.Y. 2022-23

Kabi Jagadram Roy Government General Degree College

This is to certify that SUMAN DAS, student of SEM-1 of Bengali Honours, of Kabi Jagadram Roy Government General Degree College has successfully completed the project work in Environmental Studies (ACSHP/104/AECC-1).

Debray Das

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PROJECT REPORT OF 3) CHAITALI DAS

KABI JAGADRAM ROY GOVT. GENERAL DEGREE COLLEGE

PROJECT TITLE: BUTTERFLY SPECIES OF MEJIA

SUBJECT: ENVIRONMENTAL STUDIES (ACSHP/ 104/ AECCE)



NAME: CHAITALI DAS

CLASS: 1ST SEM, Bengali (Hons)

ROLL NO: 2212078

A. Ghosh 05/11/2022
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Topic: Butterfly Species of Mejia

The butterflies are one of the most visible and functional species in the ecosystem. Butterflies belong to Lepidoptera or scaly-winged insects (lepidos = scales and pteron = wings in Greek). Butterflies have fine scales on their wings that look like fine powder. These scales are colored and result in giving striking colors and patterns to many butterflies while providing cryptic colors and camouflage patterns to others. When touched by humans, the wings tend to lose some scales. If too many scales are lost, the butterfly's ability to fly will be impaired. The scales on the butterfly wings have many properties, mostly optical, that interest scientist. The patterns they make are also seen as the best animal system for understanding the developmental and genetic processes that produce morphological variation in nature. Butterflies have been used as model organisms for a variety of fields of study, spanning ecology, evolutionary biology, and conservation biology.

Life Cycle of a Butterfly

The life cycle of a butterfly can be discussed in four stages in detail. All the butterflies have complete metamorphosis. To grow into an adult, they go through four stages - egg, larva, pupa, and adult. Every stage has different goals to achieve like caterpillars need to eat a lot and adults need to reproduce. The life cycle of the butterfly may depend on the type of butterfly; it might take from a month to a whole year. Metamorphosis is the process where butterflies' life cycle depends on. Metamorphosis, which means transformation or change in shape, is a very lengthy process. There are two types of metamorphosis, first complete metamorphosis and second incomplete metamorphosis. Some common insects like dragonflies and cockroaches go through incomplete metamorphosis. But insects like butterflies and moths go through the complete metamorphosis process. The butterflies' life cycle is divided into four parts: egg, larva, pupa, and adult.

First Stage: Egg The first stage of the butterfly is the egg from where a butterfly starts its life. The different types of eggs are small, round, oval, or cylindrical. The shape of the egg depends on the type of butterfly. The special thing about butterfly eggs is that you can see the tiny caterpillar growing inside of it. If you look closely, especially at monarch caterpillars. The eggs of the butterfly are usually laid on the leaves of plants. First, the female butterflies laid eggs on plants. By the time these plants are changed into foods for the newborn larva. Spring and summer are the best time or climates to lay eggs for female butterflies. It also

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varies on the species of that female butterfly. Female butterflies could lay a vast number of eggs at one time. But in the end, some of them can survive. In size and shape, butterfly eggs are tiny. 2 Second Stage: Caterpillar, The Larva The larva is the next stage. It is also named a caterpillar. The main thing that caterpillars do is eat. Larvas stored this food for the future and used it to get an adult. At that time, it grows up, splits its skin, and sheds it four 4 to 5 times. It grows up to 100 times on this stage. Also, the larva size grows up to 2 inches long in several weeks. The second stage of the butterfly life cycle is the larva. Butterfly larva is one which is called a caterpillar, the butterfly does not remain in this stage for a long time, in this stage all they do is to eat. An egg of the butterfly once hatched, the caterpillar will start to do his work to eat the leaf they were born on. So, it is very important for mother butterflies to lay an egg on the leaf which caterpillars can eat. The different caterpillars eat different types of leaves, so, it is very important to lay an egg on the kind of leaf the caterpillar prefers to eat because the caterpillar cannot travel to a new plant. The main purpose of the caterpillar is to eat as much as it can and grow quickly. When the caterpillar is born, it is extremely small and when they start eating, they start growing and expanding instantly. □ Third Stage: Pupa, The Transition Stage The third stage of the butterfly is the pupa. It is one of the coolest stages of butterfly life. Once the caterpillar is grown fully to its full length and weight, they form themselves into a pupa, also known as a chrysalis. Caterpillars change rapidly inside of the pupa, their remarkable transformation called metamorphosis. In this transformation, the caterpillar is transformed into a butterfly by changing tissue, limbs and organs of the caterpillar. Caterpillars stop eating after being grown. Now it's transformed into a pupa. The pupa of butterflies is known as a chrysalis. A cocoon of silk covers the pupa. This stage can take more than a week or a month. These original larva cells provide lots of energy to the growing adult cells at this stage. Fourth Stage: Adult, The Reproductive Stage The fourth stage is the final stage of the butterfly known as an adult butterfly. Once all the transformation is done inside the pupa. A person has to be very lucky to see an adult butterfly emerging out. The adult stage is the final stage of the butterfly life cycle. In this stage, the larva gets more extensive and has a pair of giant wings for the fly. But after this stage the butterfly can't grow. The main job of the butterfly is to mate and lay eggs. At this stage, some butterflies can eat nectar from flowers, but some cannot. Most of the adults' butterfly live for one or two weeks. Some of them can hibernate in winter and live more days. When the butterfly first emerges from the pupa, both of the wings are soft and folded against its body. So, all the body parts fit into the pupa.

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Taxonomy of Insects:

Butterflies belong to class Insecta which is a part of Phylum Arthropoda. Other classes of Phylum Arthropoda are Crustacea, Myriapoda, Arachnida, and Onychophora. These classes differ from each other in various characteristics ranging from body regions, locomotor organs types, respiration type, feeding habit, sensory organ types etc.

Host and Nectar Plants Host plant:

Host plants are plants that adult butterflies depend upon to raise their larval young. Female butterflies lay their eggs directly onto their host plant of choice since caterpillars cannot travel far to feed. This includes trees, shrubs, herbs, climbers, and grasses. Trees like *Bauhinia racemosa*, *Albizia lebbek*, *Aegle marmelos*, *Butea monosperma*, and *Peltophorum pterocarpum*; and shrubs like *Caesalpinia pulcherrima*, *Calotropis gigantea*, and *Calotropis procera*, were found frequent during the survey. The important herbs like *Barleria cristata*, *Mimosa pudica*, *Hygrophila auriculata*, and *Senna tora* act as host and nectar plants for butterflies. Nectar Plants: A constant supply of nectar is vital to reduce the waning of native butterfly populations, and so it's important to try and deliver a range of plants that will have at least some viable nectar-producing flowers throughout the year. Wild plants like *Ocimum americanum*, *Boerhavia diffusa*, *Desmodium triflorum*, *Euphorbia hirta*, *Malvastrum coromandelianum*, *Melochia corchorifolia*, *Ludwigia ascendens*, *Sesamum indicum*, *Sesamum radiatum*, *Sida cordifolia*, *Tridax procumbens*, *Triumfetta rhomboidea*, and *Urena lobata*, are important sources of nectar.

Classification of Butterflies:

Butterflies are classified into two superfamilies, Hesperioidea, consisting of the 'skippers,' and Papilionoidea, or 'true butterflies.' Skippers differ in several important ways from the remaining butterflies. Skippers have the antennae clubs hooked backward, have stocky bodies, and possess stronger wing muscles and better eyes. However, Hesperioidea and Papilionoidea are considered sister taxa. Modern taxonomists place them all in the superfamily Papilionoidea, distinguishing the skippers from the other butterflies at the series level only. There are about 180,000 described species of Lepidoptera, around 10% of all described species of living organisms. In butterflies (Papilionidae), there are about 17,500 described species, or 1% of known organisms. In India, there are about 1646 species of butterflies recorded.

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Importance of Butterflies :

Humans regard a variety of insects to be pests. Insects, on the other hand, are extremely important for a variety of reasons. Ecological Importance Insects play a significant role in many ecosystems, performing a variety of services. They help to aerate the soil, pollinate blossoms, and keep insects and plant pests at bay. Scavenger insects, particularly beetles, feast on dead animals and fallen trees, recycling nutrients back into the earth. Insects, as decomposers, aid in the formation of top soil, the nutrient-rich layer of soil that aids plant growth. Burrowing insects such as ants and beetles excavate tunnels that offer water conduits for plants. Flowering plants are pollinated by bees, wasps, butterflies, and ants. Certain insect populations, such as aphids and caterpillars, which feed on new plant growth, are controlled by bugs and praying mantis. Finally, all insects use the nutrients in their droppings to fertilize the earth. Economic Importance Insects are extremely valuable economically. Honey, wax, lacquer, and silk are examples of beneficial things produced by insects. Humans have reared honeybees for the purpose of making honey. To make silk, the silkworm is utilized to develop silk. Insect larvae and adult insects, such as crickets, are often used as fishing bait. Insects as food Insects, of course, are not just eaten by people. Insects are the sole food source for many amphibians, reptiles, birds, and mammals, making their roles in food chains and food webs extremely important. It is possible that food webs could collapse if insect populations decline. Ecosystem value Butterflies and moths are indicators of a healthy environment and healthy ecosystems. They indicate a wide range of other invertebrates, which comprise over two-thirds of all species. Areas rich in butterflies and moths are rich in other invertebrates. These collectively provide a wide range of environmental benefits, including pollination and natural pest control. Moths and butterflies are an important element of the food chain and are prey for birds, bats and other insectivorous animals (for example, in Britain and Ireland, Blue Tits eat an estimated 50 billion moth caterpillars each 13 year). Butterflies and moths support a range of other predators and parasites, many of which are specific to individual species, or groups of species. Butterflies have been widely used by ecologists as model organisms to study the impact of habitat loss and fragmentation, and climate change. Educational value Butterflies and moths have fascinating life-cycles that are used in many countries to teach children about the natural world. The transformation from egg to caterpillar to chrysalis is one of the wonders of nature. Other educational aspects include the intricate wing patterns and iridescence, and as examples of insect migration. Aesthetic value Butterflies and moths are part of our natural heritage and have been studied

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for over 300 years. Butterflies and moths are beautiful. Many are iconic and popular. People like butterflies. There are many references to butterflies and moths in literature, from the Bible through Shakespeare to modern day literature, and from poetry to musical lyrics. Butterflies are used by advertisers and illustrators the world over as way of indicating that something is environmentally friendly. Butterflies are often portrayed as the essence of nature or as representing freedom, beauty or peace.

Some common butterfly species of Mejia:

Despite being a much polluted area a large number of butterfly species is observed in Mejia region .We have spotted as many as 31 variety of butterflies in Mejia. Brief description of some of the species are given below:



Appias paulina, the common albatross, Christmas Island white or Ceylon lesser albatross, is a butterfly of the family Pieridae. It is found from India to Samoa.

The wingspan is about 50 mm.

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Hypolimnas bolina, the great eggfly, common eggfly, varied eggfly, or in New Zealand the blue moon butterfly, is a species of nymphalid butterfly found from Madagascar to Asia and Australia.

Male

Males are monomorphic. The dorsal wing surface is jet black but features three prominent spots, two on the forewing and one on the hindwing. To a human observer these appear as white spots fringed with blue-violet. They actually consist of a white center overlain by bright ultraviolet iridescence, a colour generated by nanostructures on the wing scale surface. Numerous smaller white spots fringe the fore- and hindwings. The ventral surface lacks any ultraviolet iridescence and consists essentially of banded white markings set against a brownish background.

Female

Females are hugely variable due to the presence of both genetic polymorphism and phenotypic plasticity. Polymorphism is expressed primarily on the dorsal surface, with morphs varying in the presence of white, orange, and blue markings. One genetic morph, named *euploeoides* is thought to present a mimic of one or several members of the genus *Euploea*. The female ventral wing surfaces are similar to those of the male. Phenotypic plasticity is such that individuals are generally darker if they develop under cooler temperatures.

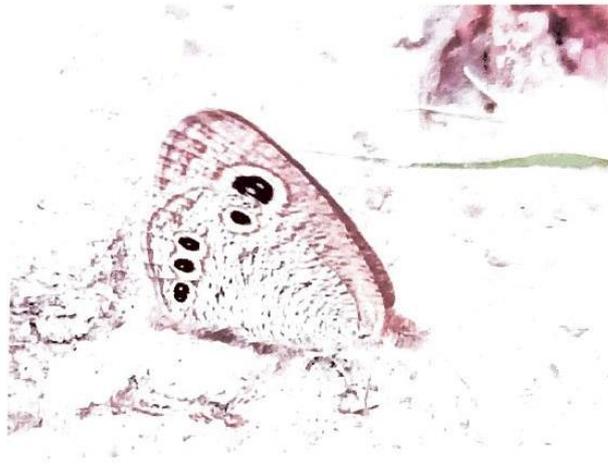
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Common Five-ring ,Upperside



Common Five-ring ,Underside .

Ypthima baldus, the common five-ring, is a species of Satyrinae butterfly found in Asia. It belongs to the Nymphalidae family.

Ypthima baldus is found in northern India, Nepal, Bhutan, Myanmar, Laos, Thailand, Korea, China, Taiwan, Japan, Malaysia, Sumatra and Kalimantan.

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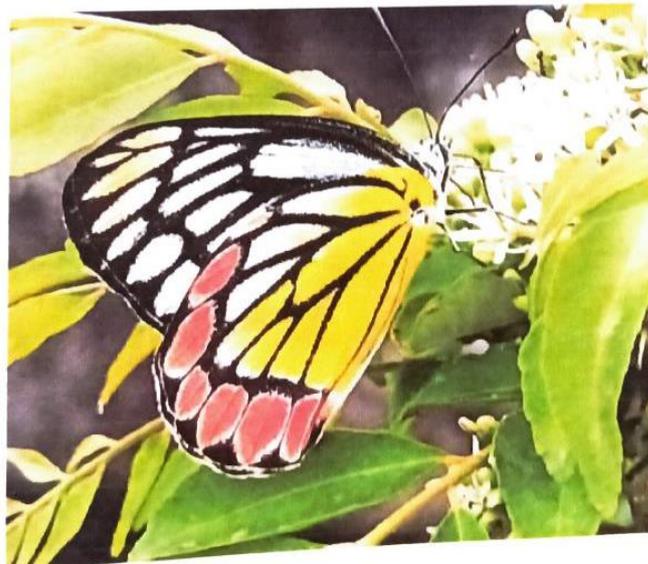
Ypthima baldus can be found on the edge of a grassy forest at an altitude of about 100-1200 m. Moreover it can be found in the garden area.

Male *Ypthima baldus* has a dull brown upperwings with a broad gray-black stripe on the forewing, while the female is paler distally. The upperwings of this species have a large yellow-ringed ocellus in the space 2 forewing, 2 adjoining smaller yellow ringed ocelluses in the 2 and 3 hindwings. The underside of the wings is pale grayish to brown against a whitish background, there are many fine dark brown lines. The forewings have a large, bi-pupilled, yellow-ringed subapical ocellus. The hind wing has 5 yellow ringed ocelluses in spaces 1b, 2, 3, 5 and 6. A pair of ocellus in space 2 and 3 are large and side by side, a pair of ocellus in space 5 and 6 are side by side, the size of an ocellus in space 6 is larger, one ocellus in space 1b consists of two points joined together.

Larva: *Ypthima baldus* larvae are cylindrical, whitish in color with dorsal and lateral pink spots. The head is brownish in color with a pair of short, round horns, the body is covered with long setae on the dorso-lateral and lateral parts. Adult larvae can be green or brown.

Pupa: *Ypthima baldus* pupa is creamy brown with many small brown or black patches. The length of the pupa is about 10.5 – 11 mm.

Wingspan from 35 – 40 mm.



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Delias eucharis, the common Jezebel, is a medium-sized pierid butterfly found in many areas of south and southeast Asia, especially in the non-arid regions of India, Bangladesh, Sri Lanka, Indonesia, Myanmar and Thailand. It belongs to the Pieridae family. The common Jezebel is one of the most common of the approximately 225 described species in the genus *Delias*.

Male

Upperside is white. The forewings have the veins broadly black, this colour broadened triangularly at the termination of the veins, costal margin narrowly black; a broad black postdiscal transverse band from costa to dorsum sloped obliquely outwards from costa to vein 4, thence parallel to termen. Hindwing with the veins similar but for three-fourths of their length much more narrowly black; a postdiscal transverse black band as on the forewing but much narrower, curved and extended only between veins 2 and 6; beyond this the veins are more broadly black and this colour as on the forewing broadens out triangularly at the termination of the veins; the interspaces beyond the postdiscal black band pink, due to the vermilion colouration of the underside showing through.

On the underside, the forewings are similar but the black edging to the veins much broader, the upper two interspaces beyond the postdiscal transverse band tinged with yellow. Hindwing: ground colour bright yellow, the veins and transverse postdiscal band as on the upperside but much more broadly black, the latter extended from the costa to vein 2; the interspaces between the veins beyond the postdiscal fascia with a series of broadly lanceolate (lance-shaped) or cone-shaped vermilion-red spots, each spot very narrowly edged with white; the basal portion of interspace 6 white, in contrast to the bright yellow of the ground colour. Antenna black; head, thorax and abdomen white, the apical joint of the palpi black; the head and thorax with a mixture of black hairs that give these parts a grey-blue appearance.

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Female

Upper and undersides similar to those in the male, but the black edging to the veins and the postdiscal transverse bands on both forewings and hindwings are much broader.

Range and Habitats

The common Jezebel are nomadic in behaviour and are found in a variety of environment including, but not limited to, temperate hill forests, tropical rainforests, dry open woodlands, and beach hinterlands. They are generally found all over India, except in the desert tracts, and up to an altitude of 7,000 feet (2,100 m) in the hills. The butterfly may be found wherever there are trees, even in towns and cities, flying high among the trees and visiting flowers.

It is also commonly seen in gardens. The females can be seen flying amongst the trees in search of its food plants, while the males are more frequently observed visiting flowers for nectar. It rests with its wings closed exhibiting the brilliantly coloured underside.

The Jezebel often flies high up in the canopy and usually comes lower down only to feed on nectar in flowers. Due to this habit apparently, it has evolved a dull upperside and a brilliant underside so that birds below it recognize it immediately while in flight and at rest.

Protection

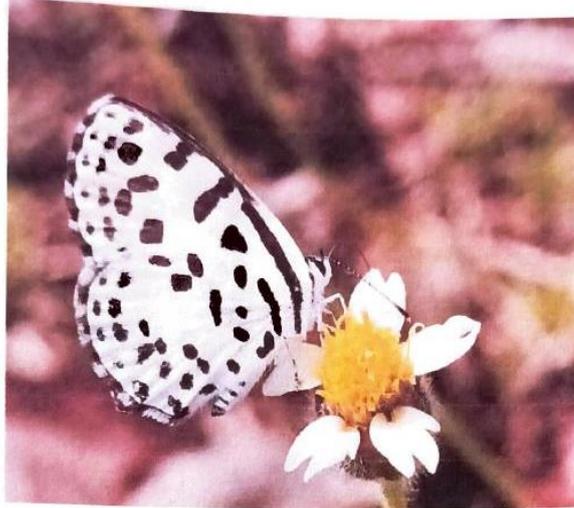
It has bright colouration to indicate the fact that it is unpalatable due to toxins accumulated by the larvae from the host plants.

Like other unpalatable butterflies the common Jezebel is mimicked by *Prioneris sita*, the painted sawtooth. The common Jezebel can be distinguished by the shape of the orange red spots on the hindwing. In the painted saw tooth these spots are very squarish whereas in the common Jezebel they are more arrow head shaped. The painted saw tooth also flies faster and will also mudpuddle.

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Castalius rosimon, the common Pierrot, is a small butterfly found in India that belongs to the lycaenids, or blues family.

The species is found in Sri Lanka, Bangladesh, India, Myanmar; Tenasserim, extending into the Malayan subregion. In the Indonesian archipelago the butterfly occurs in north-eastern Sumatra, Kalimantan, eastern Java, Bali, Bangka, Timor, Wetar, Kissar, Sumbawa and Sulawesi.

In India the butterfly is found south of the outer ranges of the Himalayas, except in desert tracts; east India; the north-west Himalayas; Assam. The butterfly is also found in the Andaman Islands and the southern Nicobar Islands.

Male

The upperside of its wings is mainly white. Forewing has the costa, apex and termen edged with black, the edging much broader on apex and termen; base outwards for a short distance more or less densely overlaid with metallic blue scales which cover and make indistinct a large basal outwardly clavate (club-shaped) black spot; a transverse black oval spot on the discocellulars touching the black edging on the costa; an oblique irregular line of four quadrate black spots beyond, the upper spot coalesced with the black on the costal border, the next spot below shifted outwards out of line, touching, as does also the lowest spot, the terminal black edging; posterior to this is a quadrate black spot in the apical half of interspace 2, and placed obliquely outwards from 1b coalescent with the terminal black border, another

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similar spot in interspace 1. Individuals of this species have been reported to exhibit seasonal colour variations and melanic aberrations that shows a similar pigmentation pattern.

Hindwing: three basal black somewhat coalescent spots overlaid with metallic blue scaling; the costal margin above the subcostal vein and vein 7 black; this colour filling also the base of interspace 6, where in some specimens it is divided into a basal portion with a spot beyond; a postdiscal curved transverse black band followed by a subterminal transverse series of black spots, each spot edged inwardly and outwardly by very slender lunules of the white ground colour; on the inner side of the postdiscal band posteriorly is a broken line of four black generally coalescent spots two and two, the two upper often touching the postdiscal band.

Underside primarily white. Forewing has a long oblique black band from base outwards to the costa; below it and obliquely placed an irregular black somewhat conical mark; following these are two outwardly oblique, medially interrupted, black macular bands; the inner of the two extended from costa along the discocellulars, is then widely interrupted below its posterior portion that is formed of two elongate coalescent spots and touches the inner subterminal transverse line of elongate spots just above the tornus; the outer, obliquely placed line is subapical and medially broken, the middle portion consisting of a quadrate spot is shifted outwards; finally, two parallel subterminal transverse series of black elongate spots, the inner series of broad, more or less rectangular spots, the outer series of more linear spots, the latter coalescent anteriorly with a slender anteciliary black line.

Hindwing: a transverse basal black band, with an elongate black spot below it on the dorsum; a transverse subbasal line of four well-separated black spots; a transverse, oval, discocellular black spot and obliquely above it three subcostal similar spots, the inner two coalescent; postdiscal and terminal markings consist, the former of four black posterior spots two and two, each pair coalescent and placed *en echelon*, the latter of a transverse double series of subterminal black spots and an anteciliary black line; the upper portion of the postdiscal markings touches the inner subterminal line. Cilia of both forewings and hindwings white alternated with black at the apices of the veins; filamentous short tail to the hindwing black tipped with white.

Antennae, head, thorax and abdomen black, the shafts of the antennae ringed with white, the head between the eyes and behind them white; beneath: the palpi, thorax and abdomen white. the last barred broadly with white on the sides.

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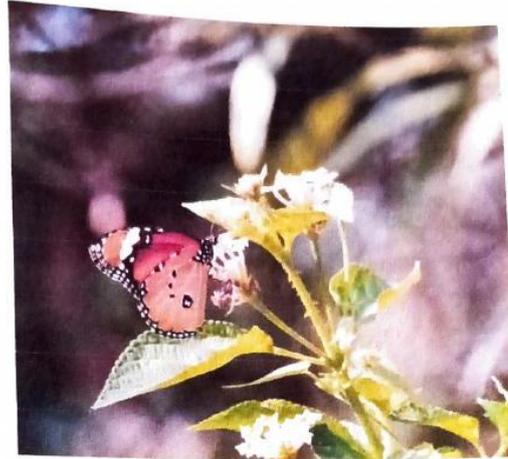


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Female

Similar to the male but with the black markings on the upper and undersides broader.



Danaus chrysippus, also known as the plain tiger, African queen, or African monarch, is a medium-sized butterfly widespread in Asia, Australia and Africa. It belongs to the Danainae subfamily of the brush-footed butterfly family Nymphalidae. Danainae primarily consume plants in the genus *Asclepias*, more commonly called milkweed. Milkweed contains toxic compounds, cardenolides, which are often consumed and stored by many butterflies. Because of their emetic properties, the plain tiger is unpalatable to most predators. As a result, its colouration is widely mimicked by other species of butterflies. The plain tiger inhabits a wide variety of habitats, although it is less likely to thrive in jungle-like conditions and is most often found in drier, wide-open areas.

D. chrysippus is a medium-sized butterfly with a wingspan of about 7–8 cm (2.8–3.1 in). The body is black with white spots. The wings are a brownish orange, the upper side brighter and richer than the underside. The apical half of the forewing is black with a white band. The hindwing has three black spots in the centre. The wings are bordered in black and outlined with semicircular white spots. This species exhibits slight sexual dimorphism, as the male has large scent glands on his hindwings, which the female lacks. They appear as a large black spot with a white centre if viewed from the underside.

D. chrysippus is a polymorphic species, so the exact colouring and patterning vary within and between populations.

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A. Chatterjee
05/11/2022

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Chaitali Das

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Certificate of Participation



Project Work

on

"BUTTERFLY SPECIES OF MEJIA"

in Environmental Studies

A.Y. 2022-23

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BANKURA UNIVERSITY

Kabi Jagadram Roy Government General
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YEAR :- 2022-2023

DEPARTMENT :- ARTS (Bengali Hons.)

Name :- Shreya Bhattacharya

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Semester :- One

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ENVIRONMENTAL POLLUTION

Developmental activities such as construction, transportation and manufacturing not only deplete the natural resources but also produce large amount of wastes that leads to pollution of air, water, soil and oceans; global warming and acid rains. Untreated or improperly treated waste is a major cause of pollution of rivers and environmental degradation causing ill health and loss of crop productivity. In this lesson I will study about the major causes of pollution, their effects on our environment and the various measures that can be taken to control such pollutions.

OBJECTIVES

After completing this lesson, I will be able to:

- Define the terms Pollution and Pollutants;
- List various kinds of Pollution;
- Describe types of Pollution, sources, harmful effects on human health and control of air pollution, noise pollution;
- Describe Water Pollution, its causes and control;
- Describe Soil Pollution, its causes and control.

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POLLUTION AND POLLUTANTS

Human Activities directly or indirectly affect the Environment Adversely. A Stone Crusher adds a lot of Suspended Particulate Matter and noise into the atmosphere. Automobiles emit from their tail pipes Oxides of Nitrogen, Sulphur dioxide, Carbon dioxide, Carbon Monoxide and a Complex mixture of Unburnt hydrocarbons and black soot which pollute the atmosphere. Domestic Sewage and run off from agricultural fields laden with pesticides and fertilizers, pollute water bodies. Effluents from tanneries contain many harmful chemicals and emit foul smell. These are only a few examples which show how human activities pollute the Environment. Pollution may be defined as addition of undesirable material into the Environment as a result of human activities. The agents which cause Environmental pollution are called pollutants. A pollutant may be defined as a physical, chemical or biological substance unintentionally released into the Environment which is directly or indirectly harmful to humans and other living organisms.

TYPES OF POLLUTION

Pollution may be of the following types:

- Air Pollution
- Water Pollution
- Noise Pollution
- Soil Pollution

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① AIR POLLUTION:

Air Pollution is a result of industrial and certain domestic activity. An ever increasing use of fossil fuels in power plants, industries, transportation, mining, construction of buildings, stone quarries had led to air pollution. Air



AIR POLLUTION

Pollution may be defined as the presence of any solid, liquid or gaseous substance including noise and radioactive radiation in the atmosphere in such concentration that may be directly and indirectly injurious to health of humans or other living organisms, plants, property or interests with the normal environmental processes. Air pollutants are of two types ① Suspended Particulate Matter, and ② Gaseous pollutants like Carbon dioxide (CO_2), NO_x , etc. Some of the major pollutants, their sources are given below -

① PARTICULATE MATTER POLLUTANTS:

Particulate matter pollutants suspended in the air are dust and soot released from the industrial chimneys. Their size ranges from 0.001 to 5000 μm in diameter. Particles less than 10 μm float and move freely with the air current. Major source of SPM (Suspended Particulate Matter) are vehicles, power plants, construction activities, oil refinery, railway yard, market place, industries, etc.

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② FLY ASH :-

Fly Ash is Ejected mostly by thermal Power Plants as by products of Coal burning Operations. Fly ash Pollutants Pollutes air and Water and may cause heavy metal Pollution in water bodies. Fly ash affects Vegetation as a result of its direct deposition on leaf surfaces or indirectly through its deposition on soil. Fly ash is now being used for making bricks and as a landfill material.

③ GASEOUS POLLUTANTS :-

Power Plants, Industries, different types of Vehicles - both private and Commercial use of petrol and diesel as fuel and release, gaseous Pollutants such as Carbon dioxide, Oxides of nitrogen and Sulphur dioxide, Oxides of nitrogen and Sulphur dioxide along with particulate matter in the form of smoke.



Air Pollution

PREVENTION AND CONTROL OF AIR POLLUTION

① Prevention and Control of Indoor Air Pollution :-

Use of Wood and dung Cakes should be replaced by cleaner fuels such as biogas, Kerosene or electricity. But supply of electricity is limited. Use of biogas and CNG use of and need to encourage. Segregation of Waste, pretreatment at source, Sterilization of rooms will help in checking indoor air pollution.

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ii) Scrubbers :-

Scrubbers are Wet Collectors. They remove Aerosols from a stream of gas either by collecting wet particles on a surface followed by their removal or else the particles are wetted by their removal or else the particles are wetted by a scrubbing liquid.

iii) Control of Vehicular Pollution :-

- The emission standards for automobiles have been set which if followed will reduce the pollution. Standards have been set for the durability of Catalytic converters which reduce vehicular emissions.
- In cities like Delhi, motor vehicles need to obtain Pollution Under Control (PUC) Certificate at regular intervals.
- The price of diesel is much cheaper than petrol which promotes use of diesel. To reduce emission of sulphur dioxide, sulphur content in diesel has been reduced to 0.06%.

NOISE POLLUTION

Noise is one of the most pervasive pollutant. A musical clock may be nice to listen during the day, but may be irritant during sleep at night. Noise by definition is "Sound without Value" or "any noise that is unwanted by the recipient". Noise level is measured in terms of decibels (dB). WHO has prescribed optimum noise level as 45 dB by day and 35 by night. Anything above 80 dB is hazardous.

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Sources of some of the Common Activities noises and their Intensity.

Source	Intensity	Source	Intensity
Quiet Conversation	20-30 dB	Radio music	50-60 dB
Loud Conversation	60 dB	Traffic Noise	60-90 dB
Lawn Mower	60-80 dB	Heavy Truck	90-100 dB
Aircraft Noise	90-120 dB	Space Vehicle	140-179 dB
Beet Music	120 dB	Launch	
Motor Cycle	105 dB	Jet Engine	140 dB

Sources of Noise Pollution:

Noise Pollution is highly annoying and irritating. Noise disturbs sleep, causes hypertension (high blood pressure), emotional problems such as aggression. All human activities contribute to noise pollution to varying extent. Sources of noise pollution are many may be located indoors or outdoors.



Noise Pollution

(a) Indoor Sources: ~ Include noise produced by radio, television, generators, electric fans, air coolers, air conditioners different home appliances, and family conflict. Noise like other pollutants is a by product of industrialization urbanization and modern civilization.

(b) Outdoor Sources: ~ of Noise Pollution include indiscriminate use of loud speakers, industrial activities, automobiles, rail traffic, aeroplanes and activities such as those at market place, religious, social and cultural

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functions sports and political rallies. During festivals, marriage and many other occasions, use of fire crackers to noise pollution.

Effects of Noise Pollution:

Noise pollution is highly annoying and irritating. Noise disturbs sleep, causes hypertension (high blood pressure), emotional problems such as aggression, mental depression and annoyance.

Prevention and Control of Noise Pollution:

Following steps can be taken to control or minimize noise pollution.

- Road traffic noise can be reduced by better designing and proper maintenance of vehicles.
- Industrial noises can be reduced by sound proofing equipment like generators and areas producing lot of noise.
- A green belt of trees is an efficient noise absorber.

WATER POLLUTION

Addition or presence of undesirable substances in water is called water pollution.



Water pollution is one of the most serious environmental problems. Water pollution is caused by a variety of human activities such as industrial effluents discharged from a specific location such as a drain pipe carrying industrial effluents discharged directly into a water body. It represents point source of pollution.

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■ Sources Of Water Pollution :

Water Pollution is the major source of water born disease and other health problems. Sediments brought by run off water from agricultural fields and discharge of untreated or partially treated sewage and industrial effluents, disposal of fly ash or solid waste into or close to a water body cause severe problems of water pollution.



Water Pollution

■ Ground Water Pollution :- Lot of people around the world depend on ground water for drinking, domestic and industrial and agricultural uses. However, human activities such as improper disposal, dumping of farm yard manures and agricultural chemicals, industrial effluents are causing pollution of ground water.

■ Control of Water Pollution :

The following measures can be adopted to control water pollution-

- ① The water requirement should be minimized by attending the techniques involved.
- ② Water should be refused with or without treatment.
- ③ Recycling of water after treatment should be possible to the extent.
- ④ The quantity of waste water discharge should be minimized.

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SOIL POLLUTION

Addition of substances which adversely affect the quality of soil or its fertility is known as soil pollution. Generally polluted water also pollute soil. Solid waste is a mixture of plastics, cloth, glass, metal and organic matter, sewage, sewage sludge, building debris, generated from households, commercial and industries establishments add to soil pollution. Acid rain and dry deposition of pollutants on land surface also contribute to soil pollution.



Soil Pollution

■ Sources of Soil Pollution: Plastic bags - Plastic bags made from low density polyethylene (LDPE), is virtually indestructible, create colossal environmental hazard. Plastic is biodegradable and burning of plastic bags in garbage dumps release highly toxic and poisonous gases like Carbon Monoxide, Carbon dioxide, Phosgene, dioxine and other poisonous chlorinated compounds.

⑥ Industrial Sources - It includes fly ash, chemical residues metallic and nuclear wastes. Large number of waste of industrial chemicals, dyes, acids, etc. Find their way into the soil are known to create many health hazards including cancer.

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Control of Soil Pollution:

Indiscriminate disposal of solid waste should be avoided. The Control soil pollution, it is essential to stop the use of plastic bags and instead use bags of degradable materials like paper and cloth. The industrial wastes prior to disposal should be properly treated for removing hazardous materials. Biomedical waste should be separately collected and incinerated in proper incinerators.

WHAT I HAVE LEARNT

- Nature's components such as air, water, soil, forest and fisheries are resources exploited by humans and their pollution are by product of urbanization and industrialization.
- Pollution in effect is an undesirable by product of industrialization and urbanization.
- There are four types of pollution; air pollution, water pollution, noise pollution, soil pollution.
- Air pollution is a result of industrial and certain domestic activity.
- Use of cleaner fuels such as biogas, CNG and electricity prevent air pollution.
- Segregation of waste, pretreatment at source, sterilization of rooms will help in checking indoor pollution.

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**KABI JAGADRAM ROY GOVT.
GENERAL DEGREE COLLEGE**

PROJECT TITLE: BUTTERFLY SPECIES OF MEJIA

**SUBJECT: ENVIRONMENTAL STUDIES (ACSHP/ 104/
AECC-1)**

NAME: PRITI KANA DUBEY

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Topic: Butterfly Species of Mejia

The butterflies are one of the most visible and functional species in the ecosystem. Butterflies belong to Lepidoptera or scaly-winged insects (lepidos = scales and pteron = wings in Greek). Butterflies have fine scales on their wings that look like fine powder. These scales are colored and result in giving striking colors and patterns to many butterflies while providing cryptic colors and camouflage patterns to others. When touched by humans, the wings tend to lose some scales. If too many scales are lost, the butterfly's ability to fly will be impaired. The scales on the butterfly wings have many properties, mostly optical, that interest scientist. The patterns they make are also seen as the best animal system for understanding the developmental and genetic processes that produce morphological variation in nature. Butterflies have been used as model organisms for a variety of fields of study, spanning ecology, evolutionary biology, and conservation biology.

Life Cycle of a Butterfly

The life cycle of a butterfly can be discussed in four stages in detail. All the butterflies have complete metamorphosis. To grow into an adult, they go through four stages - egg, larva, pupa, and adult. Every stage has different goals to achieve like caterpillars need to eat a lot and adults need to reproduce. The life cycle of the butterfly may depend on the type of butterfly: it might take from a month to a whole year. Metamorphosis is the process where butterflies' life cycle depends on. Metamorphosis, which means transformation or change in shape, is a very lengthy process. There are two types of metamorphosis, first complete metamorphosis and second incomplete metamorphosis. Some common insects like dragonflies and cockroaches go through incomplete metamorphosis. But insects like butterflies and moths go through the complete metamorphosis process. The butterflies' life cycle is divided into four parts: egg, larva, pupa, and adult.

First Stage: Egg The first stage of the butterfly is the egg from where a butterfly starts its life. The different types of eggs are small, round, oval, or cylindrical. The shape of the egg depends on the type of butterfly. The special thing about butterfly eggs is that you can see the tiny caterpillar growing inside of it. If you look closely, especially at monarch caterpillars. The eggs of the butterfly are usually laid on the leaves of plants. First, the female butterflies laid eggs on plants. By the time these plants are changed into foods for the newborn larva. Spring and summer are the best time or climates to lay eggs for female butterflies. It also

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varies on the species of that female butterfly. Female butterflies could lay a vast number of eggs at one time. But in the end, some of them can survive. In size and shape, butterfly eggs are tiny. 2 □ Second Stage: Caterpillar, The Larva The larva is the next stage. It is also named a caterpillar. The main thing that caterpillars do is eat. Larvas stored this food for the future and used it to get an adult. At that time, it grows up, splits its skin, and sheds it four 4 to 5 times. It grows up to 100 times on this stage. Also, the larva size grows up to 2 inches long in several weeks. The second stage of the butterfly life cycle is the larva. Butterfly larva is one which is called a caterpillar, the butterfly does not remain in this stage for a long time, in this stage all they do is to eat. An egg of the butterfly once hatched, the caterpillar will start to do his work to eat the leaf they were born on. So, it is very important for mother butterflies to lay an egg on the leaf which caterpillars can eat. The different caterpillars eat different types of leaves, so, it is very important to lay an egg on the kind of leaf the caterpillar prefers to eat because the caterpillar cannot travel to a new plant. The main purpose of the caterpillar is to eat as much as it can and grow quickly. When the caterpillar is born, it is extremely small and when they start eating, they start growing and expanding instantly. □ Third Stage: Pupa, The Transition Stage The third stage of the butterfly is the pupa. It is one of the coolest stages of butterfly life. Once the caterpillar is grown fully to its full length and weight, they form themselves into a pupa, also known as a chrysalis. Caterpillars change rapidly inside of the pupa, their remarkable transformation called metamorphosis. In this transformation, the caterpillar is transformed into a butterfly by changing tissue, limbs and organs of the caterpillar. Caterpillars stop eating after being grown. Now it's transformed into a pupa. The pupa of butterflies is known as a chrysalis. A cocoon of silk covers the pupa. This stage can take more than a week or a month. These original larva cells provide lots of energy to the growing adult cells at this stage. Fourth Stage: Adult, The Reproductive Stage The fourth stage is the final stage of the butterfly known as an adult butterfly. Once all the transformation is done inside the pupa. A person has to be very lucky to see an adult butterfly emerging out. The adult stage is the final stage of the butterfly life cycle. In this stage, the larva gets more extensive and has a pair of giant wings for the fly. But after this stage the butterfly can't grow. The main job of the butterfly is to mate and lay eggs. At this stage, some butterflies can eat nectar from flowers, but some cannot. Most of the adults' butterfly live for one or two weeks. Some of them can hibernate in winter and live more days. When the butterfly first emerges from the pupa, both of the wings are soft and folded against its body. So, all the body parts fit into the pupa.

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Taxonomy of Insects:

Butterflies belong to class Insecta which is a part of Phylum Arthropoda. Other classes of Phylum Arthropoda are Crustacea, Myriapoda, Arachnida, and Onychophora. These classes differ from each other in various characteristics ranging from body regions, locomotor organs types, respiration type, feeding habit, sensory organ types etc.

Host and Nectar Plants Host plant:

Host plants are plants that adult butterflies depend upon to raise their larval young. Female butterflies lay their eggs directly onto their host plant of choice since caterpillars cannot travel far to feed. This includes trees, shrubs, herbs, climbers, and grasses. Trees like *Bauhinia racemosa*, *Albizia lebeckii*, *Aegle marmelos*, *Butea monosperma*, and *Peltoporum pterocarpum*; and shrubs like *Caesalpinia pulcherrima*, *Calotropis gigantea*, and *Calotropis procera*, were found frequent during the survey. The important herbs like *Barleria cristata*, *Mimosa pudica*, *Hygrophila auriculata*, and *Senna tora* act as host and nectar plants for butterflies. Nectar Plants: A constant supply of nectar is vital to reduce the waning of native butterfly populations, and so it's important to try and deliver a range of plants that will have at least some viable nectar-producing flowers throughout the year. Wild plants like *Ocimum americanum*, *Boerhavia diffusa*, *Desmodium triflorum*, *Euphorbia hirta*, *Malvastrum coromandelianum*, *Melochia corchorifolia*, *Ludwigia ascendens*, *Sesamum indicum*, *Sesamum radiatum*, *Sida cordifolia*, *Tridax procumbens*, *Triumfetta rhomboidea*, and *Urena lobata*, are important sources of nectar.

Classification of Butterflies:

Butterflies are classified into two superfamilies, Hesperioidea, consisting of the 'skippers,' and Papilionoidea, or 'true butterflies.' Skippers differ in several important ways from the remaining butterflies. Skippers have the antennae clubs hooked backward, have stocky bodies, and possess stronger wing muscles and better eyes. However, Hesperioidea and Papilionoidea are considered sister taxa. Modern taxonomists place them all in the superfamily Papilionoidea, distinguishing the skippers from the other butterflies at the series level only. There are about 180,000 described species of Lepidoptera, around 10% of all described species of living organisms. In butterflies (Papilionidae), there are about 17,500 described species, or 1% of known organisms. In India, there are about 1646 species of butterflies recorded.

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Importance of Butterflies :

Humans regard a variety of insects to be pests. Insects, on the other hand, are extremely important for a variety of reasons. Ecological Importance Insects play a significant role in many ecosystems, performing a variety of services. They help to aerate the soil, pollinate blossoms, and keep insects and plant pests at bay. Scavenger insects, particularly beetles, feast on dead animals and fallen trees, recycling nutrients back into the earth. Insects, as decomposers, aid in the formation of top soil, the nutrient-rich layer of soil that aids plant growth. Burrowing insects such as ants and beetles excavate tunnels that offer water conduits for plants. Flowering plants are pollinated by bees, wasps, butterflies, and ants. Certain insect populations, such as aphids and caterpillars, which feed on new plant growth, are controlled by bugs and praying mantis. Finally, all insects use the nutrients in their droppings to fertilize the earth. Economic Importance Insects are extremely valuable economically. Honey, wax, lacquer, and silk are examples of beneficial things produced by insects. Humans have reared honeybees for the purpose of making honey. To make silk, the silkworm is utilized to develop silk. Insect larvae and adult insects, such as crickets, are often used as fishing bait. Insects as food Insects, of course, are not just eaten by people. Insects are the sole food source for many amphibians, reptiles, birds, and mammals, making their roles in food chains and food webs extremely important. It is possible that food webs could collapse if insect populations decline. Ecosystem value Butterflies and moths are indicators of a healthy environment and healthy ecosystems. They indicate a wide range of other invertebrates, which comprise over two-thirds of all species. Areas rich in butterflies and moths are rich in other invertebrates. These collectively provide a wide range of environmental benefits, including pollination and natural pest control. Moths and butterflies are an important element of the food chain and are prey for birds, bats and other insectivorous animals (for example, in Britain and Ireland, Blue Tits eat an estimated 50 billion moth caterpillars each 13 year). Butterflies and moths support a range of other predators and parasites, many of which are specific to individual species, or groups of species. Butterflies have been widely used by ecologists as model organisms to study the impact of habitat loss and fragmentation, and climate change. Educational value Butterflies and moths have fascinating life-cycles that are used in many countries to teach children about the natural world. The transformation from egg to caterpillar to chrysalis is one of the wonders of nature. Other educational aspects include the intricate wing patterns and iridescence, and as examples of insect migration. Aesthetic value Butterflies and moths are part of our natural heritage and have been studied

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for over 300 years. Butterflies and moths are beautiful. Many are iconic and popular. People like butterflies. There are many references to butterflies and moths in literature, from the Bible through Shakespeare to modern day literature, and from poetry to musical lyrics. Butterflies are used by advertisers and illustrators the world over as way of indicating that something is environmentally friendly. Butterflies are often portrayed as the essence of nature or as representing freedom, beauty or peace.

Some common butterfly species of Mejia:

Despite being a much polluted area a large number of butterfly species is observed in Mejia region. We have spotted as many as 31 variety of butterflies in Mejia. Brief description of some of the species are given below:



Appias paulina, the common albatross, Christmas Island white or Ceylon lesser albatross, is a butterfly of the family Pieridae. It is found from India to Samoa.

The wingspan is about 50 mm.

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Hypolimnas bolina, the great eggfly, common eggfly, varied eggfly, or in New Zealand the blue moon butterfly, is a species of nymphalid butterfly found from Madagascar to Asia and Australia.

Male

Males are monomorphic. The dorsal wing surface is jet black but features three prominent spots, two on the forewing and one on the hindwing. To a human observer these appear as white spots fringed with blue-violet. They actually consist of a white center overlain by bright ultraviolet iridescence, a colour generated by nanostructures on the wing scale surface. Numerous smaller white spots fringe the fore- and hindwings. The ventral surface lacks any ultraviolet iridescence and consists essentially of banded white markings set against a brownish background.

Female

Females are hugely variable due to the presence of both genetic polymorphism and phenotypic plasticity. Polymorphism is expressed primarily on the dorsal surface, with morphs varying in the presence of white, orange, and blue markings. One genetic morph, named *euploeoides* is thought to present a mimic of one or several members of the genus *Euploea*. The female ventral wing surfaces are similar to those of the male. Phenotypic plasticity is such that individuals are generally darker if they develop under cooler temperatures.

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Common Five-ring ,Upperside



Common Five-ring ,Underside .

Ypthima baldus, the common five-ring, is a species of Satyrinae butterfly found in Asia. It belongs to the Nymphalidae family.

Ypthima baldus is found in northern India, Nepal, Bhutan, Myanmar, Laos, Thailand, Korea, China, Taiwan, Japan, Malaysia, Sumatra and Kalimantan.

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Ypthima baldus can be found on the edge of a grassy forest at an altitude of about 300 – 1200 m. Moreover it can be found in the garden area.

Male *Ypthima baldus* has a dull brown upperwings with a broad gray-black stripe on the forewing, while the female is paler distally. The upperwings of this species have a large yellow-ringed ocellus in the space 2 forewing, 2 adjoining smaller yellow ringed ocelluses in the 2 and 3 hindwings. The underside of the wings is pale grayish to brown against a whitish background, there are many fine dark brown lines. The forewings have a large, bi-pupilled, yellow-ringed subapical ocellus. The hind wing has 5 yellow ringed ocelluses in spaces 1b, 2, 3, 5 and 6. A pair of ocellus in space 2 and 3 are large and side by side, a pair of ocellus in space 5 and 6 are side by side, the size of an ocellus in space 6 is larger, one ocellus in space 1b consists of two points joined together.

Larva: *Ypthima baldus* larvae are cylindrical, whitish in color with dorsal and lateral pink spots. The head is brownish in color with a pair of short, round horns, the body is covered with long setae on the dorso-lateral and lateral parts. Adult larvae can be green or brown.

Pupa: *Ypthima baldus* pupa is creamy brown with many small brown or black patches. The length of the pupa is about 10.5 – 11 mm.

Wingspan from 35 – 40 mm.



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Delias eucharis, the common Jezebel, is a medium-sized pierid butterfly found in many areas of south and southeast Asia, especially in the non-arid regions of India, Bangladesh, Sri Lanka, Indonesia, Myanmar and Thailand. It belongs to the Pieridae family. The common Jezebel is one of the most common of the approximately 225 described species in the genus *Delias*.

Male

Upperside is white. The forewings have the veins broadly black, this colour broadened triangularly at the termination of the veins, costal margin narrowly black; a broad black postdiscal transverse band from costa to dorsum sloped obliquely outwards from costa to vein 4, thence parallel to termen. Hindwing with the veins similar but for three-fourths of their length much more narrowly black; a postdiscal transverse black band as on the forewing but much narrower, curved and extended only between veins 2 and 6; beyond this the veins are more broadly black and this colour as on the forewing broadens out triangularly at the termination of the veins; the interspaces beyond the postdiscal black band pink, due to the vermilion colouration of the underside showing through.

On the underside, the forewings are similar but the black edging to the veins much broader, the upper two interspaces beyond the postdiscal transverse band tinged with yellow. Hindwing: ground colour bright yellow, the veins and transverse postdiscal band as on the upperside but much more broadly black, the latter extended from the costa to vein 2; the interspaces between the veins beyond the postdiscal fascia with a series of broadly lanceolate (lance-shaped) or cone-shaped vermilion-red spots, each spot very narrowly edged with white; the basal portion of interspace 6 white, in contrast to the bright yellow of the ground colour. Antenna black; head, thorax and abdomen white, the apical joint of the palpi black; the head and thorax with a mixture of black hairs that give these parts a grey-blue appearance.

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Female

Upper and undersides similar to those in the male, but the black edging to the veins and the postdiscal transverse bands on both forewings and hindwings are much broader.

Range and Habitats

The common Jezebel are nomadic in behaviour and are found in a variety of environment including, but not limited to, temperate hill forests, tropical rainforests, dry open woodlands, and beach hinterlands. They are generally found all over India, except in the desert tracts, and up to an altitude of 7,000 feet (2,100 m) in the hills. The butterfly may be found wherever there are trees, even in towns and cities, flying high among the trees and visiting flowers.

It is also commonly seen in gardens. The females can be seen flying amongst the trees in search of its food plants, while the males are more frequently observed visiting flowers for nectar. It rests with its wings closed exhibiting the brilliantly coloured underside.

The Jezebel often flies high up in the canopy and usually comes lower down only to feed on nectar in flowers. Due to this habit apparently, it has evolved a dull upperside and a brilliant underside so that birds below it recognize it immediately while in flight and at rest.

Protection

It has bright colouration to indicate the fact that it is unpalatable due to toxins accumulated by the larvae from the host plants.

Like other unpalatable butterflies the common Jezebel is mimicked by *Prioneris sita*, the painted sawtooth. The common Jezebel can be distinguished by the shape of the orange red spots on the hindwing. In the painted saw tooth these spots are very squarish whereas in the common Jezebel they are more arrow head shaped. The painted saw tooth also flies faster and will also mudpuddle.

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Castalius rosimon, the common Pierrot, is a small butterfly found in India that belongs to the lycaenids, or blues family.

The species is found in Sri Lanka, Bangladesh, India, Myanmar; Tenasserim, extending into the Malayan subregion. In the Indonesian archipelago the butterfly occurs in north-eastern Sumatra, Kalimantan, eastern Java, Bali, Bangka, Timor, Wetar, Kissar, Sumbawa and Sulawesi.

In India the butterfly is found south of the outer ranges of the Himalayas, except in desert tracts; east India; the north-west Himalayas; Assam. The butterfly is also found in the Andaman Islands and the southern Nicobar Islands.

Male

The upperside of its wings is mainly white. Forewing has the costa, apex and termen edged with black, the edging much broader on apex and termen; base outwards for a short distance more or less densely overlaid with metallic blue scales which cover and make indistinct a large basal outwardly clavate (club-shaped) black spot; a transverse black oval spot on the discocellulars touching the black edging on the costa; an oblique irregular line of four quadrate black spots beyond, the upper spot coalesced with the black on the costal border, the next spot below shifted outwards out of line, touching, as does also the lowest spot, the terminal black edging; posterior to this is a quadrate black spot in the apical half of interspace 2, and placed obliquely outwards from 1b coalescent with the terminal black border, another

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similar spot in interspace 1. Individuals of this species have been reported to exhibit seasonal colour variations and melanic aberrations that shows a similar pigmentation pattern.

Hindwing: three basal black somewhat coalescent spots overlaid with metallic blue scaling; the costal margin above the subcostal vein and vein 7 black; this colour filling also the base of interspace 6, where in some specimens it is divided into a basal portion with a spot beyond; a postdiscal curved transverse black band followed by a subterminal transverse series of black spots, each spot edged inwardly and outwardly by very slender lunules of the white ground colour; on the inner side of the postdiscal band posteriorly is a broken line of four black generally coalescent spots two and two, the two upper often touching the postdiscal band.

Underside primarily white. Forewing has a long oblique black band from base outwards to the costa; below it and obliquely placed an irregular black somewhat conical mark; following these are two outwardly oblique, medially interrupted, black macular bands; the inner of the two extended from costa along the discocellulars, is then widely interrupted below its posterior portion that is formed of two elongate coalescent spots and touches the inner subterminal transverse line of elongate spots just above the tornus; the outer, obliquely placed line is subapical and medially broken, the middle portion consisting of a quadrate spot is shifted outwards; finally, two parallel subterminal transverse series of black elongate spots, the inner series of broad, more or less rectangular spots, the outer series of more linear spots, the latter coalescent anteriorly with a slender anteciliary black line.

Hindwing: a transverse basal black band, with an elongate black spot below it on the dorsum; a transverse subbasal line of four well-separated black spots; a transverse, oval, discocellular black spot and obliquely above it three subcostal similar spots, the inner two coalescent; postdiscal and terminal markings consist, the former of four black posterior spots two and two, each pair coalescent and placed *en echelon*, the latter of a transverse double series of subterminal black spots and an anteciliary black line; the upper portion of the postdiscal markings touches the inner subterminal line. Cilia of both forewings and hindwings white alternated with black at the apices of the veins; filamentous short tail to the hindwing black tipped with white.

Antennae, head, thorax and abdomen black, the shafts of the antennae ringed with white, the head between the eyes and behind them white; beneath: the palpi, thorax and abdomen white, the last barred broadly with white on the sides.

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Female

Similar to the male but with the black markings on the upper and undersides broader.



Danaus chrysippus, also known as the plain tiger, African queen, or African monarch, is a medium-sized butterfly widespread in Asia, Australia and Africa. It belongs to the Danainae subfamily of the brush-footed butterfly family Nymphalidae. Danainae primarily consume plants in the genus *Asclepias*, more commonly called milkweed. Milkweed contains toxic compounds, cardenolides, which are often consumed and stored by many butterflies. Because of their emetic properties, the plain tiger is unpalatable to most predators. As a result, its colouration is widely mimicked by other species of butterflies. The plain tiger inhabits a wide variety of habitats, although it is less likely to thrive in jungle-like conditions and is most often found in drier, wide-open areas.

D. chrysippus is a medium-sized butterfly with a wingspan of about 7–8 cm (2.8–3.1 in). The body is black with white spots. The wings are a brownish orange, the upper side brighter and richer than the underside. The apical half of the forewing is black with a white band. The hindwing has three black spots in the centre. The wings are bordered in black and outlined with semicircular white spots. This species exhibits slight sexual dimorphism, as the male has large scent glands on his hindwings, which the female lacks. They appear as a large black spot with a white centre if viewed from the underside.

D. chrysippus is a polymorphic species, so the exact colouring and patterning vary within and between populations.

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Pritikara Das

Students' Signature

Debraj Das 5/11/22

Teacher's signature

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PROJECT COMPLETION CERTIFICATE OF 5) PRITI KANA DUBEY

Certificate of Participation



Project Work

on

"BUTTERFLY SPECIES OF MEJIA"

in Environmental Studies

A.Y. 2022-23

Kabi Jagadram Roy Government General Degree College

This is to certify that PRITI KANA DUBEY, student of SEM-1 of Bengali Honours, of Kabi Jagadram Roy Government General Degree College has successfully completed the project work in Environmental Studies (ACSHP/104/AECC-1).

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