Essential Question:

Why is historiography important and how can it be used?

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The Uses of History

- Sense of our own identity
- Better understand the present
  - "present-mindedness"
- Corrective for misleading analogies and "lessons" of the past
- Tendencies of humankind, of social institutions, and other aspects of human condition
- Develop tolerance and open-mindedness
- The basic background for many other disciplines
- Entertainment
- Critical thinking skills

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Continuity and Change: The Stages of Historical Consciousness

- History as Fact
- History as Casual Sequence
- History as Complexity
- History as Interpretation
  - Moral certain and ambiguity
  - Absolute truth and relativism

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Historiography- the study of how history is written & its various perspectives / biases

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Ontology, Epistemology, and Methodology

- Ontology: is the study of being or existence or to study conceptions of reality
- Epistemology: is the branch of philosophy that studies the nature and scope of knowledge
- Methodology: a body of methods, rules, and postulates employed by a discipline, a particular procedure or set of procedures, or the analysis of the principles or procedures of inquiry in a particular field

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Positivist and Naturalist Axioms

Reality	Single, tangible, fragmentable	Multiple, constructed, holistic
Knower/ the known	independent, dualism	Interactive, inseparable
Possibility of generalization	Time and context-free	Time- and context-bound
Casual links	Real causes, distinguishable causes and effects	Mutual simultaneous shaping
Values	Inquiry is value-free	Inquiry is value-bound

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Central idea:

Facts are integral to the study of history, but equally important is the meaning we give historical information

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Dominant Schools of Historiography

Consensus or traditional-

Argues that change results from consensus among various groups in society.

Division & class interest, etc. exist but are not central to the process of change.

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Conflict or revisionist-

Opposite view

It views conflict among groups, classes, race, and gender, etc. as central to the process of change.

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The Writing of History

- The Beginning”
  - Old Testament
  - Herodotus: *The Histories*, personal observations, surviving records, interviews of witnesses
  - Thucydides: *The History of Peloponnesian Wars*, verifiable, relevant facts only, explain events in a way that can be substantiated by evidence
  - Roman Empire
  - Renaissance
    - Machiavelli: *The Prince*
    - Guicciardini: *History of Italy*

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The Writing of History Cont.

- Leopold Von Ranke and the rise of Modern History
  - Establishing history as a respected discipline in the universities
  - Firmly established the notion that all sound history must be based on primary courses and a rigorous methodology: footnotes and bibliography, scientific
  - Historical-mindedness

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The Writing of History Cont.

- The nineteenth-century history
  - Political, legal, or diplomatic
  - Ethnocentric, nationalistic
- Karl Marx
  - Progressive Theory
  - Economics interpretation of history, economic determinism
- Sigmund Freud: Psychoanalysis
- The twentieth-century history
  - Social history: average men and women, marginalized groups
  - Women history
  - Psychohistory
  - The Impact of IT, computers, statistical packages

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Types of History

Social

Political

Economic

Diplomatic

Military

Constitutional

Marxist / Conflict

Gender

Eurocentric

Afrocentric

Environmental Determinism

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The American Civil War

1861-1865

"Brother against brother", "A divided Nation"

Javier Patón Peiró
4ºB (2011-12)

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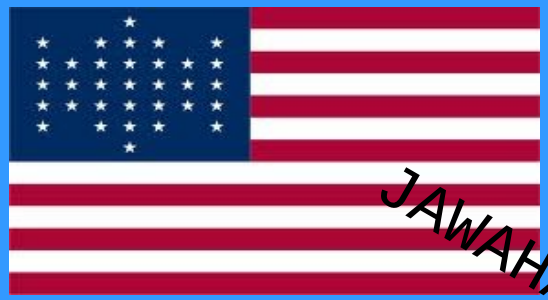
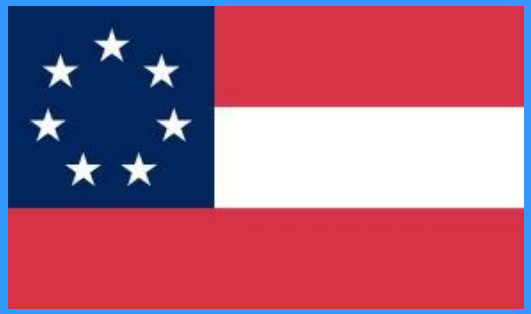
“A Divided Nation”

Differences between Northern and Southern States before the war





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The Northern States, The Union

- Three times the population of the South
- Internationally recognized government of the USA
- Almost the 90 percent of industry and railroads were located in the North
- 7/10 immigrants settled in the North
- The majority of Northern people supported the Republican Party, led by Abraham Lincoln
- Republican Party, strongly nationalist, was anti-slavery and so it was considered to be “anti-southerners”

The Southern States, The Confederacy

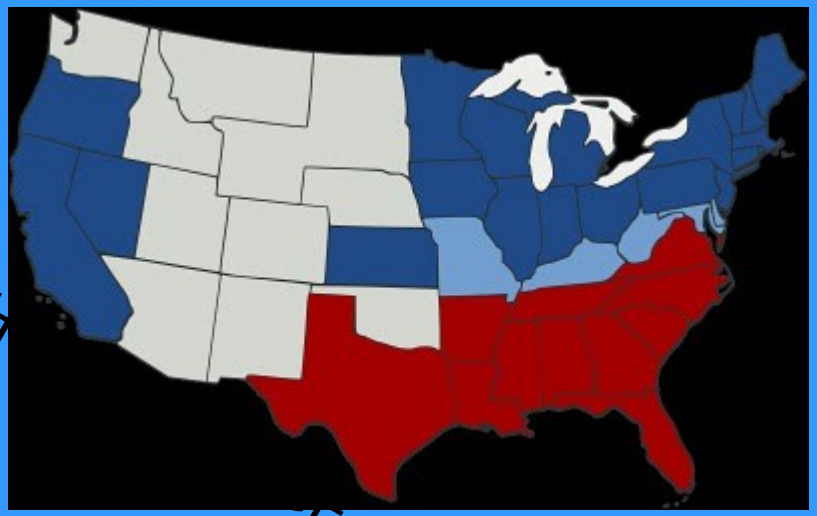
- 3 million slaves of a total of 9 million population.
- Friendly relationship with France and Britain, who supported the Confederates.
- Economy based in agrarian exploitation (cotton production)
- Reliance on slave labor discouraged immigration, and most immigrants settled in the North.
- Due to this, the South took an aggressive defensive policy
- Southern people supported the Democratic party and wanted John C. Breckinridge to be president

Abolitionist Movement:
main cause of the war

Usa was formed by 33 states in 1860.

While the economy of the Southern States was based on slave labor and they thought slavery was necessary and was part of their social system, in the Western and Northern States it was created the Abolitionist Movement against such an "abomination".

Some abolitionists thought African slaves should be taken back to Africa. Other abolitionist believed that slaves deserved equal rights in America.



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Secession of the South

On 24th December 1860, South Carolina is the first southern state to break away from the USA. Lincoln is president at this time and an Emancipation Law was feared.

By 1861, the Confederate States of America was formed by seven southern states: South Carolina, Mississipi, Florida, Alabama, Georgia, Louisiana and Texas. The former "Cotton States", capital: Montgomery (Alabama) for some months and Richmond (Virginia) until the end of the war.

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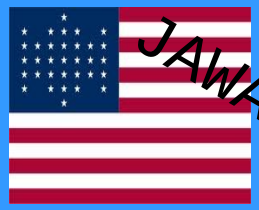
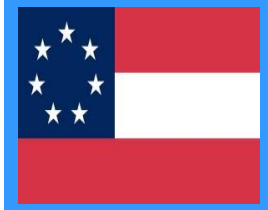
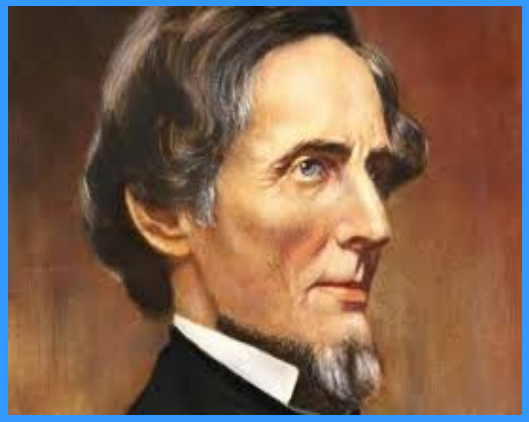
Two Presidents







Abraham Lincoln was the sixteenth president of the USA (1860-1865), leader of the Republican Party and radical abolitionist.

During the war, he was very close to the Union troops and he himself chose the best commandants for each battle.

He was a great speecher and spirited up the public opinion in favour of the Union.

Until his assassination, he developed a "Plan of Reunification" of the United States of America.

Jefferson Davis was the first and last president of the Confederate States of America.

Until 1860, he was an important oficcer in the USA Army and a promising politician who became a high charge in the USA Secretary of War and Mississipi Senator.

Although in his speeches he was against secession, he was chosen teh first president of the CSA in 1861.

After the surrender of the southern states in 1865, he was charged with treason and until the end of his life he couldn't have a public charge anymore.

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Emancipation Proclamation

1st January 1863

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Although the Confederacy considered itself a new independent country, neither Lincoln nor the "International Community" accepted it.

Lincoln continued ruling for the Southern States and, in 1st January 1863 (during the war), it was approved the Emancipation Proclamation, which gave freedom to slaves in the ten rebelled southern states, which didn't returned to the Union despite of Lincoln's threats.

Summary of the war

FIRST STAGE: From Fort Sumter to Gettysburg.

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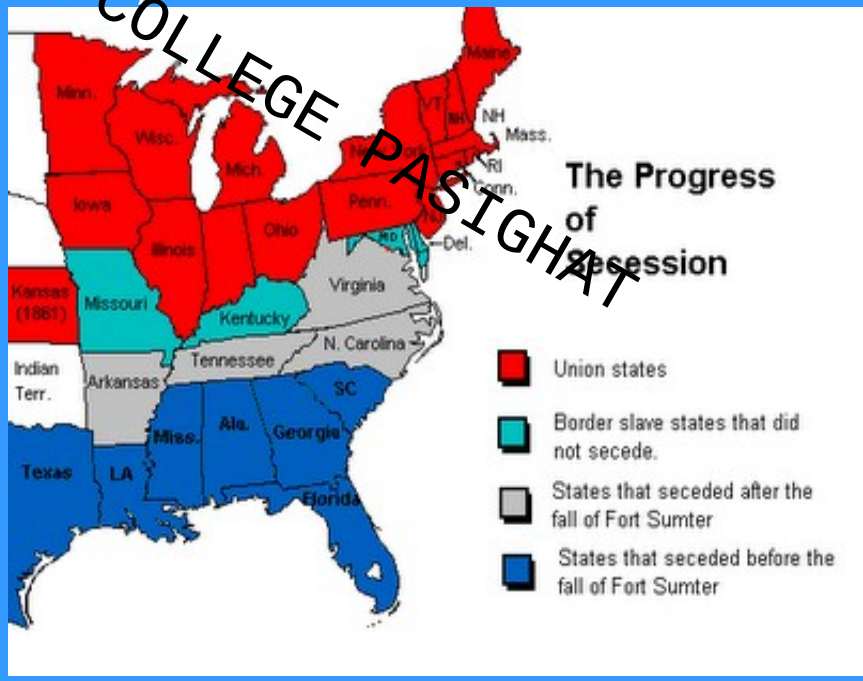
•March 1861, Lincoln takes the charge of president of the USA and in his inaugural speech declares illegal the Secession of the Seven Cotton States.

•12st April 1861, days after the Secession of South Carolina, the Confederate army moves to Fort Sumter, in the same state. The bombardment results in the first victory of the Confederacy.

•The Union recovers the Fort with extreme cruelty days after and Virginia, Arkansas, Tennessee and North Carolina decide to join the Confederacy.

•The South finances the war with their commercial relationships with European countries. They fight in the Confederacy territory for their independence of the USA.The Confederate army wins the majority of the battles.

•1st January 1863, Lincoln doesn't still accept the independence of the Confederacy and writes the Emancipation Proclamation. The leaders of the Confederates are angry because of Lincoln's attitude and the Confederate Army is moved to Gettysburg, Pennsylvania, territory of the Union.



SECOND STAGE: From Gettysburg to the fall of the Confederacy.

- 1st-3rd July 1863, Gettysburg marks the turning point of the American Civil War. The Union beats up the CSA. between 46,000 and 51,000 casualties.

- At the same time in which Gettysburg events take place, the Union takes Vicksburg, Mississipi. From now on, the Union controls the Mississipi Valley and the territory of the Confederacy is divided in two.

- The Union focus their attacks on Virginia. 2nd April 1865, some Confederate generals move from Richmond, the capital of the Confederacy.

- 9th April 1865, the Confederate Army finally surrenders in Appomatox, Virginia.

- 15th April 1865, Lincoln's murdered by a radical supporter of the Confederacy.

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Tactical Strategies

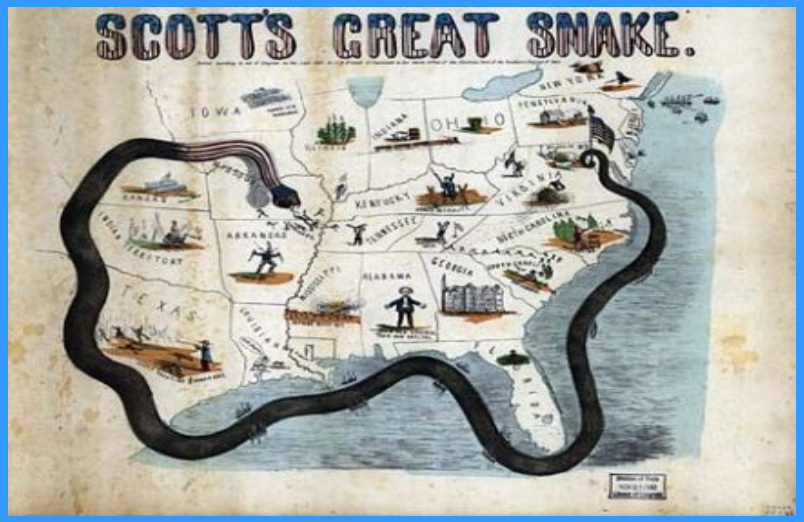
Anaconda Plan

Unionist General Winfield Scott proposed a strategy focus on a commercial blockade to the southern states.

It consisted in taking the control of southern harbors, avoiding the contact between the Confederacy and Europe.

This isolation would make little by little the South to sourrender, their economy was based in the trade of their products in echange of weapons.

The larger population of the Union allowed this plan to work.



Confederacy Defensive S.

Securing potential allies such as France and Great Britain was the main aim of the Soutern defensive strategy.

To do so, it was necessary to show them they could win that war for their independence.

At first, the Confederates attacked the borders between the USA and the CSA making the Union army and population to go to northern areas.

As war advanced, Confederate army tried to avoid the Union army, making the war to last more time as they get allies.

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Consecuences of the War

- More than 600,000 Americans lost their lives and other great number were severely injured.
- 8000 million dollars lost.
- The federal government is imposed over the states (centralism).
- 13th, 14th and 15th amendments of the Constitution, which abolish slavery and gives equal rights to Afro-American citizens.
- Industry is imposed in the USA , which turns it into the main industial power.
- Decrease of the cotton trading from the South.
- Southern violent ideologic groups (Ku-Klux-Klan).

Renaissance – *means “rebirth” in French*. This was a time period following the middle ages that lasted from the 1300-1500s.

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Renaissance, cont.

- There was a renewed interest in learning about the achievements of the ancient Greeks and Romans.
- The Renaissance had its beginnings in Italy.

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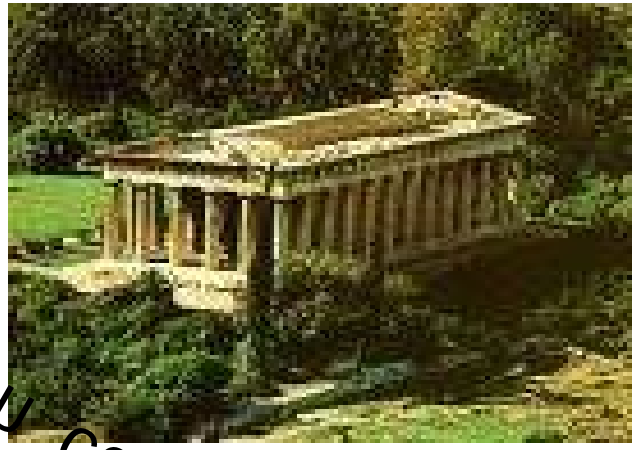

Italians cities such as Florence and Venice became rich through trade and industry

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These cities became the center for many artists and sculptors.

Humanism

- Emphasized the abilities and accomplishments of human beings.
- Humanists believed people were capable of great things and placed a great value on education.
- As a result, artists, architects, leaders, writers, scientists and other talented individuals were greatly admired.

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Humanities

- Scholars encouraged a new way of thinking and learning.
- Humanities included history, poetry, and grammar.

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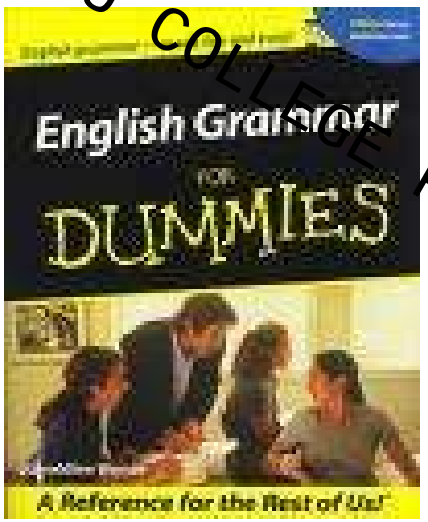
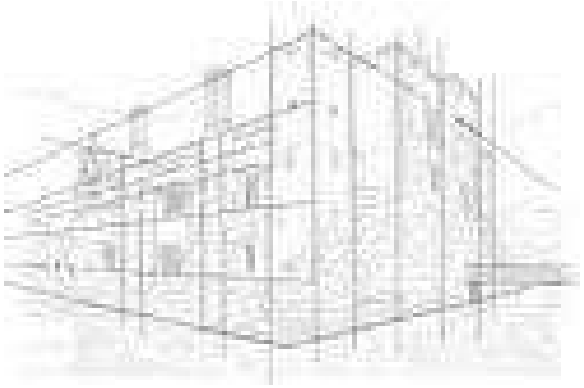


HISTORY

Renaissance Art

- Oil-based paints were used for the first time.
- Artists began to paint in perspective (3D) and use shading.
- Artists painted everyday life instead of religious scenes.



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Michelangelo – a famous painter and sculptor.

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Michelangelo's work

Pieta

Art Pencil Sketch

Creation of Adam

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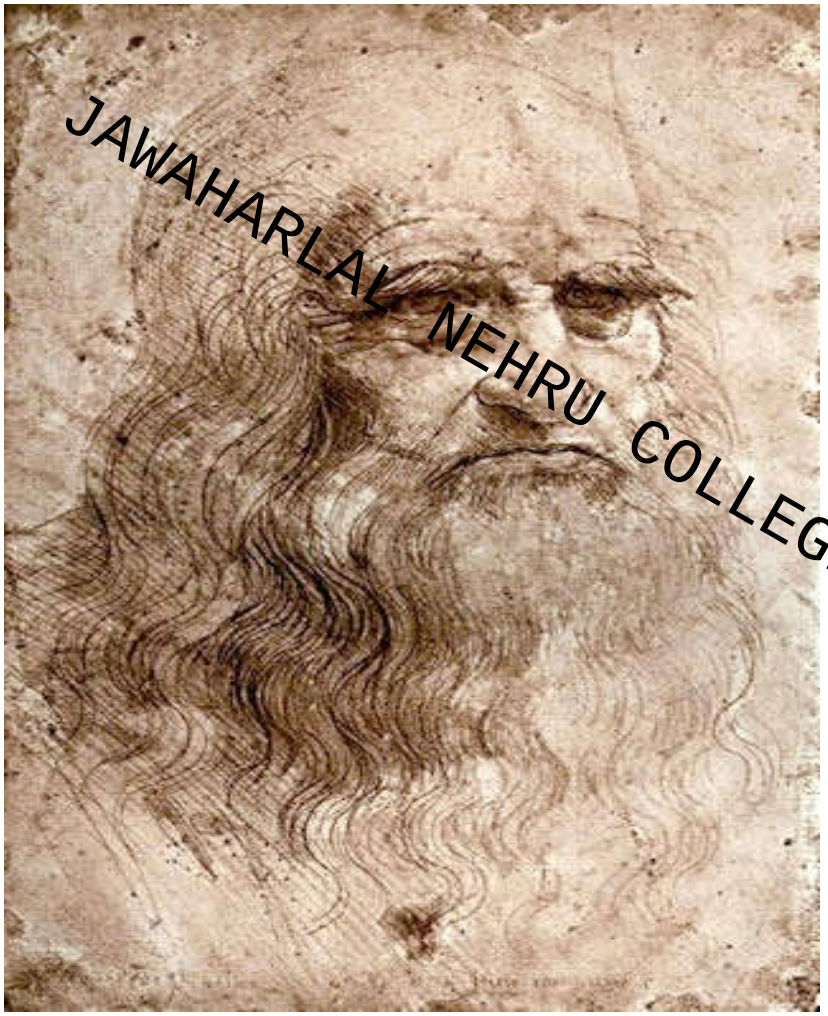
Leonardo Da Vinci – *a great painter, sculptor, architect, scientist and engineer.*



Da Vinci

- The first scientist to perform human dissections on the body to study anatomy.
- Painted very realistic pictures such as the Mona Lisa and Last Supper.
- Drew the first sketches of man in flight using wings.
- Sketched plants and animals.

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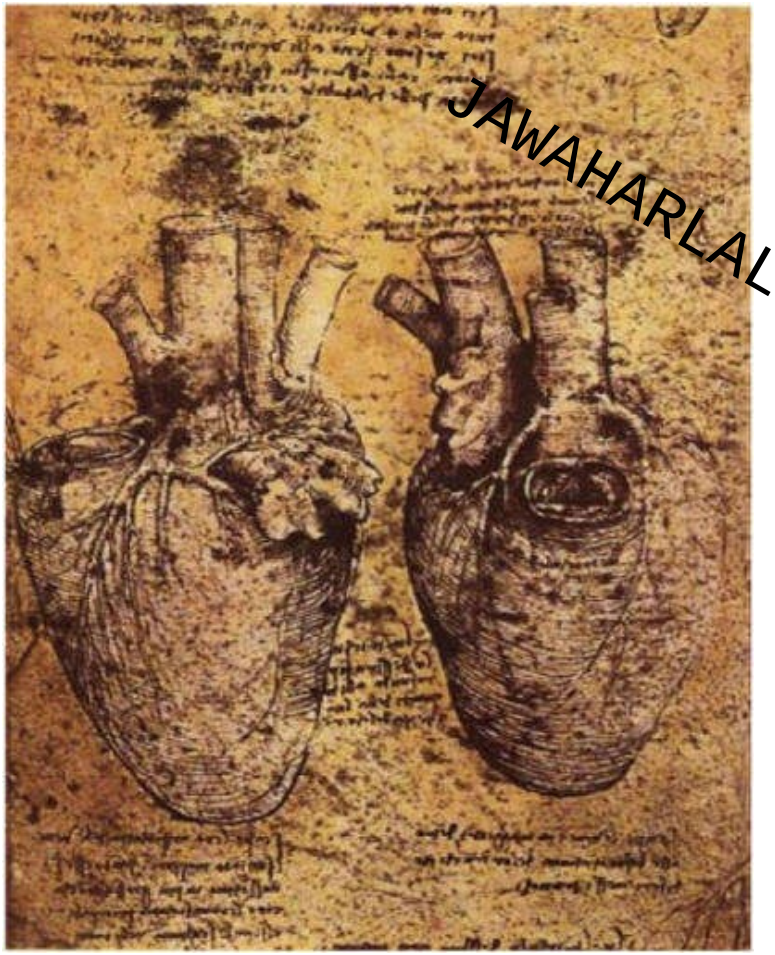
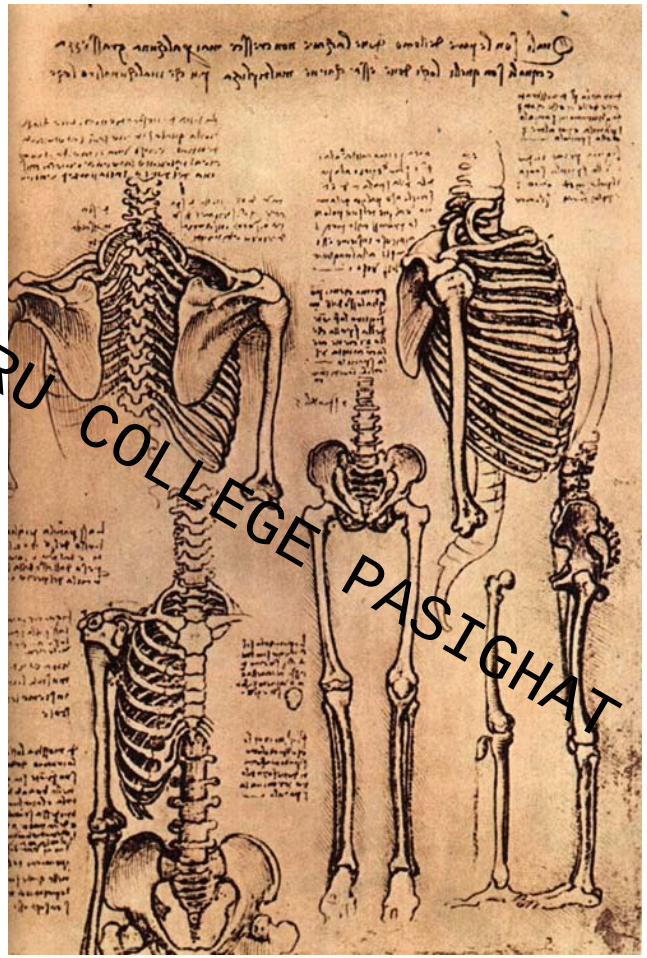
Mona Lisa

The Last Supper (*da Vinci*)

Anatomical drawings by Leonardo Da Vinci





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Renaissance Literature

- William Shakespeare is probably the most famous Rengissance writer.
- He is most famous for his plays, but also wrote poetry.
- His writing shows a deep understanding of human nature and expressed the thoughts and feelings of his characters.
- More people learned to read after the invention of the printing press. Ideas were shared with others in distant areas.

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William Shakespeare

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Shakespeare, cont.

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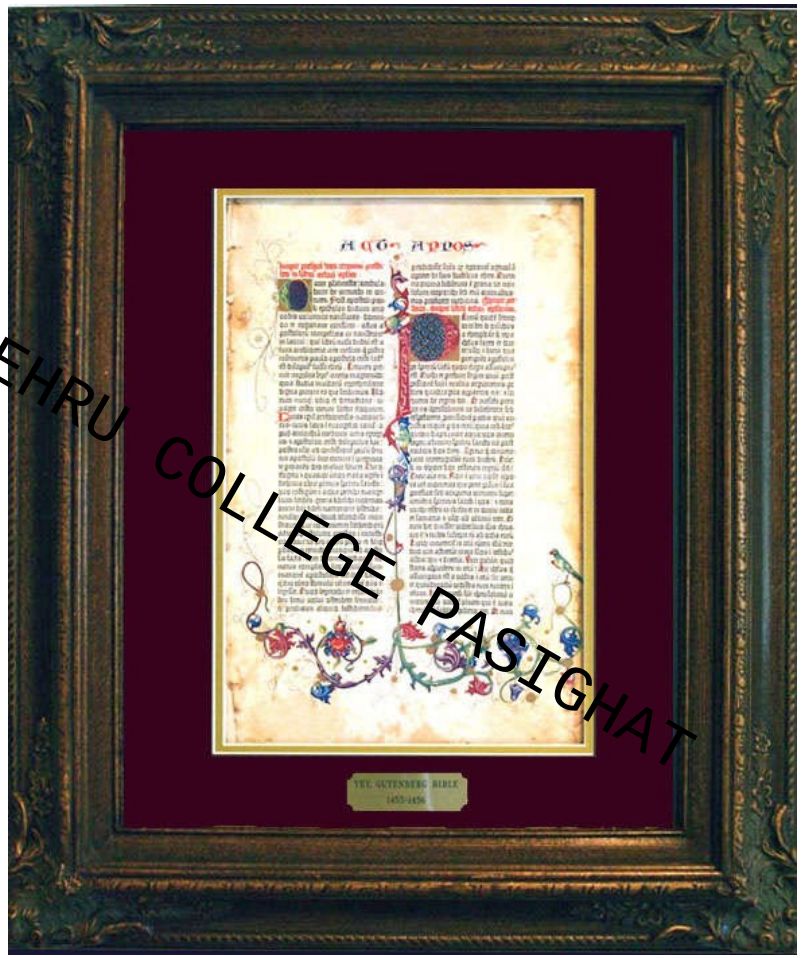
Globe Theater – London, England

Science & Technology

- Johannes Gutenberg invented the first real printing press in Germany.
- Gutenberg's first printed book was the bible.
- For the first time in history, the average person had access to printed materials.



Page from Gutenberg's bible

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Science & Technology, cont.

- Some of the ancient Greek and Roman works rediscovered during the Renaissance dealt with science.
- For the 1st time, Europeans could read about early Greek and Roman scientific advances.
- These discoveries inspired Europeans to study math, astronomy, and science.

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Navigation and Exploration

- Advances in technology helped to make exploration of the world possible.
- The introduction of latitude lines on maps made it easier for navigators to find their way.
- Discovery of new ocean currents.
- New instruments allowed sailors to locate their positions.
- New ships could carry enough food and water for longer voyages.
- Larger ships with new sails and better steering devices made longer voyages possible.

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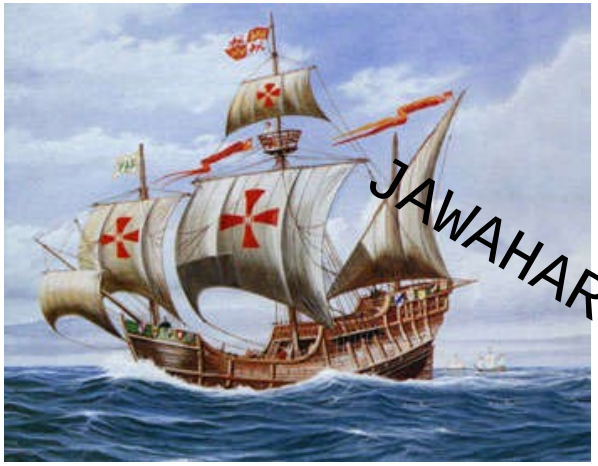
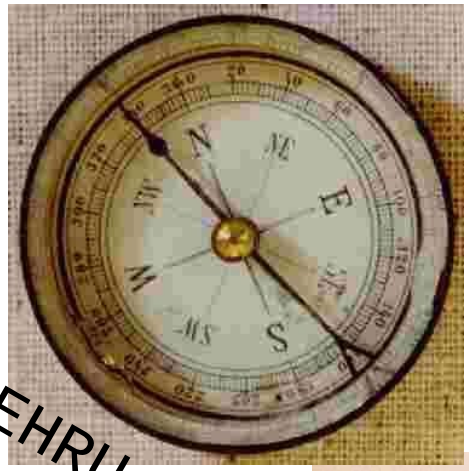
Exploration, cont.





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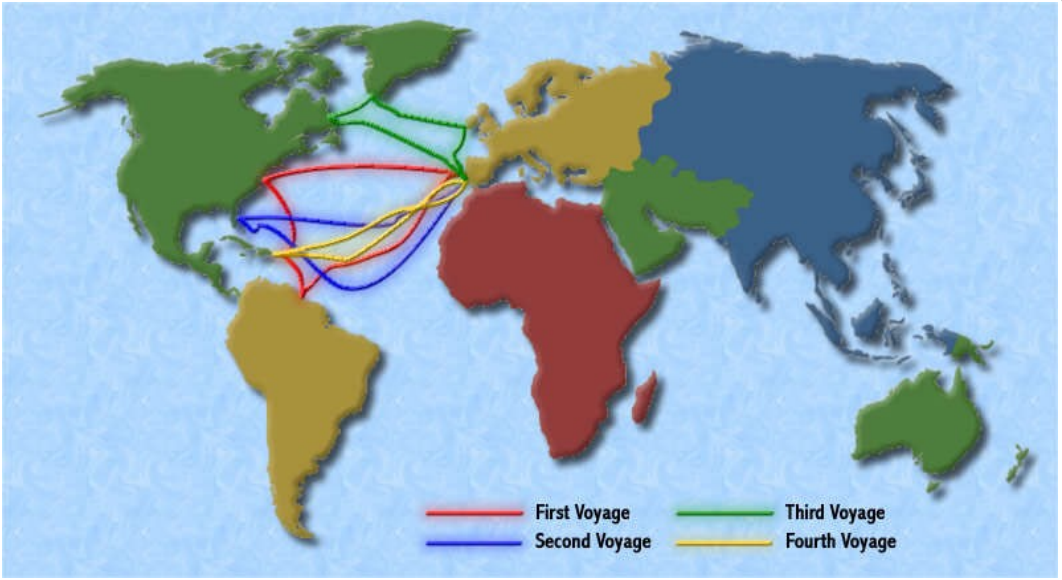

Reformation

- By the early 1300s many Europeans thought the church had become too powerful and wealthy.
- Complaints and unhappiness with the church led to a religious reform movement called the <u>Reformation.</u>
- <u>The Reformation</u> began in what is now Germany.
- People thought religious officials had lost sight of their religious duties.

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The Protestant Reformation

- A German monk named Martin Luther disagreed with the teachings of the Catholic Church.
- In 1517, Luther nailed a list of complaints to a church door in Whittenberg, Germany.
- These complaints were called the **95 Theses.**
- Luther's protests angered church officials, who expelled him from the church.

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MARTIN LUTHER

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Martin Luther's ideas

- He believed that the way to heaven was to have faith in God.
- He believed the bible was the only authority for Christians.
- Martin Luther's followers became known as Protestants. They protested against the church and its teachings.
- Martin Luther started the Lutheran church.

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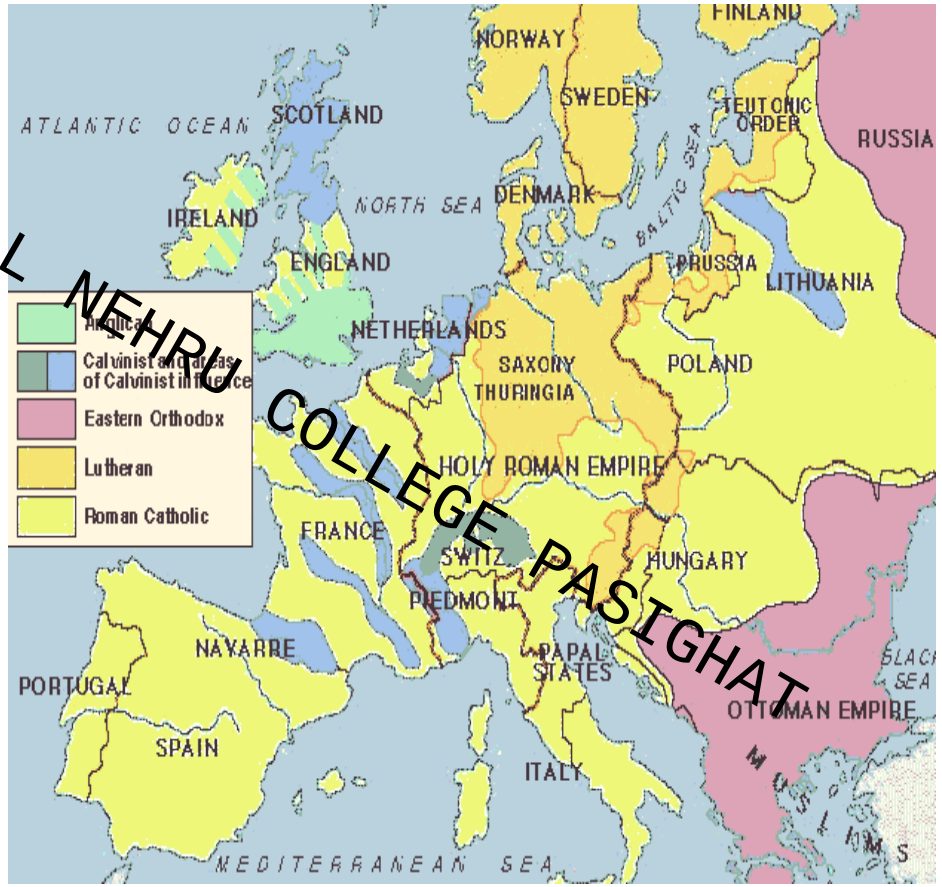
Protestant Reformation, cont.

- Other reformers followed Luther and created churches of their own.
- The Roman Catholic church was no longer the only church in Western Europe.



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Catholic Reformation

- Also known as the counter-reformation
- Many catholic officials wanted to reform the church as well.
- Church leaders began focusing more on spiritual concerns and less on political power.
- They worked to make the church's teachings easier to understand.

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Results of the Reformation

- Many different churches arose in Europe.
- In many areas, especially in the north, Protestants outnumbered Catholics.
- As the power of the church and the pope decreased, the power of monarchs (kings/queens) and national governments increased.
- Religious wars in parts of Europe led to long-lasting political and social change in Europe.

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WELCOME TO THE COMMERCIAL LAW CLASS

BY:DR.MINAM YOMSO

LAW OF CONTRACT

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INTRODUCTION

- The law of contracts forms the oldest branch of the law relating to business transactions.
- It affects every person in one way or the other, as all of us enter into some kind of contract every day.
- The law of contracts is applicable not only to the business community but also to others.

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Introduction: continues….

- Every one of us enters into a number of contracts almost every day.
- When a person takes a seat in a bus or deposits his luggage in a railway cloak room or entrusts his car to the mechanic for repairs etc., he enters into a contract though he may not be aware of this fact.
- Such contracts create legal rights and obligations.

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Introduction: continues….

- The law relating to contracts in india is contained in the Indian Contract Act 1872.
- The Act came into force on the first day of September 1872.
- It is not an exhaustive code containing the entire law of contracts.
- The Indian Contract Act may be divided into two parts : Section 1 to 75 deals with the general principles of the Law of Contract. Section 124 to 238 deals with special types of contracts such as,

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a) Contract of Indemnity and guarantee (Sec. 124 to 147)

b) Contract of Bailment and Pledge (Sec. 148 to 181)

c) Contract of Agency (Sec. 182 to 238)

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DEFINITION OF CONTRACT

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- An agreement which creates legal obligations is a contract. The obligation is an undertaking to do or abstain from doing some definite act or acts.
- Section 2(h) of the Indian Contract Act 1872 defines a contract as follows :

  "An agreement enforceable by law is a contract."
- In other words, an agreement which can be enforced in a court of law is known as a contract.

Thus a contract consists of the two elements :

(1) An agreement and

(2) The agreement must be enforceable by law.

The term agreement is defined in Section 2(e) of the Indian Contract Act which reads as under :

"Every promise and every set of promises, forming consideration for each other, is an agreement."

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PROMISE

- Sec. 2(b) defines promise as
  "A proposal when accepted, becomes a promise".
- Thus an agreement is an accepted proposal.
- We can easily conclude from the above mentioned provisions that an agreement consists of an offer or proposal from one party and its acceptance by the other.

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In other words :
Agreement = Offer + Acceptance

So, agreement means a promise. It is created when a person makes an offer to another person and if at other person signifies his assent or accepts it.

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OBLIGATION

- Obligation is a legal tie which imposes upon determinate person or persons the necessity of doing or abstaining from doing a definite act or acts.
- Obligations are also said to be varied; such as social obligations, obligations arising out of torts, obligations arising out of compromise decree, obligations arising out of quasi-contracts etc.

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CONSENSUS AD ADEM

- Consensus ad idem means identity of mind. Two or more persons are said to consent witt each other when they agree upon the same thing in the same sense.

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However, there are some agreements which arc not enforceable in a law court. Such agreements do not give rise to contractual obligations and are not contracts. An agreement of **purely social or domestic** nature is not a contract.

- **Example : Balfour V Balfour (1919)**
- **A husband and wife were residents in Ceylon, where husband was employed. They went to England on nine months leave. At the end of the time the husband had to return alone as the wife was advised to remain in England because of illness. The husband promised to send her a maintenance allowance of £ 30 a month until she returned to Ceylon. The husband failed to pay the amount. The wife sued for the allowance.**
- **It was held that there was no binding contract. She could not recover as it was a social agreement and parties did not intend to create any legal relations.**

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ELEMENTS OF A VALID CONTRACT:

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- According to Section 10 of the Act lay down the essentials of a valid contract. According to the section:
- "All agreements are contracts if they are made by the free consent of the parties competent to contract, for a lawful consideration and with a lawful object, and are not hereby expressly declared to be void".

Contracts are agreements, but all agreements need not be contracts. The term 'agreements' is, thus, much wider than the term 'contract'. An agreement become enforceable by law when it fulfils certain conditions. These conditions, which may be called the essential elements of a contract, are :

1. Offer and Acceptance
2. Intention to create legal relations
3. Lawful Consideration
4. Capacity of parties
5. Free and genuine consent
6. Lawful object
7. Agreement not declared void
8. Certainty and possibility of performance
9. Legal formalities.

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1. *Offer and Acceptance*

- An agreement comes into existence by acceptance of an offer. In an agreement there must be atleast two parties, one of them making the offer and the other accepting it. Acceptance must be in accordance with the terms and conditions of the proposal.
- An acceptance to be valid must be absolute and unqualified and in accordance with the exact terms of the offer. A proposal, when accepted becomes a promise.

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The person making the offer is known as 'offerer', 'proposer' or 'promisor'. The person to whom the offer is made is known as 'offeree' or 'proposee' or 'promisee'.

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- Example :

  A proposes to sell his car to B for Rs. 50,000 and B conveys his acceptance. The agreement comes into existence.

2. *Intention to Create Legal Relations*

- There must be an intention (among the parties) that the agreement shall result in or create legal relations. An obligation is the legal duty to do or abstain from doing a definite act or acts. If the parties do not intend to create legal obligations, there is no contract between them. An agreement which gives rise to a moral or social obligation is not contract.

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Example :

- I invited you for a dinner. You accepted the invitation. It is a social agreement. If I fail to serve you, you cannot go to Courts of Law for enforcing the agreement. Similarly, if you fail to attend the dinner, I cannot go to Court of Law for enforcing the agreement.

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3.Lawful Consideration

- The agreement must be supported by lawful consideration on both sides. Each party to the agreement must give or promise something and receive something or a promise in return. Consideration is the price for which the promise of the other is sought.

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EXAMPLE:

- If A offers t0 sell his scooter t0 B for Rs. 10'000 and B accepts the offer, then for A Rs. 10 000 is the consideration and for B the scooter is the consideration.

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4. Capacity of Parties

- The parties to an agreement must be competent to a contract, otherwise it cannot be enforceable by a Court of Law.
- Minors, Lunatics, Drunkards, Idiots, Alien enemy, Convicts etc. **are incompetent** to contract.
- Under section 11 of the act, "Every person is competent to contract who is the age of majority according to the law to which he is subject, and who is of sound mind, *and* not disqualified from contracting by any law to which he is subject"

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5.Free and Genuine Consent

- The consent of the parties to the agreement must be free and genuine. The consent *of* parties should not be obtained by **misrepresentation, fraud, undue influence, coercion or mistake;** If the consent is obtained by any of these flaws, then the contract is not valid.

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6. Lawful Object

- The object for which the agreement has been entered must not be illegal or immoral or opposed to public policy. That is, the object of the agreement must be lawful and not one of which law disapproves.

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7.Agreement not Declared Void

- The agreements must not have been expressly declared to be void by any law in force in the country.
- Under Indian Contract Act, there are five categories of agreements which are expressly declared to be void. They are:-

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1. Agreement in restraint to marriage (Sec. 26)
2. Agreement in restraint of trade (Sec. 27)
3. Agreement in restraint of proceedings (Sec. 28)
4. Agreements having uncertain meaning (Sec. 29)
5. Wagering agreement (Sec. 30).

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8.Certainty and Possibility of Performance

- Agreements to form valid contracts must be certain. If it is vague and it is not possible to ascertain its meaning, it cannot be enforced. The performance of an agreement must be possible. An agreement to do an impossible act is not valid.

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9. Legal Formalities

- A contract may be oral or in writing. If, however, a particular type of contract is required by law to be in writing, it must comply with the necessary formalities as to **writing, registration and attestation**, if necessary. If these legal formalities are not carried out, then the contract is not enforceable at law.
- The Indian Contract Act contains rules regarding each of the elements mentioned above These rules are to be discussed in the subsequent chapters.

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Summing up:
Essentials of a Valid Contract

1. There must be an offer and valid acceptance
2. The consent of the parties must *be free and genuine.*
3. The parties must intend to *create legal relationship,*
4. The parties must be *competent to contract.*
5. There must be *lawful consideration* on both sides.
6. There must be *lawful object.*
7. The agreement *not declared void* or *illegal.*
8. The terms of a contract should be *clear.*
9. 9. The performance must *not be impossible,*
10. *Legal formalities,* if any.

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QUESTIONS:

1. Define the term ‘Contract’
2. What are the essentials of a valid contract?
3. “All contracts are agreements, but all agreements are not contracts.” Discuss.

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CASH FLOW STATEMENT

- **DR.NARESH KUMAR**
- **HOD COMMERCE**

JAWAHARLAL NEHRU COLLEGE PASIGHAT

CASH FLOW STATEMENT

As per para 5 of Accounting Standard – 3 (Revised), cash flows are inflows and outflows of cash and cash equivalents.

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- Though cash flow statement, an attempt is being made to focus on cash and cash equivalents.
- Inflows (sources) may be due to issue of share capital, sale of fixed assets, sale of investments, etc.
- Outflow (usage) may be due to purchase of fixed assets, redemption of preference shares or debentures, etc.
- Difference between Inflows and outflows of cash and cash equivalents is termed as net increase or decrease in cash and cash equivalents as the case may be.

CASH AND CASH EQUIVALENTS

Accounting Standard – 3 (Revised) define cash and cash equivalents as follows:

CASH: Cash comprises cash in hand and demand deposits with bank.

CASH EQUIVALENTS: These are short-term highly liquid investments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of change in value.

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PREPAARATION OF CASH FLOW STATEMENT

According to Accounting Standard – 3 (Revised), following four steps are required:

I. Calculation of Cash Flows from Operating Activities.

II. Calculation of Cash Flows from Investing Activities.

III. Calculation of Cash Flows from Financing Activities.

IV. Calculation of net increase/decrease in cash and cash equivalents.

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I. Calculation of Cash Flow from Operating Activites

Cash flows from operating activities can be computed with the help of Income Statement of the current year, comparative Balance Sheets and the relevant additional information. As per AS – 3 (Revised), the following types activities can be regarded as cash flow from operating activities:

- Cash received from the sale of goods or rendering some services;
- Cash received from royalties, fees, commission and other revenue;
- Cash paid to suppliers for goods or services;
- Cash paid to employees or behalf of employees;
- Cash received or paid to insurance companies for premiums claims, annuities or other policy benefits;
- Cash paid as income tax or refund of income tax unless, they can be specifically identified with financing or investing activities; and
- Cash received or paid for future contracts, forward contracts, option contracts and swap contracts, when these are held for dealing or trading purpose.

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A. DIRECT METHOD

- In this method figures of income statement, e.g., sales, purchases, stock expenses are so analyzed to convert income statement based on cash basis.
- In this method cash realized from sales and cash paid for purchases and expenses will be ascertained.

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Calculation of Cash from Operating Activities

	N
Cash Receipts from Sales (Customers)	xxx
Less: Cash paid to suppliers and employees	xxx
Net cash from Operating Activities	xxx

Step (i) **Calculation Cash Receipts from Sales**

		N	N
Cash Sales		xxx	xxx
Credit Sales		xxx	xxx
Add: Opening Debtors and B/R		xxx	xxx
Less: Closing Debtors and B/R	xxx	xxx	
Total Cash realized from sales		xxx	xxx

Step (ii) **Calculation of Cash Paid to Suppliers**

Cost of goods sold		xxx	xxx
Add: Closing Stock		xxx	xxx
Less: Opening Stock		xxx	xxx
Total Purchases		xxx	xxx
Add: Opening Creditors & B/P		xxx	xxx
Less: Closing Creditors & B/P		xxx	xxx
Cash paid to Suppliers		xxx	xxx

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Step (iii) **Calculation of Cash paid for any Expenses**

	N	N
Expenses	xxx	xxx
Add: O/S Expenses in the beginning	xxx	xxx
Less: O/S Expenses at the end	xxx	xxx
Cash paid for Expenses	xxx	xxx

Problem: From the following information available from the books of X ltd. Compute cash from operating activities.

Income Statement

For the year ending 31st March, 2012

Sales		N 18,000
Less: Cost of goods sold		N 12,200
Gross margin		N 5,800
Less: S & D Expenses	N 2,000	
Salaries	N 1,000	
Depreciation of Plant	N 500	N 3,500
Net margin		N 2,300

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Current Assets and Current Liabilities

PARTICULARS	March 31, 2011 N	March 31, 2012 N
Bills Receivable	2,000	1,500
Debtors	1,000	1,500
Creditors	1,200	1,200
Bills Payable	500	200
Salaries	1,000	800
Stock –in-trade	1,000	800

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Solution: Calculation of Cash Flow from Operating Activities **(Direct Method)**

			N
Cash Receipts from Customers			18,000
Less: Cash paid to suppliers and Employees		15,300	
Net Cash from Operating Activities		2,700	
Working Notes:			
a) Cash receipts from Customers:			
Sales during the year		18,000	
Add: Opening Debtors	1,000		
Opening B/R	2,000		3,000
			21,000
Less: Closing Debtors	1,500		
Closing B/R	1,500		3,000
Cash receipt from customers			18,000

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b) Cash paid to Suppliers and Employees

Cost of goods sold		12,200
Operating Expenses (S & D + Salary)		3,000
		15,200
Add: Opening Creditors	1,000	
Opening B/P	500	
O/S Salary	1,000	
Closing Stock	800	3,300
		18,500
Less: Closing Creditors	1,200	
Closing B/P	200	
Salary at the end	800	
Opening Stock	1,000	3,200
Cash paid to Suppliers & employees		15,300

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B. INDIRECT METHOD

For calculating Cash Flows from operating activities through indirect method, we start from the figure of profit, which should be before tax and extra ordinary item. Further, this profit requires certain adjustments related to non-cash and non-operating items like:

i) An increase or decrease in the value of current assets and current liabilities, which also affect the cash flows, so these should be adjusted to net profit.

ii) Loss on sale of assets, depreciation or fictitious or intangible assets written off are to be added back because they are non-cash items that do not result in the outflows of cash.

iii) Other items which effects investing or financing cash flows such as profit on sale of assets, dividend or interest income, etc.

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Cash Flows from Operating Activities (Indirect Method)

PARTICULARS	AMOUNT N
Net Profit before interest, tax and extraordinary items	xxx
Adjustment for:	
Depreciation	xxx
Loss on sale of fixed assets	xxx
Provision for contingencies	xxx
Provision for retirement benefits	xxx
Profit on sale of investment/fixed assets	(xxx)
Interest received	(xxx)
Operating profit before working capital changes	xxx
Add: Decrease in current assets	xxx
Add: Increase in current liabilities	xxx

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Less: Increase in current assets **Less: Decrease in current liabilities**	**(xxx)** **(xxx)**
Cash generated from operations	xxx
Tax paid	(xxx)
Cash flows before extraordinary items	xxx
± Extra ordinary items	xxx
NET CASH FROM OPERATING ACTIVITIES	xxx

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Treatment of Non-cash and Non-operating items (Expenses or Reserves

- Non-cash items refer to those items which have appeared in the Income Statement as an expenditure or revenue but they do not have any impact on cash balance.
- These items affect the net profit as shown by Income Statement without causing any inflow or outflow of cash in the business.
- So, to convert accrual base income statement into cash base income statement, these items must be adjusted.

a) **Depreciation on Fixed Assets:**

- Being a non-cash expense, this does not lead to reduction in the cash balance in any way. So while computing cash flows from operating activities, this item should be added back to the net profit.

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b) **Amortization of Intangible assets, viz., Goodwill, Trade Marks, Patents, etc.:**

- This amortization of intangible assets reduces the net profit but do not affect the cash flow in any way. So to calculate cash flows from operating activities, the value of amortization of assets should be added back to net profit.

c) **Fictitious Assets written off, e.g., preliminary expenses:**

- These also have nothing to do with the cash flows but reduce the net profit. So these expenses should be added back for the computation of cash flow from operating activities.

d) **Profit or loss on sale of fixed assets:**

- Profit or loss on sale of fixed assets should be added back or deducted respectively, to the net profit figure, so that cash flow from operating activities can be computed.

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In case, a fixed assets is sold during the year following treatment should be accounted for:

(i) Calculate the depreciation charged on the assets during the year by preparing "Accumulated Depreciation Account" to be added to the net income for the year before adjustment.

(ii) Calculate amount of profit or loss on the sale of the part of that fixed assets which shall either of subtracted or add respectively to the net income for the year before adjustment.

(iii) Amount of cash received on sale of asset must be added under the head "Cash Flow from Investing Activities".

(iv) Amount of cash paid (if any) on purchase of fixed assets must be subtracted from investing activities.

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(v) Appropriation of Profits, e.g., General Reserve, Sinking Fund, etc.: All these items reduce the net profit figure without reducing the cash, so all such appropriation must be added back to net profit to calculate Cash Flows from Operating Activities.

(v) Provision for Bad and Doubtful Debts: This item also reduce the net profit but do not affect the cash. To calculate Cash Flows from Operating Activities, these items must be added back to the net profit.

(vii) Tax Provision, Dividend, Sale/Purchase of fixed assets:

- In case of proposed dividends, the provision created during the year must be added to net income before adjustments and the amount actually paid during the year must be subtracted under the head "Cash Flow from Financing Activities".
- In case of provision for taxation, the provision created during the year must be added to net income before adjustments and the amount actually paid during the year is subtracted from "Cash Flow from Operating Activities'.

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TREATMENT OF SOME SPECIAL ITEMS

1. **Treatment of Interest:**

(a) **If it is financial enterprise:** Cash flows from interest paid and interest received should be treated as Cash Flows from Operating Activities.

(b) **If it is other than financial enterprise:** Cash flows from interest paid should be treated as Cash Flows from Financing Activities while interest received should be treated as Cash Flows from Investing Activities.

NOTE: ***Interest on calls-in-arrears is a cash flow from financing activities.***

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2. **Treatment of Dividend:**

(i) **If it is a financial enterprise:** Cash flows from dividend received should be treated as cash flows from Operating Activities, while cash flows from dividend paid should be treated as cash flows from Financing Activities.

(ii) **If it is other than financial enterprise:** Cash flows from dividend received should be treated as cash flows from Investing Activities, while cash flows from dividend paid should be treated as cash flows from Financing Activities.

NOTE: ***Dividend paid should always be treated in Cash Flows from Financing Activities.***

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3. Treatment of Taxes on Income:

- Taxes on income should be disclosed separately.
- It has also stated that it can't be indentified specifically with Financing Activities or Investing Activities then, it should be classified as cash flows from Operating Activities.
- While preparing CFS current year's tax provision should be added back to the current year's profit to arrive at cash flows from operating activities.
- Tax paid during the year should be deducted from cash before tax from Operating Activities.
- Students are advised to prepare 'Provision for Tax Account' to know hidden transactions, if any.

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Provision for Tax Account

Dr. Cr.

PARTICULARS	Amount N	PARTICULARS	Amount N
To Bank A/c (Tax paid)	xxx	By Balance b/d	xxx
To Balance c/d	xxx	By Profit and Loss A/c (Current year's provision)	xxx
	xxx		xxx
		By Balance b/d	xxx

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NOTE:

1. Tax paid should be subtracted after deducting the refund of tax from cash before tax from operating activities as actual tax paid is the outflows.
2. In the absence of specific information Provision for Tax shown in the previous year's balance sheet should be treated as tax paid and Provision for Tax shown in the current year's balance sheet should be treated as current year's tax provision.

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Example: Following are the extract from the balance sheets of ABC Ltd.

Liabilities	31.3.2011	31.3.2012	Assets	31.3.2011	31.3.2012
Profit & Loss A/c Provision for Tax	60,000 10,000	1,00,000 15,000			
	70,000	1,15,000			

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Show how the related item will appear in the CFS.

Calculation of Profit before taxation and extraordinary items:

Profit made during the year (N1,00,000 – N60,000)	N40,000
Add: Provision for Tax	N 15,000
NP before taxation	N55,000

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Cash Flow Statement

For the Year ended 31st March, 2012

Cash Flow from Operating Activities:	
Net Profit before taxation & extraordinary items	N55,000
Less: Income Tax paid	N10,000
Net cash from Operating activities	N45,000

Working Note:

Provision for Tax Account

Dr. Cr.

PARTICULARS	Amount N	PARTICULARS	Amount N
To Cash A/c (Tax paid)	10,000	By Balance b/d	10,000
To Balance c/d	15,000	By Profit and Loss A/c (Current year's provision)	15,000
	15,000		25,000

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Example: Following are the extract from the Balance Sheets of ABC Ltd.

LIABILITIES	31.3.11 N	31.3.12 N	ASSETS	31.3.11 N	31.3.12
Profit and Loss Account	60,000	1,00,000			
Provision for Tax	10,000	15,000			
Additional information During the year tax paid N 12,000. Show how the related items will appear in CFS.					

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Solution:

Calculation of Profit before taxation & extraordinary items:

Profit made during the year	N40,000
Add: Provision for Tax	N17,000
Net Profit before taxation & EOI	N57,000

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Cash Flow Statement

For the year ended 31st March, 2012

Cash from Operating Activities:	
Net Profit before taxation & extraordinary items	N57,000
Less: Income tax paid	N12,000
Net Cash from Operating Activities	N45,000

Working Note:

Provision for Tax Account

Dr. Cr.

PARTICULARS	Amount N	PARTICULARS	Amount N
To Cash A/c (Tax paid)	12,000	By Balance b/d	10,000
To Balance c/d	15,000	By Profit & Loss A/c (Current year's provision being balancing figure)	17,000
	27,000		27,000

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Example: Following are the extract for the Balance Sheets of ABC Ltd.

	31.13.11	31.12.12
	N	N
Profit and Loss A/c	60,000	1,00,000
Provision for Tax	10,000	15,000

Additional information:

Provision for tax made during the year 2011-12 N14,000.

Solution:

Calculation of Profit before tax & extraordinary items

Profit made during the year	N40,000
Add: Provision for tax	N 14,000

Net Profit before tax & extraordinary items	N 54,000

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Cash Flow Statement

Cash from Operating Activities:	
Net Profit before tax and extraordinary items	N54,000
Less: Income tax paid	N 9,000

Net Cash from Operating Activities	N45,000

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Working Note:

Provision for Tax Account

Dr. Cr.

PARTICULARS	Amount N	PARTICULARS	Amount N
To Cash A/c (Tax paid being balancing Figure)	9,000	By Balance b/d	10,000
To Balance c/d	15,000	By Profit and Loss A/c (Current year's provision)	14,000
	24,000		24,000

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II. Cash Flow from Investing Activities

- Cash flows from acquisition or disposal of long-term assets or investments are termed as Cash Flows from Investing Activities.
- The important point is to be noted here that these assets have not been held by the business concern for resale.
- In this type of classification cash flows represents the expenditure which have been made with the intention to generate future income or cash flows.
- As per AS-3 (Revised) following types of activities can be regarded as cash flow from Investing Activities:
- Cash paid for acquiring tangible or intangible fixed assets (including those relating to capitalized R & D costs).

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- Cash received from sale of fixed assets (tangibles or intangibles).
- Cash paid for acquiring shares, warrants, or debt instruments of other enterprises and/or interests in some joint ventures.
- Cash received from disposal or issue of shares , warrants, or debt instruments of other enterprises and/or interests in some joint ventures.
- Cash given as an advance and loans given to third parties.
- Cash received from the repayment of advances and losses given to third parties.

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Cash Flows from Investing Activities

	N
Sale of fixed assets	xxx
Purchase of fixed assets	(xxx)
Purchase of long-term investments	(xxx)
Sale of long-term investments	(xxx)
Interest received (non-financial enterprise)	xxx
Dividend received (non-financial enterprise)	xxx
Net Cash from Investing Activities	xxx

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Example:

From the following particulars, calculate cash flow from investing activities:

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	N
Machinery as on 1.4.2011	80,000
Machinery as on 31.3.2012	90,000
Accumulated depreciation as on 1.4.2011	22,500
Accumulated depreciation as on 31.3.2012	37,500

Additional information:

During the year a machine costing N 37,500 with accumulated depreciation of N 21,000 sold for N 18,200. Calculate cash flow from investing activities.

Computation of Cash Flow from Investing Activities

	N
Sale of machinery	18,200
Less: Purchase of machinery	(47,500)
Net cash used in investing activities	(29,300)

Working Notes:

Accumulated Depreciation Account

To Machinery sold A/c	21,000	By Balance b/d	22,500
To Balance c/d	37,500	By P & L A/c (Dep. Provided during the year -Bal. fig.)	36,000
	58,500		58,500

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Machinery Account

To Balance b/d	80,000	By Machinery sold A/c	37,500
To Cash A/c (Purchases-Bal fig.)	47,500	By Balance c/d	90,000
	1,27,500		1,27,500

Machinery Sold Account

To Machinery A/c	37,500	By Depreciation A/c	21,000
To P & L A/c (Profit on sale)	1,700	By Bank A/c (Sale)	18,200
	39,200		39,200

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III. Cash Flows from Financing Activities

- Cash flows from the activities, which result in change in the shape and composition of owners' funds (including preference share capital) and borrowed funds of the business are called Cash Flows from Financing Activities.
- Some of the examples of Cash Flows from Financing Activities are as follows:

- Cash receipts from issuance of share capital.
- Cash receipts from issuance of Debentures and Long-term, or short-term borrowings, etc.
- Repayment of amount borrowed.
- Payment of dividend.

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Example:

From the following information related to ABC Ltd., calculate cash flows from financing activities:

(i) 2,000 equity shares of N 10 per share were issued at par.

(ii) 8% Preference shares of N 10,000 were redeemed at premium of 10%.

(iii) dividend paid N 2,000.

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Solution:

Computation of Cash Flows from Financing Activities

	N
Issue of equity shares	20,000
Redemption of 8% Preference Shares (at premium)	(11,000)
Dividend paid	(2,000)
Net Cash from Financing Activities	7,000

IV. Calculation of Net Increase or Decrease in Cash and Cash Equivalents

	Opening Balance	Closing Balance
Cash in Hand	xxx	xxx
Cash at bank	xxx	xxx
Short-term Investments	xxx	xxx
Total	xxx	xxx

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Cash Flow Statement
For the Year ending ……

JAWAHARLAL NEHRU COLLEGE PASIGHAT

PARTICULARS		Amount N	Amount N
CASH FLOWS FROM OPERTING ACTIVITIES			
Net Profit before tax and extraordinary items		xxx	
Adjustment for:			
Depreciation		xxx	
Loss on sale of fixed assets		xxx	
Gain on sale of fixed assets		(xxx)	
Loss on sale of foreign exchange		xxx	
Interest received		(xxx)	
Dividend received		(xxx)	

Operating Profit before working capital changes		xxx	
Add: Decrease in current assets	xxx		
Increase in current liabilities	xxx		
	---	xxx	

Less: Increase in current assets	xxx	xxx	
Decrease in current liabilities	xxx		
	---	(xxx)	

Cash generated from operating activities		xxx	

Income tax paid	**(xxx)**	
Cash flow before extraordinary items	xxx	
± Extraordinary items	xxx	

Net Cash from Operating Activities		xxx
Cash Flows from Investing Activities		
Receipt from sale of fixed assets	xxx	
Purchase of fixed assets	(xxx)	
Interest received	xxx	
Dividend received	xxx	
Sale of Investments	xxx	
Purchase of Investments	(xxx)	

Net Cash from Investing Activities		xxx
Cash Flows from Financing Activities		
Proceeds from issuance of share capital	xxx	
Proceeds from long-term borrowings	xxx	
Repayment of borrowings	(xxx)	
Interest paid	(xxx)	
Dividend paid	(xxx)	

Net Cash from Financing Activities		xxx

Net Increase/Decrease in Cash and Cash Equivalents		xxx

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Cash and Cash Equivalents at the beginning of the period		**xxx** **--------**
Cash and Cash Equivalents at the end of the period		xxx

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Problem: From the following Balance Sheets, prepare a cash flow statement as per AS-3 (Revised):

Balance Sheets

Liabilities	31.3.11	31.3.12	Assets	31.3.11	31.3.12
Share Capital	3,60,000	4,00,000	Machinery (at cost)	3,00,000	5,00,000
Reserves & Surplus	80,000	1,00,000	Less: Depreciation	80,000	1,50,000
Bank Loan	1,00,000	75,000		--------	--------
Creditors	2,10,000	2,00,000		2,20,000	3,50,000
Bills Payable	-----	5,000	Goodwill	80,000	70,000
Proposed Dividend	45,000	60,000	Investments	90,000	1,10,000
Income Tax Payable	25,000	30,000	Stock	2,00,000	2,25,000
			Debtors	2,00,000	1,90,000
			Bank	1,30,000	25,000
	9,20,000	9,70,000		9,20,000	9,70,000

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Additional information :

a. During the year a part of the machinery costing N 50,000 was sold for N 25,000.

B. Depreciation provided during the year N 1,00,000.

D. Interim dividend paid during year N 25,000.

Solution:

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Computation of Profit before Taxation and extraordinary items

Increase in Reserves and Surplus	20,000
Add: Tax provision	30,000
Add: Proposed dividend	60,000
Add: Interim dividend	25,000
Net Profit before taxation & extraordinary items	1,35,000

Cash Flow Statement
For the year ended 31st March, 2012

JAWAHARLAL NEHRU COLLEGE PASIGHAT

PARTICULARS		Amount N	Amount N
I. Cash Flows from Operating Activities			
Net Profit before tax and extraordinary items		1,35,000	
Adjustment for:			
Depreciation		1,00,000	
Goodwill written off		10,000	
Gain on sale of Machine		(5,000)	

Operating Profit before Working Capital changes		2,40,000	
Add: Decrease in current assets			
Debtors	10,000		
Add: Increase in current liabilities			
Bills Payable	5,000		

		15,000	

		2,55,000	

LESS: Increase in current assets:			
Stock	25,000		
Add: Decrease in current liabilities:			
Creditors	10,000		

		(35,000)	

Cash generated from Operating Activities		2,20,000	
Payment of tax		25,000	

Net Cash from Operating Activities			1,95,000
II. Cash Flows form Investing Activities:			
Purchase of Fixed Assets		(2,50,000)	
Sale of Machinery		25,000	
Investments		(20,000)	

Net Cash Used in Investing Activities			(2,45,000)

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III. Cash Flows from Financing Activities:		
Issue of Share Capital	40,000	
Repayment of Bank Loan	(25,000)	
Proposed Dividend paid	(45,000)	
Interim Dividend paid	(25,000)	

Net Cash Used in Financing Activities		(55,000)

Net Decrease in Cash and Cash Equivalents		(1,05,000)
Cash and Cash Equivalents in the beginning of the period		1,30,000

Cash and Cash Equivalents at the end of the period		25,000
		=======

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Working Notes:

Fixed Asset Account

To Balance b/d	3,00,000	By Machinery Sold A/c	50,000
To Bank A/c (Purchases)	2,50,000	By Balance c/d	5,00,000
	5,50,000		5,50,000

Machinery Sold Account

To Fixed A/c	50,000	By Depreciation A/c	30,000
To P & L A/c (Profit)	5,000	By Bank A/c (Sale)	25,000
	55,000		55,000

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Accumulated Depreciation Account

To Machinery Sold A/c (Balancing Fig.)	30,000	By Balance b/d	80,000
To Balance c/d	1,50,000	By P & L A/c (Provision)	1,00,000
	1,80,000		1,80,000

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Problem: 2010

From the following Balance Sheets of M/s. Goodluck Company, prepare Cash Flow Statement for the year ended 31st March, 2009 As per AS-3 (Revised):

Particulars	1.4.2008 N	31.3.2009 N	Assets	1.4.2008 N	31.3.2009 N
Creditors	40,000	44,000	Cash	10,000	7,000
Loan from X	25,000	----	Debtors	30,000	50,000
Loan from Bank	40,000	50,000	Stock	40,000	25,000
Capital	1,25,000	1,53,000	Machinery	80,000	55,000
			Land	35,000	50,000
			Buildings	35,000	60,000
	2,30,000	2,47,000		2,30,000	2,47,000

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During the year a machine costing N10,000 with accumulation depreciation N30,000 was sold N5,000.

Solution:

Cash Flow Statement

For the year ended 31st March, 2009

JAWAHARLAL NEHRU COLLEGE PASIGHAT

PARTICULARS		AMOUNT N	AMOUNT N
A. Cash Flows from Operating Activities			
Net Profit before Taxation and Extraordinary items		28,000	
Add: Loss on sale of machine		2,000	
Add: Depreciation		18,000	

Operating Profit before Working Capital changes		48,000	
Add: Increase in Creditors	4,000		
Add: Decrease in Stock	15,000		
	--------	19,000	

		67,000	
Less: Increase in Debtors		(20,000)	

Net Cash from Operating Activities		**47,000**
Cash Flows from Investing Activities		
Sale of Machinery	**5,000**	
Purchase of Land	**(15,000)**	
Purchase of Buildings	**(25,000)**	

Net Cash used in Investing Activities		**(35,000)**
Cash Flows from Financing Activities		
Loan from Bank	**10,000**	
Repayment of Loan from X	**(25,000)**	

Net Cash used in Financing Activities		**(15,000)**

Net Decrease in Cash and Cash Equivalents		**(3,000)**
Cash and Cash Equivalents at the beginning of the period		**10,000**

Cash and Cash Equivalents at the end of the Period		7,000

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Working Note:

Machinery Account

Dr. Cr.

Particulars	Amount	Particulars	Amount
To Balance b/d	80,000	By Bank A/c	5,000
		By Loss on Sale of Machinery	2,000
		By Depreciation A/c (Balancing figure)	18,000
		By Balance c/d	55,000
	80,000		80,000

JAWAHARLAL NEHRU COLLEGE PASIGHAT

WELCOME TO THE COST ACCOUNTING CLASS

By:

Dr. Deba Prasad Panda

JAWAHARLAL NEHRU COLLEGE PASIGHAT

UNIT–II

ELEMENTS OF COST AND COSTING TECHNIQUES

In this chapter we will cover:-

- Classification of Cost.
- Controllable Costs.
- Concept of Cost.
- Analysis of Cost.
- Elements of Cost.
- Preparation of Cost Sheet.

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Cost

I.C.M.A. London : "Cost means the amount of expenditure (actual or notional) incurred on, or attributable to, a given thing."

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- For example:
- X purchased a chair for Rs.500.
- Y manufactured a chair by paying Rs.150 for timber, Rs.50 for rent, Rs. 150 for color and other articles, Rs.150 to carpenter.

- From the above two examples it is clear that cost dose not mean the same thing under all circumstances.
- In other words cost is a flexible concept which can't be exactly defined. It depends on:-

a) The nature of business and industry, and

b) The context in which it is used.

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Classification of Cost

- Classification is the process of ***grouping costs*** according to their ***common features***.
- There are various bases of classifying costs. Some important classifications are discussed below.

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Basis of Classification of Cost

1. By Nature or Element
2. By Functions
3. By Relation to Cost Center
4. By Variability/ Behaviour
5. By controllability
6. By Normality
7. By Inventory
8. By Time
9. For Managerial Decision Making

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1.By Nature or Element

1. Materials Cost (Direct + Indirect)
2. Labour costs (Direct + Indirect)
3. Expenses (Direct + Indirect)

- Observations:

- Direct material +Direct Labour + Direct Expenses= **Prime Cost**
- Indirect material +Indirect Labour + Indirect Expenses= **Overhead**

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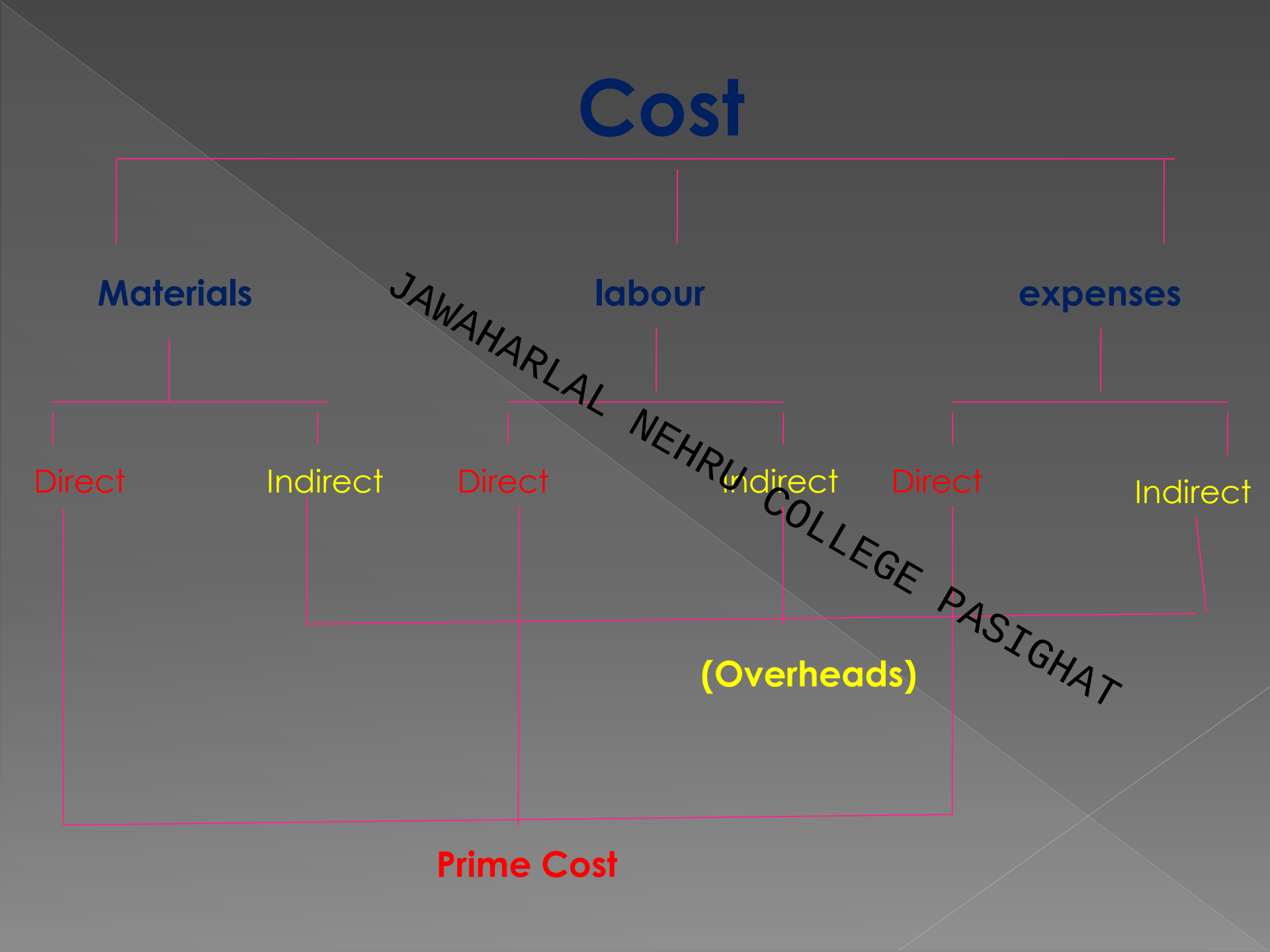

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Material Cost

- The term 'Materials refer to all commodities supplied to an undertaking.
- For costing purposes materials may be classified into two broad categories i.e. Direct materials and Indirect materials.

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(a) Direct Materials

- **Direct materials** are those materials which can be conveniently identified with and can be directly allocated to a particular product, job or process.
- One of the nature of direct material is that it varies directly with the volume of output.
- Example:

a) **Basic raw materials**: Timber in furniture, Cloth in garments, Gold or silver in jewelry etc.

b) **Primary Packing materials: Bottles** for water, wine, Can or tin for drinks, milk, ghee, bag for cement etc.

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(b) Indirect Materials

- **Indirect materials** are those materials which can not be conveniently identified with and can not be directly allocated to a particular product, job or process.
- it may or may not vary directly with the volume of output.
- Example:

a) Stores used for maintaining machines such as Lubricant, oil, grease, cotton etc.
b) Materials of small value etc.

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Direct Labour

- **Direct Labour** is that which can be readily identified with a specific product, job, contract or process.
- it varies directly with the volume of output.
- Example:

a) Weaver in weaving unit, all factory workers, carpenter in furniture unit, baker in baking unit etc.

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(b) Indirect Labour

- **Indirect Labour** is that labour which can not be readily identified with a specific job, contract or work order.
- it may or may not vary directly with the volume of output.
- Example:

a) Labour employed in personnel department, pay roll, engineering, time keeping department etc.

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Direct Expenses

- All direct costs other than direct material and direct labour costs are termed as **direct expenses.**
- It can be directly allocated to a particular product, job or process.
- It varies directly with the volume of output.
- Example: Excise duty and Royalty based on output, Hiring charges of machine tools etc. Cost of special designs etc.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Indirect Expenses

- All indirect costs other than indirect material and indirect labour costs are termed as **indirect expenses.**
- It can not be directly allocated to a particular product, job or process.
- It may or may not vary directly with the volume of output.
- Example: Rent, rates and taxes, repair, insurance, depreciation, etc.

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Overheads or on cost or indirect costs

Overheads* = *Indirect Material* + *Indirect Labour* + *Indirect Expenses

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(i) Production/Manufacturing/ Factory overheads

- Aggregate of indirect material cost, indirect labour cost and indirect expenses incurred by **production department**.
- Example: cost of consumables, salary of supervisor, rent rates taxes of factory building etc.

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(ii) Administrative overheads

- *Aggregate of indirect material cost, indirect labour cost and indirect expenses incurred by administrative department.*
- *Example: cost of printing, postage, of administrative department, salary of managing director, rent, rates taxes of office building etc.*

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(iii)Selling Overheads

- *Aggregate of indirect material cost, indirect labour cost and indirect expenses incurred by Sales department.*
- *Example: cost of printing, postage, of sales department, salary of sales director, rent, rates taxes of sales department/show room, advertising etc.*

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(iv) Distribution Overheads

- ***Aggregate of indirect material cost, indirect labour cost and indirect expenses incurred by Distribution department.***
- ***Example: cost of printing, postage, of distribution department, salary of staff of distribution dept., rent, rates taxes of distribution department, Freight and carriage outward etc.***

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(ii) Classification of Costs by Functions

1. *Production Cost*
2. *Administrative Cost*
3. *Selling Cost*
4. *Distribution Cost*
5. *Research Cost*
6. *Development Cost*
7. *Pre-production Cost*

JAWAHARLAL NEHRU COLLEGE PASIGHAT

1.Production Cost

Production cost= Aggregate of Direct material cost, direct labour cost, direct expenses of factory and production/factory overheads.

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2.Administrative cost

Administrativecost= Aggregate of Direct materialcost, direct labour cost, direct expenses of administrative departments and administrative overheads.

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3.Selling Cost

- ***Selling cost= Aggregate of Direct material cost, direct labour cost, direct expenses of selling department and selling overheads.***

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Distribution Cost

- Aggregate of material cost, labour cost and expenses incurred by distribution department.

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Research Cost

- **The cost of research for new product, process development or innovation of new methods**

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Development Cost

- The cost for new product, process development or innovation of new methods and its implementation.

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Pre-Production Cost

- Pilot project cost before commercialisation of a product

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3.Classification of cost s by Relation to Cost Centers

- **Direct cost of the Cost Center**
- **Indirect cost of the Cost Center**

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4.Classification of Costs by Variability/Behaviour

- **Fixed Costs**
- **Variable Costs**
- **Semi variable Cost/Semi fixed Costs**

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Fixed Cost

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- Fixed costs are those costs which do not vary with the change in the volume of output.
- Fixed cost per unit decreases as the production increases and vice versa.
- Examples of Fixed Cost: Rent, Insurance, salary of manager etc.

Example

OUTPUT(UNITS)	TOTAL FIXED COST (Rs.)	Fixed cost per unit(AFC)
0	1000	1000
1	1000	1000
10	1000	100
100	1000	10
1000	1000	1

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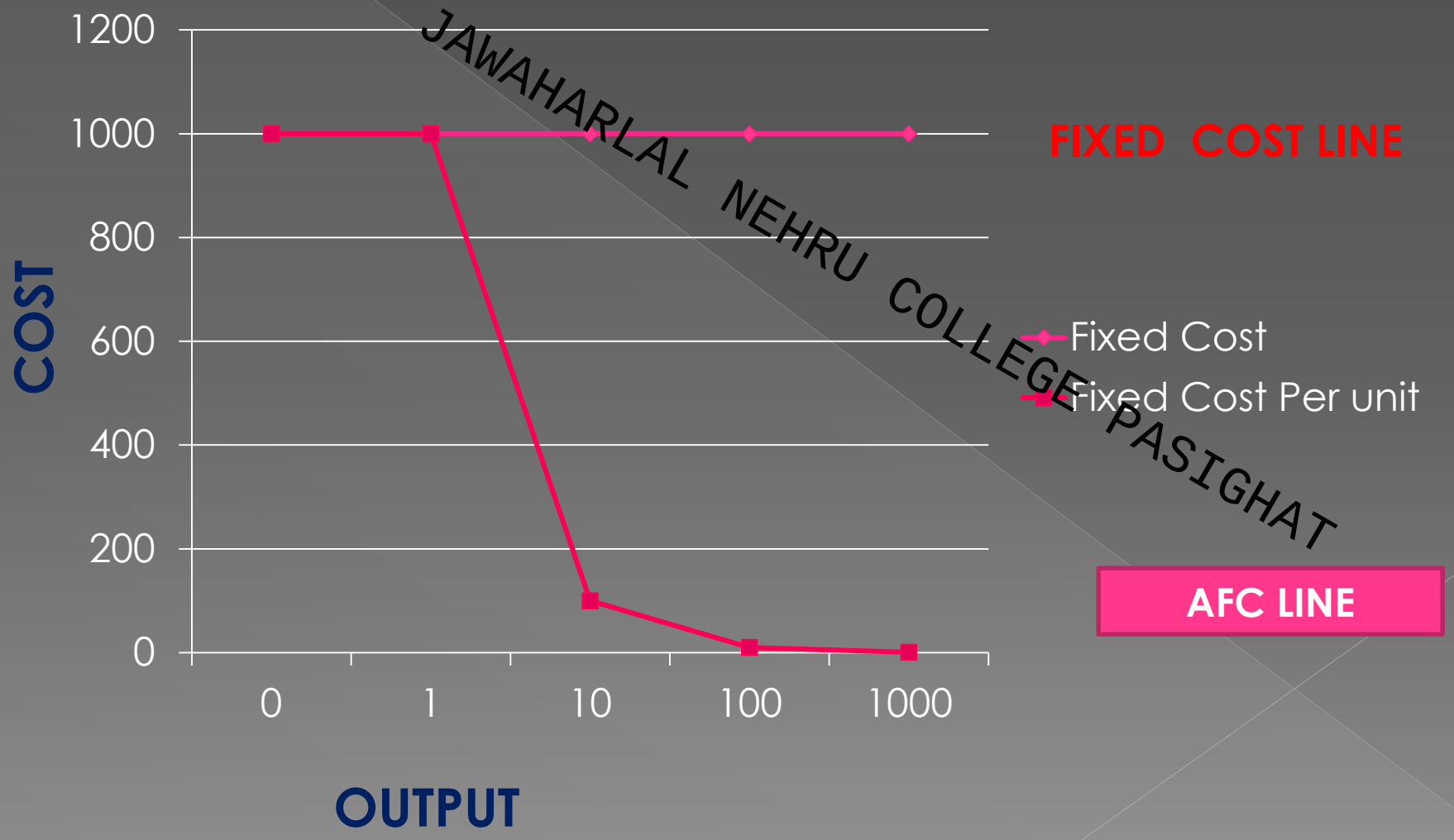
FIXED COST LINE



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Variable Cost

- Variable cost are those costs which vary in direct proportion to the volume of production.
- Variable cost per unit remains constant
- For example: Direct material cost, direct labour cost, direct expenses etc.

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Example

OUTPUT(UNITS)	Variable cost per unit	TOTAL Variable cost
0	0	0
1	10	10
10	10	100
100	10	1000
1000	10	10000

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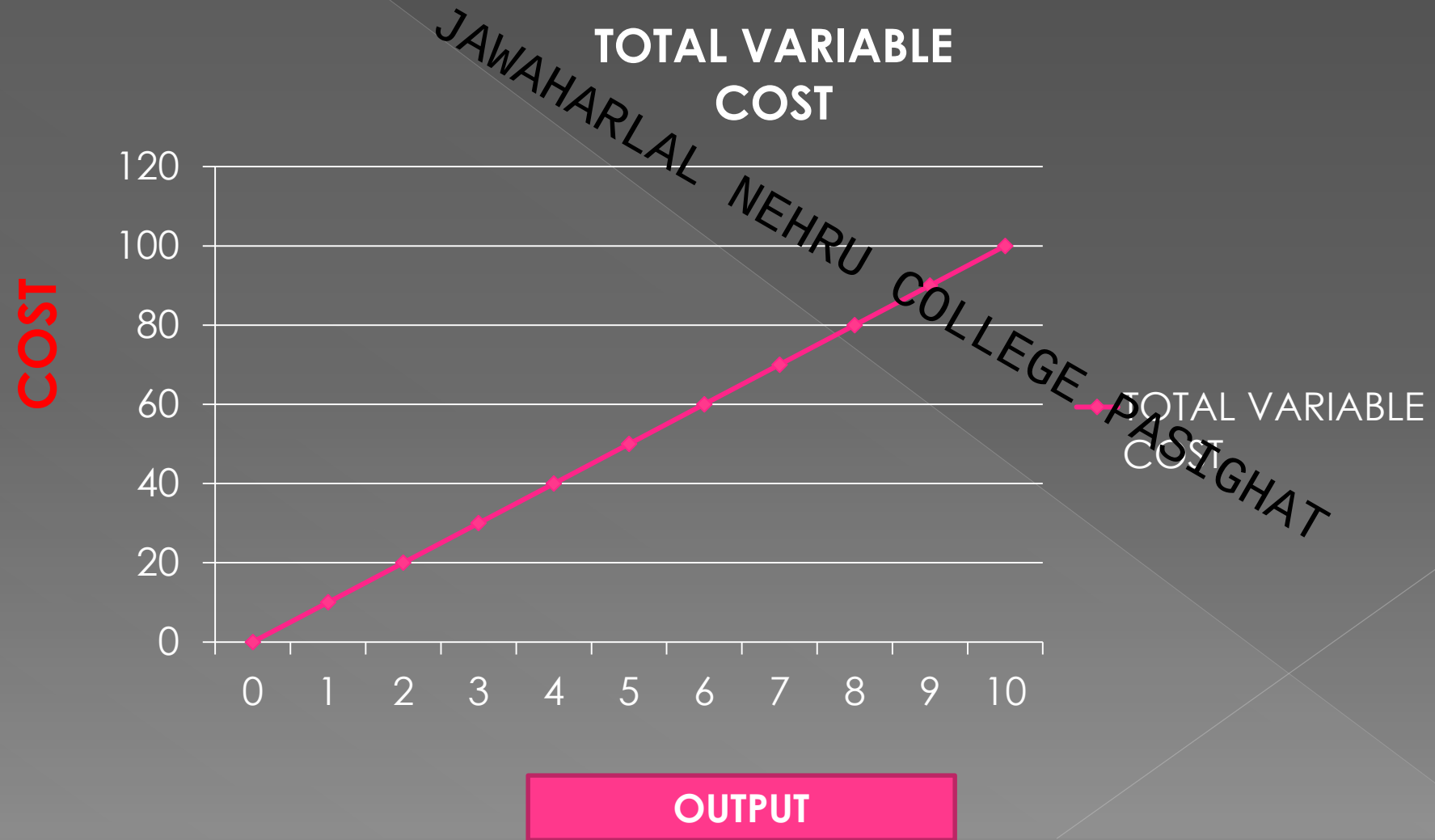
TOTAL VARIABLE COST
JAWAHARLAL NEHRU COLLEGE PASIGHAT
COST
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10
TOTAL VARIABLE COST
OUTPUT

Semi Variable cost/ Semi Fixed Cost

- These Costs are partly fixed and partly variable.
- Example: Telephone, Electricity, depreciation etc

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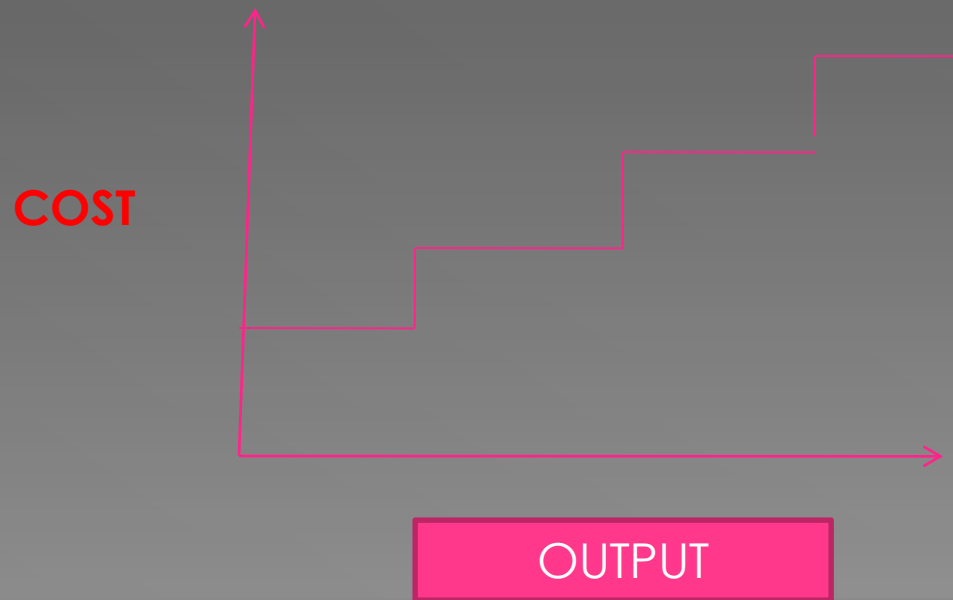

5.Classification of cost by controllability

- **Controllable cost**

Example: all direct costs

- **Uncontrollable Cost**

Example: Managerial remuneration, all fixed costs

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6.Classification of costs by Normality:

- **Normal cost**: It is the cost which is normally incurred at a given level of output. (Cost of production)
- For example: cost of material or labour as per standard
- **Abnormal Cost**: These costs are incurred in and above the normal cost due to abnormal situation and these costs charged to costing profit and loss account
- For example: cost of abnormal material losses or abnormal idle time

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7.Classification of cost by Inventory

- Product costs or inventoriable costs: costs which are charged to products or services (Ex- variable costs)
- Period Costs: these costs are not charged to products but written off from revenue of the period. (all fixed costs)

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8.Classification of costs by time

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- **Historical costs:** Actual costs incurred in a period. Ex: Cost of material consumed or labour cost in the financial year.
- **Pre-determined costs**: future costs ascertained in advance.

For example standard costs or budgeted costs.

9.Special costs used for managerial decision making

a) Relevant costs: future costs, ex-dismantal cost of machinery
b) Irrelevant costs : ex-written down value of old machine is irrelevant cost
c) Sunk cost: Historical or past costs ex-written down value of old machine is sunk cost.
d) Shut-down costs: costs at the time of shut down of factory (all fixed costs)

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e) **Out of pocket costs**: costs involve outlay of cash.

f) **Opportunity cost**: Cost of next best alternative sacrificed. Rent of old building proposed to be used as new factory.

g)**Differential Costs**: Increase or decrease in total Costs due to production of less or more output.

h) **Marginal Cost**:

i)**Replacement cost**

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ITEMS EXCLUDED FROM COST ACCOUNTS

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- **Incomes:** Profit on sale of fixed assets, profit on sale of investments, interest income,dividend income, rental income etc.
- **Expenditures:** Loss on sale of fixed assets and investments, interest on mortgages and loans, preliminary expenses written off, goodwill written off.
- **Appropriations:** Income tax, dividend distribution tax, transfer to general reserves and special reserves.

COMPONENTS OF TOTAL COST

- **Prime Cost**= Direct Material+ direct Labour+ Direct Expences.
- **Works cost/Factory Cost**= Prime cost + works/factory/production overhead +(opening work in progress- closing WIP)
- **Cost of production or cost of goods produced**= Works cost + Administrative overheads
- **Cost of goods sold**= cost of goods produced +opening stock of finished goods-closing stock of finished goods.
- **Cost of sales**= cost of goods sold+selling & Distribution overhead.

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COST SHEET:

- C.I.M .A. London: “A cost sheet is a document which provides for the assembly of the detailed cost of a cost center or cost unit.
- a cost sheet is a statement showing various components of total costs in a classified manner. It shows prime cost, works (or factory) cost, cost of production, cost of goods sold and total cost. It is also called as a 'STATEMENTOF COST."

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Purpose of cost sheet

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(i) It shows total cost and unit cost of output.

(ii) It reflects the break up figures of the total cost, i.e. different elements of cost.

(iii) It facilitates comparison over the years

(iv) It helps in the estimation of costs for preparation of tenders and quotations.

(v) It helps the management in fixing the selling price more accurately.

(vi) It acts as a basis for cost control as detailed costs in a classified manner are available.

Proforma of a cost sheet

Output: Units:

Particulars	TOTAL COST(Rs.)	Cost per Unit(Rs.)
Direct Material	--------	------
Direct Labour	-------	-------
Direct Expenses	--------	-------
PRIME COST	--------	-------
Add factory or works overheads	-------	-------
WORKS COST	-------	-------
Add Administrative overheads	--------	-------
COST OF PRODUCTION	--------	-------
Add selling and distribution overheads	--------	-------
TOTAL COST OR COST OF SALES	--------	-------
Add Profit (or minus loss)	--------	-------
SALES	--------	-------

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Some adjustments in cost sheet

1. **Raw materials consumed:**

Opening Stock of Materials

***Add* : Purchases**

***Add* : Expenses on Purchases**

***Less*: Purchase Returns**

***Less*: Closing Stock of Materials**

***Less*: Net value of Normal Scrap**

Value of raw materials consumed

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2.Work in progress

(i) If work-in-progress is valued at **prime cost basis,** then it is adjusted before arriving at the prime cost. Thus:-

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Direct materials consumed	xxxx
Add Direct wages	xxxxx
Add Chargeable expenses	xxxxx
Add: Opening work-in-progress	xxxxx
Less: Closing work-in-progress	xxxxx
PRIME COST	xxxxxx

(ii) If the work-in-progress is valued at works cost basis, then the work-in-progress amount is adjusted before arriving at the works cost. Thus,

PRIME COST	xxx
Add : Factory overheads :	xxx
Add : Cost of opening W.I. P.	xxx
Less: Cost of closing W. I. P.	xxx
FACTORY/ WORKS COST "	xxx

- ***Note:*** If the question does not mention the basis of valuation of work-in-progress, then it should be valued at works cost basis.

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3. Stock of Finished Goods (Opening and closing)

- The adjustment for opening stock and closing stock of finished goods are made in the following manner:-

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COST SHEET for the period…

COST OF PRODUCTION (of goods produced)

Add: Opening stock of finished goods

COST OF PRODUCTION OF GOODS AVAILABLE FOR SALE

Less: Cost of closing stock of finished goods

COST OF PRODUCTION OF GOODS SOLD

4.Treatment of Scrap

- When the factory has several productions, the realisable value of the scrap should be deducted from the factory overheads or factory cost in the cost sheet.

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To be noted.....

- **Valuation of closing stock:**

=Cost of goods produced XClosing stock (units)

Number of units produced

- **Some costs may be given as a percentage of other, calculate accordingly.**

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Q.Prepare a cost sheet from the following data.(RGU-2012)

Opening Stock:	**Raw materials**	**Rs. 50,000**
	Work in progress	**Rs.30,000**
	Finished goods	**Rs.32,000**
Closing Stock:	**Raw materials**	**Rs. 24,000**
	Work in progress	**Rs.18,000**
	Finished goods	**Rs.30,000**
Direct Wages:		**Rs.50,000**
Direct Expenses:		**15%of direct wages**
Purchase of raw materials:		**Rs.1,50,000**
Factory Expenses:		**18% of Prime cost**
Administrative & Selling Expenses:		**22%of works cost**
Sales:		**Rs.7,20,000**

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Particulars	Total Cost(Rs.)	Per Unit Cost (Rs.)
Raw Materials Consumed(Working Note1.)	1,76,000	
Direct wages	50,000	
Direct Expenses (Working Note 2)	7,500	
PRIME COST	2,33,500	
Add factory or works overheads(Working 3)	42,030	
Works cost(before adjustment of WIP)	2,75,530	
Add opening Work in Progress	30,000	
	3,05,530	
Less Closing work in Progress	18,000	
WORKS COST	2,87,530	
Add Administrative & Selling overheads (working 4)	63,257	
COST OF PRODUCTION	3,50,787	
Add opening stock of finished goods	32,000	
	3,82,787	
Less Closing stock of finished goods	30,000	
TOTAL COST OR COST OF SALES	3,52,787	
PROFIT (Balancing Figure) (Rs.7,20,000 –Rs.3,52,787)	3,67,213	
SALES	7,20,000	

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Workings:

1. Raw materials consumed:

Opening Stock of Raw materials	Rs. 50,000
Add Purchase of raw materials	Rs.1,50,000
Raw materials available for use	Rs.2,00,000
Less Closing stock of raw materials	Rs. 24,000
Value of raw materials consumed	Rs.1,76,000

2. Direct Expenses:

15% of Direct wages(Rs.50,000)

$= \frac{15}{100} \times 50,000 = Rs.7,500$

JAWAHARLAL NEHRU COLLEGE PASIGHAT

3. Factory Expenses:

18% of Prime Cost(Rs.2,33,500)

$= \frac{18}{100} \times 2,33,500 =$ Rs.42,030

4. Administrative and Selling Expenses:

22% of Works Cost(Rs.2,87,530)

$= \frac{22}{100} \times 2,87,530 =$ Rs.63,256.60= Rs.63,257

JAWAHARLAL NEHRU COLLEGE PASIGHAT

(RGU-2011) Q .The following data relate to the manufacture of a standard product during the month of March, 2011

Raw materials	Rs.3,20,000
Direct wages	Rs.1,92,000
Machine hours worked	16,000 Hours
Machine hour rate	Rs.16 per hour
Office on cost	20% of works cost
Selling on cost	Rs.6 per unit
Units produced	8,000
Units sold	7,200@Rs.100 each

JAWAHARLAL NEHRU COLLEGE PASIGHAT

You are required to prepare a cost sheet in respect of above showing-

(i) Cost per Unit

(ii) Profit for the period

Cost sheet for the Month of March,2011

Particulars	Total Cost(Rs.)	Per Unit Cost (Rs.)
Raw Materials	3,20,000	40
Direct wages	1,92,000	24
Direct Expenses (Machine running cost)(Working Note 1)	2,56,000	32
PRIME COST	7,68,000	96
Add factory or works overheads		
Works cost	7,68,000	96
Add Office on cost (Administrative overheads)(working2)	1,53,600	19.20
COST OF PRODUCTION	9,21,600	115.20
Less closing stock of finished goods (800 units)(working 3)	92,160	115.20
Cost of goods sold (7,200 Units)	8,29,440	115.20
Add Selling on cost (Selling & dist.Overhead) @6per unit X7,200 units	43,200	6
COST OF SALES	8,72,640	121.20
LOSS (Balancing Figure)	**1,52,640**	21.20
SALES(7,200 UNITS @ Rs 100 each)	7,20,000	100

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Working Notes:

1. Cost of running of machine for the product is treated as direct expenses:

=Machine hours worked X Machine hour rate

= 16,000 Hours X Rs.16 per hour =Rs.2,56,000

2.Office on cost: 20% of works cost

= 20% of Works Cost(Rs.7,68,000)

$= \frac{20}{100} \times 7,68,000 = Rs.1,53,600$

3. Value of closing stock:

Closing stock(units) = Units produced – units sold

=8,000 – 7200 = 800 units

Value of closing stock=

$\frac{\text{Cost of goods produced}}{\text{Number of units produced}} \times \text{Closing stock (units)}$

$= \frac{Rs.9,21,600}{8,000} \times 800 \text{ units}$

=Rs.92,160

JAWAHARLAL NEHRU COLLEGE PASIGHAT

(RGU-2010) Q .Prepare Cost Sheet from the following data:

Opening Stock:	**Raw materials**	**Rs. 10,000**
	Work in progress	**Rs. 5,000**
	Finished goods	**Rs. 8,000**
Closing Stock:	**Raw materials**	**Rs. 8,000**
	Work in progress	**Rs. 3,000**
	Finished goods	**Rs. 8,000**
Direct Wages:		**Rs.16,000**
Direct Expenses:		**10% of direct wages**
Purchase of raw materials:		**Rs.50,000**
Factory Expenses:		**10% of Prime cost**
Administrative & Selling Expenses:		**20% of works cost**
Sales:		**Rs.1,20,000**

JAWAHARLAL NEHRU COLLEGE PASIGHAT

COST SHEET FOR THE PERIOD…

Particulars	Total Cost(Rs.)	Per Unit Cost(Rs.)
Raw Materials Consumed(Working Note1.)	52,000	
Direct wages	16,000	
Direct Expenses (Working Note 2)	1,600	
PRIME COST	69,600	
Add factory or works overheads(Working 3)	6,960	
Works cost(before adjustment of WIP)	76,560	
Add opening Work in Progress	5,000	
	81,560	
Less Closing work in Progress	3,000	
WORKS COST	78,560	
Add Administrative & Selling overheads (working 4)	15,712	
COST OF PRODUCTION	94,272	
Add opening stock of finished goods	8,000	
	1,02,272	
Less Closing stock of finished goods	8,000	
TOTAL COST OR COST OF SALES	94,272	
PROFIT (Balancing Figure) (Rs.1,20,000 –Rs.94,272)	25,728	
SALES	1,20,000	

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Workings:

1. Raw materials consumed:

Opening Stock of Raw materials	Rs.	10,000
Add Purchase of raw materials	Rs.	50,000
Raw materials available for use	Rs.	60,000
Less Closing stock of raw materials	Rs.	8,000
Value of raw materials consumed	Rs.	52,000

2. Direct Expenses:

10% of Direct wages(Rs.16,000)

$= \frac{10}{100} \times 16,000 = Rs.1,600$

JAWAHARLAL NEHRU COLLEGE PASIGHAT

3. Factory Expenses:

10% of Prime Cost(Rs.69,600)

$= \frac{10}{100} \times 69,600 = Rs.6,960$

4. Administrative and Selling Expenses:

20% of Works Cost(Rs.78,560)

$= \frac{20}{100} \times 78,560 = Rs.15,712$

JAWAHARLAL NEHRU COLLEGE PASIGHAT

RGU: 2009: Q: Soda products Ltd. Serves you the following information with regard to a product Zem. Prepare Cost Sheet for the period ended on 31st March, 2009 and ascertain profit.

Consumable materials:

Opening stock-Rs.10,000

Purchases-Rs.85,000

Closing stock-Rs.4,000

Direct wages-Rs.20,000

Other Direct Expenses-Rs.10,000

Factory Overheads-100% of Direct labour

Office Overheads-10% of works cost

Selling & distribution Overheads-Rs.2 per unit

Units of finished product:

At the beginning(1000 Units) –Rs.16,000

At the End (2000) units

Produced during the year (10,000 units)

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Cost sheet for 'Zem' of soda Products Ltd. For the period ended on 31st March 2011

Particulars	Total Cost(Rs.)	Per Unit Cost (Rs.)
Raw Materials consumed (Working Note-1)	91,000	9.10
Direct wages	20,000	2.00
Direct Expenses	10,000	1.00
PRIME COST	1,21,000	12.10
Add factory or works overheads(100% of direct labour i.e. Rs.20,000	20,000	2.00
Works cost	1,41,000	14.10
Add Office & Administrative overheads (10% of works cost i.e. 10% of Rs.1,41,000	14,100	1.41
COST OF PRODUCTION	1,55,100	15.51
Add opening stock of finished goods(1000 units)	16,000	16.00
	1,71,100	
Less Closing stock of finished goods(2000 units)working-3	31,020	15.51
Cost of goods sold (9,000 Units)	1,40,080	15.564
Add Selling & Distbn. Expenses @Rs.2 per unit X 9,000 units sold (working2)	18,000	2.00
COST OF SALES	1,58,080	17.564
Profit/LOSS (Balancing Figure)		
SALES (No information available)		

JAWAHARLAL NEHRU COLLEGE PASIGHAT

- As no information of selling price is given so profit or loss can not be ascertained from this question.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Workings

1. Raw materials consumed:

Opening Stock of Raw materials	Rs. 10,000
Add Purchase of raw materials	Rs. 85,000
Raw materials available for use	Rs. 95,000
Less Closing stock of raw materials	Rs. 4,000
Value of raw materials consumed	Rs. 91,000

2. No. of Units sold:

Opening stock of finished goods-	1,000 units
Add Produced during the year-	10,000 units
Finished products available for sale-	11,000 units
Less Closing stock of finished goods-	2,000 units
Number of units sold	9,000 umits

JAWAHARLAL NEHRU COLLEGE PASIGHAT

3.Value of closing stock:

Closing stock = 2000 units

Value of closing stock=

$$\frac{\text{Cost of goods produced}}{\text{Number of units produced}} \times \text{Closing stock (units)}$$

$$= \frac{\text{Rs.1,55,100}}{10{,}000} \times 2000 \text{ units}$$

=Rs.31,020

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Not for Exam…just try

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Calculate the missing figures from the following :

	Estimated cost	Estimated profit (%)	Estimated selling price
(a)	Rs. 9,000	10% of cost	?
(b)	Rs. 9,000	10% of selling price	?
(c)	?	10% of cost	Rs. 11,000
(d)	?	10% of selling price	Rs. 5,000

Solution

Solution:

Solution

(a) **Cost price** Rs. 100 | **Profit** 10% of cost, i. e., Rs. 10 | **Selling price** Rs. 110

Rs. 9000 | 10% of cost

$\frac{110}{100} \times 9{,}000 =$ Rs. 9,900

(b) **C. P.** 90 | **Profit** 10% on S. P. | **S. P.** 100

9,000 | "

$\frac{100}{90} \times 9{,}000 =$ Rs. 10,000

(c) **S. P.** 110 | **Profit** 10% of cost | **C. P.** 100

11,000 | "

$\frac{100}{110} \times 11{,}000 =$ Rs. 10,000

( ) **S. P.** 100 | **Profit** 10% of S. P. | **C. P.** 90

5,000 | "

$\frac{90}{100} \times 5{,}000 =$ Rs. 4,500

JAWAHARLAL NEHRU COLLEGE PASIGHAT

BCM-403
BANKING & INSURANCE

JAWAHARLAL NEHRU C...

BY

NANG RASAMI THAMOUNG
ASST. PROFESSOR IN COMMERCE

UNIT-I
BANKING

JAWAHARLAL NEHRU COLLEGE PASIGHAT

MEANING:

- **Finance is the life blood of trade, commerce and industry. Now-a-days, banking sector acts as the backbone of modern business. Development of any country mainly depends upon the banking system.**
- **What is a Bank?**
- **A bank is a financial institution which deals with deposits and advances and other related services. It receives money from those who want to save in the form of deposits and it lends money to those who need it.**

JAWAHARLAL NEHRU COLLEGE OF ASSISTANTS

DEFINITION:

- **Oxford Dictionary defines a bank as "an establishment for custody of money, which it pays out on customer's order.“**
- **Chamber’s Twentieth century Dictionary defines a bank as, “an institution for the keeping, lending and exchanging etc. of money”.**
- **" Prof. Kent defines a bank as, “an organization whose principal operations are concerned with the accumulation of the temporarily idle money of the general public for the purpose of advancing to others for expenditure.”**

JAWAHARLAL NEHRU COLLEGE OF ASIGAN

DEFINITION:

Banking Regulation Act of India, 1949 defines Banking as "accepting, for the purpose of lending or of investment of deposits of money from the public, repayable on demand or otherwise or withdrawable by cheque, draft order or otherwise." The Reserve Bank of India Act, 1934 and the Banking Regulation Act, 1949, govern the banking operations in India.

JAWAHARLAL NEHRU COLLEGE, JORHAT

FEATURES/CHARECTERISTICS:

1. Dealing in Money:

Bank is a financial institution which deals with other people's money i.e. money given by depositors.

2. Individual / Firm / Company

A bank may be a person, firm or a company. A banking company means a company which is in the business of banking.

3. Acceptance of Deposit

A bank accepts money from the people in the form of deposits which are usually repayable on demand or after the expiry of a fixed period. It gives safety to the deposits of its customers. It also acts as a custodian of funds of its customers.

JAWAHARLAL NEHRU COLLEGE PALGHAR

FEATURES/CHARECTERISTICS:

- **4. Giving Advances**

A bank lends out money in the form of loans to those who require it for different purposes.

5. Payment and Withdrawal

A bank provides easy payment and withdrawal facility to its customers in the form of cheques and drafts, It also brings bank money in circulation. This money is in the form of cheques, drafts, etc.

6. Agency and Utility Services

A bank provides various banking facilities to its customers. They include general utility services and agency services.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

FEATURES/CHARECTERISTICS:

7. Profit and Service Orientation

A bank is a profit seeking institution having service oriented approach.

8. Ever increasing Functions

Banking is an evolutionary concept. There is continuous expansion and diversification as regards the functions, services and activities of a bank.

9. Connecting Link

A bank acts as a connecting link between borrowers and lenders of money. Banks collect money from those who have surplus money and give the same to those who are in need of money.

10. Banking Business

A bank's main activity should be to do business of banking which should not be subsidiary to any other business.

11. Name Identity

A bank should always add the word "bank" to its name to enable people to know that it is a bank and that it is dealing in money.

JAWAHARLAL NEHRU COLLEGE PALGHAT

SIGNIFICANCE OF BANKS:

1. Mobilising Saving for Capital Formation.
2. Financing Industry.
3. Financing Trade.
4. Financing Agriculture.
5. Financing Consumer Activities.
6. Financing Employment Generating Activities.(Study loans)
7. Help in Monetary Policy.

JAWAHARLAL NEHRU COLLEGE PALAKKAD

TYPES OF BANKS::

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1.Public Sector Banks:

PUBLIC SECTOR BANKS

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- Public sector banks are banks in which the government has a major holding.
- At least 51% ownership is vested with the government.
- The shares of these banks are listed on stock exchanges.

2.Private Sector Banks:

PRIVATE BANKS

JAWAHARLAL NEHRU COLLEGE PASIGHAT

- All those banks in which majority of stake are held by private individuals
- The banks, which came in operation after 1991, with the introduction of economic reforms and financial sector reforms are called "new private-sector banks“
- New banks are strategic in their thinking and operations.

ING Vysya BANK

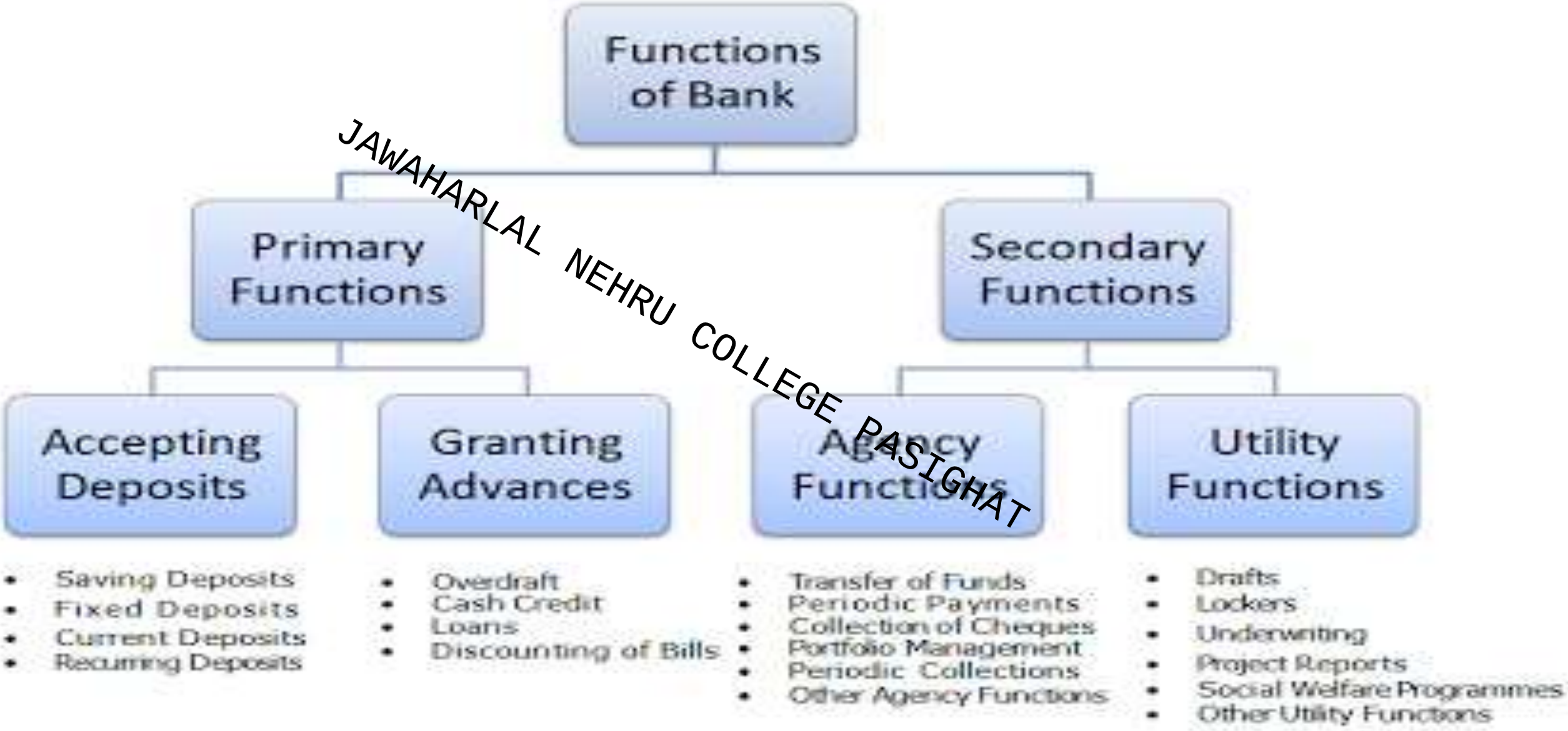
ICICI Bank

DhanlaxmiBank

FEDERAL BANK
YOUR PERFECT BANKING PARTNER

KVB Karur Vysya Bank
Smart way to bank

FUNCTIONS OF BANKS/COMMERCIAL BANKS:



JAWAHARLAL NEHRU COLLEGE PASIGHAT

WORKING CAPITAL ANALYSIS

Unit-II

MR.WANGDA GYATSO GYANA
ASST.PROF. IN COMMERCE

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Meaning:

Capital required for a business can be classified under two categories:

i) **Fixed Capital-Long term funds**

ii) **Working Capital-Short Term Funds**

Definition: Shubin: "Working capital is the amount of funds necessary to cover the cost of *operating the enterprise*."

Genestenberg: " Circulating capital means current assets of a company that are changed in the ordinary course of business from one form to another, as for example, from cash to inventories, inventories to receivables, receivables into cash."

JAWAHARLAL NEHRU COLLEGE PASTHAT

CONCEPTS OF WORKING CAPITAL:

There are two concepts of working capital:

i) **Gross working Capital**

ii) **Net working Capital**

Gross working Capital: It is the capital that is invested in the current assets of the company. Current assets are those assets which in the ordinary course of business can be converted into cash within a short period of normally one accounting year.

Examples of Current Assets:

JAWAHARLAL NEHRU COLLEGE, JORHAT

EXAMPLES OF CURRENT ASSETS:

1. Cash in hand and bank balances
2. Bills receivables
3. Sundry Debtors(less provision for bad debts)
4. Short term loans and advances
5. Inventories of stocks as:
   a) Raw materials
   b) work in Progress
   c) Stores and spares
   d) Finished goods
6. Temporary investments of surplus funds
7. Prepaid Expenses
8. Accrued Incomes

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NET WORKING CAPITAL:

In a narrow sense the term net working capital refers to the excess of current assets over current liabilities:

Net working Capital = Current assets – Current Liabilities

Examples of Current liabilities:

1. **Bills Payable**
2. **Sundry creditors or Accounts payable**
3. **Accrued or outstanding expenses**
4. **Short term loans, advances and deposits**
5. **Dividends payable**
6. **Bank overdraft**
7. **Provision for taxation if it does not amount to appropriation of profits.**

JAWAHARLAL NEHRU COLLEGE PASIGHAT

NEED OR OBJECTS OF WORKING CAPITAL:

1. For the purchase of raw materials, components and spares.
2. To pay wages and salaries.
3. To incur day to day expenses and overhead costs such as fuel power and office expenses etc.
4. To meet the selling costs such as packing, advertising etc.
5. To provide credit facilities to customers.
6. To maintain the inventories of raw material, work in progress, stores and spares, and finished stock.

JAWAHARLAL NEHRU COLLEGE OF ASIGAT

CLASSIFICATION OR KINDS OF WORKING CAPITAL:

Working capital may be classified in two ways:

1. **On the basis of concept-??**
2. **On the basis of time**

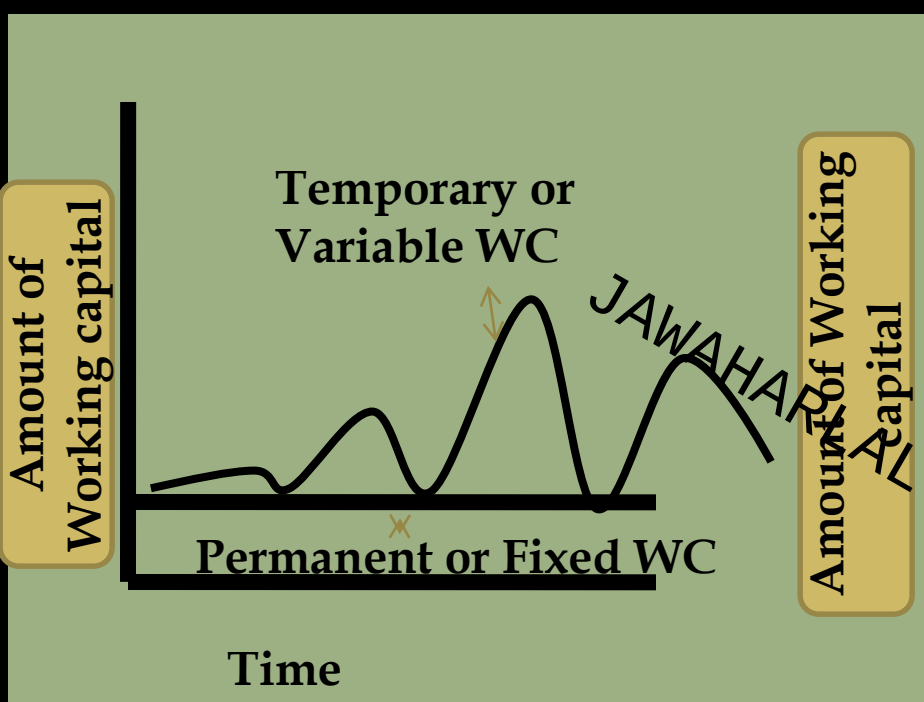
On the basis of time, working capital may be classified as:

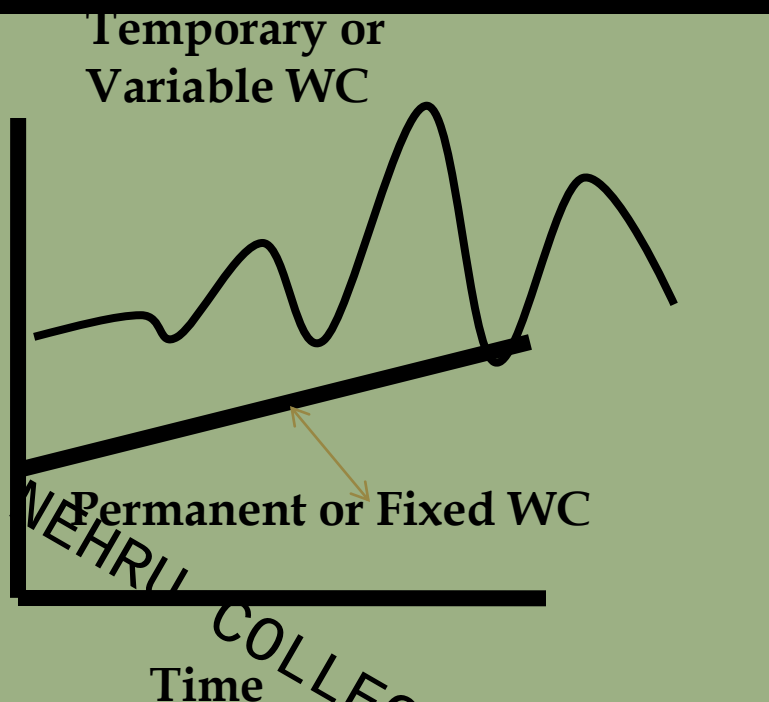
a) **Permanent or fixed working capital (Regular (Minimum level of current assets, Circulation of current assets from cash to inventories) and Reserve-For future contingencies)**

b) **Temporary or variable working capital: it is the amount of working capital which is required to meet the seasonal demands and some special exigencies.**

JAWAHARLAL NEHRU COLLEGE, JAGIGHAT

CLASSIFICATION OR KINDS OF WORKING CAPITAL:





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FACTORS DETERMINING WORKING CAPITAL REQUIREMENT

The working capital requirement of a concern depend upon a large number of factors i.e.:

1.Nature or character of business(Utility,trading, manufacturing)

2.Size of business/Scale of Operations(Small, medium large)

3.Production Policy (high in Peak season and less in slack season-Ex-winter garment)

4.Manufacturing process/Length of production cycle

5.Seasonal variations

6.Working capital cycle

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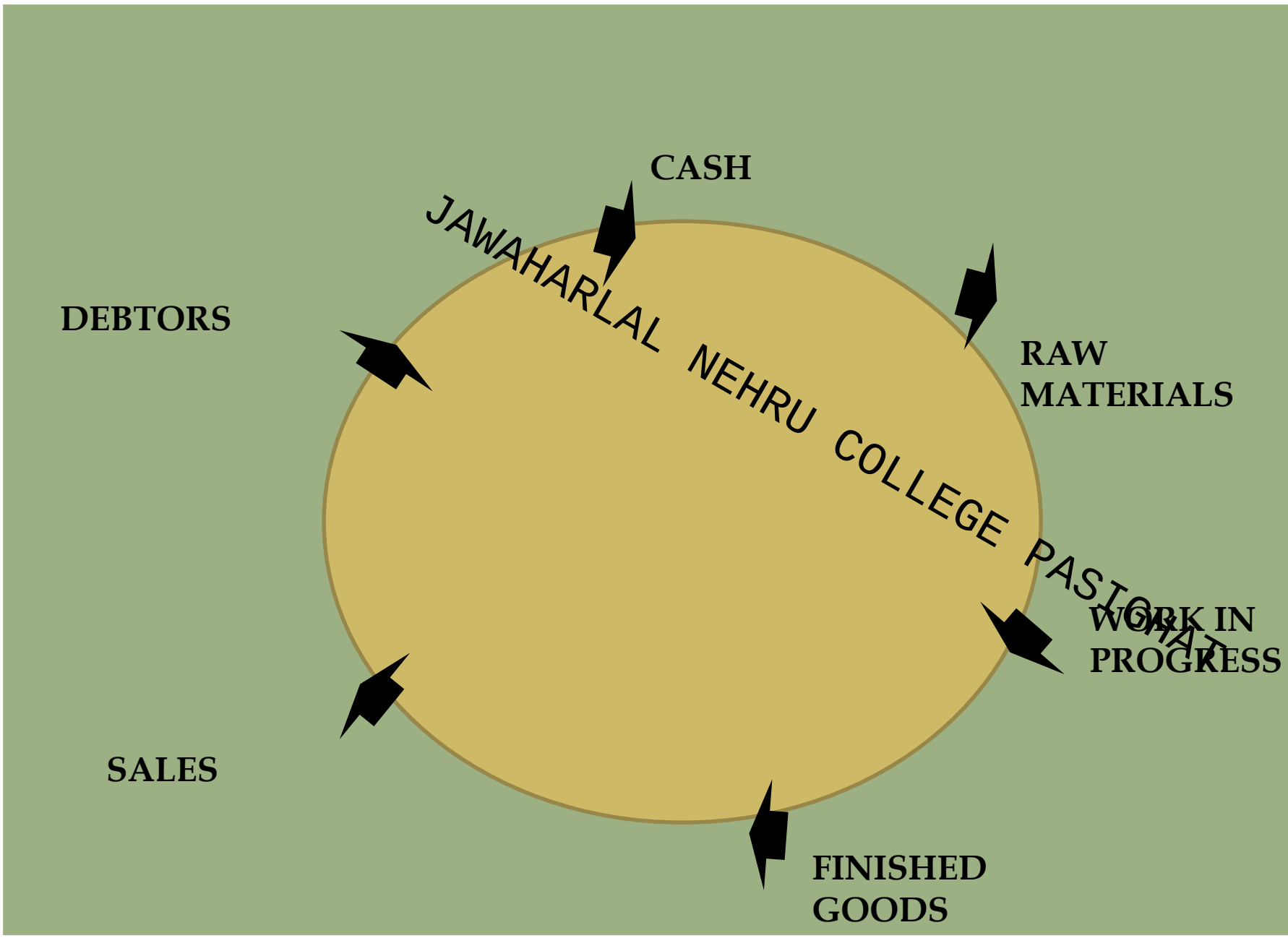
WORKING CAPITAL CYCLE



FACTORS DETERMINING WORKING CAPITAL REQUIREMENT(Continued..)

7.Credit policy(Debtors and creditors)

8.Business cycles (Boom & Depressions)

9.Rate of growth of business

10.Earning capacity and dividend policy

11.Price level changes

12.Other factors(operating efficiency, management ability, irregularities of supply, import policy, asset structure, importance of labour, banking facilities etc.)

JAWAHARLAL NEHRU COLLEGE PASIGHAT

SOURCES OF WORKING CAPITAL

As the working capital requirements of a concern can be classified as:

a) **Permanent or fixed working capital requirements**

b) **Temporary or variable working capital requirements.**

- **The fixed proportion of working capital should be generally financed from the fixed capital sources while the temporary or variable working capital requirements of a concern may be met from the short term sources of capital.**

JAWAHARLAL NEHRU COLLEGE PASTGHAT

SOURCES OF WORKING CAPITAL

Long term/Permanent or Fixed:	Short term/Temporary or variable
1.Shares	1.Commercial Banks
2.Debentures	2.Indigenous Bankers
3.Public Deposits	3.Trade Credits
4. Ploughing back of Profits	4.Instalment Credit
5.Loans from Financial Institutions	5.Advances
6.Retained Earnings	6.Account Receivable (Credit)
7.Funds raised through GDR/NRI	

JAWAHARLAL NEHRU COLLEGE PASIGHAT

PRINCIPLES OF WORKING CAPITAL MANAGEMENT

1. Principle of cost minimisation (Minimisation of cost of funding(dividend and interest costs) and holding WC)
2. Principle of risk variation. (lower the amount of Net WC, higher the risk of insolvency- Conservative Policy(Sufficient WC), moderate policy and Aggressive policy(Lowest possible WC)
3. Principle of Profit maximisation
4. Principle of credit-worthiness
5. Tradeoff between liquidity and profitability

JAWAHARLAL NEHRU COLLEGE PASIGHAT

WORKING CAPITAL MANAGEMENT

As Working capital is the excess of CA over CL, therefore management of working capital refers to the management and control of each components of current assets and current liabilities. Therefore, management of working capital entails three important dimensions:

1) Management of current assets
2) Management of current liabilities
3) Formulation of policies with regard to profitability, risk and liquidity i.e. tradeoff between profitability and liquidity

JAWAHARLAL NEHRU COLLEGE PASIGHAT

WORKING CAPITAL MANAGEMENT

JAWAHARLAL NEHRU COLLEGE PASIGHAT

FORECAST/ESTIMATE OF WORKING CAPITAL REQUIREMENTS

- **Working capital is the life-blood and controlling nerve centre of a business.**
- **No business can sustain without adequate amount of working capital. To avoid the shortage of working capital at once, an estimate of working capital requirements should be made in advance so that arrangements can be made to procure adequate working capital.**
- **But estimation of working capital requirements is not an easy task and a large number of factors have to be considered before starting this exercise.**
- **For a manufacturing organisation, the following factors have to be taken into consideration while making an estimate of working capital requirements.**

JAWAHARLAL NEHRU COLLEGE, JASIGHAT

FACTORS(FOR MANUFACTURING CONCERN)

1. The length of time, raw materials are to remain in stores before they are issued for production.
2. The length of the production cycle or work in progress (Time required for conversion of raw material into finished product)
3. The length of sales cycle during which finished goods are to be kept waiting for sales
4. The average period of credit allowed to customers
5. The amount of cash required to pay day to day expenses of the business.
6. The average amount of cash required to make advance payments, if any.
7. The average credit period expected to be allowed by suppliers.
8. Time-lag in the payment of wages and other expenses.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

FACTORS(FOR MANUFACTURING CONCERN)

- The sum total of point 1 to 6 is the current assets.
- The sum total of point 7 & 8 is the current liabilities.
- The requirements of working capital or net working capital can be determined by the formula:

WC= CA-CL

- It is to be noted that incase of purely trading concerns, points one and two would not arise but all other factors from 3 to 8 are to be taken into consideration.
- In order to provide for contingencies, some extra amount generally calculated as a fixed percentage of the working capital may be added as a margin of safety.

JAWAHARLAL NEHRU COLLEGE, PASIGHAT

Q1. Prepare an estimate of working capital requirements from the following information of a trading concern.

a) **Projected annual sales** **1,00,000 units**

b) **Selling Price** **Rs.8 per unit**

c) **% of net profit on sales** **25%**

d) **Average credit period allowed to customers: 8 weeks**

e) **Average credit period allowed by suppliers: 4 weeks**

f) **Average stock holding in terms of sales requirement: 12 weeks**

g) **Allow 10% for contingencies.**

JAWAHARLAL NEHRU COLLEGE, PASIGHAT

Q1. Solution
STATEMENT OF WORKING CAPITAL REQUIREMENTS

Current Assets:	**Rs.**
Debtors (8 weeks): 6,00,000X8 / 52 =	**92,308**
Stocks (12 weeks): 6,00,000X12 / 52 =	**1,38,462**
	2,30,770
Less Current Liabilities:	
Creditors (4 weeks): 6,00,000X4 / 52	**46,154**
Net working Capital	**1,84,616**
Add 10% for contingencies	**18,462**
Working Capital Required	**2,03,078**

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Q1. Solution
STATEMENT OF WORKING CAPITAL REQUIREMENTS

Working Notes:

1.Sales=1,00,000X8=Rs.8,00,000

Profit = 25% of Rs.8,00,000= Rs.2,00,000

Cost of Sales=8,00,000-2,00,000=Rs.6,00,000

2. As it is a trading concern cost of sales are assumed to be the purchases.

3. Profits have been ignored as funds provided by profits may or may not be used as working capital.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Q2. Find the working capital requirements

	Rs.
(i) Amount blocked up for stocks:	
Stocks of finished product	5,000
Stocks of stores, materials etc.	8,000
(ii) Average credit given;	
Inland sales-6weeks credit	3,12,000
Export sales-1½ weeks credit	78,000
(iii) Lag in Payments:	
Wages 1½ weeks	2,60,000
Stocks materials etc. -1½ months	48,000
Rent Royalties etc .-6months	10,000
Clerical staff ½ mo nth	62,400
manager ½ month	4,800
Miscellaneous Expenses 1 ½ Months	48,000

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Q2. Find the working capital requirements

(iv) Payment in advance: Rs.

Sundry expenses (paid quaterly in advance) 8,000

(v) Undrawn profit on the average throughout the year 11,000

(vi) Add 10% to your computed figures as contingencies.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Q2. Solution:

Statement showing the average working capital requirement

Current Assets:	**Rs.**
(i) Stock of finished products	**5,000**
(ii) Stock of stores materials etc.	**8,000**
(iii)Sundry Debtors:	
(a) inland (6weeks) 3,12,000X6/52 =	**36,000**
(b) Export 1 ½ weeks 78,000X3/52 X1/2=2,250	
	38,250
(iv) Payments in advance 8,000X ¼(Quaterly)	**2,000**
Total of current Assets	**53,250**

JAWAHARLAL NEHRU COLLEGE PALGHAT

Q2. Solution:Continued....

Statement showing the average working capital requirement

Less Current Liabilities:	**Rs.**
Lag in Payment of:	
(i) wages(1 ½ weeks)2,60,000X3/52X1/2=7,500	
(ii)Stocks(1 ½ months)48,000/12 X3/2=	**6,000**
(iii)Rent etc(6months)10,000X6/12=	**5,000**
(iv)Clerical staff(1/2months) 62,400/12X1/2 =	**2,600**
(v) Manager(1/2 months) 4,800/12X1/2=	**200**
(vi) Misc. Exp.1½ months)48,000/12X3/2=6,000	
Total of current liabilities	**27,300**
Net Working Capital (CA-CL)	**25,950**
Add 10% margin for contingencies10% of 25,950	**2,595**
Average working capital requirement	**28,545**

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Q3. Mr.Z wishes to commence a new trading business and gives the following information, Calculate (i) his estimated profit for the year (b) his average working capital requirements

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(1) The total estimated sales in a year will be Rs.12.00,000

(2) His estimated fixed expenses are of Rs.2,000 per month and variable expenses equal to 5% of his turnover.

(3) He expects to fix a sales price for each product which will be 25% in excess of his cost of purchases.

(4) He expects to turnover his stock four times in a year.

(5) The sales and purchases will be evenly spread throught the year. All sales will be <u>for cash</u> but he expects one month's credit for purchases.

Q3. Solution: (a) ESTIMATED PROFIT OF MR.Z FOR THE YEAR

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		Rs.
Sales		12,00,000
Less Gross profit(12,00,000X25/125)		2,40,000
Cost of Goods sold		9,60,000
Gross profit		2,40,000
Less Expenses:		
Fixed (2,000X12)	=24,000	
Variable (12,00,000X5/100)	=60,000	
Total expenditure		84,000
Net Profit		1,56,000

Q3. Solution: (b) STATEMENT OF AVERAGE WORKING CAPITAL REQUIREMENTS

Current Assets:		Rs.
(a)Stock		
Turnover of stock is 4 times		
Average stock= cost of goods sold/Stock turnover		
= 9,60,000/4=		2,40,000
(b) Cash:		
To meet fixed expenses	2,000	
To meet variable expenses		
12,00,000X5/100 X 1/12 =	5,000	7,000
(Assumed to be for one month)		
Debtors(As all sales are for cash only)		NIL
Total of current assets		2,47,000
Less Current Liabilities:		
Creditors (1month) 9,60,000 X 1/12=		80,000
Working Capital Required		1,67,000

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Q4. Prepare a statement of working capital requirement of a concern for production of 3,00,000 units of output in a year. The cost structure and other informations are given below.

	Cost per unit in Rs.
Raw materials	20
Direct Labour	05
Overheads	15
Total Cost	40
Profit	10
Selling Price	50

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(a)Raw materials are held in stock for two months.

(b)Work in progress (100% complete in regard to materials and 50% for labour and overhead will be approximately half a months production.

(c) Finished goods remain in warehouse on an average for a month.

Q4. Continued……

(d) Suppliers of materials extend a month's credit.

(e) Two months credit is allowed to debtors, calculation of debtors may be made at selling price.

(f) A minimum cash balance of Rs.25,000 is expected to be maintained.

(g) The production pattern is assumed to be even during the year.

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Solution:Q.4: Statement showing the working capital requirements

		RS.
Current Assets:		
Stock of raw materials(2months) 3,00,000X20X2/12		**10,00,000**
Stock of work in process (1/2 months)		
Raw materials 3,00,000X20X1/2X1/12=	**2,50,000**	
Direct Labour (50%) 3,00,000X5X1/2X1/12X50/100=	**31,250**	
Overheads (50%) 3,00,000X15X1/2X1/12X50/100=	**93,750**	
		3,75,000
Stock of Finished Goods(1months at cost)		
Raw materials 3,00,000X20X 1/12=	**5,00,000**	
Direct Labour 3,00,000X5X1/12=	**1,25,000**	
Overheads 3,00,000X15X1/12=	**3,75,000**	
		10,00,000
Debtors(2Months at selling price)3,00,000X50X2/12		**25,00,000**
Cash balance required		**25,000**
Total of Current Assets		**49,00,000**
Less Current Liabilities:		
Creditors for raw materials(1Month) 3,00,000X20X1/12		**5,00,000**
WORKING CAPITAL REQUIRED (CA-CL)		**44,00,000**

JAWAHARLAL NEHRU COLLEGE OF INSIGHT

INCOME TAX

- DR.MONJUNG MOSSANG
- ASST.PROF IN COMMERCE

JAWAHARLAL NEHRU COLLEGE PASIGHAT

UNIT-I I: COMPUTATION OF INCOME UNDER DIFFERENT HEADS-I INCOME FROM SALARIES

Salary (Section 15 – 17) Salary is the remuneration received by or accruing to an individual, periodically, for service rendered as a result of an express or implied contract.

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1. When **due** from the former employer or present employer in the previous year, whether paid or not
2. When **paid or allowed** in the previous year, by or on behalf of a former employer or present employer, though not due or before it becomes due.
3. When **arrears of salary** is paid in the previous year by or on behalf of a former employer or present employer, if not charged to tax in the period to which it relates.

Section 17(1) of the Income tax Act gives an inclusive and not exhaustive definition of “Salaries” , which includes:

(i) Wages

(ii) Annuity or pension

(iii) Gratuity

(iv) Fees, Commission, allowances perquisites or profits in lieu of salary (v) Advance of Salary

(vi) Amount transferred from unrecognized provident fund to recognized provident fund

(vii) Contribution of employer to a Recognized Provident Fund in excess of the prescribed limit

(viii) Leave Encashment

(ix)Compensation as a result of variation in Service contract etc.

(x) Contribution made by the Central Government to the account of an employee under a notified Pension scheme.

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CHARECTERISTICS OF SALARY

(i) Relationship of employer and employee

(ii) Nature of employer (Individual, sole proprietor, partnership firm..)

(iii) Salary from more than one employer

(iv) Salary from present, past or prospective employer.

(v) Tax free salary

(vi) Salary of MLA and MP

(vii) Receipts from persons other than employer

(viii) Place of accrual of salary.

(ix) Deductions made by the employer

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EXAMPLE

Gross Salary/Salary=Net salary received + deductions made by employer.

Q.Mr. A receives Rs.4,20,000/- p.a. as net salary. Employer has deducted Rs.4,000 p.m. as employees contribution to RPF., Rs.5,000 p.a. as tax deducted at source and Rs.2,000 p.a. as professional tax. During the year employer had deducted Rs.2,500 p.m. towards the recovery of house building advance taken by Mr.A. Find out the Gross salary.

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EXAMPLE

Calculation of Gross Salary:

Net salary received		**Rs.4,20,000**
Add:	**i) Employees own contribution to P.F.@4000X12**	**Rs48,000**
	ii) Tax deducted at source	**Rs5,000**
	iii)Professional tax deducted at source	**Rs2,000**
	iv) Recovery of House building advance@2,500X12	**Rs.30,000**
Gross salary		**Rs.5,05,000**

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Treatment of Different forms of Salary:

1. Basic Salary-Fully Taxable
2. Dearness Allowance-Fully Taxable
3. Advance Salary –Fully Taxable(On receipt basis)
4. Arrear of Salary–Fully Taxable(On receipt basis)
5. Fees and Commission–Fully Taxable
6. Bonus-–Fully Taxable (Relief U/S 89 for arrears)
7. Salary in lieu of notice period–Fully Taxable

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Treatment of Different forms of Salary:

8.Gratuity-For Govt. employees Fully Exempted

Non Govt.Employees:

i)15 days of salary X Length of service

ii)Rs.10,00,000

iii)Gratuity Actually received

Which ever is less is exempted from tax any excess gratuity is taxable.

9. Pension (Uncomuueted)-Fully Taxable

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Treatment of Different forms of Salary:

10.Commuted Pension-

(i) Govt.Employee-Fully exempt from Tax

(ii) Non-Govt.Employee who received Gratuity 1/3 of commuted pension is exempt from tax and 2/3 is taxable.

(iii) Non Govt. Employee who does not receive gratuity -1/2 of commuted pension is exempt from tax and ½ is taxable

11. Leave salary encashment:

During employment –fully taxable for Govt.& Non-Govt. employees.

Govt. employees getting leave encashment at the time of retirement is fully exempt from tax.

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Treatment of Different forms of Salary:

Non-Govt. employees getting leave encashment at the time of retirement

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i) Earned Leave in No of months X Average monthly salary

ii) 10X Average monthly salary

iii) Rs.3,00,000

iv) Leave encashment actually received

LEAST OF THE ABOVE IS EXEMPTED FROM TAX AND REST IS TAXABLE

12.Annuity-Paid by present employer is fully taxable

Annuity received from an EX-employer is taxable under profit in lieu of salary.

13.Provident Fund:

i) Statutory provident Fund (SPF)-PF Act 1925

ii) Recognised provident Fund (RPF)-PF Act 1952

iii) Unrecognised Provident Fund(URPF)

iv) Public Provident Fund(PPF)

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14.Treatment of Provident Fund:

	STATUTORY PRVIDENT FUNDS	RECOGNISED PRVIDENT FUND	UNRECOGNISED PRVIDENT FUND	PUBLIC PRVIDENT FUND
1.EMPLOYER'S CONTRIBUTION	EXEMPT	EXEMPT UPTO 12% OF SALARY	EXEMPT	EMPLOYER DOES NOT CONTRIBUTE
2.EMPLOYEE'S OWN CONTRIBUTION (Deductions U/S 80C)	FULLY DEDUCTIBLE	FULLY DEDUCTIBLE	NOT DEDUCTIBLE	FULLY DEDUCTIBLE
3. INTEREST CREDITED TO PRVIDENT FUND	EXEMPT	EXEMPT UPTO RATE PRESCRIBED BY GOVT.(9.5%)	EXEMPT	EXEMPT

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Q. Calculate the taxable amount of annual accretion to RPF

i) Pay Rs.24,500 p.m.

ii) Commission Rs.36,000

iii) Employer's contribution to RPF@14% of salary

iv) Interest credited to RPF during the year @12% is Rs.24,000

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Ans.Calculation of taxable amount of annual accretion to RPF

i) Employer's contribution to RPF @ 14% of		
of salary(14% of 2,94,000+36,000	Rs.46,200	
Less 12% of salary being exempted	Rs.39.600	
Taxable portion		Rs.6,600
ii) Interest credited to RPF @12%	Rs.24,000	
Less exempted upto @ 9.5%(24,000X9.5%/12)	Rs.19,000	
Taxable portion		Rs.5,000
Taxable portion of Annual Accretion		Rs.11,600

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PARTLY TAXABLE Allowance

1) Education Allowance
2) Hostel allowance
3) Tribal area allowance
4) Transport allowance
5) Composite hill compensatory allowance
6) Running allowance to the employees of transport undertakings
7) House rent allowance
8) Under Ground Allowance

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Example

Solution:

Computation of Gross salary of Mr.Hari:

Salary @ Rs.30,000 p.m. X12		Rs.3,60,000
Commission 50,00,000X 2/100		Rs.1,00,000
Gross salary of Hari		Rs.4,60,000
Exemption of HRA:		
i) Actual HRA Received:		Rs.96,000 (LEAST)
ii) Actual Rent Paid:Rs.12,000X12	Rs.1,44,000	
10% of Salary Rs.4,60,000X10/100	Rs. 46,000	
Excess of rent paid over 10% of salary (1,44,000-46,000=		Rs.98,000
iii) 40% of Salary (Amritsar)4,60,000X40/100		Rs.1,84,000

Least of the above Rs.96,000 is exempted from tax, hence

Taxable HRA NIL

JAWAHARLAL NEHRU COLLEGE PASIGHAT

BSc. IVth Sem: UNIT IV

- CULTIVATION OF OYSTER MUSHROOM

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.

- Oyster mushroom is known as Pleurotus species
- Common name=Dingri
- Good source of nutrition
- Phyllum-Basidomycotina
- Class-Basidiomycetes
- Family-Polyporaceae
- Genus Pleurotus.

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NUTRITIONAL VALUE OF OYSTER MUSHROOM:-

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Sr. No.	Nutrient	Quantity
1.	Water	76.69 gm
2.	Enegry	28 kcl
3.	Protein	2.85 g
4.	Lipid(Fat)	0.35 g
5.	Ash	0.87 g
6.	Carbohydrate	5.24 g
7.	Fiber	2.0 g
8.	Sugar	0.95 g

MINERALS:-

Sr. No.	Minerals	Quantity
1.	Ca	8 mg
2.	Fe	1.14 mg
3.	Mg	15 mg
4.	P	103 mg
5.	K	161 mg
6.	Na	15 mg
7.	Zn	0.66 mg
8.	Cu	0.210 mg
9.	Mn	0.097 mg
10.	Se	2.2 mcg

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- .

Pleurotus florida

Pleurotus ostratus

Pleurotus sajor-caju

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species

- 1. **Pleurotus sajor-caju –summer species**
- 2. **Pleurotus pulmonarius-summer spcies**
- ***Pleurotus ostreatu –winter species***

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cultivation

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YIELD:

More than 500 kg of fresh mushroom per ton of dry wheat or paddy straw.

SUBTRATE PREPARATION AND TREATMENT:

- Mushrooms grows on substrates like paddy straw, maize cobs or leaves, vegetable wastes, industrial wastes such as paper mill sludge, coffee by products, leaf litter, tree barks etc…
- Since paddy straw is easily available and cheap, well dried and fresh paddy straw is widely used. The straw is chopped into 3 – 4 cm pieces and soaked in water for 8 – 16 hrs. Excess water is drained and the straw is sterilized.

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SPAWN PREPARATION:

- Wheat/rice grains are boiled in water for 15 min and excess water is drained. The grains are allowed to cool in sieves.
- Wheat/rice grains are then mixed with required quantities of Gypsum and Calcium carbonate.
- These grains are filled into bottles and autoclaved for 2 hrs at 121 °C.
- The pH is maintained at 7.
- These bottles are inoculated with mycelium or spores and incubated at 22 – 44 °C in a dark place.
- It takes 2 weeks for complete spread of mycelium.

JAWAHARLAL NEHRU COLLEGE PASTORAL

SUBTRATE INOCULATION:

- In Polythene bags (35 x 50 cm, 150 gauge) wet substratum is compressed and filled layers by layers. Upon each layer the grain spawn is spread at 2% on the whole surface uniformly. Holes of about 2 mm in diameter are made on the bags for breathing .

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SPAWN RUN AND PIN INOCULATION:

- Temperature of the room is maintained at 25°C and relative humidity above 85%. Humidity is maintained by frequent sprinkling of water on the floor and walls.
- It takes 20 – 22 days for complete spread of mycelium on the spawn.
- After about 22 days the bags are fully impregnated with white mycelium and are transferred to cropping rooms.

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FRUITING AND PICKING :

- The blocks are kept in the racks at 60 cm gap. Temperature is maintained between 20 – 33 °C.
- Relative humidity in the room is maintained by spraying water on the floor and walls.
- Spraying of water on the blocks is avoided for first 2 – 3 days.
- When the pins reach 2 – 3 cm little heavy watering is required. The heads are harvested before they shed spores.
- After first flush 0.5 – 1 cm outer layer is scrapped to initiate second flush which occurs in about 10days.

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To start growing mushrooms you need to buy the spores. The spores shown below have been grown on a corn cob. One "bottle" of spore can be used for 2 sacks. The spores on the right have been broken into 8 pieces.

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Step 1: Preparing the straw You will need sterilized straw. Sterilized straw will ensure all other fungi spores are killed.

To sterilize straw, boil it in water for half an hour. Squeeze water out of the straw. The straw has to be 60% moist i.e. when you squeeze the straw, no water should be wrung out. The straw is ready to use.

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Step 2: Preparing the bag Start packing the straw into the plastic bag of approximate dimensions 12*24 inches. Fill in two inches of straw. Crumble one chunk of the the spore on top of the straw along the edges. Spores grow out from the sides of the bag, so it is important to distribute the spores along the edges. Spores in the middle will not germinate.

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Step 3: Layering Pack in four inches of straw. Repeat the process three more times. After the last layer of spore, pack in two inches of straw.

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Step 4: Closing Twist the open end and tie the bag tightly.

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Step 5: Making air holes Make 12 – 20 holes using a sharp stick all over the bag. This will promote air circulation. The mushrooms will grow out through these holes.

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Step 6: Germination

Your mushroom bag is now ready. Set in a cool dark place to promote mycelium growth.

You can also get the cool dark effect by hanging a wet jute sack around the grow bag. Make sure that the sack is at least one foot away from the plastic bag. Spray the sack every 5 days to keep it moist.

Mushrooms will start sprouting in 18 days.

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MOULD DISEASE

- Mould infact substrate as well as fruiting oyster.
- Infection may starts from spwning stage to harvesting stage.

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Identification of mould

- 1. on substrate they appear as
- greenish
- Brownish
- Blackish
- Yellowish mycelia growth
- 2. discoloration of fruiting body.
- 3. infected mushroom become deformed and rotted

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moulds

- . Aspergillus niger

A. flavus

A.. fumigatus

- Arthrobotrys sp.
- Alternaria alternata
- Cephalosporium aspermum
- Cladosporium cladosporoides
- Fusarium moniliforme
- Penicillium spp.
- Rhizopus sp.
- Trichoderma viride

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Control measures

- 1. sanitation of mushroom house
- Disposal of left over materials
- Removal of infected spawn, fruiting bodies
- Very old, rotten, with high moistened straw should not be used.
- Fumigation of mushroom house by using formaldehyde before grow.
- Spray with Benomyl, carbendazim, Blitox and Thiram chemicals.

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Substrate supplementation

- Use horse gram powder (8g/kg of stra)

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Oyster cultivation

JAWAHARLAL NEHRU COLLEGE PASIGHAT

- Polyethylene bags—1 kg
- Water sprayer.

Procedure

1. Take dried paddy straw.
2. Chop the straw into 1 to 2 cm bits.
3. Soak the chopped straw into water overnight.
4. Drain off the excess water.
5. Add horse gram powder at the rate of 8 g/kg.
6. Add spawn at the rate of 30 g/kg.
7. Mix all the constituents.
8. Fill the mixture into polyethylene bags with holes.
9. Keep (incubate) the field bags in a room at 21 to 30°C with sufficient light and ventilation for 15-16 days for spawn running.
10. Cut open the polyethylene bags on the sides without disturbing the bed.
11. Spray water over the bags twice a day.

Observations

Observe for the mushroom crop after 3 to 4 days of opening the polyethylene bags (*i.e.* after 20-22 days of spawning).

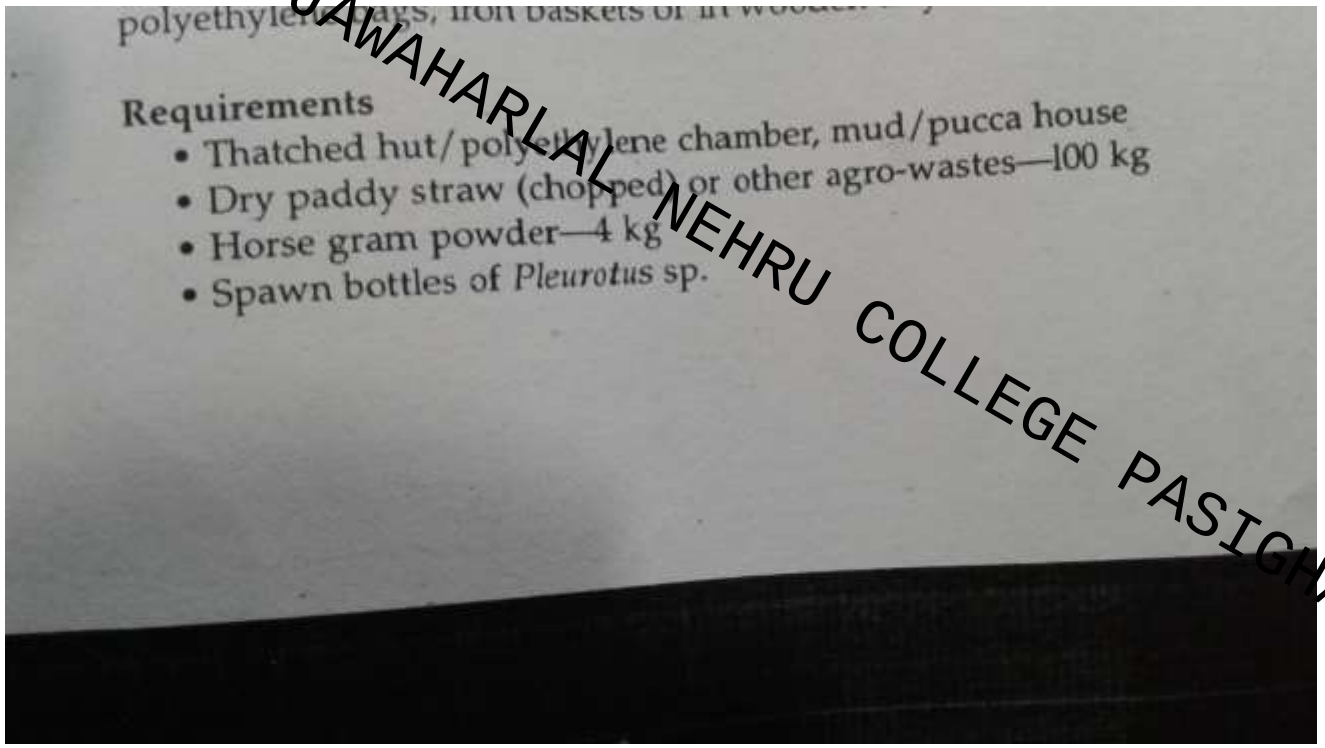
12. Harvesting

First harvesting is to be done 20-22 days after spawning, 2nd harvesting 27-29 days after spawning and 3rd harvesting 36 days after spawning.

Precautions

1. For better yields, temperature of the room should be in the range of 20-26°C and relative humidity of 70-90% during cropping period.
2. Provide light for 15-20 minutes during cropping period.
3. Polyethylene bags with holes should be used.

Oyster cultivation



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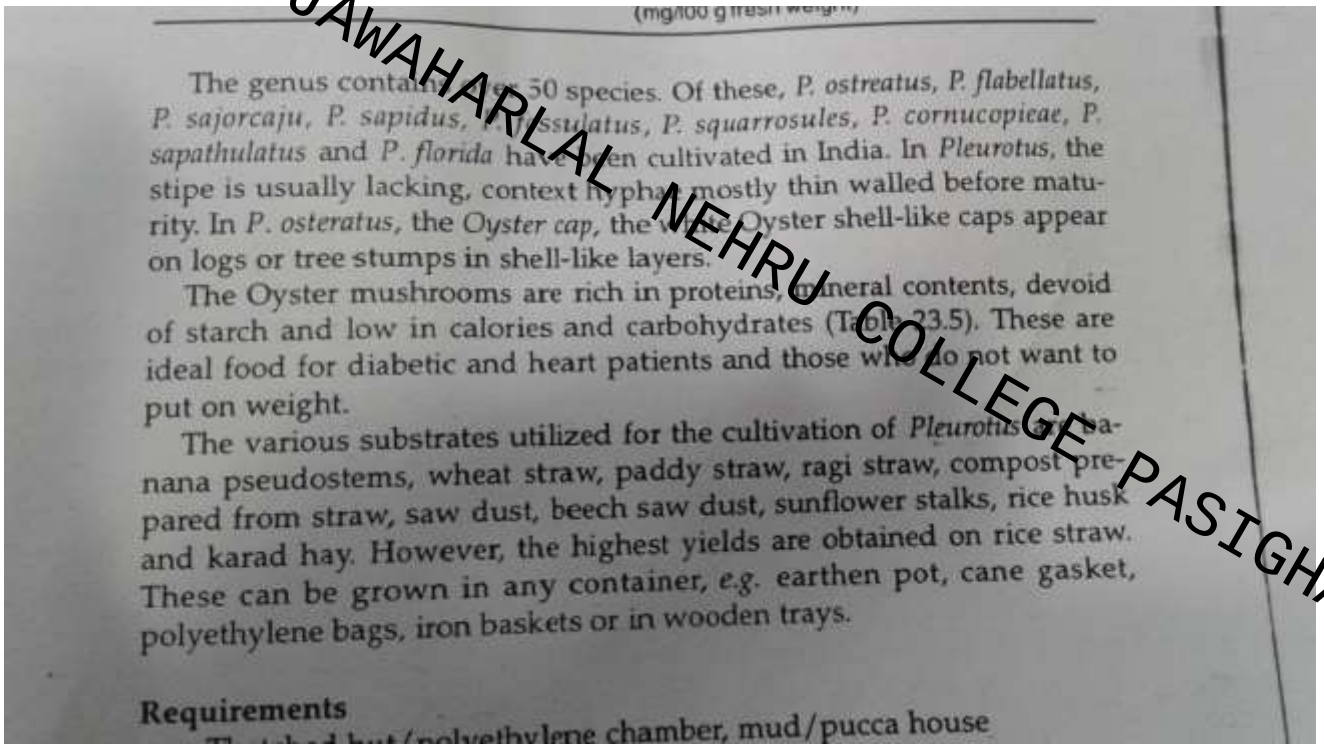
Oyster cultivation



(mg/100 g fresh weight)

The genus contains over 50 species. Of these, *P. ostreatus*, *P. flabellatus*, *P. sajorcaju*, *P. sapidus*, *P. flabellatus*, *P. squarrosules*, *P. cornucopieae*, *P. sapathulatus* and *P. florida* have been cultivated in India. In *Pleurotus*, the stipe is usually lacking, context hyphae mostly thin walled before maturity. In *P. osteratus*, the *Oyster cap*, the white Oyster shell-like caps appear on logs or tree stumps in shell-like layers.

The Oyster mushrooms are rich in proteins, mineral contents, devoid of starch and low in calories and carbohydrates (Table 23.5). These are ideal food for diabetic and heart patients and those who do not want to put on weight.

The various substrates utilized for the cultivation of *Pleurotus* are banana pseudostems, wheat straw, paddy straw, ragi straw, compost prepared from straw, saw dust, beech saw dust, sunflower stalks, rice husk and karad hay. However, the highest yields are obtained on rice straw. These can be grown in any container, *e.g.* earthen pot, cane gasket, polyethylene bags, iron baskets or in wooden trays.

Requirements

Thatched hut/polyethylene chamber, mud/pucca house

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.

thanks

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BSc VIth Sem: What is biostatistics?

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JAWAHARLAL NEHRU COLLEGE PASIGHAT

What is biostatistics?

- Biostatistics is a method of collecting and analyzing biological data.

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- Biostatistics is the methodology
1. for collecting,
2. analysing,
3. interpreting and
4. drawing conclusions from biological information or data.

- Putting it in other words, biostatistics is the methodology which researchers have developed for interpreting and drawing conclusions from collected biological data.

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- biostatistics is much more than just the tabulation of numbers and the graphical presentation of these tabulated numbers.
- bioStatistics is the science of gaining information from numerical and categorical data like the blood type of person, marital status or religious affiliation, food habit, life style etc.

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Use of biostatics

Statistical methods can be used to find answers to the questions like:

- • What kind and how much data need to be collected?
- • How should we organize and summarize the data?
- • How can we analyse the data and draw conclusions from it?
- • How can we assess the strength of the conclusions and evaluate their uncertainty?.

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Bio statistics provides methods for:

- 1. Design: Planning and carrying out research studies.
- 2. Description: Summarizing and exploring data.
- 3. Inference: Making predictions and generalizing about phenomena rep-resented by the data.

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Sample Vs population

- Population and sample are two basic concepts of statistics. Population can be characterized as the set of individuals persons or objects in which an investigator is primarily interested during his or her research problem, sometimes we want to measure all individuals then population are obtained, but
- often only a set of individuals of that population are observed; such a set of individuals constitutes a sample. Therefore:
- Population is the collection of all individuals or items under consideration in a statistical study.
- while Sample is that part of the population or items from which information is collected.

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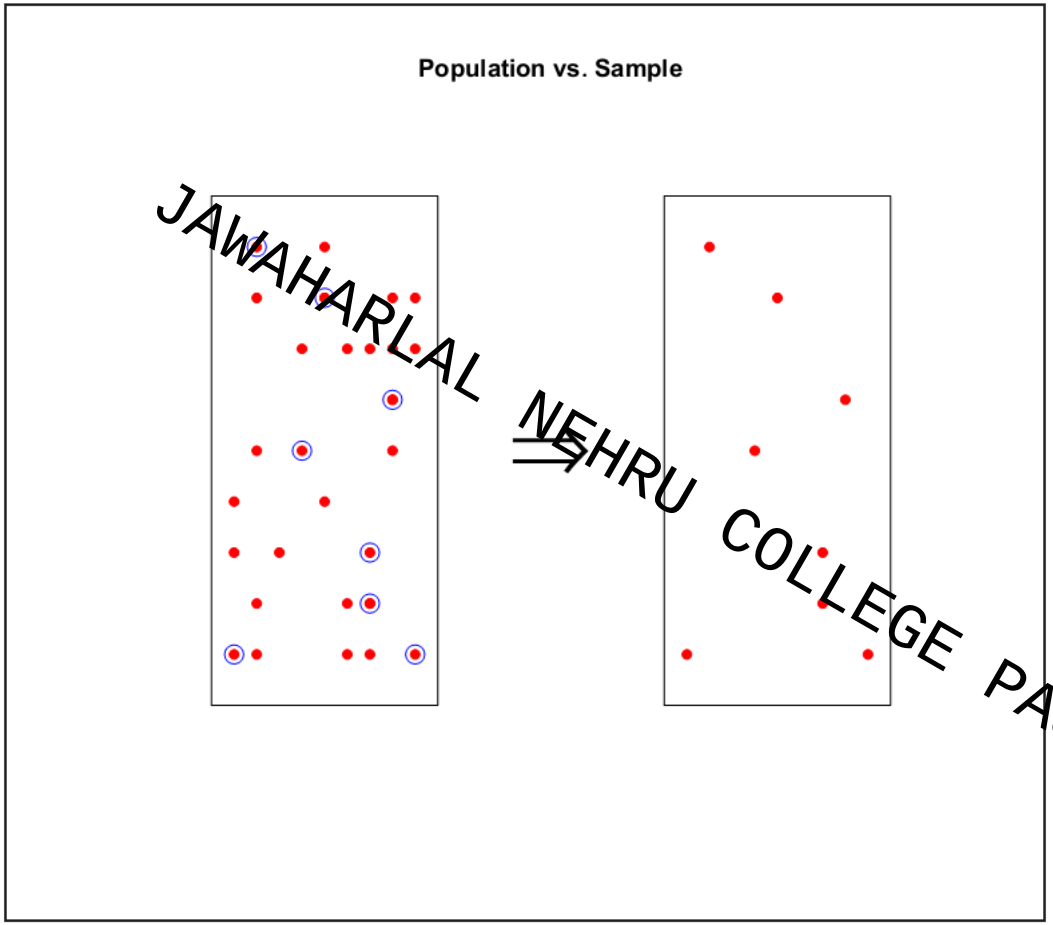

Figure 1: Population and Sample

BSc. VIth SEM: Tables and Graphs

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Tables and Graphs

- **Purpose:** To display data so that they can be readily understood.
- **Principle:** Tables and graphs should contain enough information, to be self-sufficient- without reliance on material within the text of the document of which they are a part.
- Tables and graphs share some common features, but for any specific situation, one is likely to be more suitable than the onother.

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Characteristics of table

- Tabulation is a systematic presentation of raw data in columns and rows.
- Good table should contain all the required information in minimum space without loosing clarity.
- It should suit the purpose of investigation.
- Unit of measurement must be mentioned.
- It should be self explanatory.

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diagrams

- Sometimes, tables becomes cumbersome to fit all the required data; hence data is represented in diagrams.
- Diagrams gives pictorial effects and attractive, easy to understand.
- It's a visual forms for presentation of statistical data.
- But don't show exact value, only approximate in diagrams.
- It is a supplement to the table not replacement.

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Titles and Sources

- **Titles:** ***What, How Classified, Where, and When***
  - Titles should specifically state what is being included in the cells of a table or the points plotted on a graph. With respect to a table cell, the title should clearly state what is in the cell, how the cells are classified, where the data were collected and when they were collected.
  - Titles should not state the purpose of the table or graph--a common mistake.
- **Source:** If a table or graph contains information from another published source, then that source should be indicated with a "source" statement.

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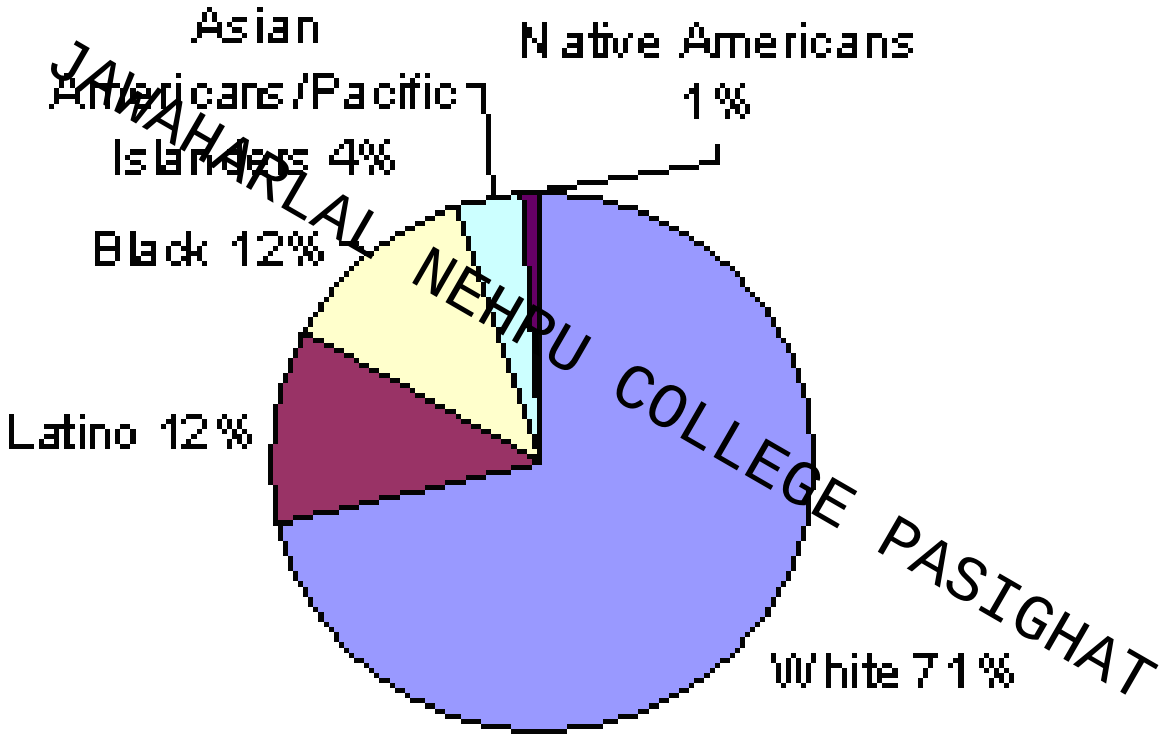
Circular: Pie chart

Figure - US Population by Race/Ethinicity: 2000



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Source: ***Am J Public Health, Dec.2003; 93:2094***
Data are from the US Bureau of the Census

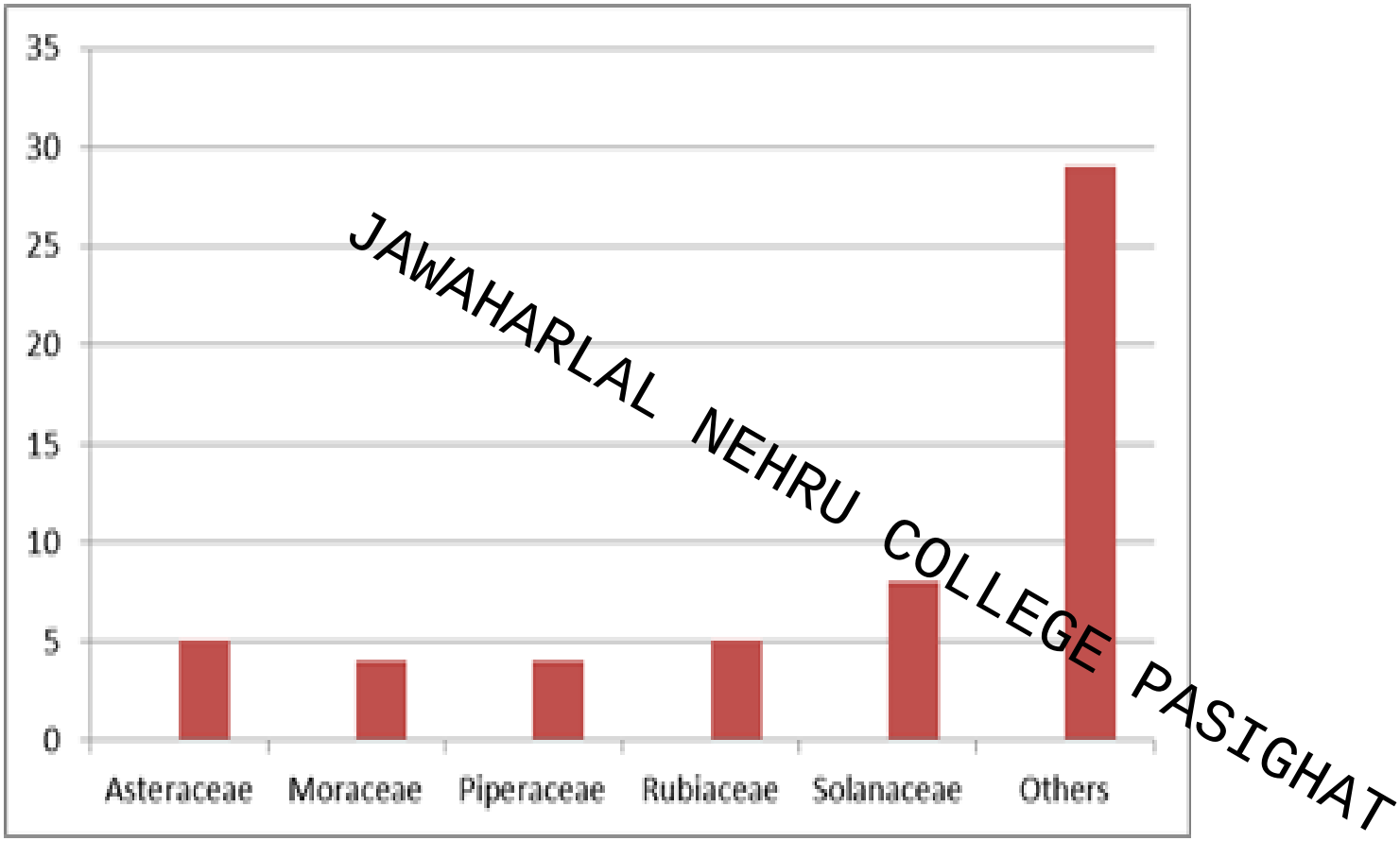

Figure 1: Family-wise representation.

Payum et al., 2014: American Journal of Pharmatech Research.

Antioxidant potential of some medicinal food plants of Arunachal Pradesh. Payum et al., 2013

Sample	TPC(mg GAE/g)	TFC (µMRE/g)	ABTS (µM/g)	DPPH (µM/g)
Zanthoxylum rhetsa shoot	117.95±3.22	120.14±2.31	167.69 ±3.21	851.42 ±3.44
Solanum kurzii berry	14.60±1.12	89.00±2.11	30.70±1.34	257.74±2.31
Phoebe cooperiana(fruit)	33.93±1.14	941.5±5.31	268.114±4.13	405.76±2.24
Allium hookeri	10.51±2.53	40.31±3.01	76.03±2.36	93±1.16
Solanum spirale (Leaf)	18.64±2.12	5.29±1.01	29.85±1.25	45.4±0.37
Solanum spirale (berry)	11.72±1.42	50.52±1.03	38.27±1.33	52±0.92
Pouzolzia bennettiana	4.80±2.11	120±1.25	111.69±1.03	278.48±1.01
Clerodendrum colebrookianum	11.84±2.32	10.88±1.12	24.84±1.27	86.24±1.28

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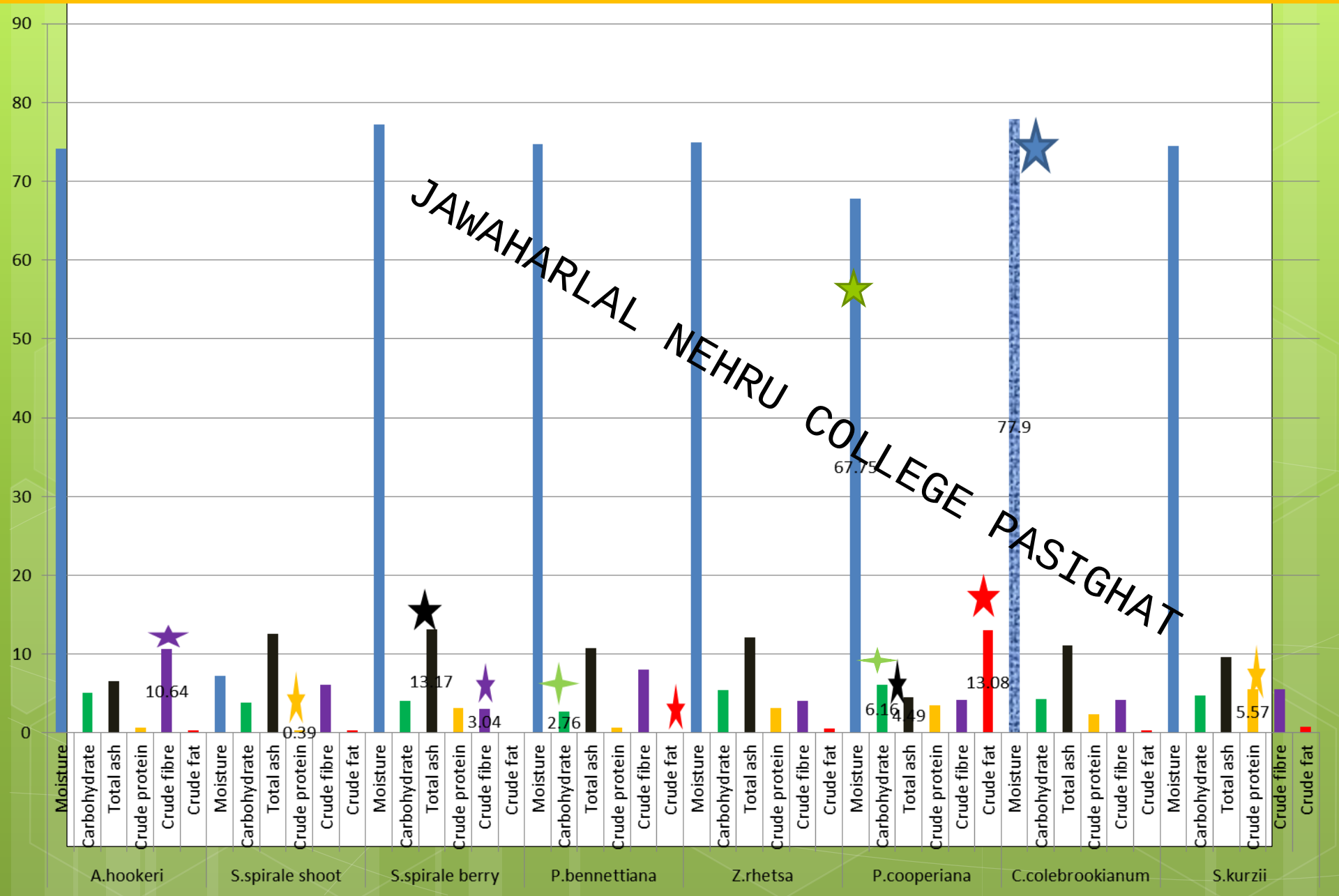
Proximate value of some wild veg. of Arunachal Pradesh.

Payum et al., 2016.



BSc. Vith Sem: Graphical representation of data

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JAWAHARLAL NEHRU COLLEGE PASIGHAT

Graphical representation of data

- 1. when data is quantitatively represented through chart and diagrams.
- 2. to show the relative position of different subdivision/sub-data.

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advantages

- Easlily understood, easy intrepretation.
- More attractive
- Useful in comparing relationship between two or more sets of figures.
- Enable statistical problems in a visual form.

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types

- Line diagram/graph
- Bar diagram
- Pie chart
- Histogram
- Frequency polygon
- Ogive/commulative frequency polygon.

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Graphical representation of ungrouped data

JAWAHARLAL NEHRU COLLEGE PASIGHAT

can be represented by using

- 1.Line graph.
- 2. Bar graph/bar diagram
- 3. Circle graph/pie diagrams
- 4. pictograms

Line graph/graph

- Most common graphical representation
- By plotting X axis on horizontally while Y axis vertically.
- Find out the intersecting point or origin and join all intersections.
- Example: cricket score in each over.

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Line graph

Concentration in mg/100ml	2	4	6	8	10
Absorbance at 517nm	0.0634	0.1595	0..2747	0.3815	0.4838

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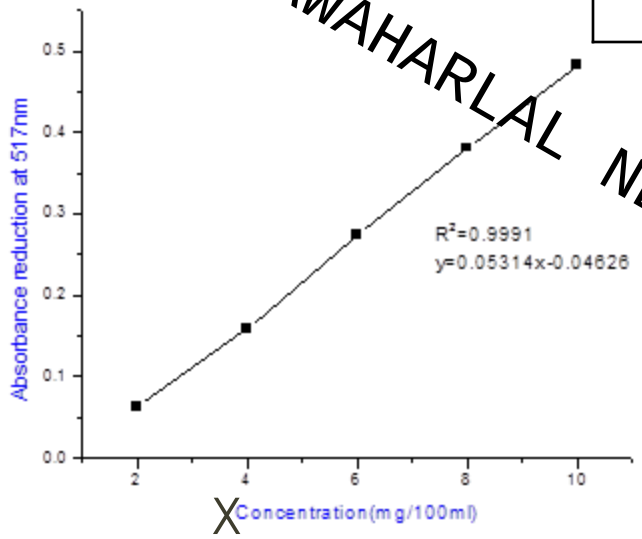
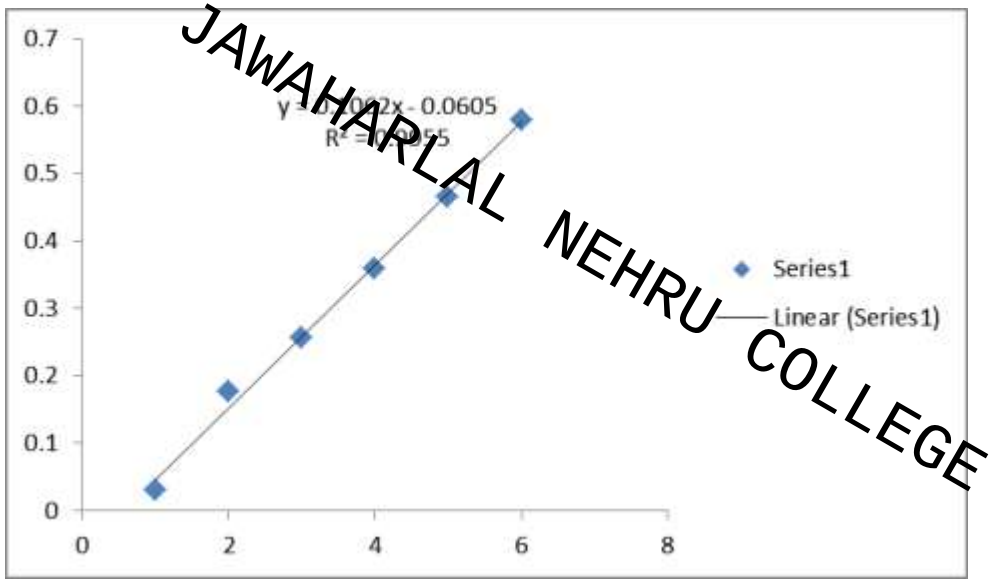
- Y



- Graph shows absorvance VS concentartion of DPPH

Glucose standard	
0ml	0.030192
.2ml	0.17599
.4ml	0.25736
.6ml	0.35854
.8ml	0.46592
1ml	0.5796

- .....



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- Graph shows Concentration of glucose Vs absorbance

Example 1. *A word-nonsense syllables association test was administered on a student of class X to demonstrate the effect of practice on learning. The data so obtained may be studied from the following table.*

Trial No.	1	2	3	4	5	6	7	8	9	10	11	12
Score	4	5	8	8	10	13	12	12	14	16	16	16

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Draw a line graph for the representation and interpretation of the above data.

Solution. Plot the points (1, 4), (2, 5), (3, 8), (4, 8), (5, 10), (6, 13), (7, 12), (8, 10), (9, 14) and (10, 16).

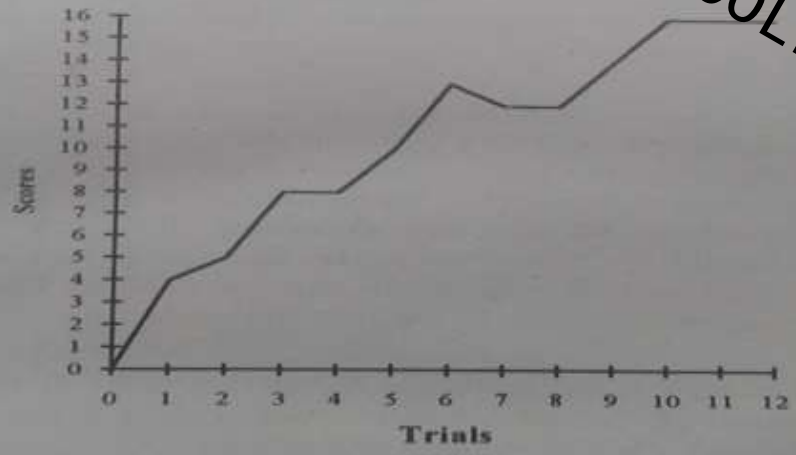

Fig. 4.1. Line Graph — The effect of practice on learning

Bar diagram

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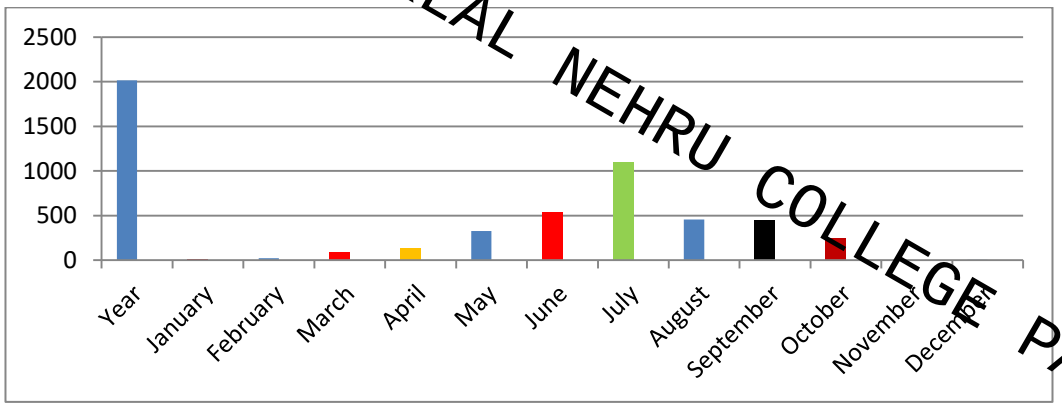

Figure 2.7: Monthly rain fall (mm) in East Siang District in the year 2013.

Source:HYDROMET DIVISION, NEW INDIA METEOROLOGICAL DEPARTMENT, Govt. of India, Ministry of Earth Science.

Simple Bar diagram

only one variable can be represented

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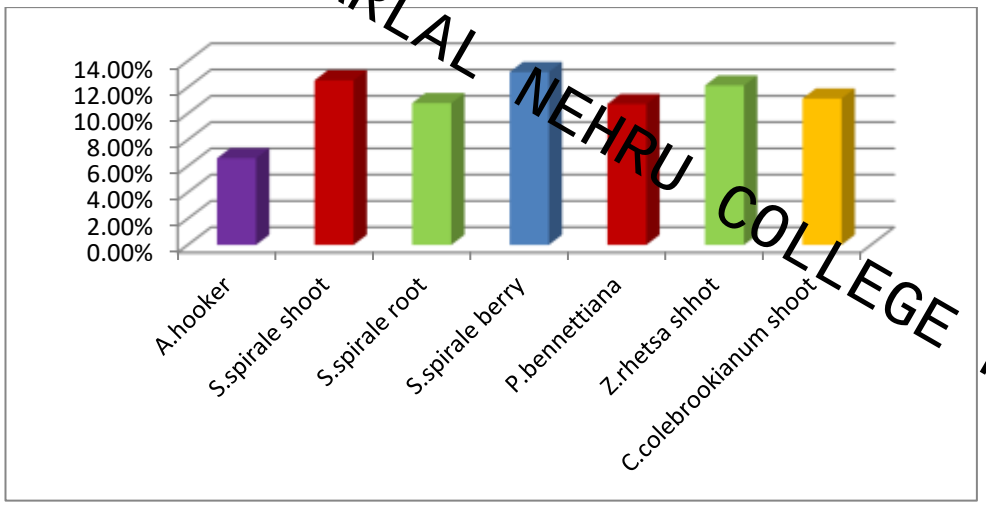
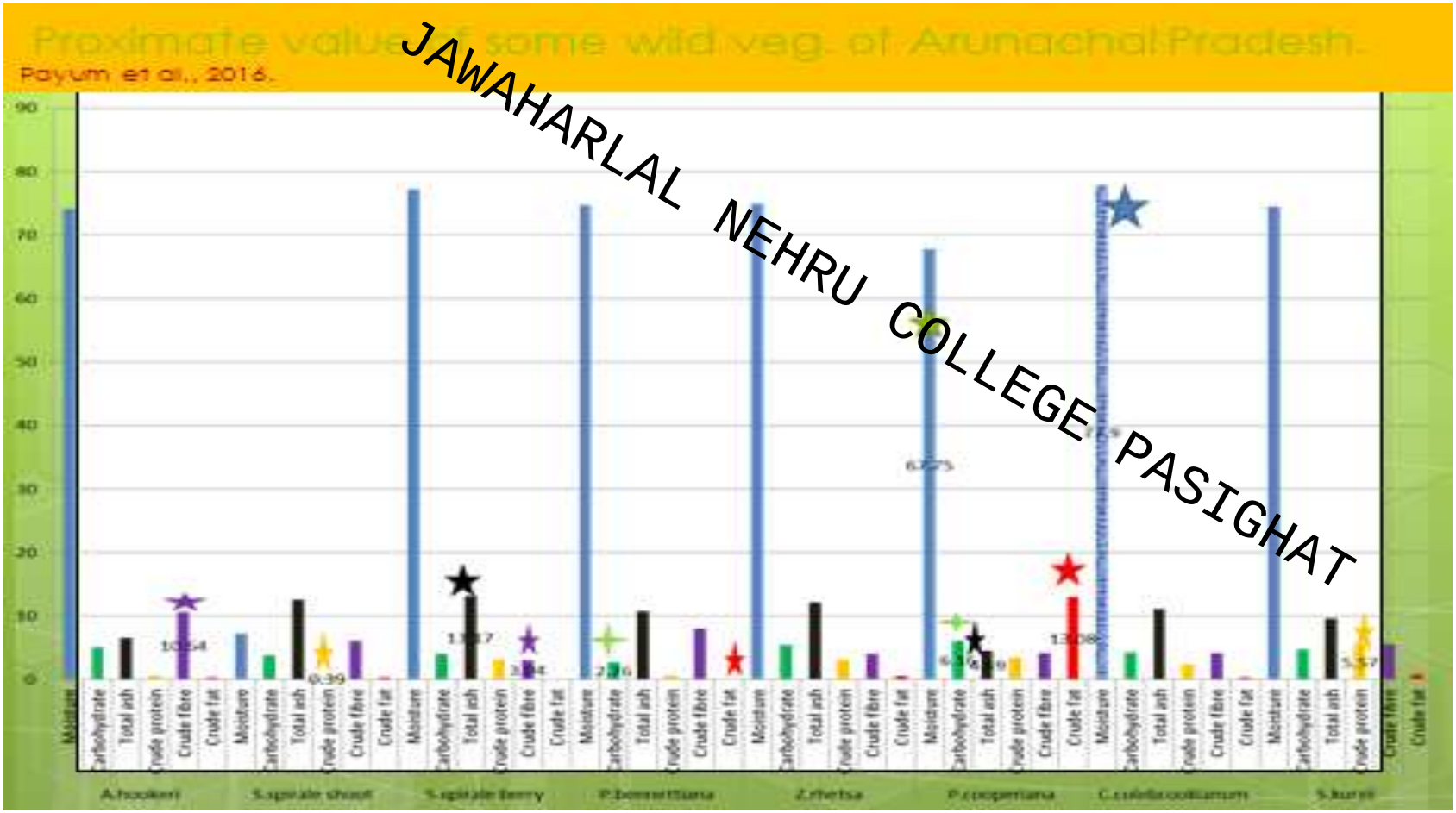
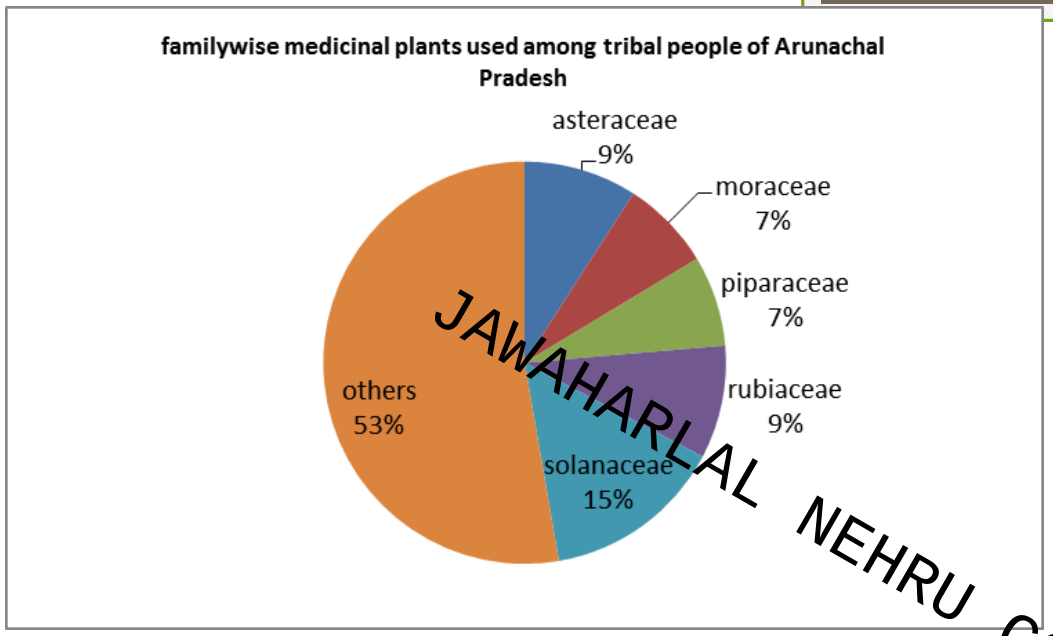


Fig: 6.22: Total ash content.

Multiple bar diagram

many variables can be represented





Asteraceae		5
Moraceae		4
Piperaceae		4
Rubiaceae		5
Solanaceae		8
Others		29

$$\text{Angle} = \frac{\text{Value of one component}}{\text{Total of all the components}} \times 360$$

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Pie diagram for medicinal plants

out of55 family

Eg: asteraceae: 5/55 then multiply by 3.6

Step I. Plot a circle of appropriate size with protractor, pencil and compass. The angles of a circle total 360°.

Step II. Convert the given value of the components of an item in percentage of the total value of the item.

Step III. In laying out the sector for a pie chart it is logical to adopt the common procedure to arrange sectors according to size with the largest at the top and the others in sequence running clockwise.

Step IV. Transpose the various component values correspond to the degree on the circle. Since 100% is represented by 360° angle the centre of the circle, therefore, 1% value is represented by $360^\circ / 100 = 3.6^\circ$. If 8 be the percentage of a certain component, the angle which represents the percentage of such component is (3.6×8) degrees.

Step V. Measure with protector the points on a circle representing the size of each sector.

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Pie chart

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- Is a circular graph that represent total value in circle and components in part wise.
- Useful in comparing components and total value.
- Data is expressed in percentage of total value.
- The total value is equated as 360 degree.

Example: Marks obtained in test examination by a Bioscience students of Serampore College.

Zoology	Botany	Physiology
65	60	55

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Solution: Total number of components
$= 65 + 60 + 55 = 180$

Subject	Marks obtained	Angle
Zoology	65	$\frac{65}{180} \times 360 = 130°$
Botany	60	$\frac{60}{180} \times 360 = 120°$
Physiology	55	$\frac{55}{180} \times 360 = 110°$

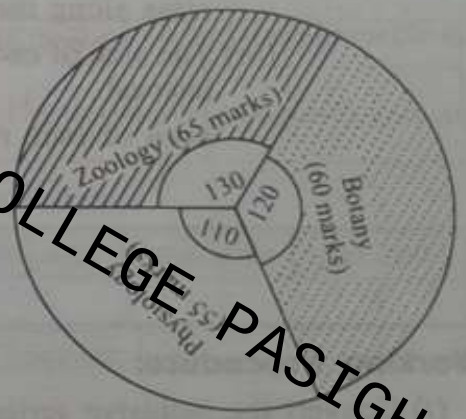

Fig. 3.6 Pie chart showing ma
of three subjects

pictogram

- Data is represented by picture

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pictogram

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Pictogram: It is a popular method of representing statistical data in pictures.

(*i*) In pictogram a number of pictures of equal size and definite numerical value are drawn.

(*ii*) Each picture represents a number of units.

(*iii*) Pictures are draw side horizontally or vertically.

(*iv*) It is widely used public and private sector.

Represent the following data of the production of books (Biostatistics) from S. Chand & Company.

Year	2006	2007	2008
Production of book	1000	2000	3000

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Solution: The given data is represented by pictogram as shown in Fig. 3.7.

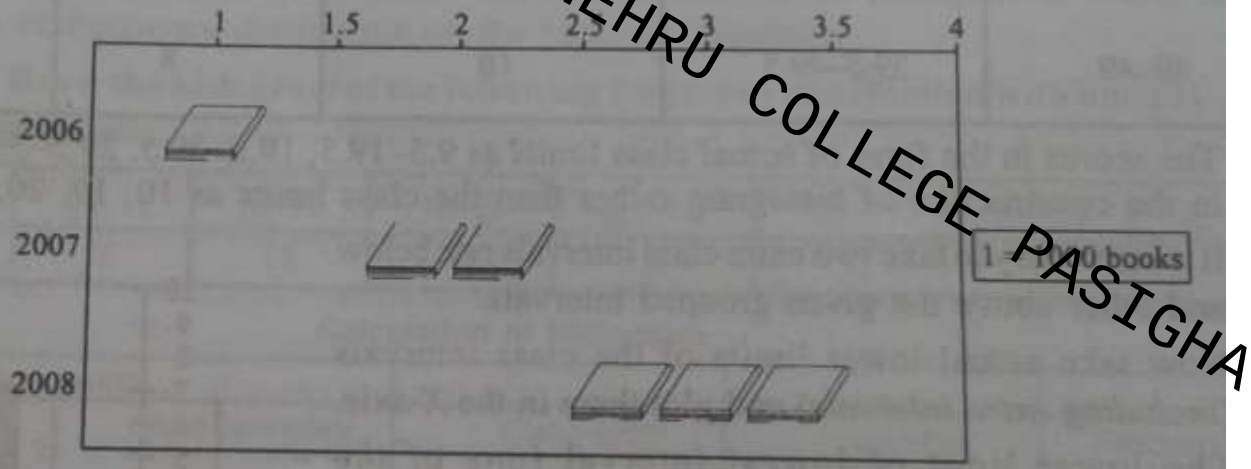

Fig. 3.7 Pictogram.

pictogram

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Solution: The given data is represented by pictogram as shown in Fig. 3.7.

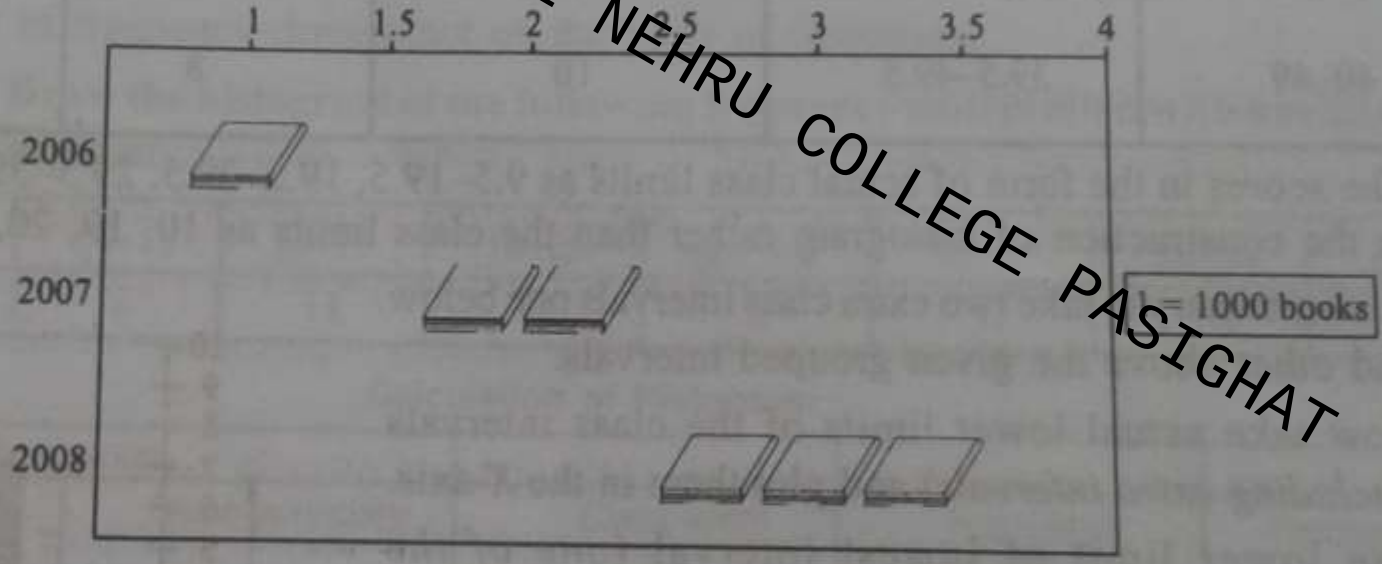

Fig. 3.7 Pictogram.

Graphical representation of grouped data

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Can be represented by using:

- Histogram
- Frequency polygonal
- Cumulative frequency curve or ogive
- Ratio diagram/ arithlog

- **Graphical representation of ungrouped data**

can be represented by using

- 1.Line graph.
- 2. Bar graph/bar diagram
- 3. Circle graph/pie diagrams
- 4. pictograms

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Graphical representation of ungrouped data

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can be represented by using

- 1.Line graph.
- 2. Bar graph/bar diagram
- 3. Circle graph/pie diagrams
- 4. pictograms

histogram

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- Histogram is represented by a rectangular bar to depict frequency distribution.
- Size of the class interval is represented by width
- Size of the frequency is represented by height.
- Class boundaries/intervals is important in the construction of histogram and represent in horizontal or X axis of the graph.
- Frequency is represented as height in the graph on Y axis.
- Histogram is essentially an area diagram composed of series of adjacent ractangles.

Steps/procedure of histogram

age	10-19	20-29	30-39	40-49
No. of class		0	1	10

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- If data is given in inclusive series, convert data into exclusive series.
- It is customary to take two extra class intervals one below and another above the given class.

age	9.5-19.5	19.5-29.5	29.5-39.5	39.5-49.5
No.of class	1	0	1	10

- .

- Take actual lower limit of class intervals and plot it in X axis
- Then take the corresponding frequency and construct graph by joining lower and higher limit of class interval and frequency of that class intervals.

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Example of inclusive data

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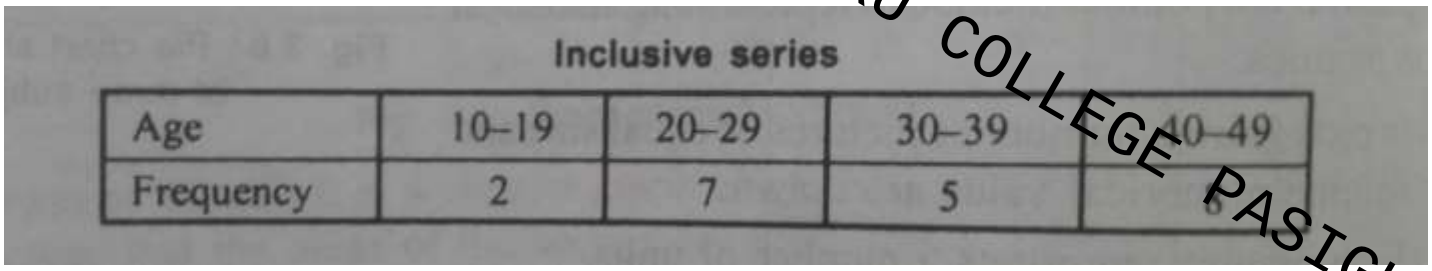

Inclusive series

Age	10–19	20–29	30–39	40–49
Frequency	2	7	5	6

Convert inclusive data into exclusive data

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Exclusive Series:

Age (class interval)		Size of int	Frequency	Frequency dens
Score limit	True limit			
10–19	9.5–19.5	10	2	$\frac{2}{10} = 0.2$
20–29	19.5–29.5	10	7	$\frac{7}{10} = 0.7$
30–39	29.5–39.5	10	5	$\frac{5}{10} = 0.5$
40–49	39.5–49.5	10	8	$\frac{8}{10} = 0.8$

(*ii*) The scores in the form of actual class limits

Draw graph

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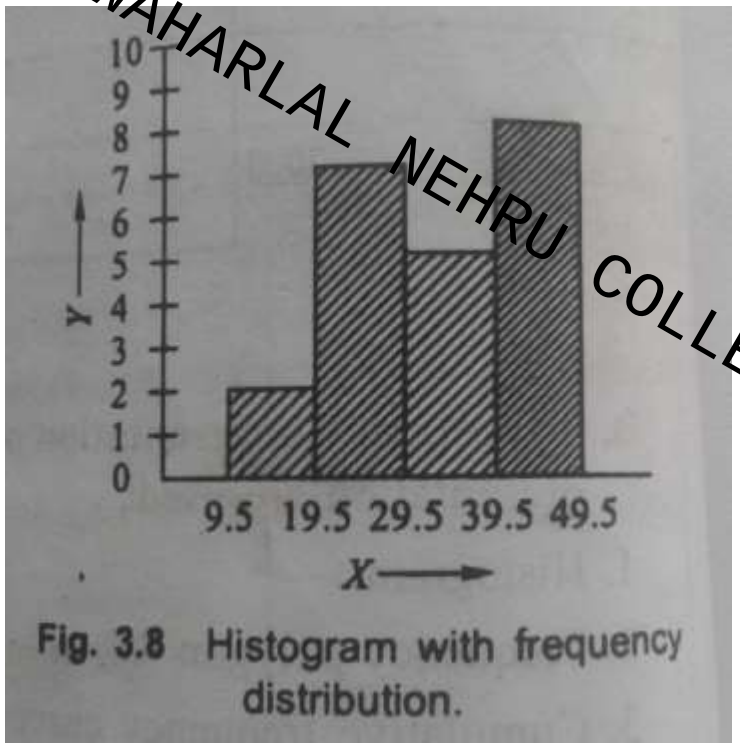

Fig. 3.8 Histogram with frequency distribution.

If data is equal class intervals, directly construct histogram

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Example: Population of carp fishes in 100 ponds are as follows:

Number of carps per ponds	0–100	100–200	200–300	300–400	400–500	500–600
No. of ponds	12	18	27	20	17	6

Solution: This is the case of Histogram with equal class interval.

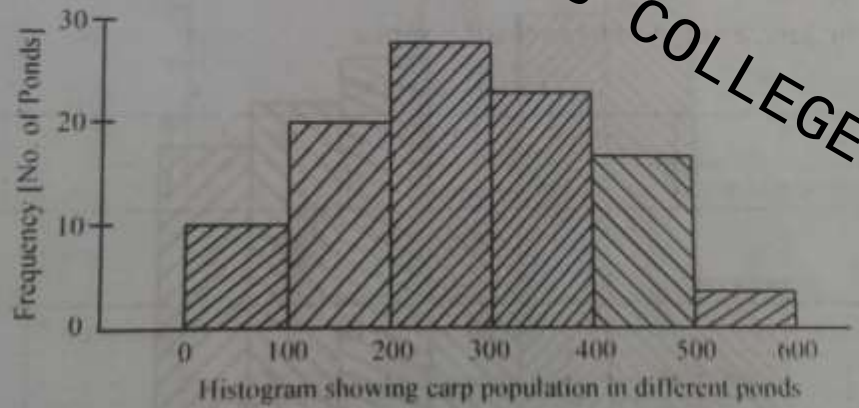

Fig. 3.9 Histogram with equal class intervals.

Frequency polygon

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- A curve obtained by joining the middle of the histograms starts from (highest) histogram to immediate lower histogram successively and form into a figure with a many angles or polygon.
- It is used, where class intervals are equal with discrete (not joined) variables.
- It gives idea about the shape of the frequency distribution.

Example: Construct a histogram and frequency polygon for the following data:

100–150	150–200	200–250	250–300	300–350
4	6	13	5	2

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Solution: We have the case of equal class interval.

Class Interval	Frequency	C.F.
100–150	4	4
150–200	6	10
200–250	13	23
250–300	5	28
300–350	2	30

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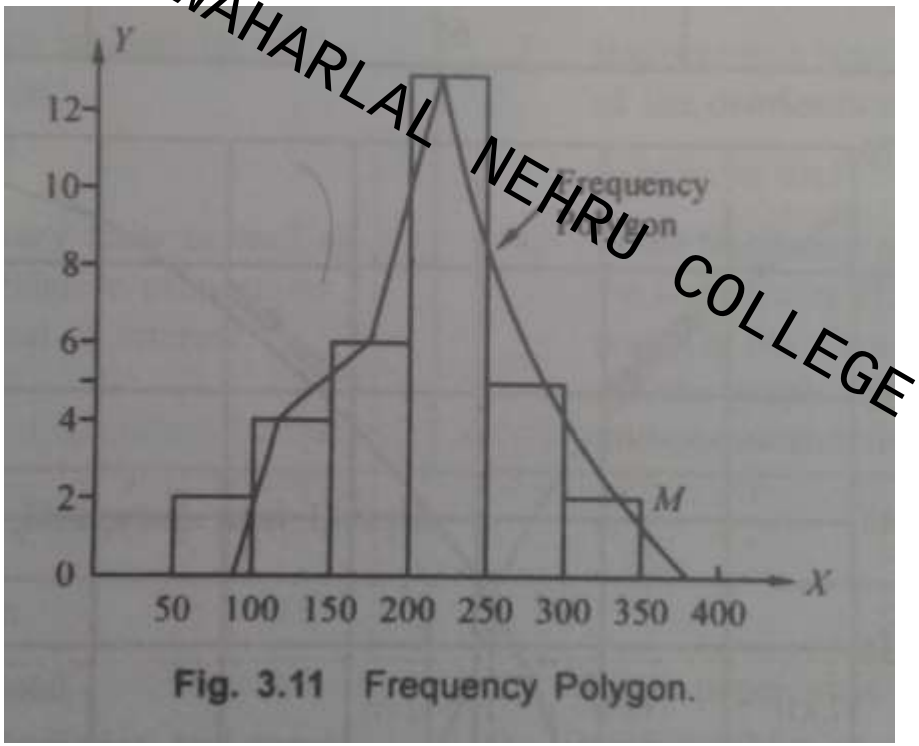

Fig. 3.11 Frequency Polygon.

Ogive/comulative frequency

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- It is a graph to represent data of comulative frequency distribution.
- Ogive gives a curve form graph.
- When the curve is drawn from the comulated data downward, it is called less than ogive (table) while when curve is drawn from the comulated upward, it is called more than ogive.
- It is an important graph to find out median.
- Upper limits (class intervals)are presented along X axis.
- Comulative frequencies are presented along Y axi

Example 14. *Draw a cumulative frequency graph and estimate the number of persons between the ages 32 — 42 in the following table :*

Age	20 —25	25—30	30—35	35—40	40—45	45—50	50—55	55—60
No. of persons	50	70	100	180	150	120	70	59

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Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20 — 25	25	50	50
25 — 30	30	70	120
30 — 35	35	100	220
35 — 40	40	180	400
40 — 45	45	150	550
45 — 50	50	120	670
50 — 55	55	70	740
55 — 60	60	59	799
		799	

Example 15. *Plot less than Ogive and more than Ogive for the following data :*

Cost of production	4 — 6	6 — 8	8 — 10	10 — 12	12 — 14	14 — 16
No. of farms	13	111	182	105	19	7

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Class interval (*Cost of production*)	*Class boundary*	*Frequency* (*No. of farms*)	*Cumulative Frequency* (*Less than Ogive*)	(*More than Ogive*)
	4	0	0	437
4 — 6	6	13	13	424
6 — 8	8	111	124	313
8 — 10	10	182	306	131
10 — 12	12	105	411	26
12 — 14	14	19	430	7
14 — 16	16	7	437	0
		437		

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Class interval (Cost of production)	Class boundary	Frequency (No. of farms)	Cumulative Frequency (Less than Ogive)	Cumulative Frequency (More than Ogive)
	4	0	0	437
4—6	6	13	13	424
6—8	8	111	124	313
8—10	10	182	306	131
10—12	12	105	411	26
12—14	14	19	430	7
14—16	16	7	437	0
		437		

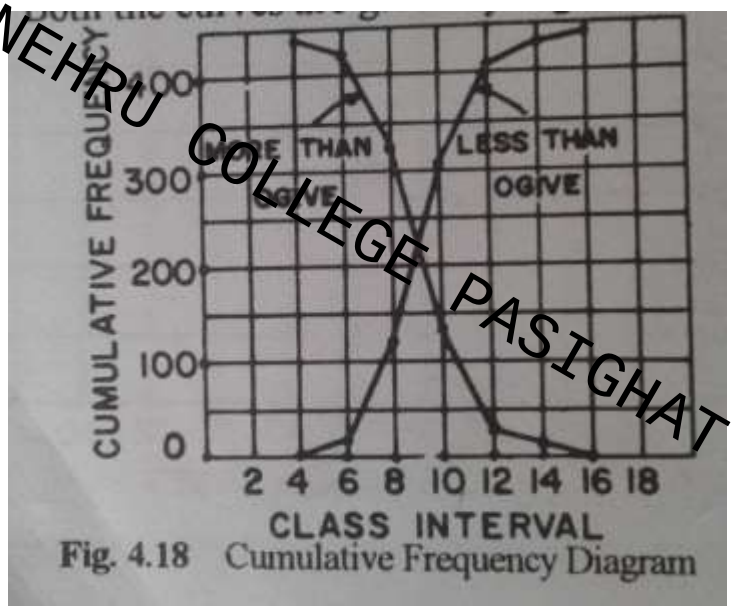

Fig. 4.18 Cumulative Frequency Diagram

Comulative frequency column is important.

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Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20—25	25	50	50
25—30	30	70	120
30—35	35	100	220
35—40	40	180	400
40—45	45	150	550
45—50	50	120	670
50—55	55	70	740
55—60	60	59	799
		799	

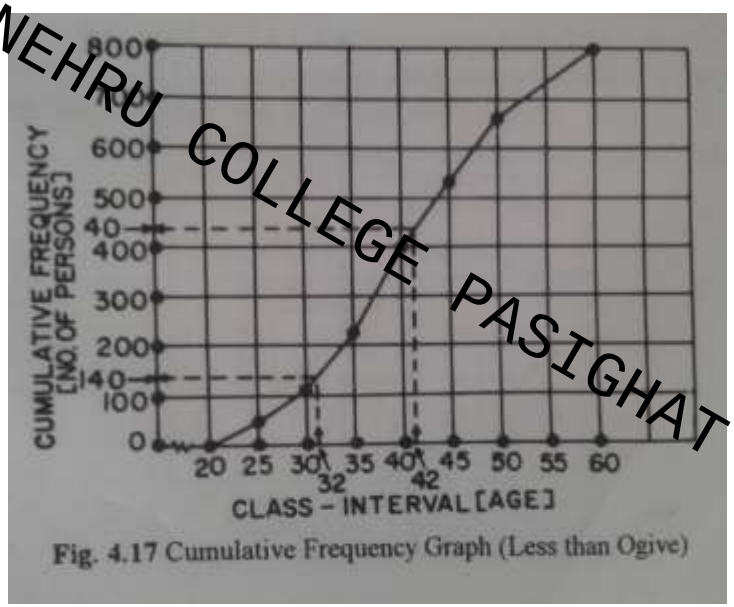

Fig. 4.17 Cumulative Frequency Graph (Less than Ogive)

BSc. VI Sem: Frequency Table

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JAWAHARLAL NEHRU COLLEGE PASIGHAT

Frequency table

- It is a grouping of data/numbers representing variables (characters)according to value of the data.
- It is a way of placing variables (difference in score/numbers) with a close values in a same group.
- Keeping of individual score/data in a familiar group/class.
- Classification of data according to homogeneity.
- When homogeny data are presented in tabular form it is called frequency table.

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Remark: for easy handling of data, Class intervals should in in between 5-20 or multiples of 5

3.2 Frequency Table or Frequency Distribution

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Suppose there are 50 students in a class. Their heights in centimetres are given below :

105, 101, 101, 109, 103, 122, 104, 102, 101, 105, 103, 106, 119, 120, 116, 115, 119, 118, 122, 109, 108, 107, 106, 105, 104, 103, 102, 106, 103, 109, 117, 114, 120, 122, 107, 116, 113, 119, 116, 101, 115, 110, 122, 107, 108, 105, 106, 101, 117.

The data given in the above form is **ungrouped data**. Therefore, to avoid confusion, we first of all write them in the ascending or the descending order. Arranging the above data in ascending order, we get

Array

The data given in the above form is **ungrouped data**. Therefore, to avoid confusion, we first of all write them in the ascending or the descending order. Arranging the above data in ascending order, we get

101, 101, 101, 101, 101, 102, 103, 103, 103, 103, 103, 104, 104, 105, 105, 105, 105, 106, 106, 106, 107, 107, 107, 108, 108, 109, 109, 109, 110, 113, 114, 115, 115, 116, 116, 116, 117, 117, 118, 119, 119, 119, 120, 120, 122, 122, 122, 122, 122.

We call this way of arrangement **array** and the data are said to be **arrayed**. To make the work easier, we can further group these figures and form a table.

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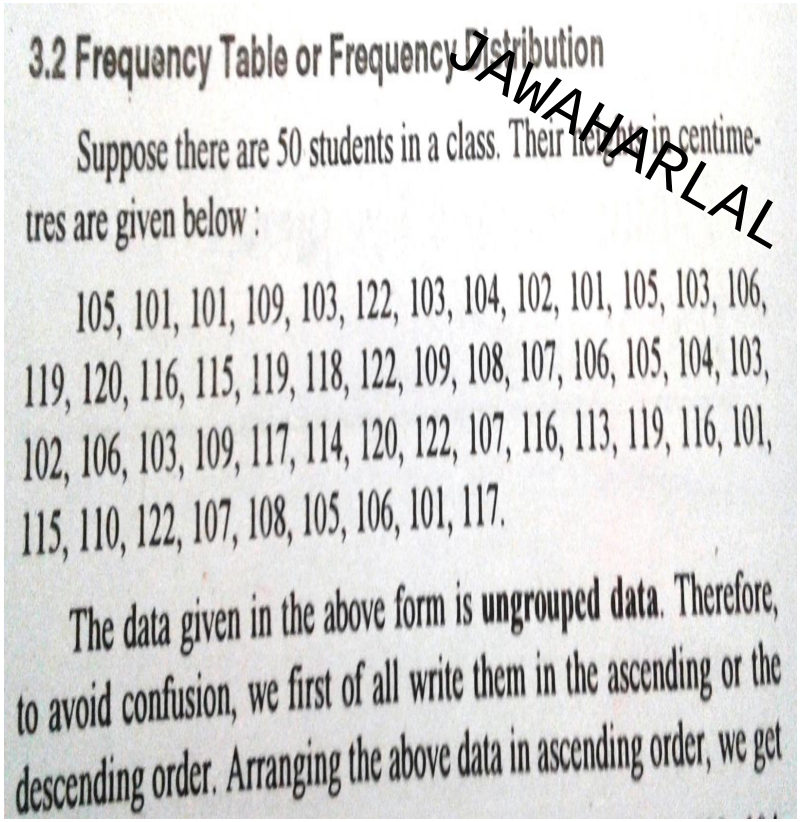
Ungrouped data



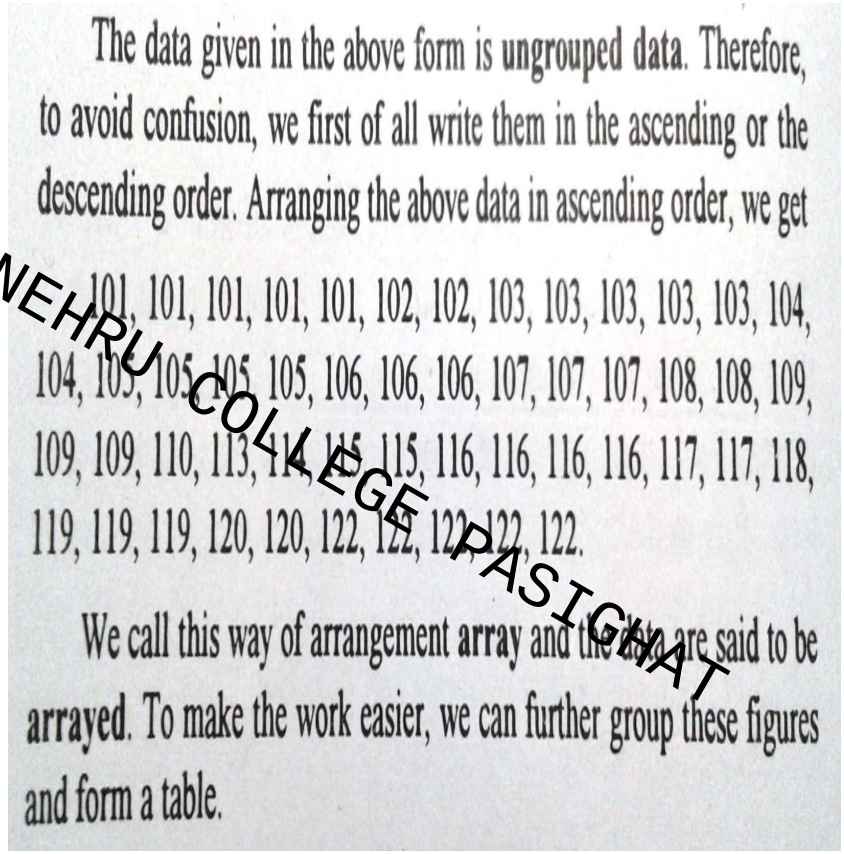
3.2 Frequency Table or Frequency Distribution

Suppose there are 50 students in a class. Their heights in centimetres are given below :

105, 101, 101, 109, 103, 122, 103, 104, 102, 101, 105, 103, 106, 119, 120, 116, 115, 119, 118, 122, 109, 108, 107, 106, 105, 104, 103, 102, 106, 103, 109, 117, 114, 120, 122, 107, 116, 113, 119, 116, 101, 115, 110, 122, 107, 108, 105, 106, 101, 117.

The data given in the above form is **ungrouped data**. Therefore, to avoid confusion, we first of all write them in the ascending or the descending order. Arranging the above data in ascending order, we get

Arrayed data



The data given in the above form is **ungrouped data**. Therefore, to avoid confusion, we first of all write them in the ascending or the descending order. Arranging the above data in ascending order, we get

101, 101, 101, 101, 101, 102, 102, 103, 103, 103, 103, 103, 104, 104, 105, 105, 105, 105, 106, 106, 106, 107, 107, 107, 108, 108, 109, 109, 109, 110, 113, 114, 115, 115, 116, 116, 116, 116, 117, 117, 118, 119, 119, 119, 120, 120, 122, 122, 122, 122.

We call this way of arrangement **array** and the data are said to be **arrayed**. To make the work easier, we can further group these figures and form a table.

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Frequency table/frequency distribution

We call this way of arrangement **array** and the data are said to be **arrayed**. To make the work easier, we can further group these figures and form a table.

TABLE I

Heights (in cm)	*No. of students*	*Heights (in cm)*	*No. of students*
101	5	110	1
102	4	113	1
103	5	114	1
104	2	115	2
105	4	116	4
106	3	117	2
107	3	118	1
108	2	119	3
109	3	120	2
		122	4

The method of arranging the given data in the above form is known as **frequency distribution**. Here heights are called variates

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and the number of students whose heights are a particular number of centimetres is called **frequency of the variate**. Thus frequency is the number of times a variate has been repeated. Though the frequency table given above is an improvement over the arranged data, yet we can further simplify it by classifying it into groups :

Further simplification of the same data into groups called Group frequency table/grouped frequency distribution.
(in this table we can have 5 frequency of variates:
(101=lower limit,
105 =upper limit
of exclusive class interval of 101to 105.)

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TABLE II

Heights (in cm)	No. of students
101-105	8
106-110	12
111-115	4
116-120	12
121-125	4
	50

Where do we place if a student's height is 105.5 ?

- use Including frequency table for such case

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Exclusive vs Inclusive distribution

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Exclusive/discontinuous frequency distribution

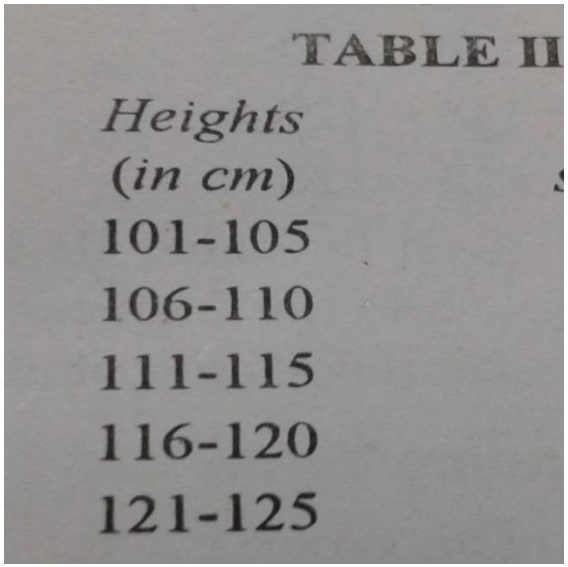

TABLE II

Heights (in cm)
101-105
106-110
111-115
116-120
121-125

Inclusive/contineous frequency distribution

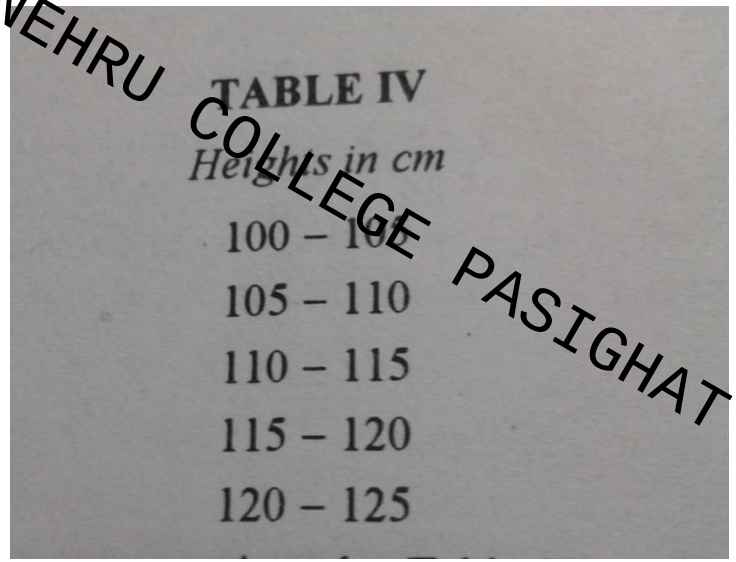

TABLE IV

Heights in cm
100 – 105
105 – 110
110 – 115
115 – 120
120 – 125

3.3 Preparation of a Frequency Table

(*i*) Arrange the scores or form an array.

(*ii*) Draw a table consisting of three columns :

(*a*) Class-interval, (*b*) Tally, (*c*) Frequency.

(*iii*) Bearing in mind the lower and the upper limits, write down the class–intervals or the variables in the first column.

(*iv*) Against each interval or the variable write down as many vertical lines in the "Tally column" as the number of scores it contains.

(*v*) Count the number of vertical lines, crossing of 4 lines to be counted as 5 and put down the number in the 'frequency column'.

Note : The total of the frequency column must be equal to the total number of items of the given data.

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We have discussed/seen

- 1. Frequency table

- Lets understand commulative frequency, which is simply a summation of frequency

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summation

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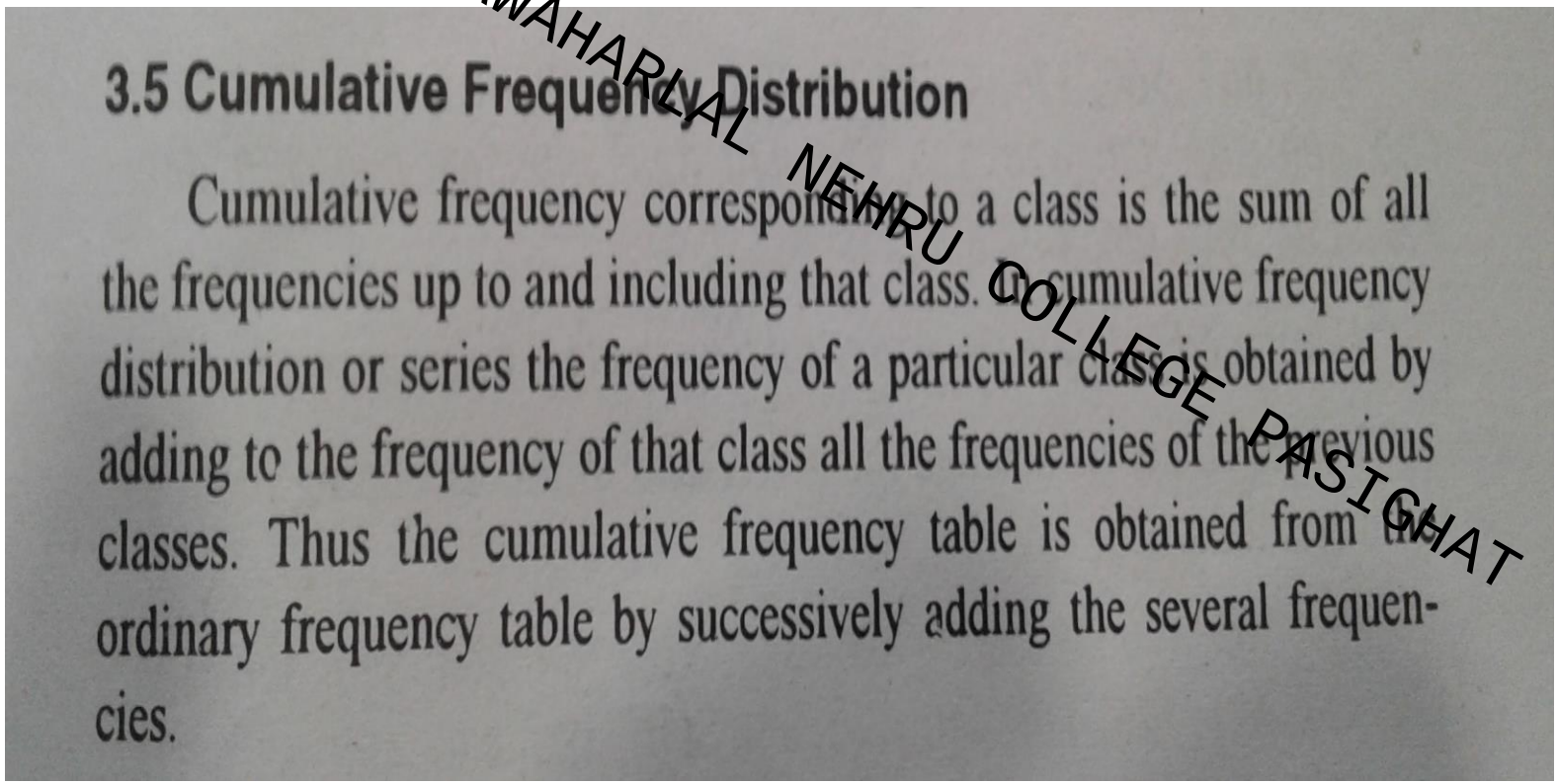

3.5 Cumulative Frequency Distribution

Cumulative frequency corresponding to a class is the sum of all the frequencies up to and including that class. In cumulative frequency distribution or series the frequency of a particular class is obtained by adding to the frequency of that class all the frequencies of the previous classes. Thus the cumulative frequency table is obtained from the ordinary frequency table by successively adding the several frequencies.

example

Example 3. *The marks obtained by 35 students of 11th class of a Government school are :*

628, 665, 560, 328, 421, 525, 326, 480, 470, 405, 421, 664, 668, 620, 300, 305, 520, 420, 370, 326, 440, 328, 480, 565, 650, 480, 360, 325, 450, 360, 426, 440, 306.

Form a cumulative frequency table with class interval of 50.

Solution. Let us arrange the given data in the ascending order of the magnitudes.

300, 305, 306, 325, 326, 326, 328, 328, 360, 360, 360, 370, 405, 420, 421, 421, 426, 426, 440, 440, 450, 470, 480, 480, 480, 520, 525, 560, 565, 620, 628, 650, 664, 665, 668.

Let us now put them in a group of class interval 50 in the following cumulative frequency distribution form :

Class interval	*Frequency*	*Cumulative Frequency*
300 — 350	8	8
351 — 400	4	12
401 — 450	9	21
451 — 500	4	25
501 — 550	2	27
551 — 600	2	29
601 — 650	3	32
651 — 700	3	35

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We have discussed/seen

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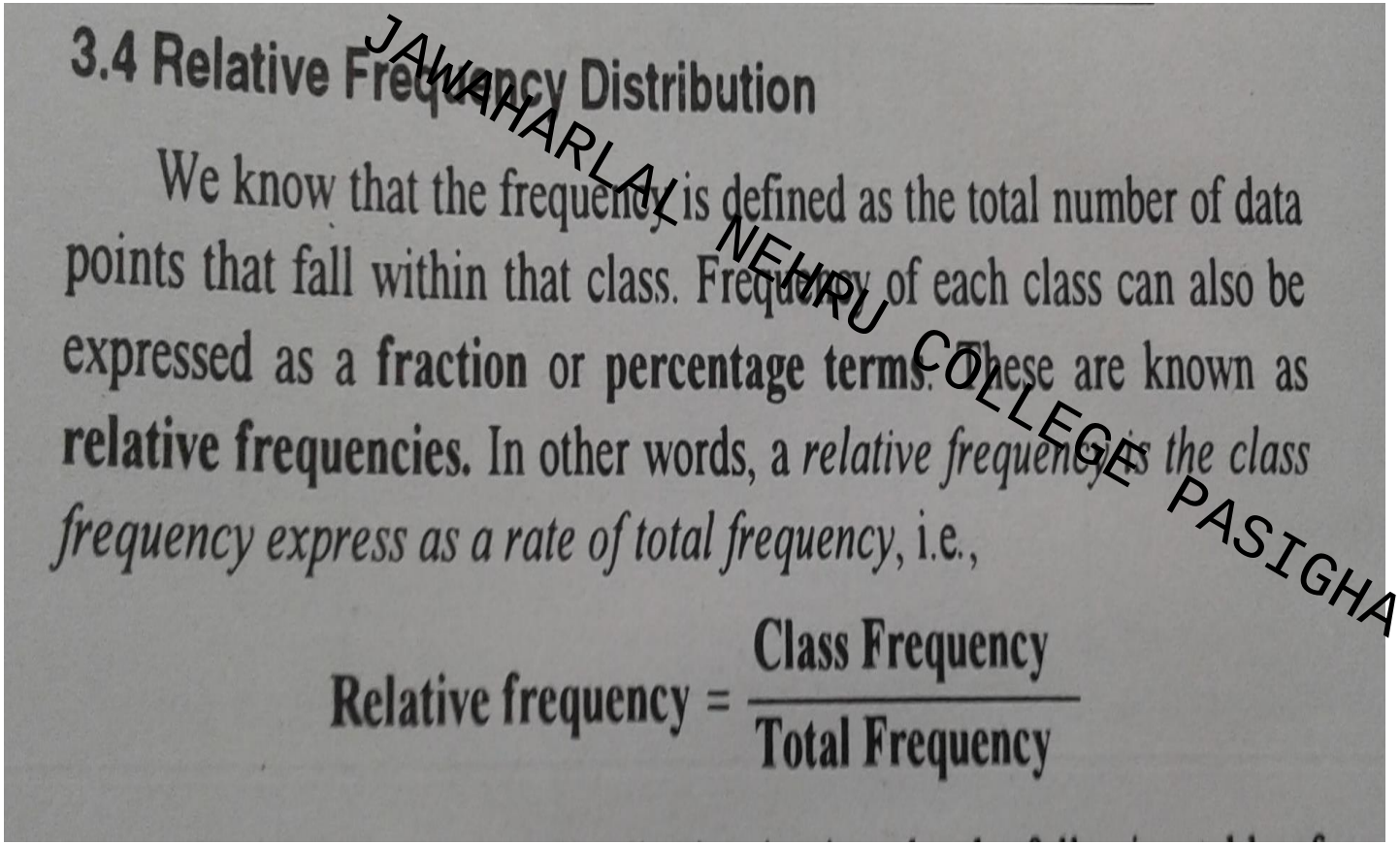
- 1. Frequency table
- 2. commutative frequency, which is simply a summation of frequency.

Now:

- 3. lets understand percentage/relative frequency or how much the frequency relate one another.

percentage



3.4 Relative Frequency Distribution

We know that the frequency is defined as the total number of data points that fall within that class. Frequency of each class can also be expressed as a **fraction** or **percentage terms**. These are known as **relative frequencies.** In other words, a *relative frequency is the class frequency express as a rate of total frequency*, i.e.,

$$\text{Relative frequency} = \frac{\text{Class Frequency}}{\text{Total Frequency}}$$

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A relative frequency distribution is given by the following table of marks secured by 25 students out of 100.

TABLE : Relative Frequency Distribution for the Collection Days

Class (Marks)	*Frequency (No. of students)*	*Relative frequency*
20 — 40	6	6/25 = 0.24 or 24%
40 — 60	12	12/25 = 0.48 = 48%
60 — 80	4	4/25 = 0.16 = 16%
80 — 100	3	3/25 = 0.12 = 12%
Total	25	1.00 or 100%

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It may be observed that the sum of all relative frequencies is 1.000 or 100 per cent because the frequency of each class has been expressed as a percentage of the total frequencies. (or data)

We have discussed/seen

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- 1. Frequency table
- 2. commutative frequency, which is simply a summation of frequency.
- 3. I percentage/relative frequency or how much the frequency relate one another.

histogram

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- Histogram is represented by a rectangular bar to depict frequency distribution.
- Size of the class interval is represented by width
- Size of the frequency is represented by height.
- Class boundaries/intervals is important in the construction of histogram and represent in horizontal or X axis of the graph.
- Frequency is represented as height in the graph on Y axis.
- Histogram is essentially an area diagram composed of series of adjacent rectangles.

Steps/procedure of histogram

age	10-19	20-29	30-39	40-49
No. of class		0	1	10

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- If data is given in exclusive series, convert data into inclusive series.
- It is customary to take two extra class intervals one below and another above the given class.

age	9.5-19.5	19.5-29.5	29.5-39.5	39.5-49.5
No.of class	1	0	1	10

- .

- Take actual lower limit of class intervals and plot it in X axis
- Then take the corresponding frequency and construct graph by joining lower and higher limit of class interval and frequency of that class intervals.

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Example of inclusive data

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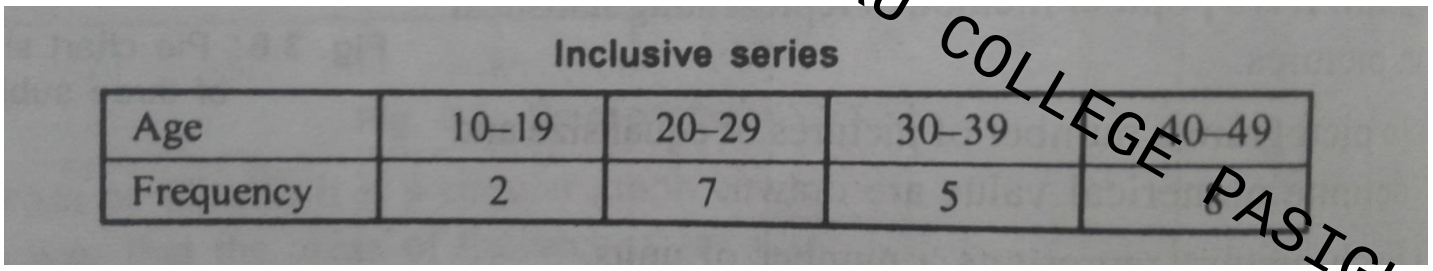

Inclusive series

Age	10–19	20–29	30–39	40–49
Frequency	2	7	5	6

Convert inclusive data into exclusive data

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Exclusive Series:

Age (class interval)		Size of interval	Frequency	Frequency density
Score limit	True limit			
10–19	9.5–19.5	10	2	$\frac{2}{10} = 0.2$
20–29	19.5–29.5	10	7	$\frac{7}{10} = 0.7$
30–39	29.5–39.5	10	5	$\frac{5}{10} = 0.5$
40–49	39.5–49.5	10	8	$\frac{8}{10} = 0.8$

(*ii*) The scores in the form of actual class limits

Draw graph

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Exclusive Series:

Age (class interval)		Size of interval	Frequency	Frequency density
Score limit	True limit			
10–19	9.5–19.5	10	2	$\frac{2}{10} = 0.2$
20–29	19.5–29.5	10	7	$\frac{7}{10} = 0.7$
30–39	29.5–39.5	10	5	$\frac{5}{10} = 0.5$
40–49	39.5–49.5	10	8	$\frac{8}{10} = 0.8$

(*ii*) The scores in the form of actual class limits

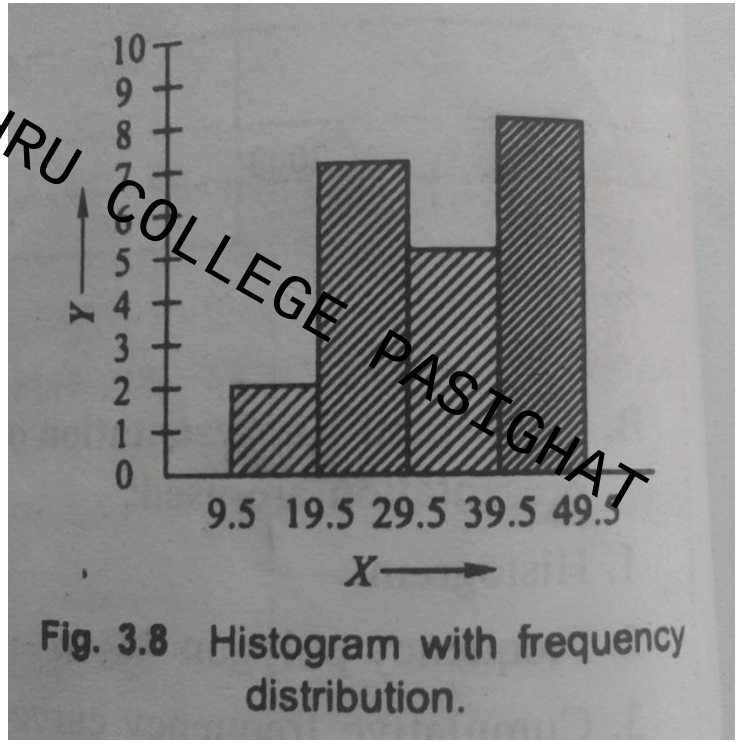

Fig. 3.8 Histogram with frequency distribution.

If data is equal class intervals, directly construct histogram

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Example: Population of carp fishes in 100 ponds are as follows:

Number of carps per ponds	0–100	100–200	200–300	300–400	400–500	500–600
No. of ponds	12	18	27	20	17	6

Solution: This is the case of Histogram with equal class interval.

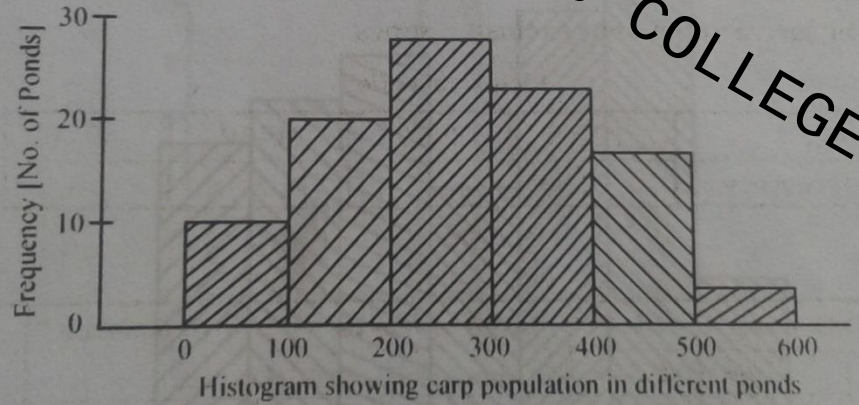

Fig. 3.9 Histogram with equal class intervals.

Objectives

- We have learned what is histogram
- Now
- Lets discuss frequency polygon

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Frequency polygon

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- A curve obtained by joining the middle of the histograms starts from (highest) histogram to immediate lower histogram successively and form into a figure with a many angles or polygon.
- It is used, where class intervals are equal with discrete (not joined) variables.
- It gives idea about the shape of the frequency distribution.

Example: Construct a histogram and frequency polygon for the following data:

100–150	150–200	200–250	250–300	300–350
4	6	13	5	2

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Solution: We have the case of equal class interval.

Class Interval	Frequency	C.F.
100–150	4	4
150–200	6	10
200–250	13	25
250–300	5	28
300–350	2	30

Frequency polygon

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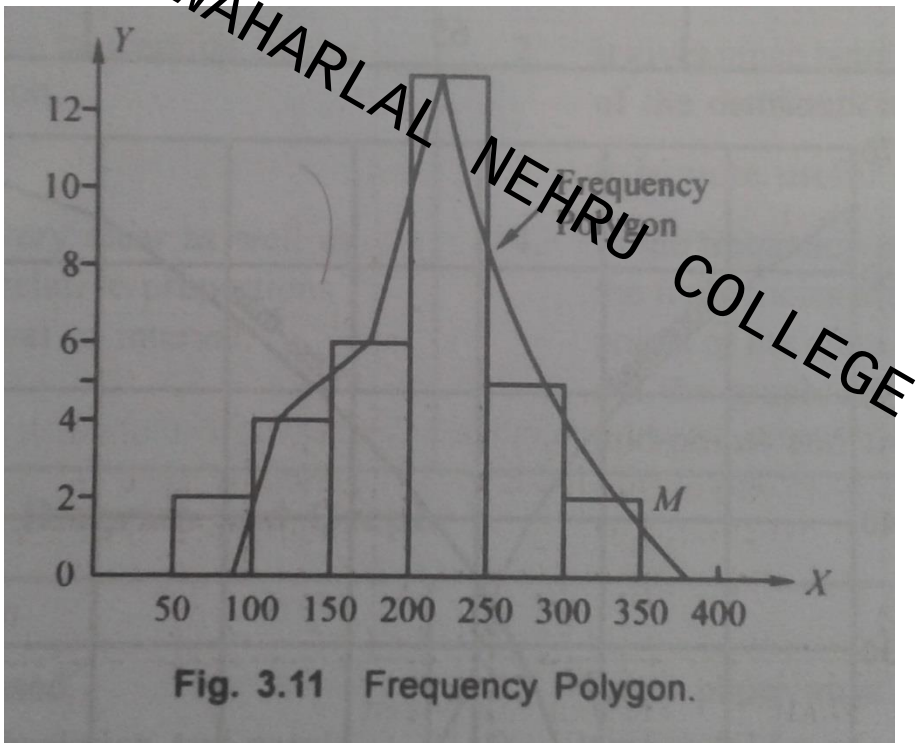

Fig. 3.11 Frequency Polygon.

Objectives

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- We have learned what is histogram
- Discussed frequency polygon
- Now
- Lets see ogive/ commutative frequency

Ogive/cumulative frequency

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- It is a graph to represent data of cumulative frequency distribution.
- Ogive gives a curve form graph.
- When the curve is drawn from the cumulated data downward is called less than ogive (table) while when curve is drawn from the cumulated upward is called more than ogive.
- It is an important graph to find out median.
- Upper limits (class intervals)are presented along X axis.
- Cumulative frequencies are presented along Y axis

Example 14. *Draw a cumulative frequency graph and estimate the number of persons between the ages 32 — 42 in the following table :*

Age	20 —25	25—30	30—35	35—40	40—45	45—50	50—55	55—60
No. of persons	50	70	100	180	150	120	70	59

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Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20 — 25	25	50	50
25 — 30	30	[illegible]	120
30 — 35	35	100	220
35 — 40	40	180	400
40 — 45	45	150	[illegible]
45 — 50	50	120	670
50 — 55	55	70	740
55 — 60	60	59	799
		799	

Keep on adding the commulative frequency

Add to get less than ogive but deduct to get more than ogive in commulative frequency

Example 15. *Plot less than Ogive and more than Ogive for the following data :*

Cost of production	4 — 6	6 — 8	8 — 10	10 — 12	12 — 14	14 — 16
No. of farms	13	111	182	105	19	7

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Class interval (Cost of production)	*Class boundary*	*Frequency (No. of farms)*	*Cumulative Frequency (Less than Ogive)*	*(More than Ogive)*
	4	0	0	437
4 — 6	6	13	13	424
6 — 8	8	111	124	313
8 — 10	10	182	306	131
10 — 12	12	105	411	26
12 — 14	14	19	430	7
14 — 16	16	7	437	0
		437		

OGIVE

Class interval (Cost of production)	Class boundary	Frequency (No. of farms)	Cumulative Frequency (Less than Ogive)	Cumulative Frequency (More than Ogive)
	4	0	0	437
4—6	6	13	13	424
6—8	8	111	124	313
8—10	10	182	306	131
10—12	12	105	411	26
12—14	14	19	430	7
14—16	16	7	437	0
		437		

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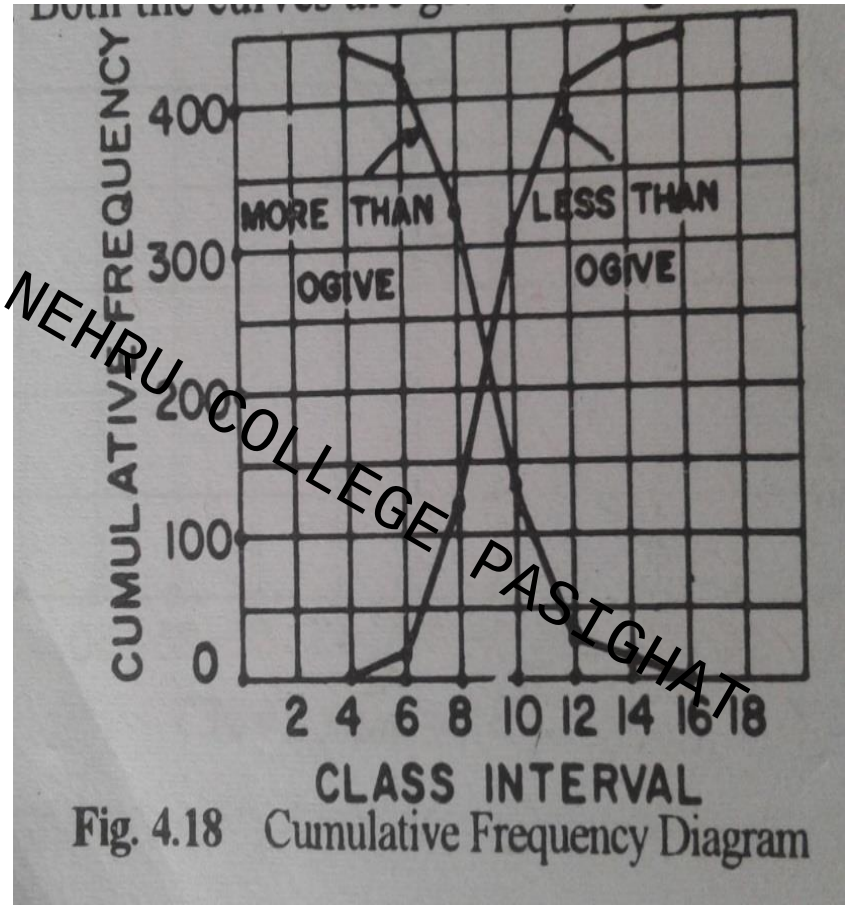

Fig. 4.18 Cumulative Frequency Diagram

Example 14. *Draw a cumulative frequency graph and estimate the number of persons between the ages 32 — 42 in the following table :*

Age	20 —25	25—30	30—35	35—40	40—45	45—50	50—55	55—60
No. of persons	50	70	100	180	150	120	70	59

Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20—25	25	50	50
25—30	30	70	120
30—35	35	100	220
35—40	40	180	400
40—45	45	150	550
45—50	50	120	670
50—55	55	70	740
55—60	60	59	799
		799	

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HINT: Age between 32 to 42=35+40+45=120 divided by 3=40.

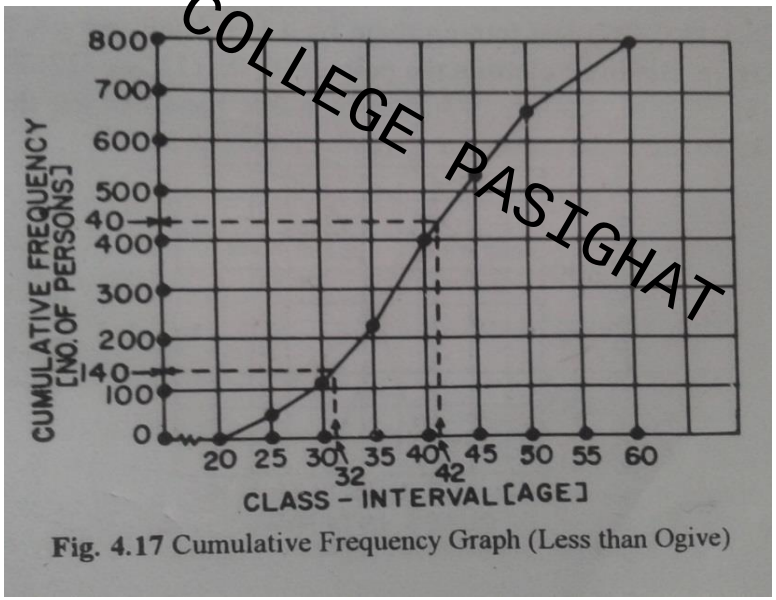

Fig. 4.17 Cumulative Frequency Graph (Less than Ogive)

Mughal garden, N. Delhi

BSc. I Sem.

Dr. T. Payum
Department of Botany
J.N.College, Pasighat
Arunachal Pradesh

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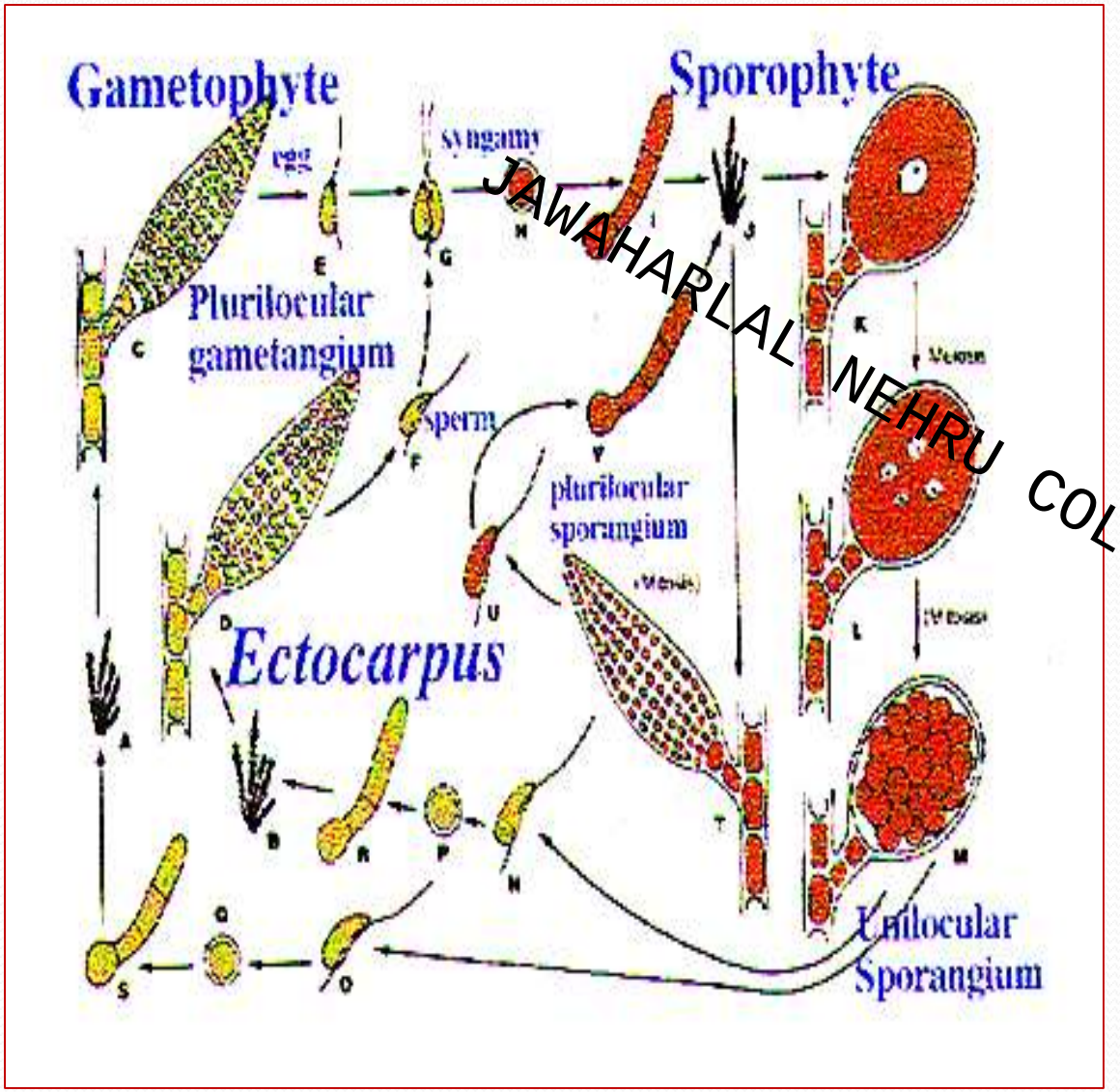
Points to remember



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- Three pluriloculars:

1. Plurilocular sporangium (Asexual) (2n).
2. Male and Female Plurilocular gametangium (produced from Unilocular sporangium take part in sexual reproductionn (n).).

✓ Two sporangium i.e Unilocular sporangium and Plurilocular sporangium.

✓ Notice the gametophyte (n) and Sporophyte (2n).

sporangiums

Plurilocular sporangium lead to asexual reproduction

Unilocular sporangium lead to sexual reproduction

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SYSTEMATIC POSITION

- CLASS- PHAEOPHYCEAE
- ORDER-ECTOCARPALES
- FAMILY-ECTOCARPACEAE
- GENUS-ECTOCARPUS
- SPECIES- *E. acanthophorus, E. acutus etc.*
- BROWN ALAGE, WIDELY DISTRIBUTED, REMAIN ATTACHED TO ROCKS AND OTHER BOGGER ALAGE.

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VEGETATIVE/THALLUS/ PLANT BODY

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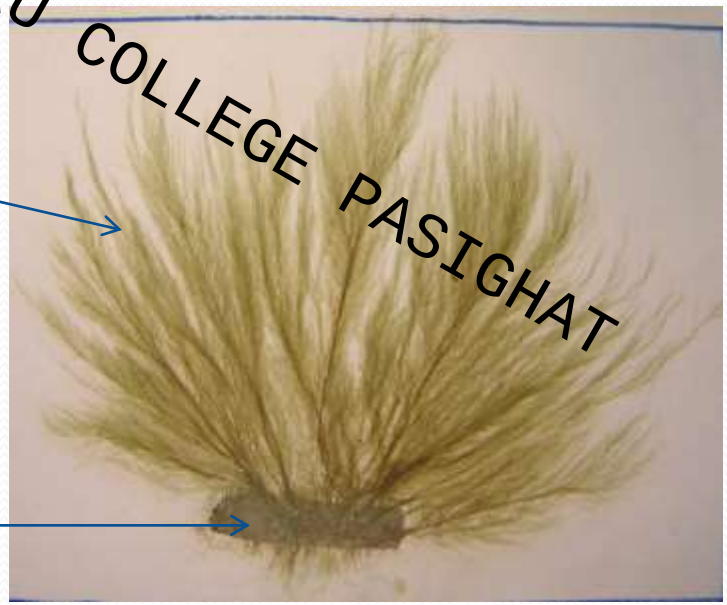
- Occur as tufts of branched filaments.
- Thallus can be divided into prostrate and branched errect portion.

- ERRECT PORTION

- PROSTRATE PORTION



,

- Errect branches are uniserriate or monosiphonous.
- Branching is always lateral in position and arise from beneath the septa.
- Cell contain numerous disc-shaped brown plastids.
- Morphologically all vegetative thallus are similar in appearance BUT
- Genetically two types of ectocarpus thallus are found (Haploid & Diploid)

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,

- 1. DIPLOID SPOROPHYTE THAT PRODUCE SPORES
- 2. HAPLOID GAMETOPHYTE THAT PRODUCE GAMETES.

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REPRODUCTION/LIFE CYCLE

- COMPLETE LIFE CYCLE BY TWO METHODS:-
- 1. ASEXUAL REPRODUCTION / SPOROPHYTE
- 2. SEXUAL REPRODUCTION/ GAMETOPHYTE

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ASEXUAL REPRODUCTION/ZOOSPORE FORMATION

- Ectocarpus produce two kinds of asexual structures called zoores:-
- A) Haploid zoospore is borne from unilocular sporangium
- B) Diploid zoospore is borne from plurilocular zoospore.
- Unilocular zoosporangiaum and plurilocular zoosporangium may be developed on same thallus or in separate thallus.

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UNILOCULAR ZOOSPORANGIUM

- Unilocular zoosporangium produce 32-64 haploid zoospores by meiotic division.
- These zoospores escape through terminal opening of sporangium and give rise to haploid gametophyte plant i.e thallus.
-
-

Unilocular zoosporangium

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PLURILOCULAR ZOOSPORE

- The plurilocular sporangium produce diploid zoospores by mitotic dividion.
- Plurilocular zoospores germinate to give rise to diploid sporophyte plant.
- Plurilocular appears as many tiers of cells arranged like an open maize.
- Unilocular zoopsopes as well as plurilocular zoopsores develope laterally inserted flagella.
- Flagella are heterokont.

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- PLURILOCULAR SPORANGIUM

- **Asexual reproduction**

- (2n)Unilocular zoosporangium
- (meiotic)
- (n)haploid zoospore
- Haploid gametophyte thallus (n)

- Plurilocular sporangium (2n)
- (mitotic)
- (2n)Diploid zoospore
- Diploid sporophyte thallus (2n)

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Sexual reproduction

- Gametophyte thallus produced from unilocular zoospores matured up to produce **plurilocular gametangium.**
- Plurilocular gametangium produce gametes, laterally biflagellated
- Heterothallic i.e gametes from different thallus fuse together.
- Isogamous i.e same type of gametes fuse together.
- Male gametes are more active than female gametes

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Contd.

- Male gametes crowd around the female gamete and fertilization take place.
- Zygote grow to form sporophyte plant.
- Sporophyte plant again produce unilocular or plurilocular zoosporangium.

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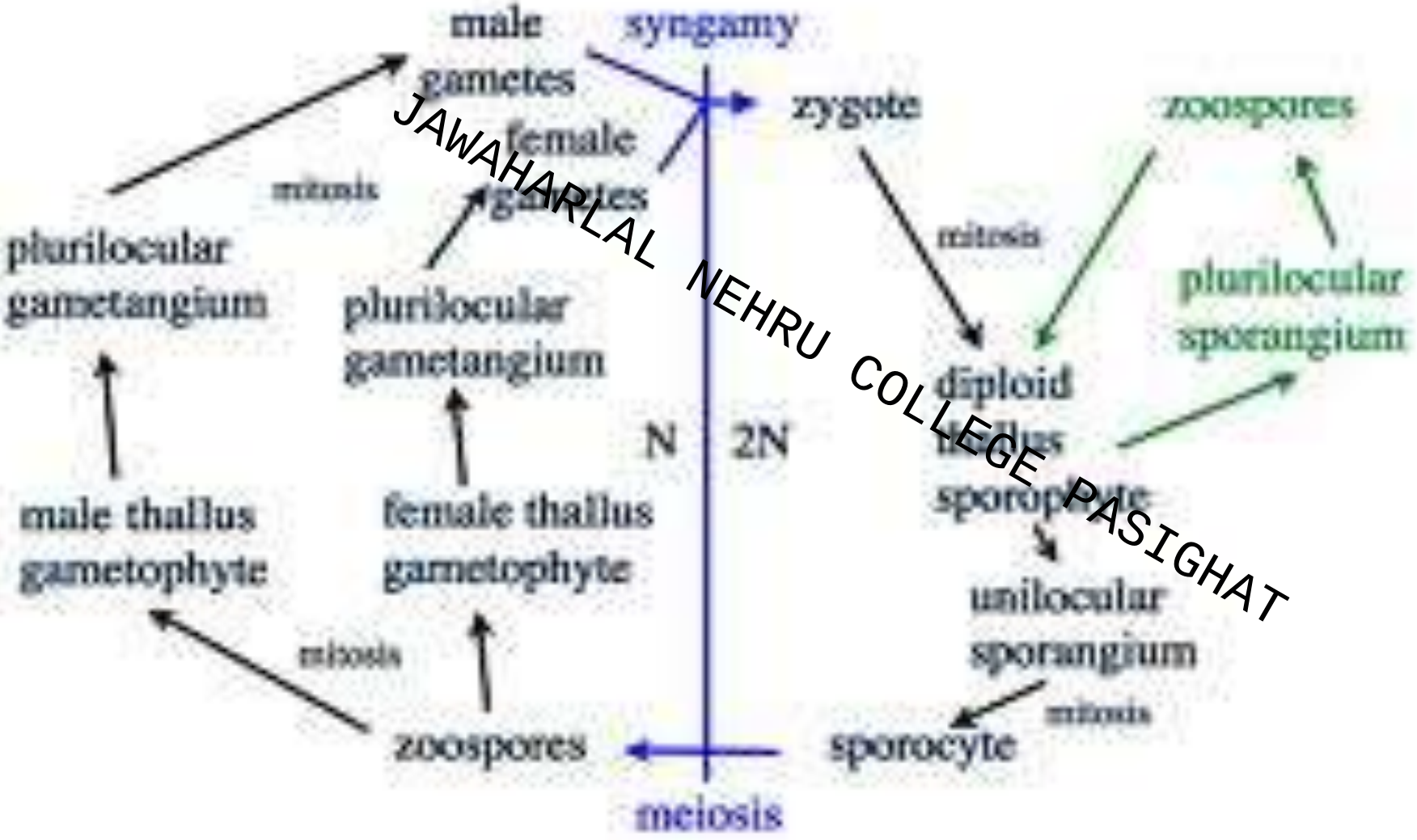
Ectocarpus Life Cycle



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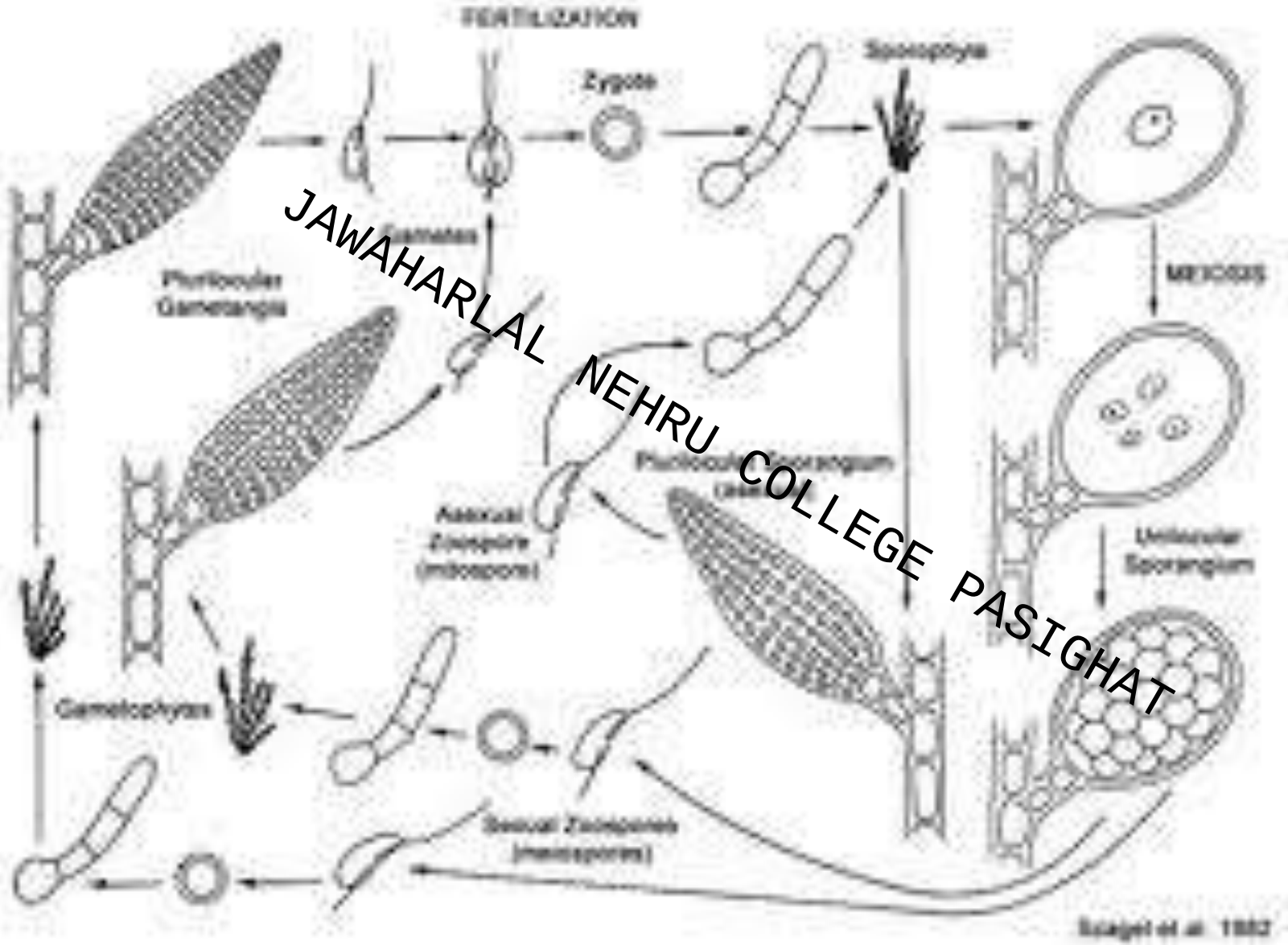

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Alternation of generation

- Isomorphic alternation of generation by forming familiar sporophyte and gametophyte thallus.

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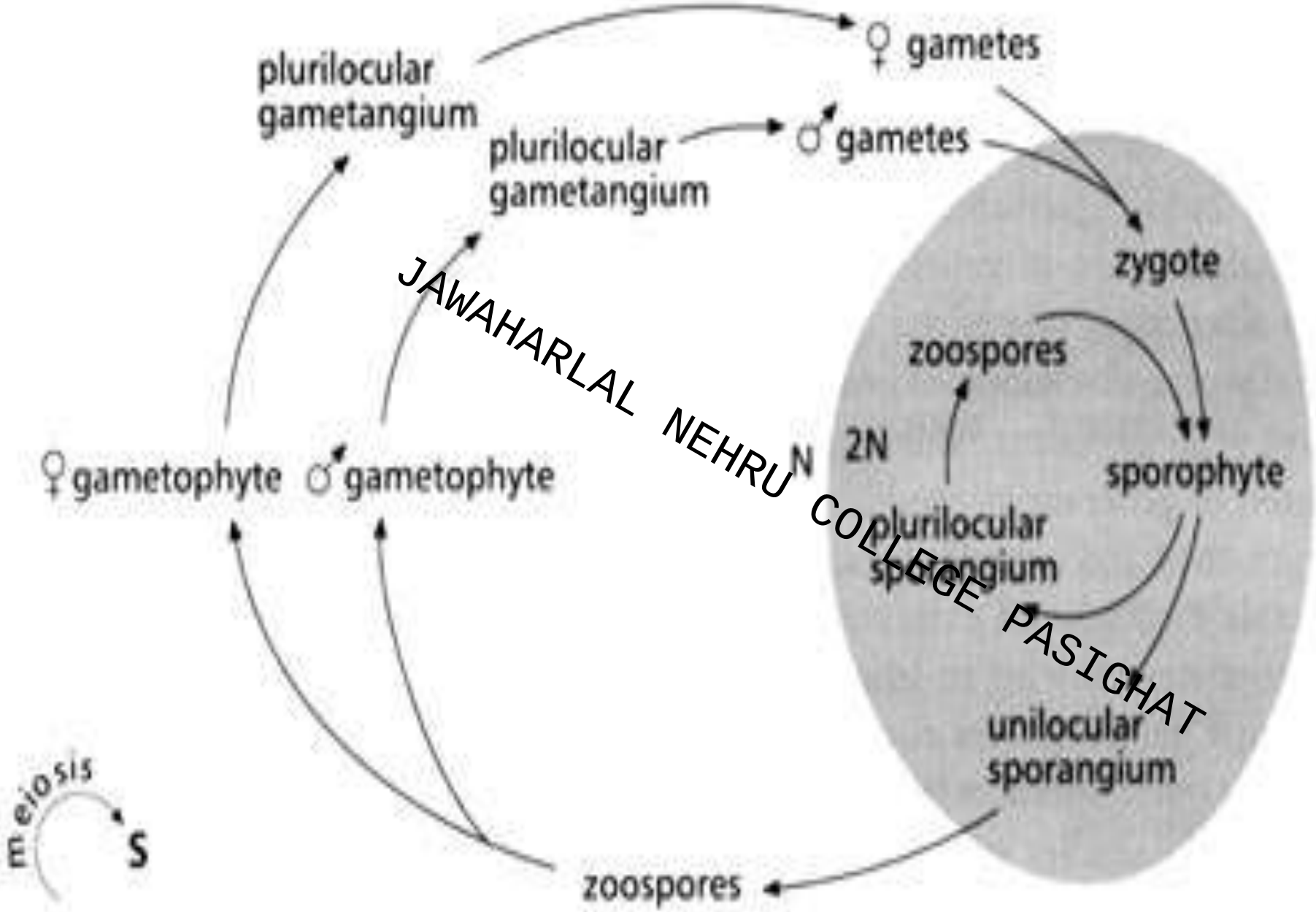

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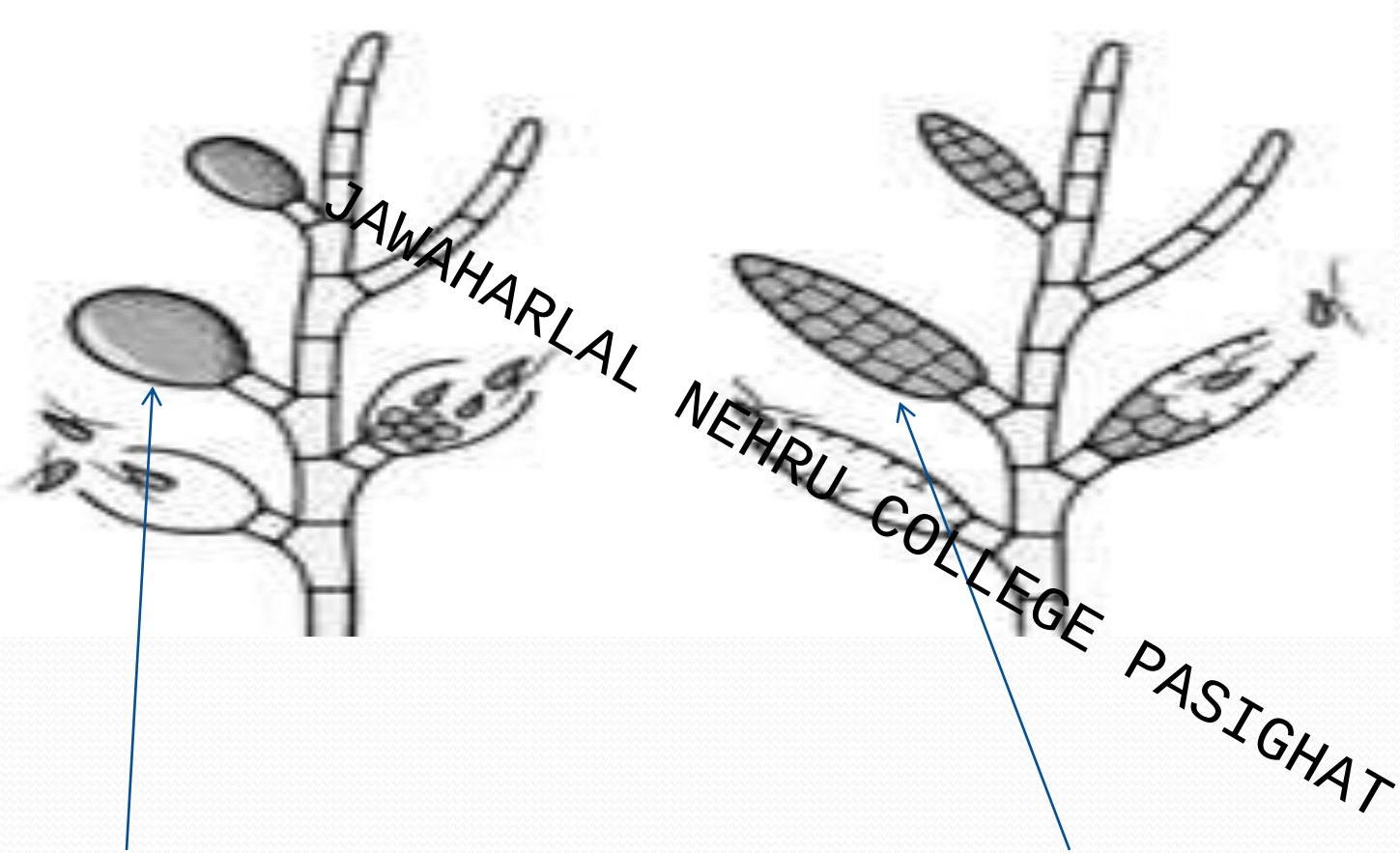
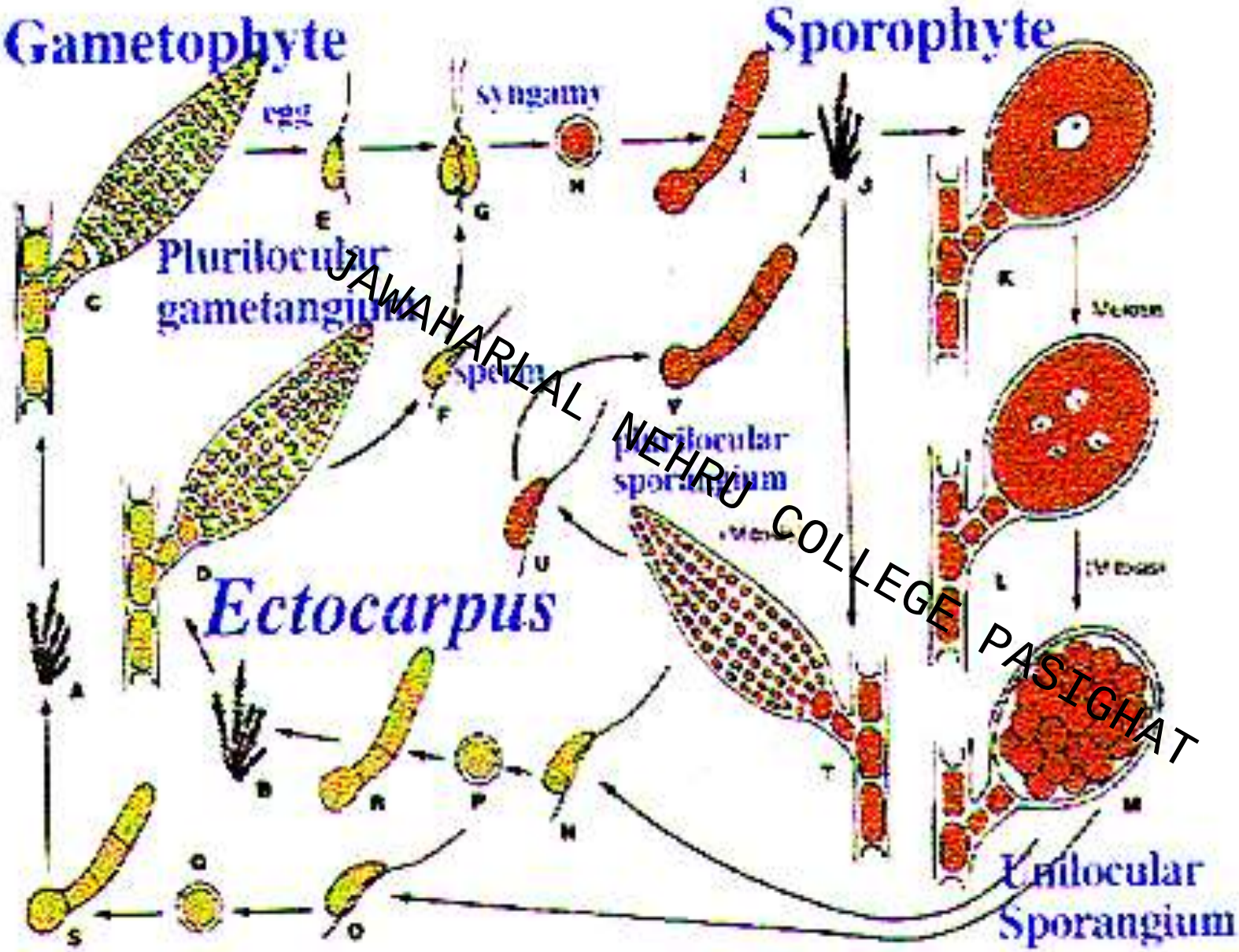


- Unilocular

Plurilocular


Gametophyte
Sporophyte
egg
syngamy
Plurilocular gametangium
Ectocarpus
Unilocular Sporangium
JAWAHARLAL NEHRU COLLEGE PASIGHAT

BRYOPHYTES

SEMESTER – I

PAPER : BOT-111

UNIT – IV

JAWAHARLAL NEHRU COLLEGE PASIGHAT

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The Division Bryophyta coomprises of **Mosses & Liverworts** and their allies

Moss Gametophytes with sporophytes evident

Thalloid Liverworts

Division Bryophyta : *Nonvascular Thallophytes*

Characteristic features of Bryophytes:

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A. Plant body is a thallus.
B. No well developed **vascular** tissue. (xylem and phloem).
C. True **roots** and **leaves** absent.
D. **Rhizoids** for anchorage & absorption.
E. **Absorb** their water and nutrients at the **soil's surface**.
F. **Heteromorphic** & show **alternation of generation**.
G. Mostly **dioecious**. Reproduce by Archegonia & Antheridia.
H. Despite being **terrestrial**, compulsorily **require water** for reproduction.

Bryophytes have two stages in their life cycle:

1. Gametophyte – the dominant **haploid** stage in the life cycle, usually associated with **mycorrhizal fungi**. Produce **gametes.**

a) **Antheridia** (singular: **antheridium**) **male** organs, which produces many **flagellated sperms** as the **male gametes.**

b) **Archegonia** (singular: **archegonium**) **female** organs, which each produce only one **egg** as the **female gamete**.

2. Sporophyte

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2. **Sporophyte** –

a) the short-lived, unbranched **diploid** stage in the life cycle of the Bryophytes. Entirely dependent on the Gametophyte.

b) It contains a terminal **sporangium**, which produces spores that arises from the **sporophyte** (known as a **calyptra**).

c) This sporophyte releases **spores** which grow into **protonema,** that develop into new gametophytes.

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DIVERSITY AMONGST THE BRYOPHYTES

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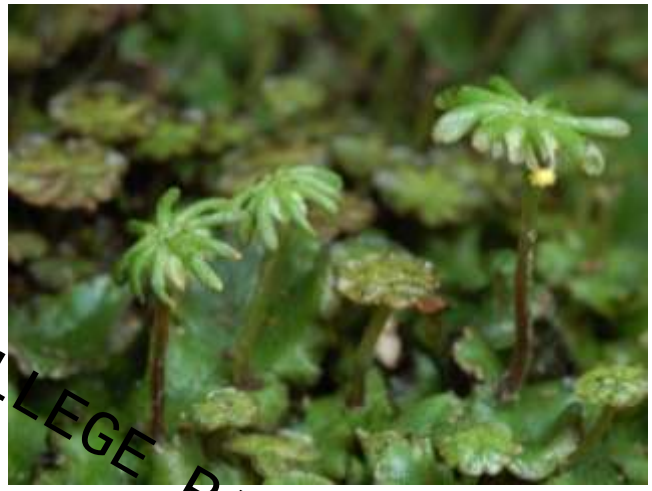
A. Class – Hepaticopsida : the Liverworts

1. **Liverworts** were named during the medieval times. Since they were lobed they were thought to be similar to the human liver.
2. Gametophytic plant body is a **prostrate, dorsiventral**, leaf-like **thallus**.
3. They always have **unicellular rhizoids**.
4. They have **photosynthetic upper sides** and **non photosynthetic undersides**.
5. Their sporangia are often **unstalked**.
6. They shed spores from the sporangia.
7. They reproduce asexually using **Gamma Cups**, which produces specialized propagules called **gemmules**, that survive as the “older” plant dies off.
8. The most common species is ***Marchantia*.**



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B. Class – Antherocerotopsida : the Hornworts

1. **Hornworts** are our **smallest** group of bryophytes with only 100 species.
2. The most common and well known is ***Anthoceros***.
3. Gametophyte is prostrate, dorsiventral, green and unlobed.
4. Its **sporophyte** is considered to be the most advanced among bryophytes in evolutionary terms.
5. The **sporophyte** is shaped like a small horn.
6. Each photosynthetic cell has only **ONE** chloroplast.
7. The cavities of hornworts are filled with **mucilage**.

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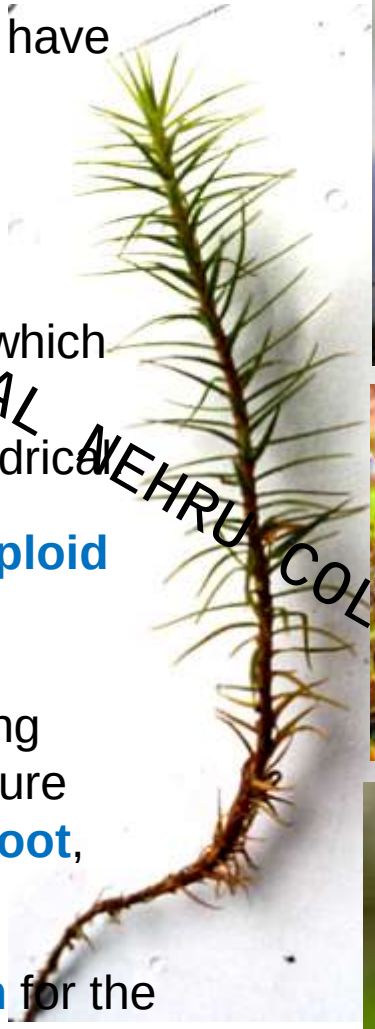
C. Class – Bryopsida : the Mosses

1. Mosses do not have leaves but ***do*** have leafy extensions.
2. Their spores form a filamentous **protonema**. *(means first thread)*
3. The **protonema** sends out shoots which grow up into **gametophytes**. The gametophytes are upright and cylindrical.
4. From the **gametophyte** arises a **diploid sporophyte** that produces a single **capsule** known as the **calyptra**, a structure that protects the developing spores from **dessication**. The mature **sporophyte** has three parts – the **foot**, the **seta** and the **capsule**.
5. The capsule acts as a **sporangium** for the development of **spores**.



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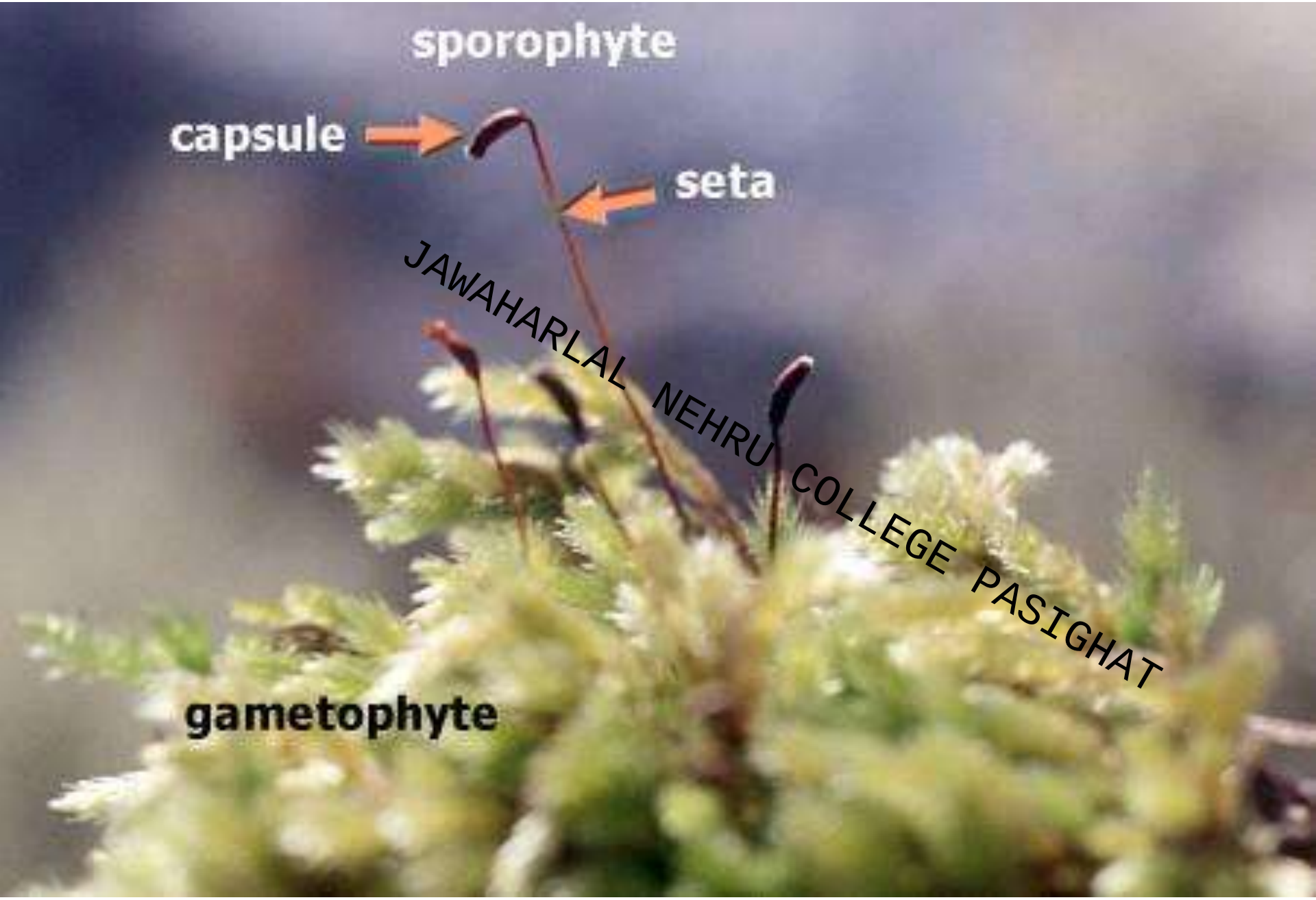

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Moss (*Polytrichum*)

Liverwort (*Marchantia*)

Hornwort (*Anthoceros*)

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SEMESTER – V

PAPER : BOT-353

(*Cell Biology, Genetics & Evolution*)

UNIT – I I

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Lecture Overview

- Chromatin Organization.
- Packaging of Genome.

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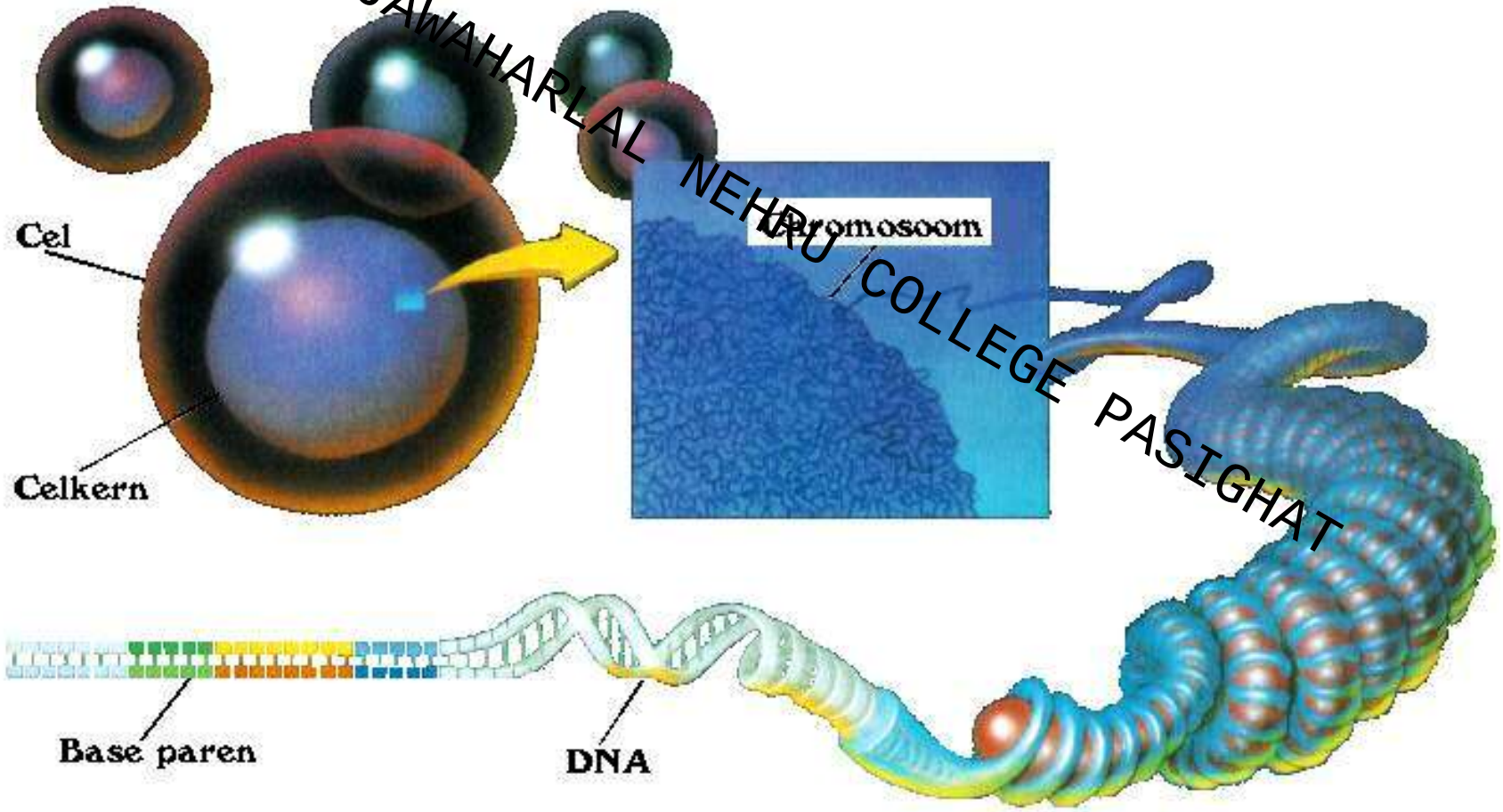

Genetic Material in the Living Cells

- Cells contain a nucleus surrounded by a nuclear membrane in eukaryotic cells, and a nuclear region in the prokaryotic cells (Nucleoid).
- In a non-dividing cell the nucleus is filled with a thread-like material known as "chromatin".
- Chromatin is made up of DNA and proteins (mainly histones and some non-histone acidic proteins).

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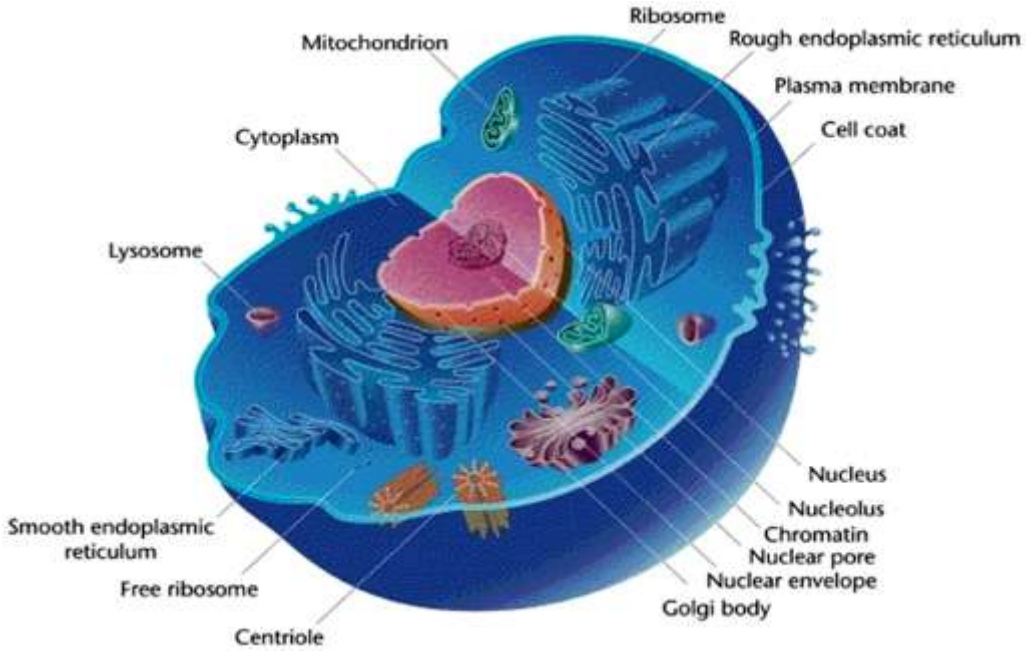
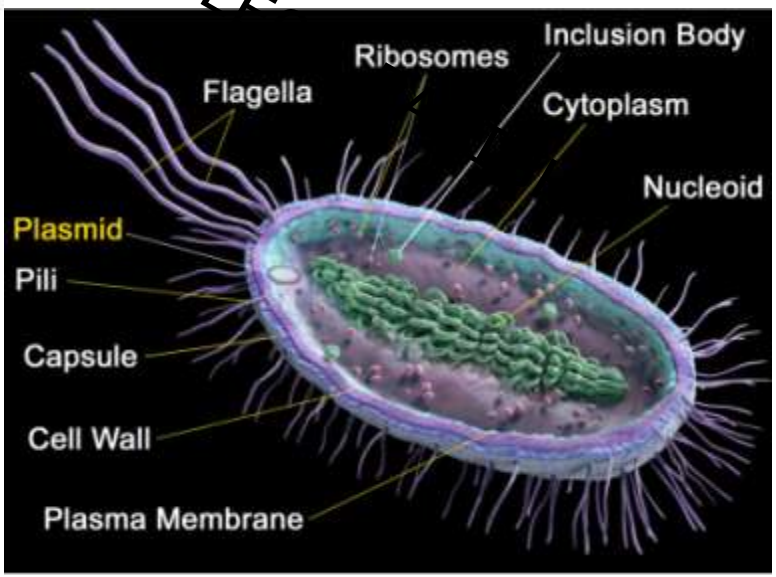
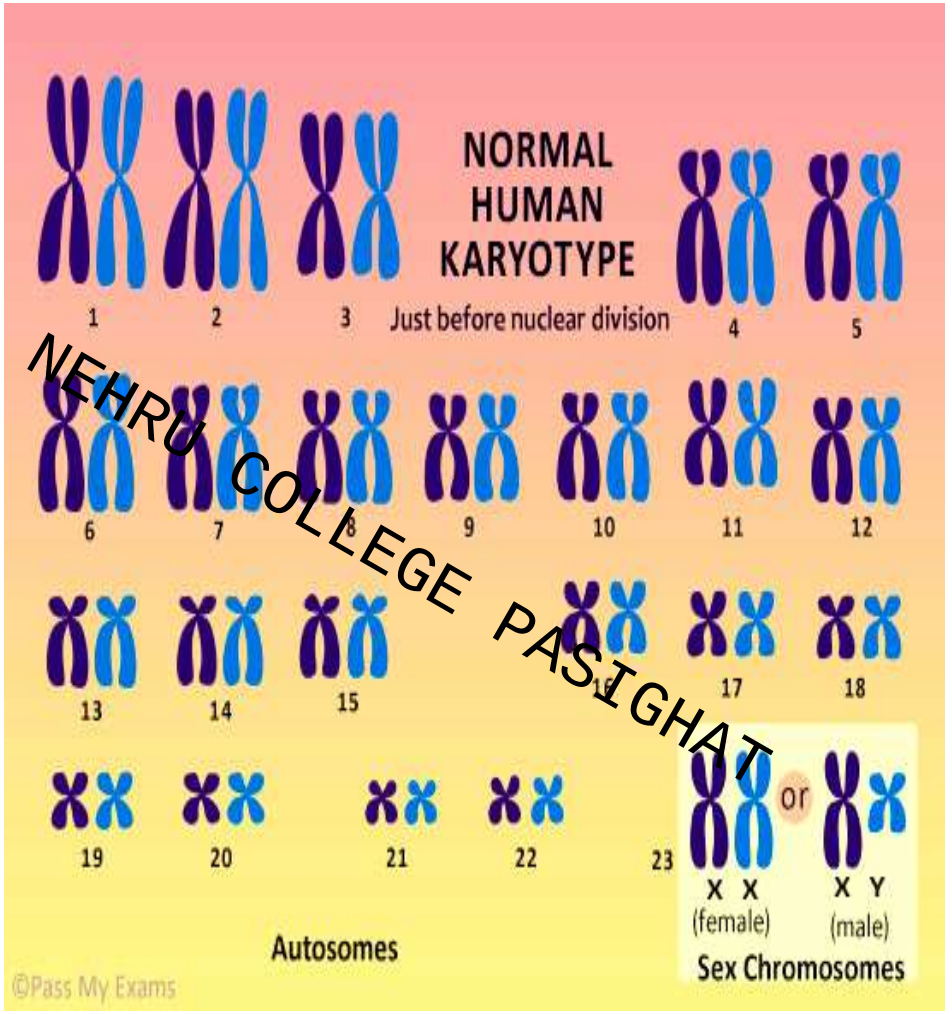




The Normal Human Chromosomes

- Normal human cells contain 23 pairs of homologous chromosomes:
  i. 22 pairs of autosomes.
  ii. 1 pair of sex chromosomes.
- Autosomes are the same in males and females
- Sex chromosomes are:
  i. XX in females
  ii. XY in males.
- Both X are homologous. Y is much smaller than X and it contains a fewer genes than X.



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Chromosomes

- **One** member of each chromosome pair is derived from each **parent**.
- **Somatic cells** have **diploid** complement of chromosomes i.e. 46.
- **Germ cells** (Gametes: sperm and ova) have **haploid** complement i.e 23.
- Individual chromsomes are recognized by
  i. Arm lengths (p- short, q-long).
  ii. Centromere position (metacentric, sub-metacentric, acrocentric, telocentric).

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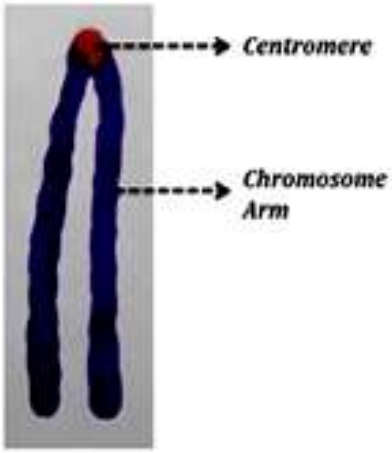
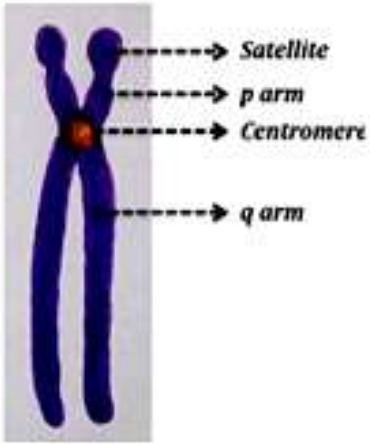
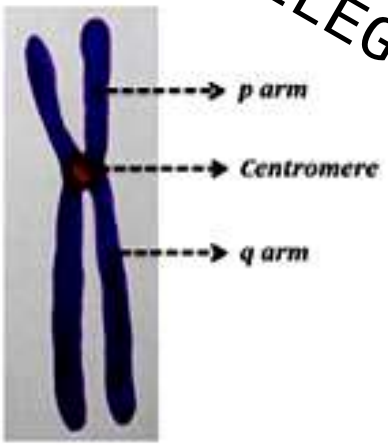


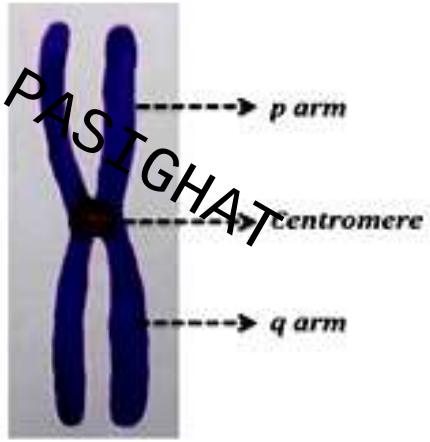
Telocentric



Accrocentric

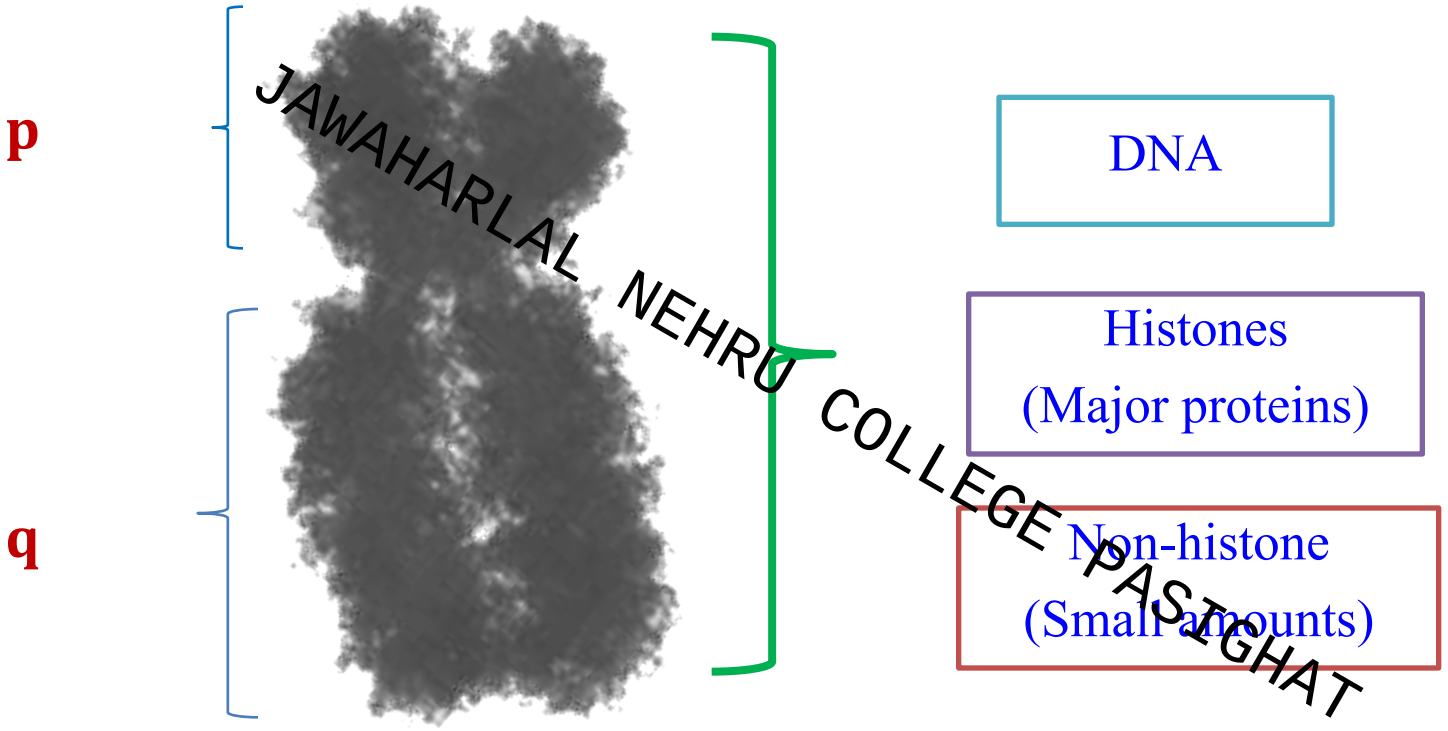


Sub-metacentric



Metacentric

Composition of Chromosome



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- The chromosomes themselves are macromolecular entities that must be synthesized, packaged, protected, and properly distributed to daughter cells at cell division.
- Significant segments of every chromosome are dedicated to these functions.

DNA Condensation: Why?

The length of DNA in one chromosome

4 cm

How can this be packed

into this...

2 µm

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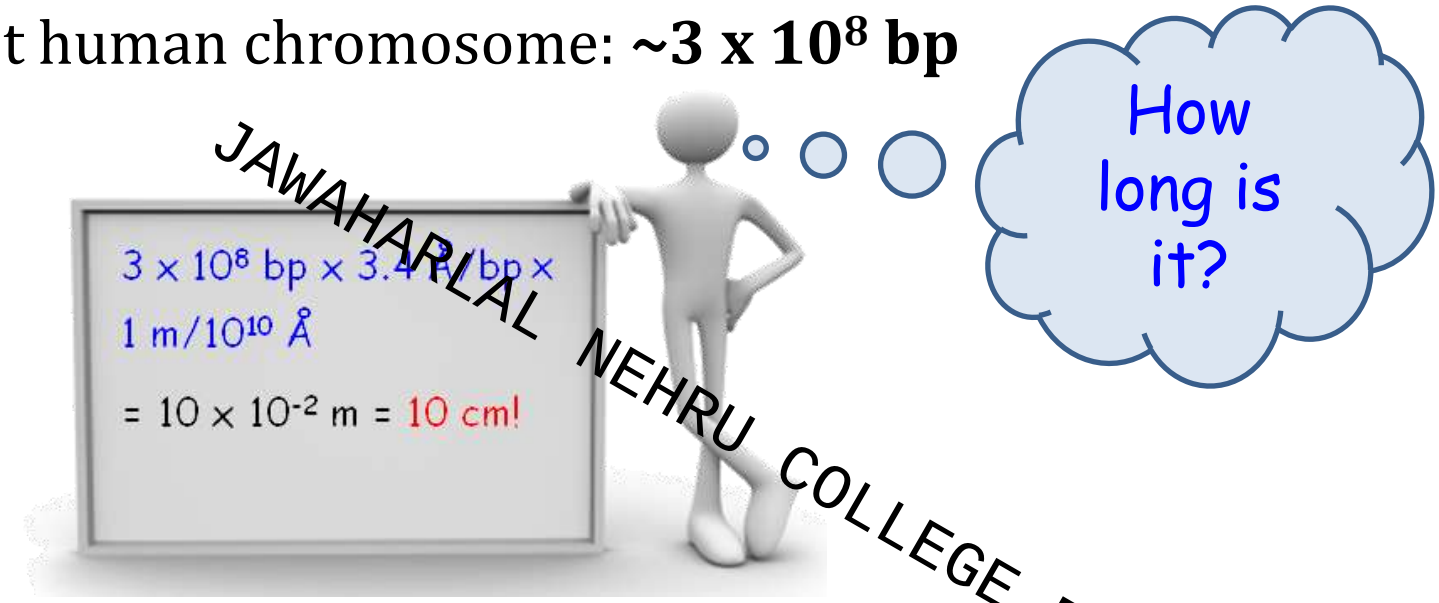
This would be equal to packing a 40 km long rope into a space of 1 meter

A serious problem of packaging

1. Largest human chromosome: **~3 x 10^8 bp**



2. A typical cell nucleus = 10 µm = 10 x 10^{-6} m
3. Therefore the DNA must be compacted ~10^4-fold.

This is like fitting a 40 km-long rope into a 1 meter box !

- Eukaryotes contain thousands of times more DNA than do bacteria, and as a result, the DNA–condensation problems of eukaryotes—(compacting the DNA so that it fits in the cell nucleus)—are more complex than those of bacteria.

- Bacteria do not contain nucleosomes, although they have small, basic (+'vely charged) proteins that are involved in condensing their DNA.

- DNA compaction must be dynamic, because changes in the degree of condensation must occur quickly and when needed, as the cell passes through the stages of the cell cycle. ***Conserved ?***

- Furthermore, when in its most highly compacted form, DNA is not accessible to transcription or replication enzymes, so it must be able to rapidly expose regions containing genes that are required at any given moment, and then condense again.

- Done by modification enzymes that alter the state of DNA condensation, and can target their activity to specific regions of the chromosome that must be transcribed or replicated.

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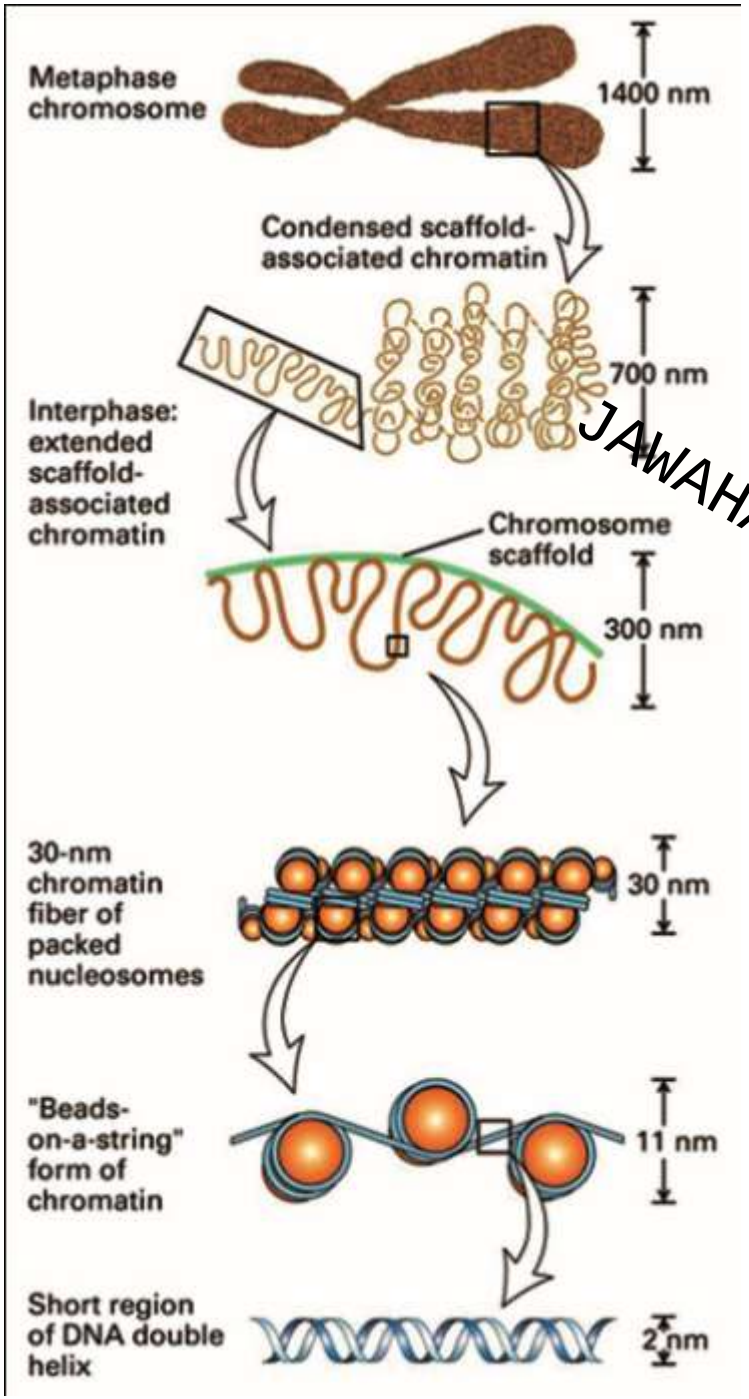

The DNA packaging SUPERSTRUCTURE

Higher-order DNA compaction in a eukaryotic chromosome.

This model shows the levels of organization that could provide the observed degree of DNA compaction in the chromosomes of eukaryotes. **First** the DNA is wrapped around histone octamers, **then** H1 stimulates formation of the 30 nm filament. Further levels of organization are not well understood but seem to involve further coiling and loops in the form of rosettes, which also coil into thicker structures. **Overall**, progressive levels of organization take the form of coils upon coils upon coils. It should be noted that in cells, the higher-order structures (above the 30 nm filament) are unlikely to be as uniform as depicted here.

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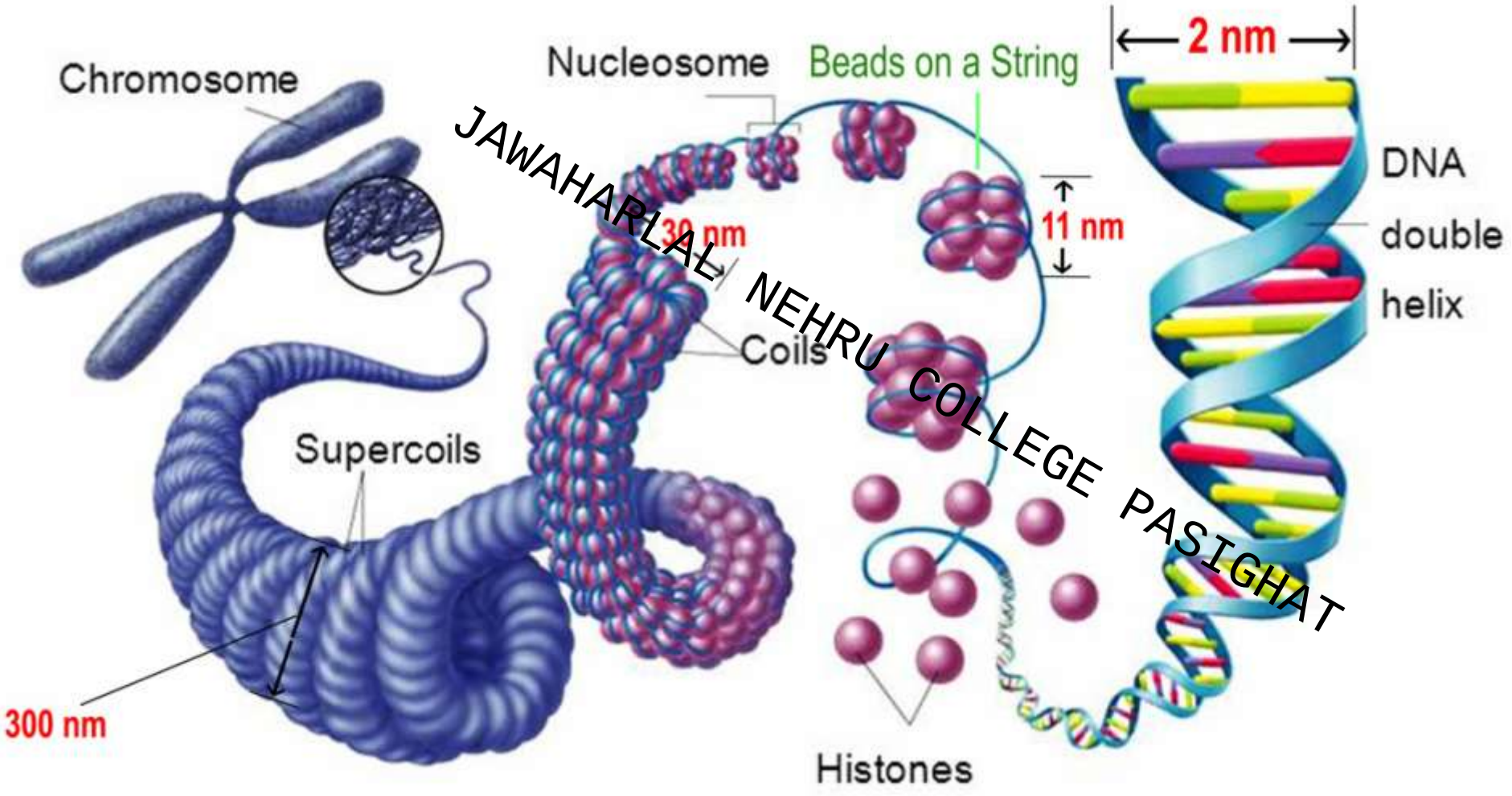
The DNA packaging SUPERSTRUCTURE



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BRYOPHYTES

SEMESTER – I

PAPER : BOT-111

UNIT – IV

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MARCHANTIA

MARCHANTIA

Division : Bryophyta
Class : Hepaticopsida
Order : Marchantiales
Family : Marchantiaceae

- Cosmopolitan in distribution.
- Genus *Marchantia* has 765 species ww.
- Grows best in cool, moist and shady places.
- *Marchantia polymorpha* grows as a pioneer in the burnt forest soil after fire.
- 11 species in India, growing mainly in the Himalayas and the South-Indian hills.
- *Marchantia palmate* : eastern Himalayas.
- Reproductive phase during February & March in the Hiamalayas and during October-November in South Indian hills.

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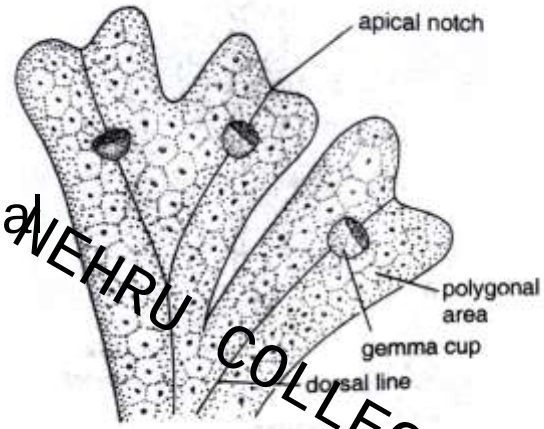
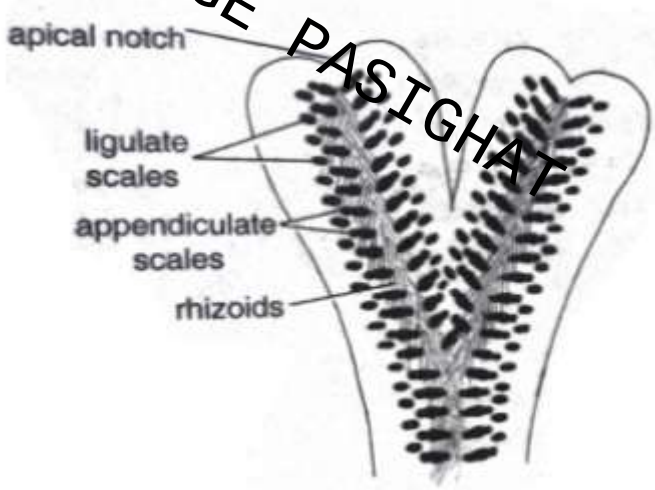
A. VEGETATIVE STRUCTURE:

1. Morphology / External Structures:

- The vegetative plant represents the gametophytic plant body.
- Prostrate, dorsiventral and dichotomously branched thallus.
- Distinct midrib, marked on the dorsal surface by a shallow groove.
- Ventral: Rhizoids and Scales
- Rhizoids hyaline and unicellular.
- Scales are multicellular & violet in colour. (anthocyanin pigments).
- Gemma Cups: contain specialized, multicellular, asexual reproductive bodies/granules called Gemma.





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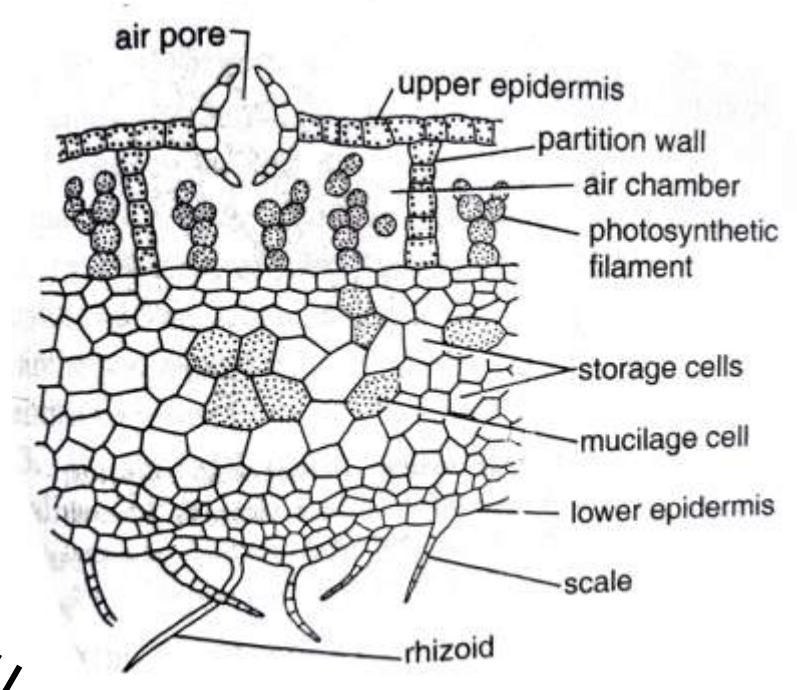
2. Anatomy / Internal Structures:

i. Epidermal Region:

- Outermost region: upper and lower
- Numerous air pores analogous to the stomata in higher plants.
- Rhizoids and scales on lower epidermis.



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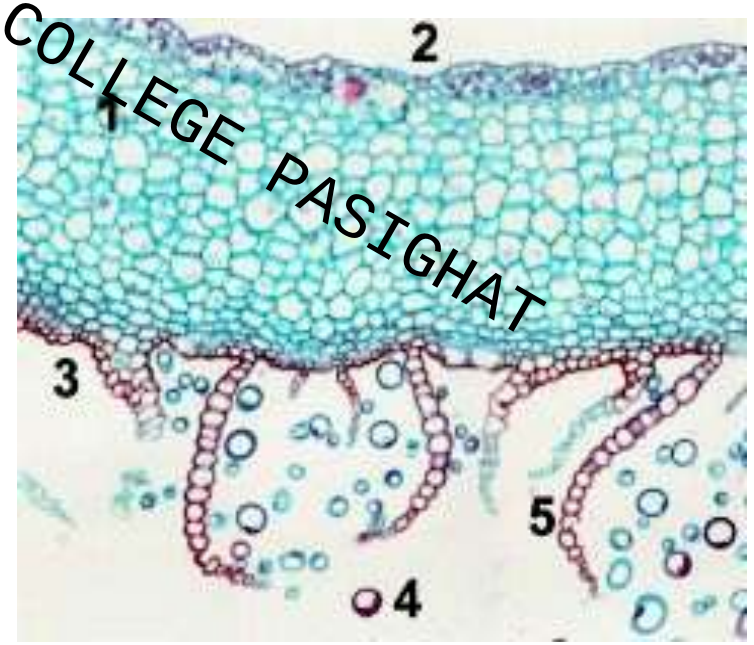
ii. Photosynthetic Region:

- Just beneath the upper epidermis.
- Simple or branched photosynthetic filament
- Composed of Chlorophyll containing cells.

iii. Storage Region:

Just below the photosynthetic region.

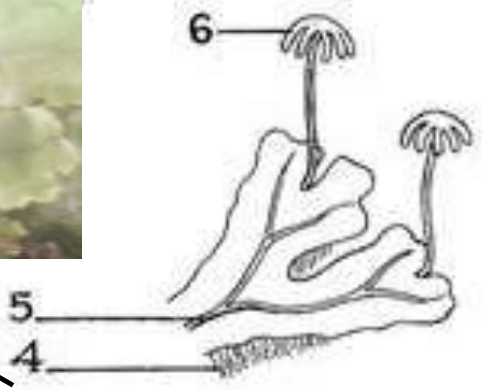
- Compact zone of several layers of polygonal parenchymatous cells.
- Achlorophyllous without intercellular spaces.
- Mostly contain starch or protein granules, mucilage and oil.



B. REPRODUCTIVE STRUCTURES:

1. External Structures:

- The main thallus represents the Gametophyte.
- It reproduces sexually through gametes.
- *Marchantia* is heterothallic or dioecious.
- Gametophores develop at the distal end of respective thallus *(apical notch)*
- Antheridia: on Antheridiophore.
- Archegonia: on Archegoniophore.
- They are terminal.



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i. Antheridiophore:

- Arises at the apical notch.
- 1-3 cm long stalk
- 8-lobed peltate disc at its apex.
- Each lobe on the peltate disc have numerous minute cavities on the u.s.
- Antheridial chambers embedded in the photosynthetic region.
- Each antheridial chamber contains a single antheridium.

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ii. Archegoniophore:

- Arises at the apical notch.
- 3-5 cm stalk and a terminal disc.
- Disc is star shaped with 8-9 radiating arms or ‘Rays,’
- Each ray contains a row of 12-14 archegonia embedded in a fertile pocket along the ventral ridge.

2. Internal Structures:

Ontogenically, the gametophores are the extension of the vegetative thallus. Therefore, they show the characteristics of the vegetative thallus, i.e., their anatomy shows the presence of air chambers, air pores and photosynthetic filaments all over the upper epidermis and storage region just beneath them.

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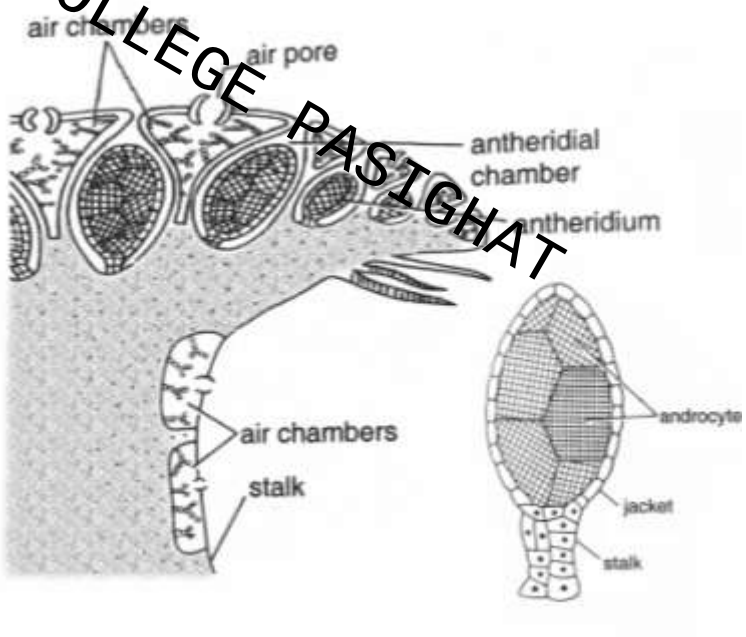
i. Antheridia:

- The air chambers on the upper surface are alternated with numerous flask-shaped cavities, called the ***Antheridial Chambers***.
- The antheridial chambers open externally by a pore, called ***Ostiole***.
- Each antheridial chamber contains a single ***Antheridium***.
- The mature antheridium is a globular structure, attached to the floor of the antheridial chamber by a multicellular ***stalk***.
- The antheridium has a single layered sterile ***jacket***, enclosing a mass of androcytes, which eventually metamorphose into ***antherozoids*** (minute, rod-like biflagellate male gametes).



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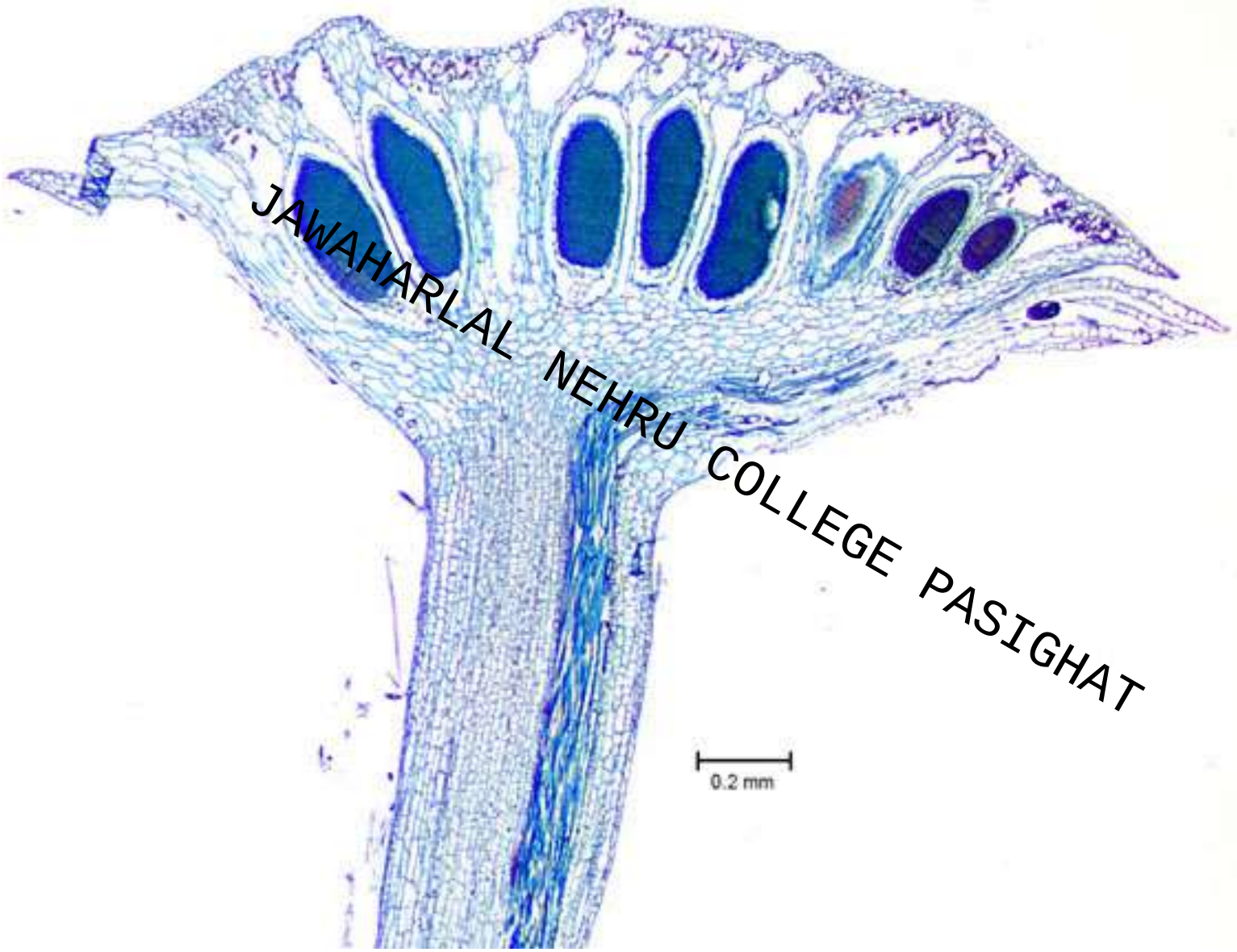

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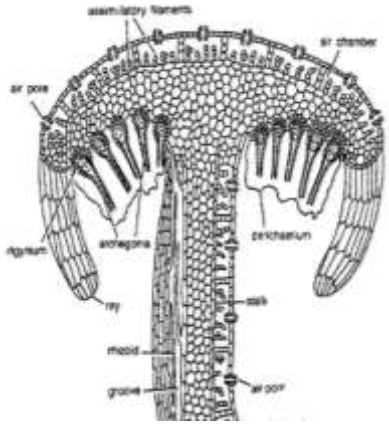
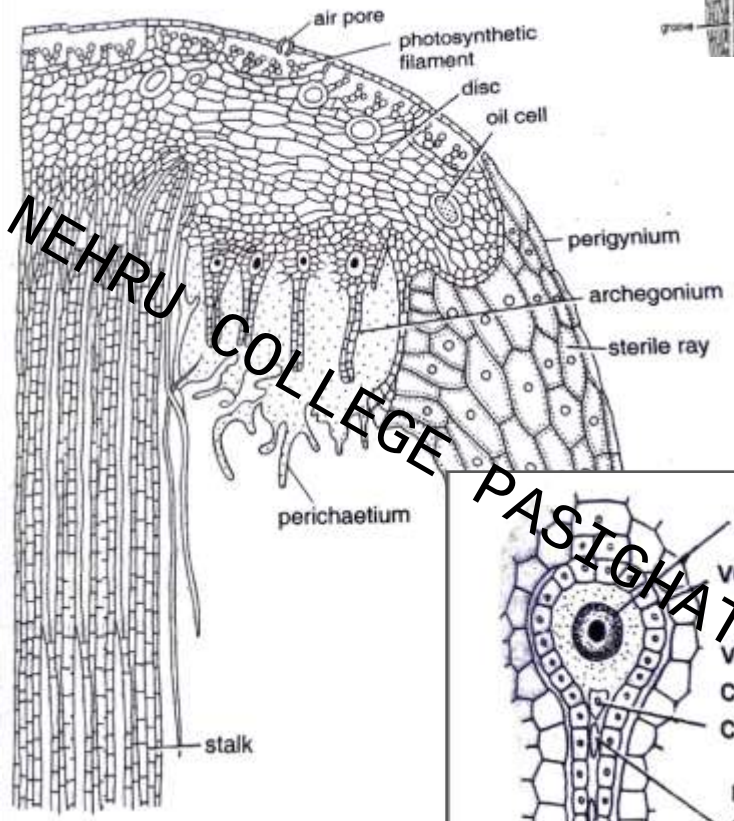
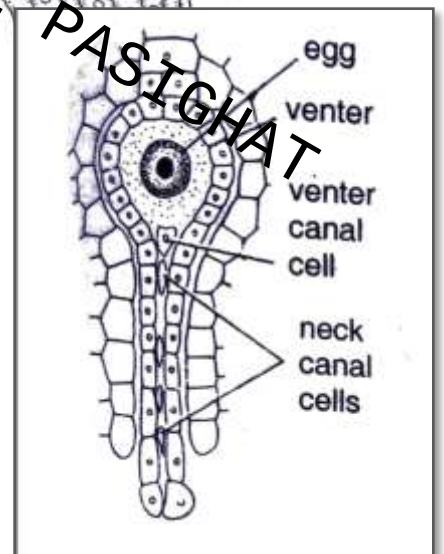
ii. Archegonium:

- Archegonia are found in uniseriate fertile pockets along the ventral ridges of radiating discs, near the stalk.
- They are enclosed inside a mass of sterile tissue, called ***Perichaetium***.
- The mature archegonium is pendant and attached to the ventral ridges of the radiating disc by a short stalk.
- It is an inverted flask-shaped structure, with a basal swollen ***Venter*** and an elongated ***Neck***.
- The venter is surrounded by a single layered sterile Jacket and contains a large egg and a relatively smaller Venter Canal Cell.
- The neck consists of 6 vertical rows of cells, called the ***Neck Cells***, which enclose a narrow canal with 4-8 ***Neck Canal Cells***.
- The tip of the neck has a rosette of four ***Cover Cells***.







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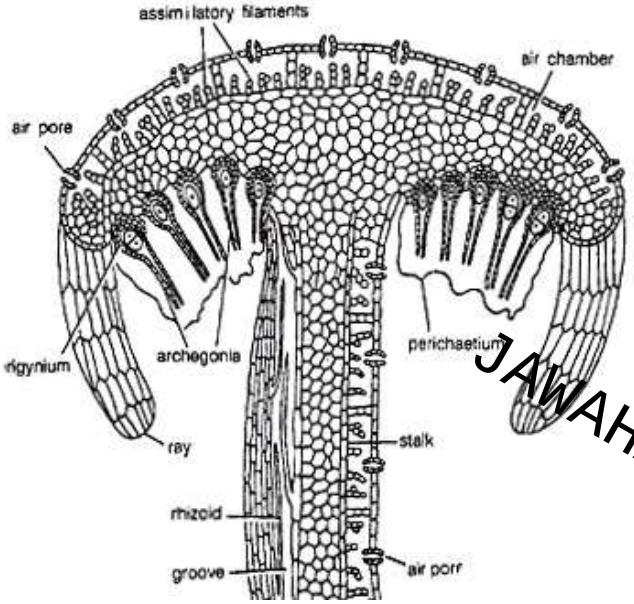

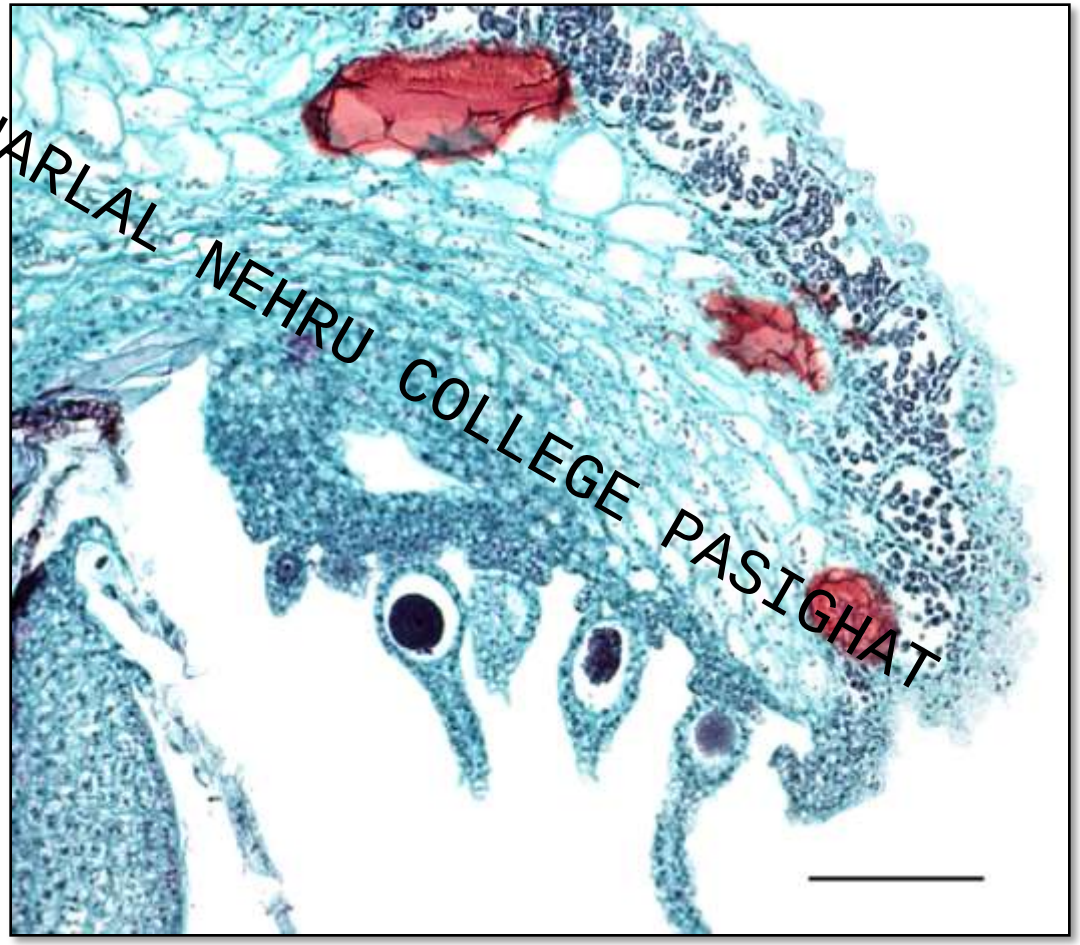

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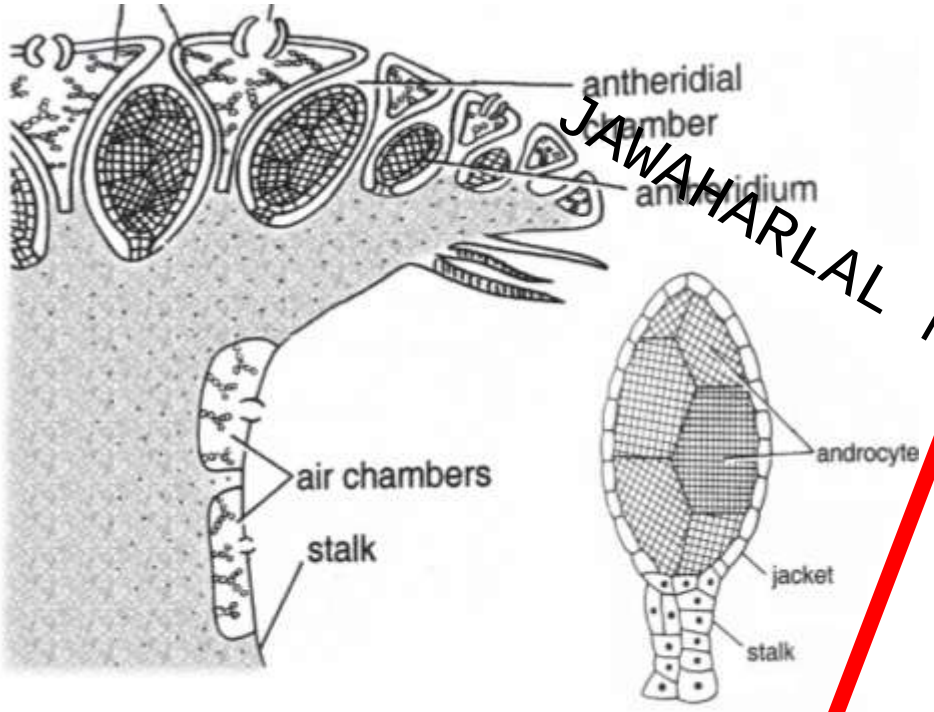
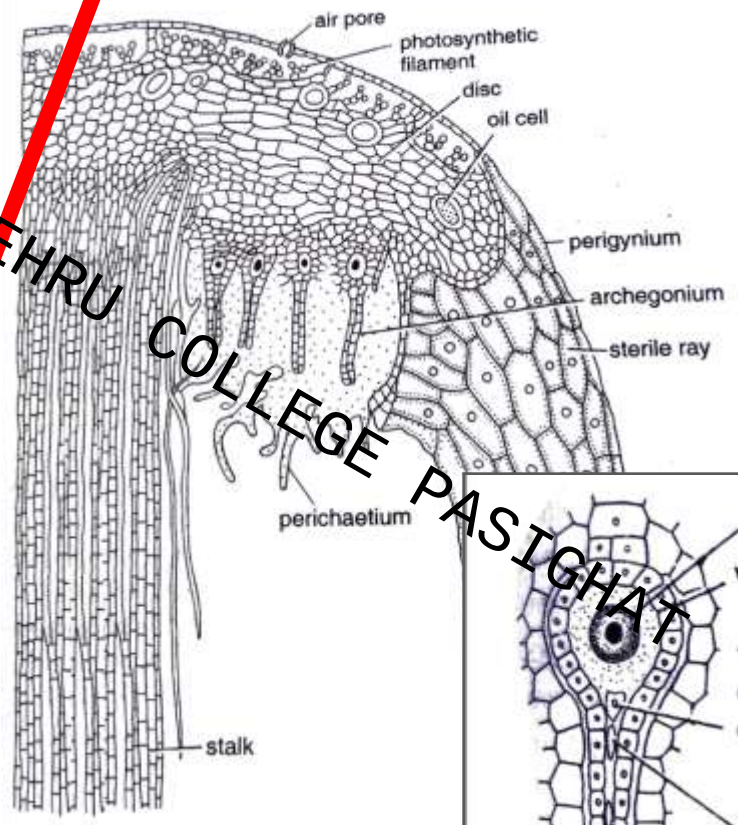
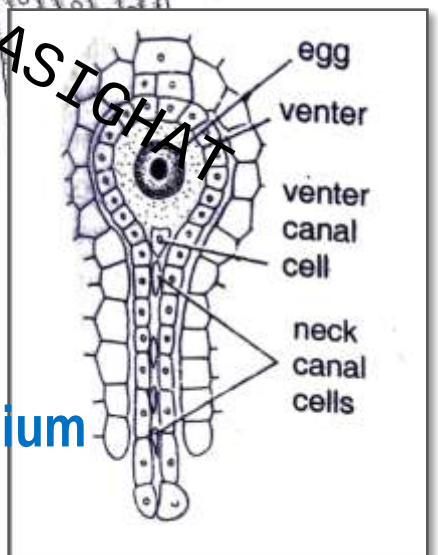
FERTILIZATION



Antheridiophore > Antheridium





Archegoniophore > Archegonium

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LIFE CYCLE

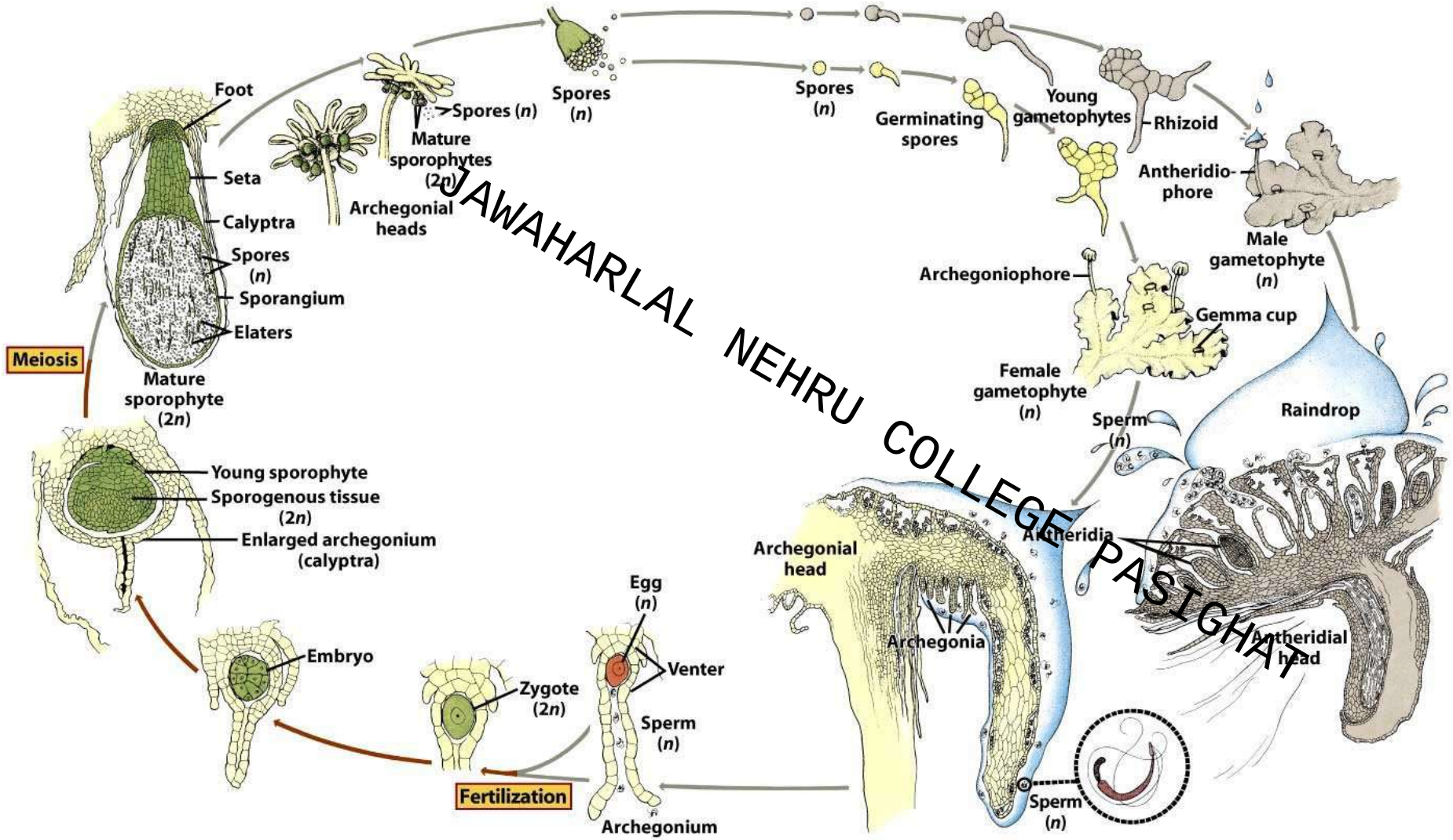

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Figure 16-15
Biology of Plants, Seventh Edition
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JAWAHARLAL NEHRU COLLEGE PASIGHAT

MICROBIOLOGY

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CHARACTERISTIC FEATURES OF DIFFERENT GROUPS OF MICROORGANISMS

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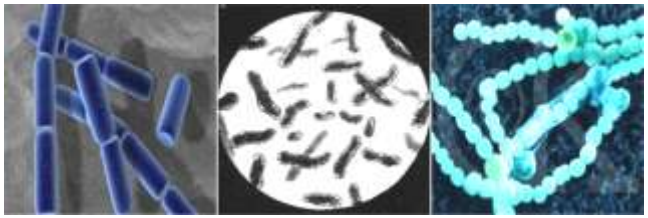
1. Archaebacteria
2. Eubacteria
    a. Actinomycetes
    b. Mycoplasmas

BACTERIA



- constitute a large domain of prokaryotic microorganisms. Believed to be among the first life forms to appear on Earth, and are present in most of its habitats.
- Size : 0.5 μm – 2.0 μm.
- Shape: Rod shaped (Bacillus), Spherical (Coccus), Spiral (spirilla), helicoid (*vibrios*).
  Mono-, diplo-, strepto-(long chain), tetra-, staphylo- (aggregate).
- Gram staining : peptydoglycan layer in cell wall.
- Flagella: Number & Position

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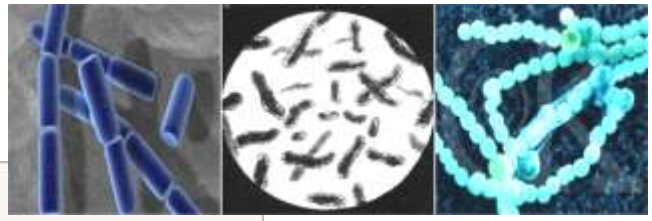
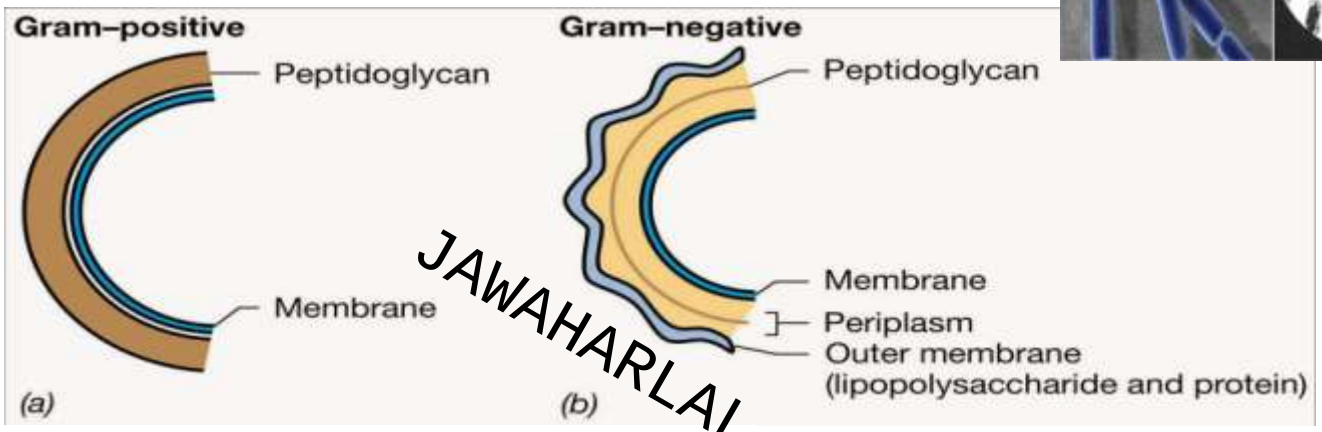
Atrichous Monotrichous Amphitrichous Lophotrichous Peritrichous

- Nutrition: Autotrophic – *phototrophic, chemosynthetic (sulphur, hydrogen)*
  Heterotrophic – parasitic / saprophytic / symbiotic
- Habit & Habitat: Acedophile, Halophile, Lithophile, Mesophile, Thermophile, etc

BACTERIA





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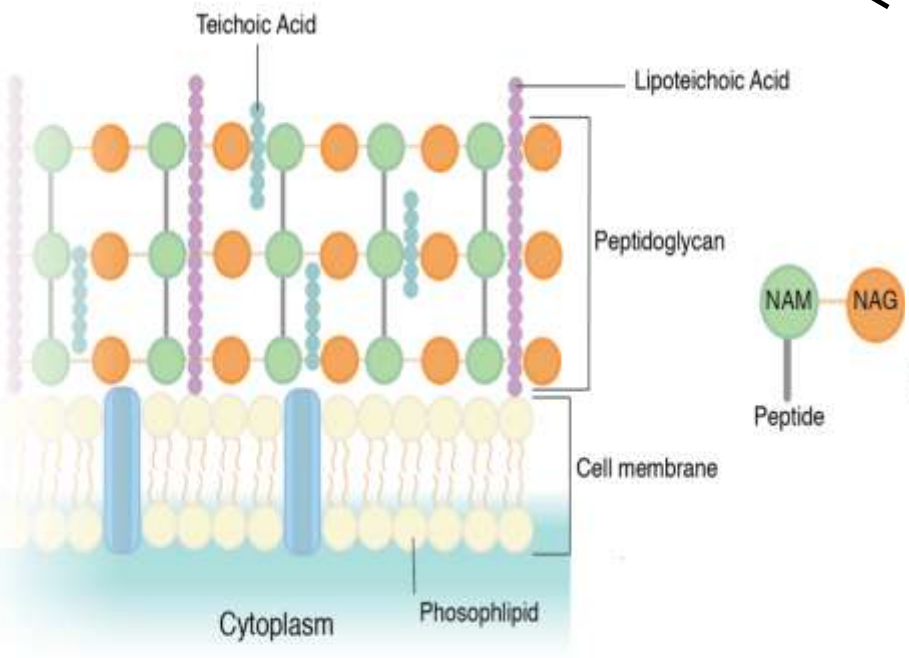
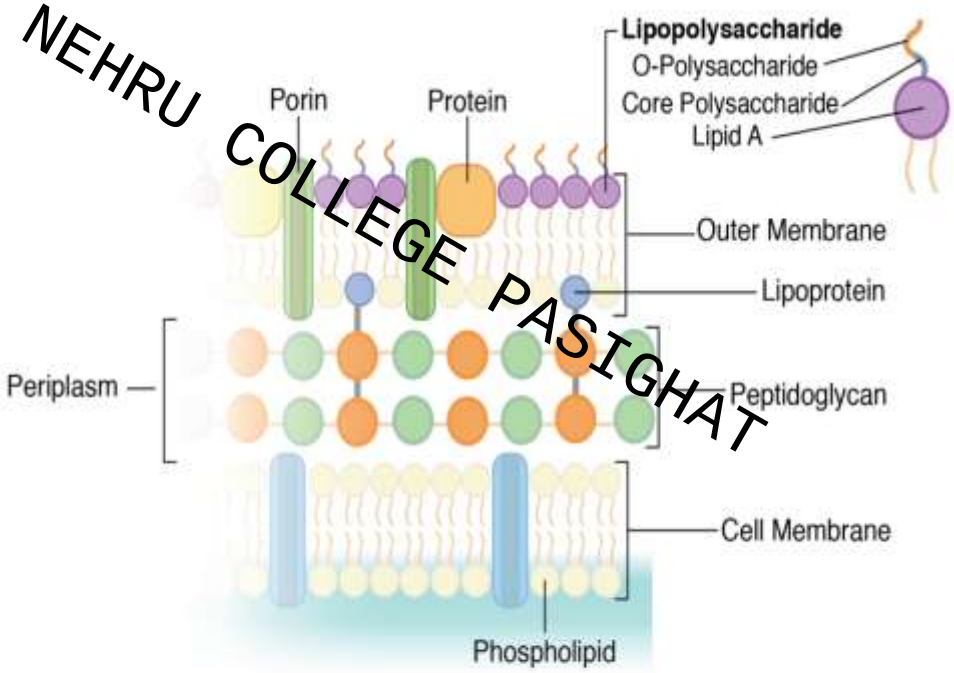
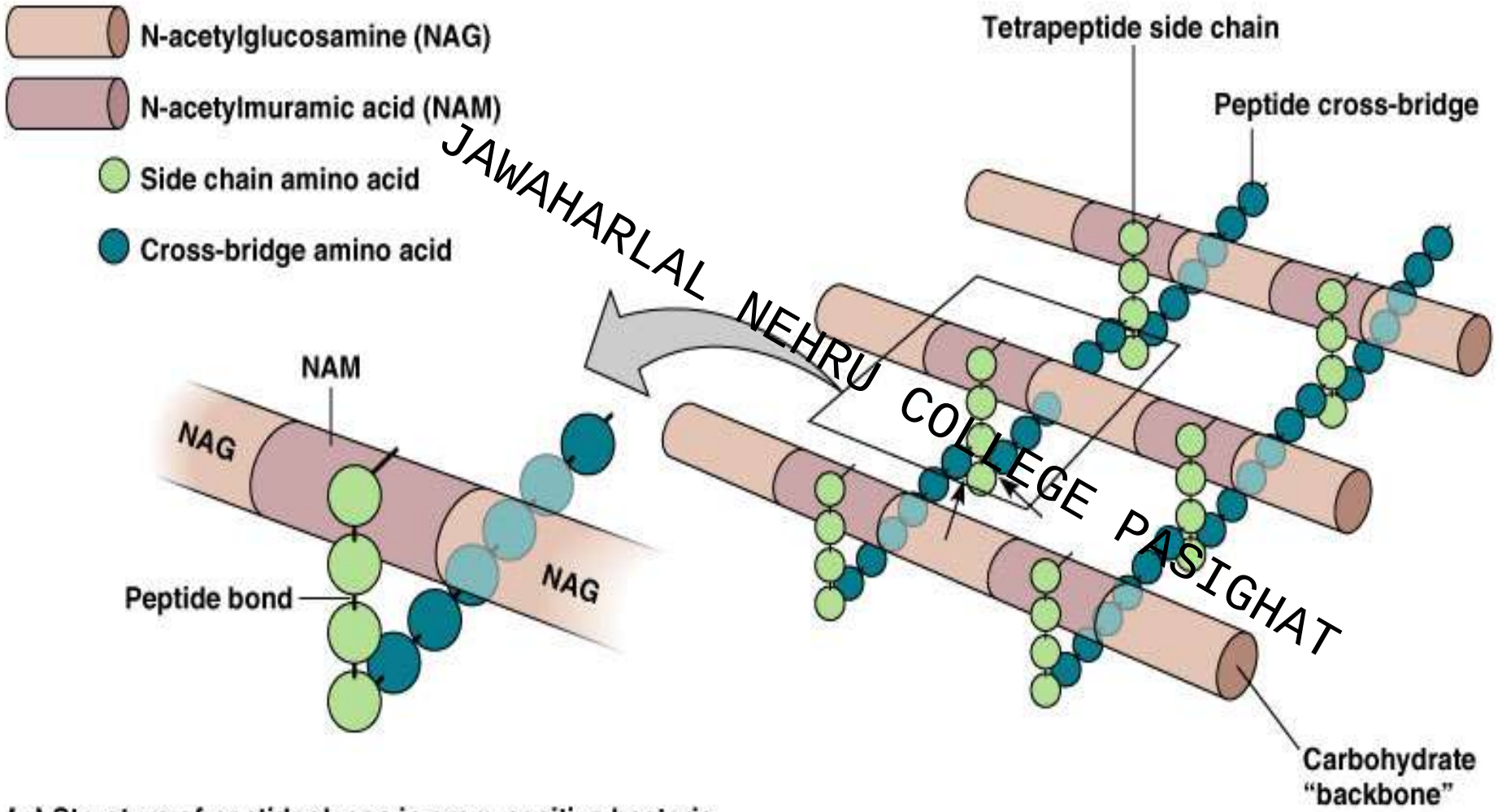


Gram Positive Bacteria Cell Wall



Gram Negative Bacteria Cell Wall

PEPTIDOGLYCAN LAYER



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(a) Structure of peptidoglycan in gram-positive bacteria

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MICROBIOLOGY

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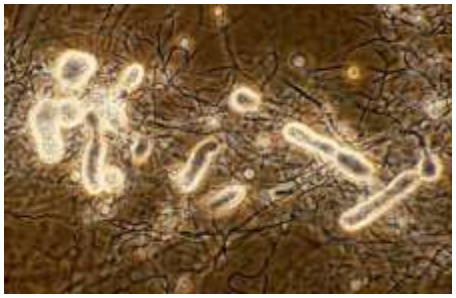
ACTINOMYCETES

- Mostly aerobic.
- Gram +ve bacteria.
- Occur abundantly in soil, water, mud, manure, milk & other food products.
- Mostly saprophytes. Some are parasites.
- Parasitic strains cause some serious diseases in plants & animals.
- Primary sources of naturally synthesized antibiotics. e.g. *Straptomyces*

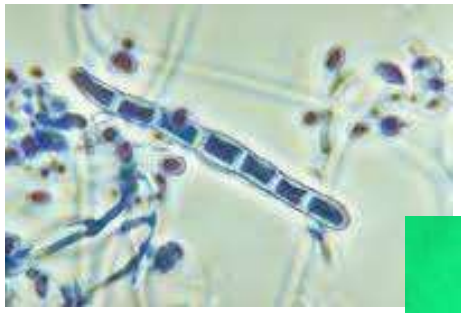
JAWAHARLAL NEHRU COLLEGE, PASIGHAT

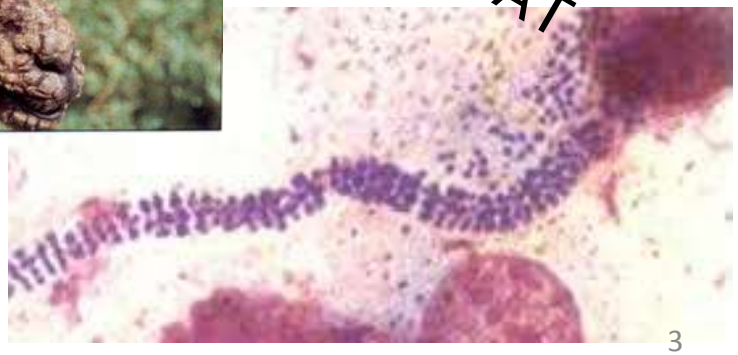
DISTRIBUTION



- Found in all types of habitats.
  - ❖Soil, water, decomposing organic matter, etc.
- Some are symbionts (*Frankia sp.*). Some are pathogenic to humans (*Dermatophylus*).

JAWAHARLAL NEHRU COLLEGE PASIGHAT





STRUCTURE

- Greek words: *Actis* = ray; *mykes* = fungus
- Fungus-like bacteria with cylindrical cells which are usually united to form filaments, resembling the mycelium of a true fungus.
- Branched, non-septate, thin.
- In some species, filaments break up into small coccoid cells. They are usually non-motile.
- In *Actinoplanes*, small flagella are present.
- In young filaments, the cytoplasm is homogenous, but at maturity, many vacuoles, fat droplets, granules and few rod-shaped bodies develop in the cytoplasm.
- As in other true bacteria, there is no well-defined nucleus. Instead, many chromatin granules are present.
- At maturity, the cell wall becomes fragile and so, the full-grown filaments break up easily.

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LOCOMOTION

- They are mostly non-motile, except for *Actinoplanes*, which are aquatic and swim about with the help of minute flagella.

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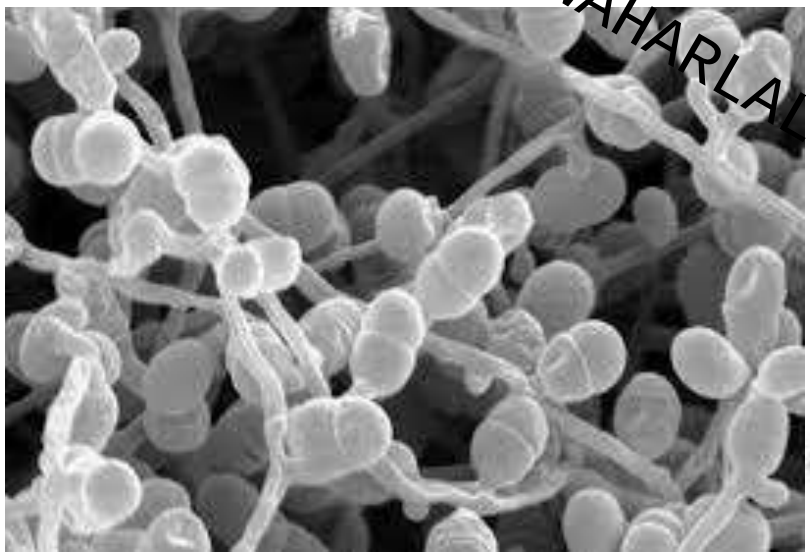

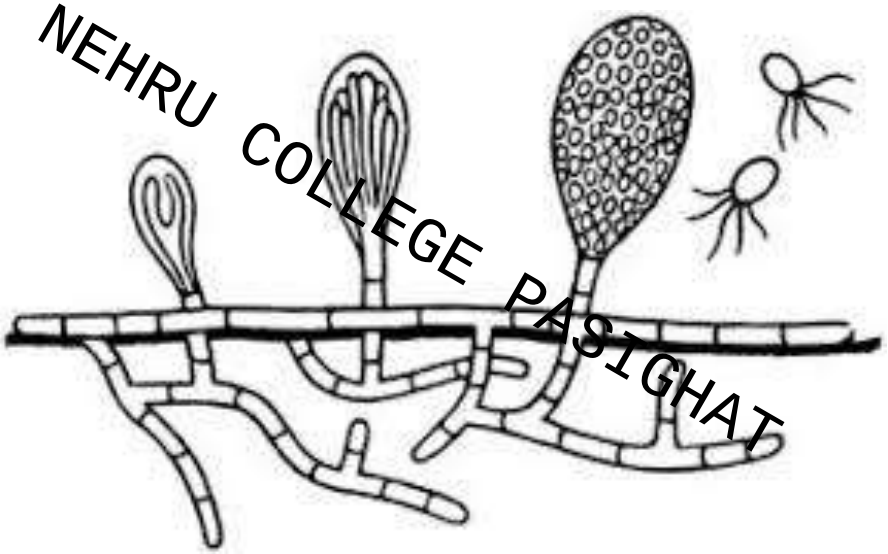

REPRODUCTION

- They generally multiply by Fragmentation (Asexual method).
- The mycelium breaks up into small coccoid or very rarely, rod-shaped cells, each of which grows into new filaments.
- Some species of Actinomycetes also form asexual reproductive structures in the form of conidia and sporangiospores.
- Conidia develop on conidiophores and sporangiospores develop on sporangiophores, either singly or in long chains.
- Conidia and sporangiospores develop by septa formation at the tip of aerial filaments, usually in response to nutrient deficiency.

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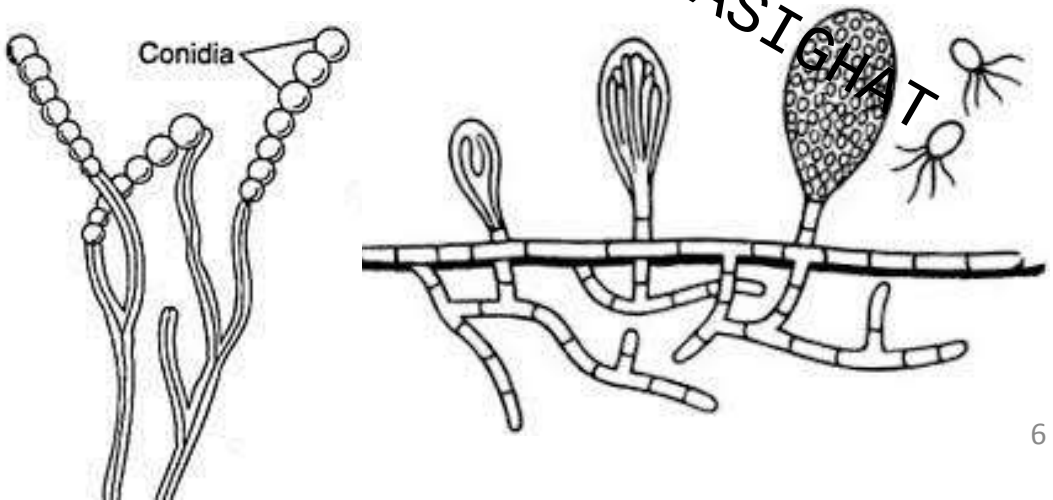

CLASSIFICATION

- Taxonomic classification of Actinomycetes has been done on the basis of morphology, arrangement of spores, cell-wall chemistry, types of sugar present in the cell extract and the heat resistance of the spores.
- The single order Actinomycetales has 8 families.

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OTHER SIGNIFICANT FEATURES

- Symbiotic species, Frankia sp. show symbiosis with a variety of non-leguminous plants, like *Casuarina* (Casuarinaceae), *Rubus* and *Pursia* (Rosaceae).

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❖ Human Diseases	Actinomycetes Pathogen
○ Tuberculosis ……	*Mycobacterium tuberculosis*
○ Leprosy ……	*Mycobacterium leprae*
○ Diphtheria ……	*Corynebacterium diptheriae*

❖ Animal Diseases	Actinomycetes Pathogen
○ TB of Cattle ……..	*Mycobacterium bovis*
○ TB of Domestic Fowls ……..	*Mycobacterium avium* (other birds also)

❖ Plant Diseases	Actinomycetes Pathogen
○ Tondu disease of Wheat ……	*Corynebacterium titrici*
○ Scab of Potato ……	*Actinomyces scabies*

MYCOPLASMA

- Smallest known aerobic prokaryotes without a cell wall.
- First discovered by Louis Pasteur (1843), while studying Pneumonia of Cattle.
- They were designated as PPLO (Pleuropneomonia-like Organisms).

  *(However, Pasteur couldn't isolate them in pure culture on standard nutrient media & observe them under light microscope. In 1898, two French microbiologists – **Nocard & Roux** were successful in obtaining pure culture of them in media-containing serum. They observed that these microorganisms could produce disease when inoculated into healthy cattle.)*

- Gram –ve, usually non-motile, free-living, parasitic & saprophytic.
- Sensitive to dessication.
- Do not grow at low pH.
- Heat sensitive (<50ºC)

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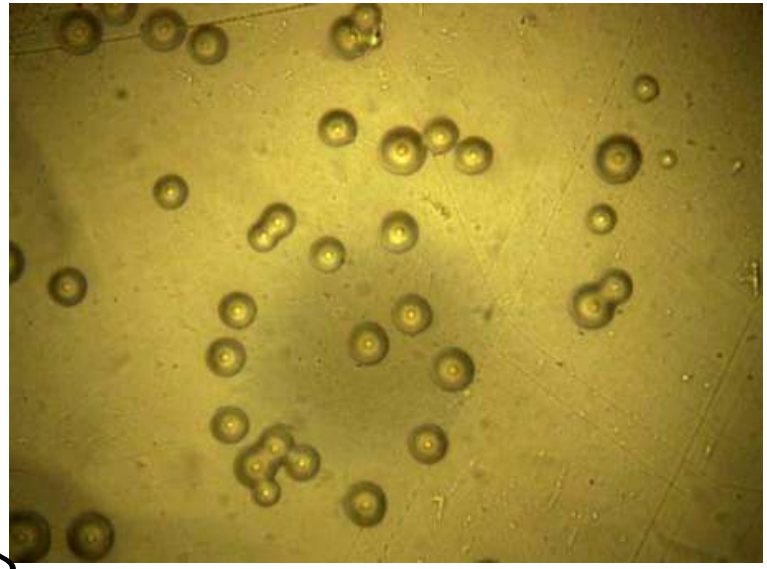
DISTRIBUTION

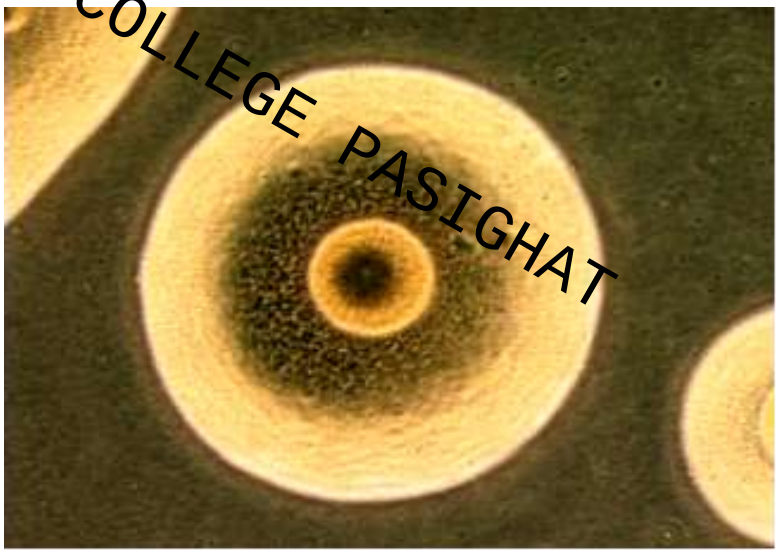
- Frequent contaminants in tissue cultures rich in organic matter.
- Abundant in unsenitized areas rich in organic matters.
- Also found in hot-water springs & other thermal environments. They occur in soil, sewage water, different substrates and in humans, animals and plants.
- Mostly they are pathogens and parasites.

JAWAHARLAL NEHRU COLLEGE PASIGHAT

STRUCTURE

- Unicellular, prokaryotic & non-motile. On media, forms fried-egg shaped colonies.
- Under microscope, they appear small, unicellular bodies and some of them form branched filaments.
- Because of their particularly small size, they can pass through bacterial filters. They can also grow in a medium which contains no living tissues. Because of these two characteristics, Mycoplasmas are considered to be intermediate between bacteria and viruses.

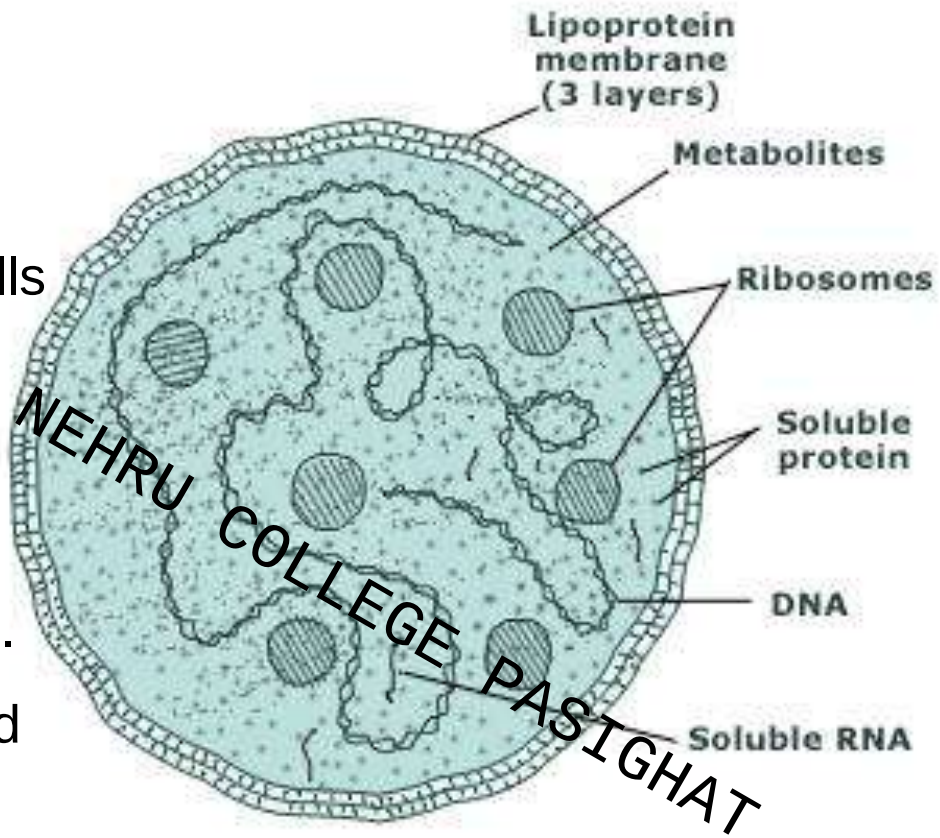




JAWAHARLAL NEHRU COLLEGE PASIGHAT

STRUCTURE

- A true cell wall is absent. This makes these organisms highly elastic and readily deformable. Hence, Mycoplasmas do not have any definite regular shape. The cells may be coccoid, granular, pear-shaped, cluster-like, ring-like or filamentous.
- Cells are covered by a single lipoprotein cytoplasmic membrane.
- Cytoplasm contains ribosomes and nucleoplasm-like structures.
- Resistent to antibiotics acting on cell walls.



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REPRODUCTION

- Mostly by Budding or Binary Fission within the host cell.
- A single cell divides into very minute cells, called *Elementary Bodies*, which are found in the mature cells of host plants and animals.
- Some species forms long filaments and chain of minute spherical conidia. These conidia are initially very small and increase in size later after liberation.

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CLASSIFICATION

- On the basis of nutritional requirements, morphology & habitat preferences: 4 genera

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1. ***Mycoplasma:*** Require cholesterol for growth. Parasitic – infects mucous membranes & joints of humans & animals.
2. ***Acholeplasma:*** Donot require cholesterol for growth. Free-living saprophytes, heat-sensitive. Cannot grow above 45ºC.
3. ***Spiroplasma:*** Bounded by 3-layered membrane. Require cholesterol for growth. Gram +ve, motile, facultative anaerobes.
4. ***Thermoplasma:*** Heat loving. Donot require cholesterol for growth. Strictly anaerobic, acidophillic. Can grow above 60ºC temp.

DISEASES CAUSED BY MYCOPLASMA

- In plants, they cause diseases in sieve tubes, upsetting the hormonal balance. Due to infection, the flowers may assume the shape of foliage leaves, because **Anthocyanin** formation is inhibited. It may also cause wilting of leaves, forming a condition called "*Witch's Broom*."

- In human, they cause a disease called PAP (Primary Atypical Pneumonia). PAP has an incubation period of 9–21 days and the disease may last upto 3 weeks, causing headache, cough etc.

- In animals, they infect the mouth, pharynx and sometimes, urogenital tract. Most common species causing Pneumonia in the upper respiratory tract of animals & humans is *Mycoplasma pneumonae*.

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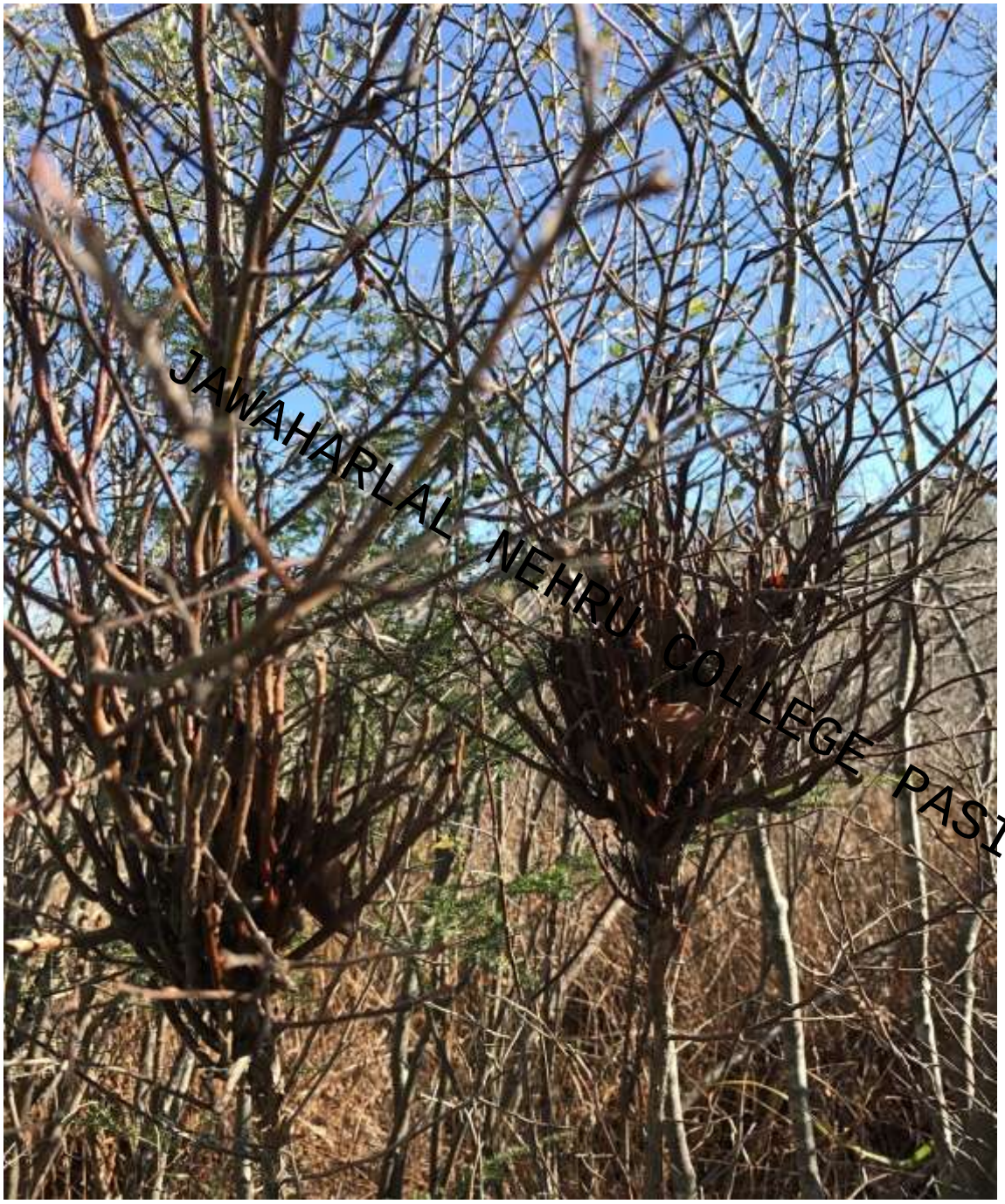
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POPULATION GROWTH

VARIATION AMONG NATIONS (UNEVEN DISTRIBUTION)

WORLD POPULATION DISTRIBUTION

FACTORS OF POPULATION DISTRIBUTION

- TOPOGRAPHY
- CLIMATE
- WATER SUPPLY
- RESOURCES
- TECHNOLOGY (NOW)

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What is population growth?

- An increase in the number of people that reside in a country, state, city etc. Or
- The net change in population between two point of time expressed as percentage of population at a given period of time is called growth rate of population.

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To determine whether there has been population growth, the following formula is used: (Birth rate + immigration) – (Death rate + emigration).

What's Behind Population Growth

- Three Components
  - Fertility: The natural capability to produce offspring.
  - Mortality: The state of being mortal, or susceptible to death.
  - Migration: Movement of people to a new area or country in order to find work or better living conditions.

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Factors Affecting Human Population Size

Population change equation

- Population change = (Births + Immigration) – (Deaths + Emigration)

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- Crude birth rate = births per 1000 people in population per year
- Crude death rate = deaths per 1000 people in population per year
- Migration= movement of persons from one settlement place to another region for considerable time period.

Regional and continental (sub)totals in 2013

Rank	Continent	Population 2013	±% p.a. 2010-2013	% of world pop.
—	**World**	**7,162,119,000**	**1.17%**	**100%**
7	Antarctica	4,490	0%	**0%**
6	Australia and Oceania	38,304,000	1.47%	**0.53%**
5	South America	406,740,000	1.06%	**5.68%**
4	North America	565,265,000	1.00%	**7.89%**
3	Europe	742,452,000	0.10%	**10.37%**
2	Africa	1,110,635,000	2.51%	**15.51%**
1	Asia	4,298,723,000	1.06%	**60.02%**

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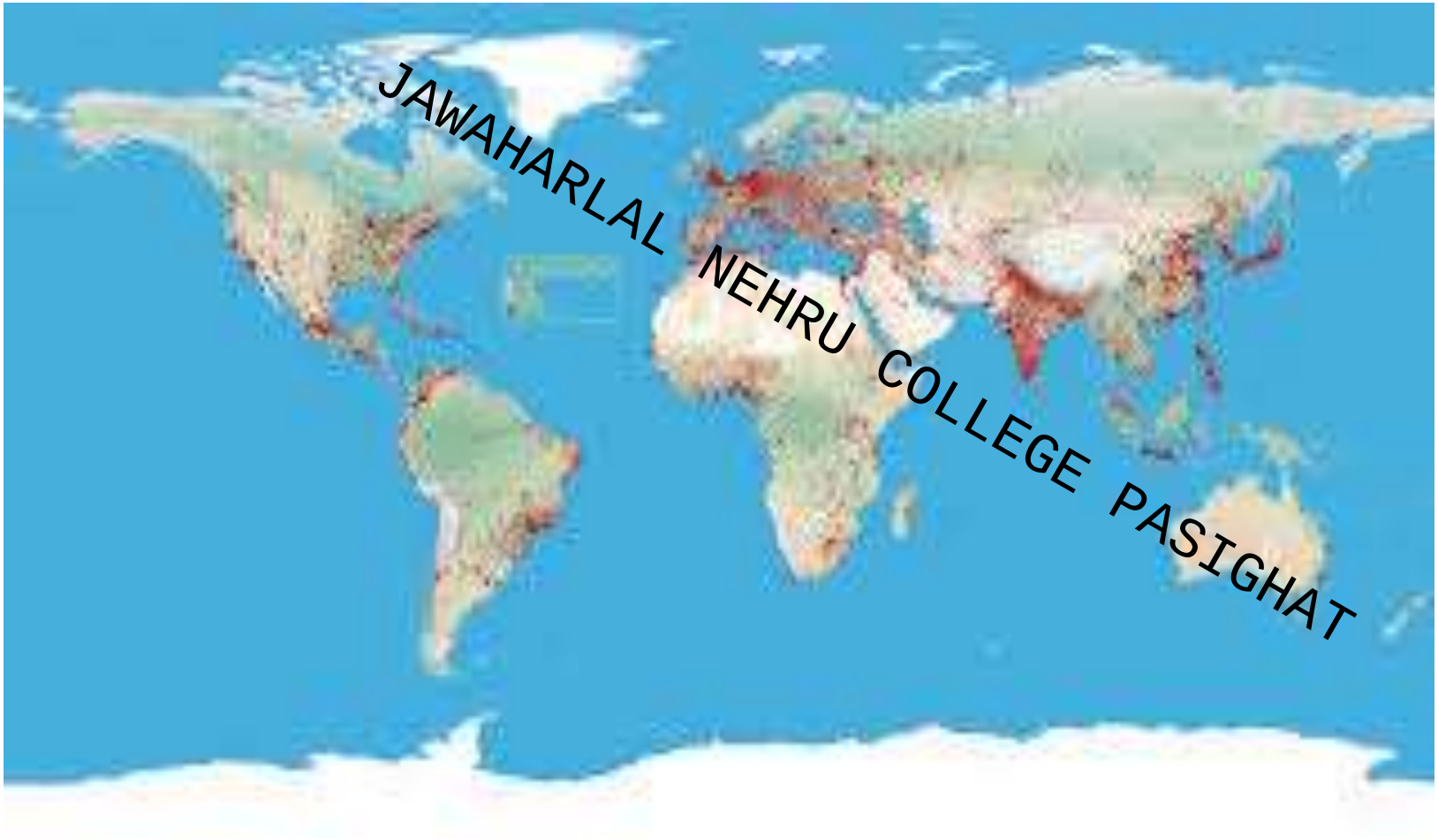
WORLD POPULATION DISTRIBUTION-2017



Causes of population growth

(DEVELOPED & UNDER-DEVELOPED COUNTRIES)

- Near universal incidence of marriage
- Increase in life expectancy
- Better health facilities
- Lack of family planning & birth control awareness in under-develop countries.
- Early marriage.
- Low infant mortality.
- Economic backwardness & illiteracy
- Climatic factors.
- Socio-political factors.
- High birth rate & declining death rate.

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HOW TO TACKLING THE PROBLEMS

Economic Front:

- Removal of Poverty
- Ensuring equitable distribution of income
- Creation of employment opportunities

Social Front:

- Improving the status of woman
- Improving the education levels
- Raising the minimum age of marriage

Political Front:

- Govt policy and programme

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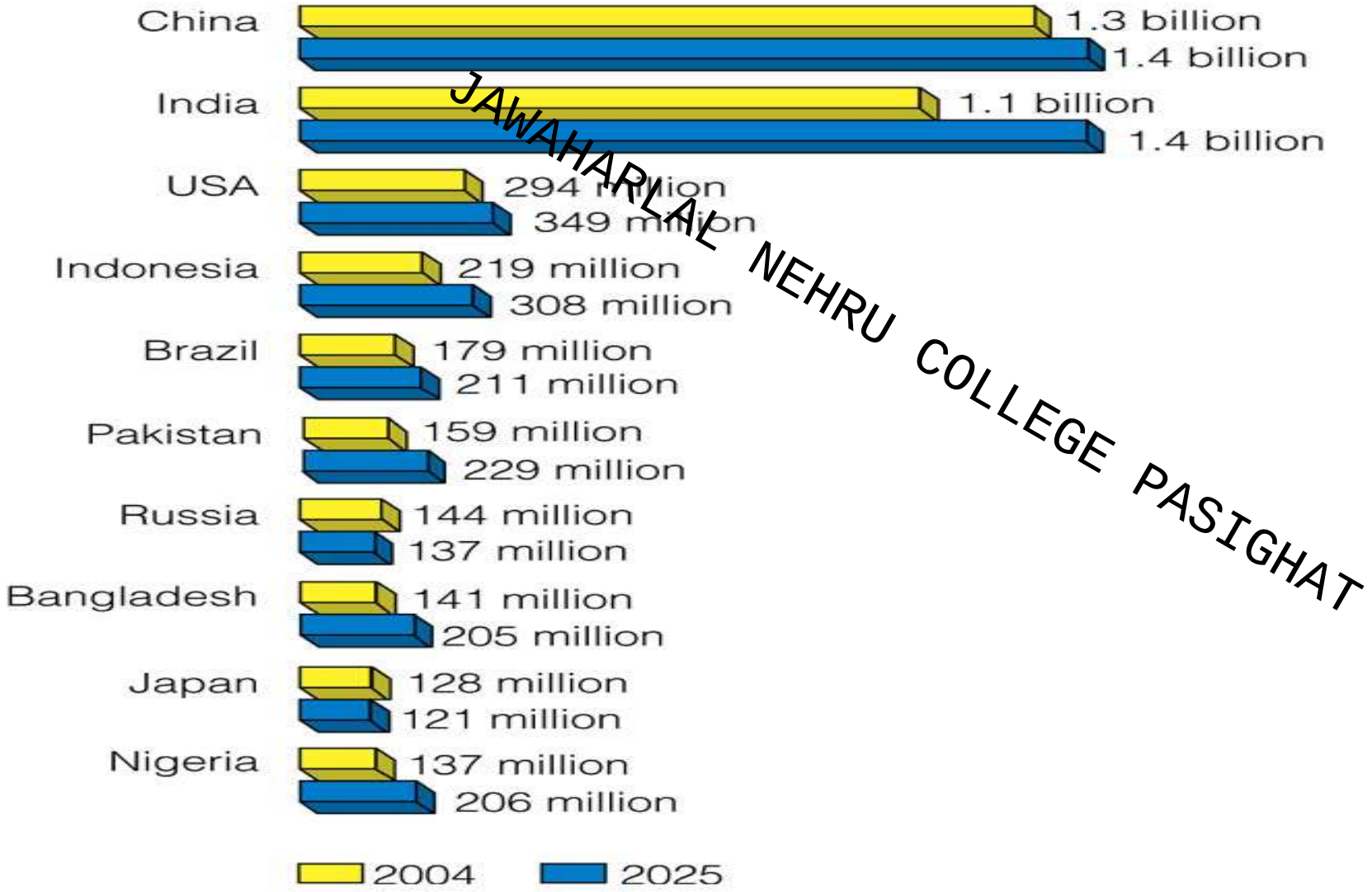
Projected population growth in major nations



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THANK YOU..!!

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- ANYONE HAVING PROBLEMS WITH THIS TOPIC MAY ASK LATER OUTSIDE THE AUDITORIUM AND DEPT. OF GEOGRAPHY UPPER CAMPUS J.N. COLLEGE.

GOVERNANCE AND DEVELOPMENT

By: Kani Burang

Dept. of Geography

J.N. College, Pasighat (A.P.)

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Definition of Governance

- **We define Governance as actions that has to do with the manner in which responsibility is discharged.**
- **Governance is defined as the manner in which power is exercised in the management of country' economic and social resources for development (World bank).**
- Such a responsibility may be acquired through
  - election;
  - appointment or delegation in the public domain or in the area of commerce – corporate governance

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Definition of development

- **Development is not purely an economic phenomenon but rather a multidimensional process involving reorganisation and reorientation of entire economic and social system.**
- **Development is process of improving the quality of all human lives with three equally important aspects.**

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- **1. Raising peoples' living levels, i.e., Incomes and consumption, levels of food, medical services, education through relevant growth process.**
- **2. Creating conditions conducive to the growth of peoples' self esteem through the establishment of social, political and economic systems and institution which promote human dignity and respect.**
- **3. Increasing peoples' freedom to choose by enlarging the range of their choice variables, e.g. Varieties of good and services**

Components of good governance

- Therefore, we say that Good governance would mean a condition whereby such responsibility is satisfied in
  - An effective,
  - Transparent, and
  - Accountable manner
  - Equity
  - Rules of law
  - Inclusiveness.

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Good governance

- Good governance entails the existence of efficient and accountable institutions:
  - Political,
  - Judicial,
  - Administrative,
  - Economic,
  - Corporate

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Good governance

- Rules that will
  - promote development,
  - protects human rights,
  - respects the rule of law, and
- ensures that people are free to participate in, and be heard on, decisions that affect their lives.

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Challenges of governance and Development

- Accountability/Transfarency
- Socio-economic problems
- Poverty and unemployment
- Administrative system
- Low participation of peoples
- Economic imbalances
- Physical factors
- Demographic factors

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Conclusion

- Governance and development are two side of same coin.
- Improvement in one's effect others

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CULTURAL DIVERSITY IN INDIA

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CONTENTS

- Introduction
- Religion and spirituality
- Languages
- Festivals
- Performing Arts
  - Dance
  - Music
- Architecture
- Cuisine
- Clothing

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INTRODUCTION

- The culture of India refers to the way of life of the people of India
- Amazing cultural diversity throughout the country
- India's languages, dances, music, architecture, food and customs differ from place to place within the country

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- There is hardly any culture in the world that is as varied and unique as India's

Marina Langkam

RELIGION AND SPIRITUALITY

- India is one of the most religious countries in the world with large and active populations of Hindus (80.45%), Muslims(13.43%), Christians(2.34%), Sikhs(1.86%) and others
- Unlike in the West, where one's faith is considered "private", Indians tend to display their religion prominently

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- People who are irreligious are looked upon rather suspiciously
- A person's name, occupation, style of dress, marriage partner, and diet are all largely based on religion

Marina Langkam

Religion and Spirituality contd...

- Family
- Marriage
- Namaste

Family

Family plays a significant role in the Indian culture. For generations, India has had a prevailing tradition of the joint family system. It is a system under which extended members of a family – parents, children, the children's spouses and their offspring, etc.

Marriage

For centuries, arranged marriages have been the tradition in Indian society though men and women have always had the choice of who they want to marry. Even today, the vast majority of Indians have their marriages planned by their parents and other respected family-members,

The divorce rate is extremely low compared with about 50% in the United States .

The arranged marriages generally have a much lower divorce rate.

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Namaste

Namaste, *namaskar* or *Namaskara* or *Namaskaram*, *VanakkamNomoshkaar* is a common spoken greeting in Indian subcontinent.

Namaskar is considered formal version than Namaste but both express deep respect.Taken literally, it means "I bow to you",word is derived from Sanskrit (namah): to bowand (te): "to you".

LANGUAGES

Language

...not so simple in India...

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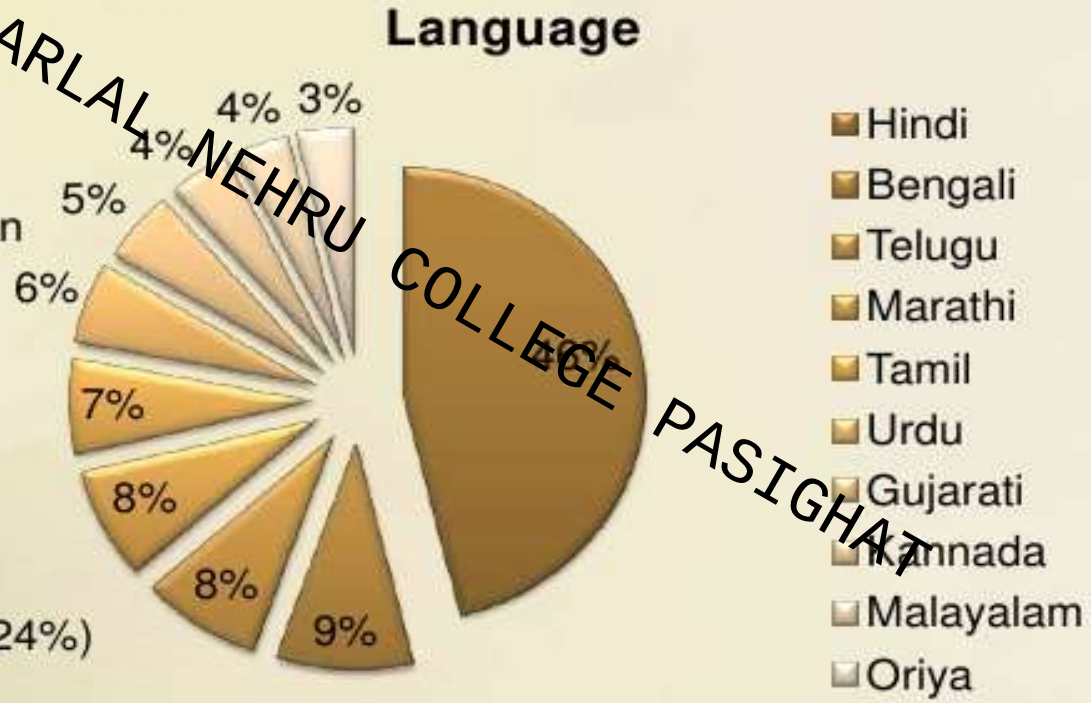
- India has 21 officially recognised languages which is only 2 less than the European Union!
- Under constitution, Hindi and English are official languages of the state
- Two major linguistic families: Indo-Aryan (74%) and Dravidian (24%)



FESTIVALS

List of Selected Festivals
Hindu Festivals
Baisakhi
Basant Panchami
Diwali
Durga Puja
Holi
Janmasthami
Karwa Chauth
Mahashivaratri
Makar Sankranti
Naag Panchmi
Ganesh Puja
Navratri
Rakhi
Ramnavami
Christian Festivals
17. Christmas 18. Ester 19. Good Friday
Sikh Festivals
20. Guru Nanak Jayanti 21.Lohri
Muslim Festival
22.Bakra Eid 23. Eid-ul-fitr 24. Muhorram
Buddhist Festival
25. Buddha Purnima
Jain Festival
26. Mahavir Jayanti
National Festivals
27.Independence Day
28.Republic Day
29.Gandhi Jayanti

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PERFORMING ARTS

Indian dance too has diverse folk and classical forms. Among the well known folk dances are the bhangra of Punjab, Bihu of Assam, the chhau of Jharkhand, Odissi of Orissa, ghoomar of Rajasthan, dandiya and garba of Gujarat and Lavani of Maharashtra.

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GHAT

- Kathakali (kerela)
- Lavani (Maharastra)
- Garba (Gujarat)
- Bhangra (Punjab)
- Kuchipudi (Andhra Pradesh)

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- Ghoomar (Rajasthan)
- Bharatnatyam (Tamil Nadu)
- Kathak (Uttar Pradesh)
- Cheraw Dance (Mizoram)
- Bihu (Assam)

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ARCHITECTURE

Indian architecture has evolved through various ages in different regions of the country. Apart from these natural and obvious evolution from the pre-historic and historic periods, evolution of Indian architecture was generally affected by the emergence and decay of great empires and dynasties in the sub-continent .

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Cuisine

How to eat Indian food

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IMPORTANT DISHES OF INDIA

- Makke ki roti and sarson sa saag (Punjab)
- Dhokla (Gujarat)
- Vada Pav (Maharashtra)
- Litti Chokha (Bihar)
- Dal Baati (Rajasthan)

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Important dishes of India Contd...

- Hyderabadi Biryani (Andhra Pradesh)
- Masala Dosa (Tamil Nadu)
- Vindaloo (Goa)
- Momos, Thukpa (Sikkim)
- Apong (Beer) (Arunachal Pradesh)
- Iromba (Manipur)
- Jadoh (Meghalaya)

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CLOTHING

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Traditional clothing in India greatly varies across different parts of the country. It is influenced immensely by local culture, geography and climate.

Popular styles of dress include draped garments such as sari for women and Dhoti or lungi for men; in addition, stitched clothes such as churidar for women and kurta-pyjama and European-style trousers and shirts for men, are also popular.

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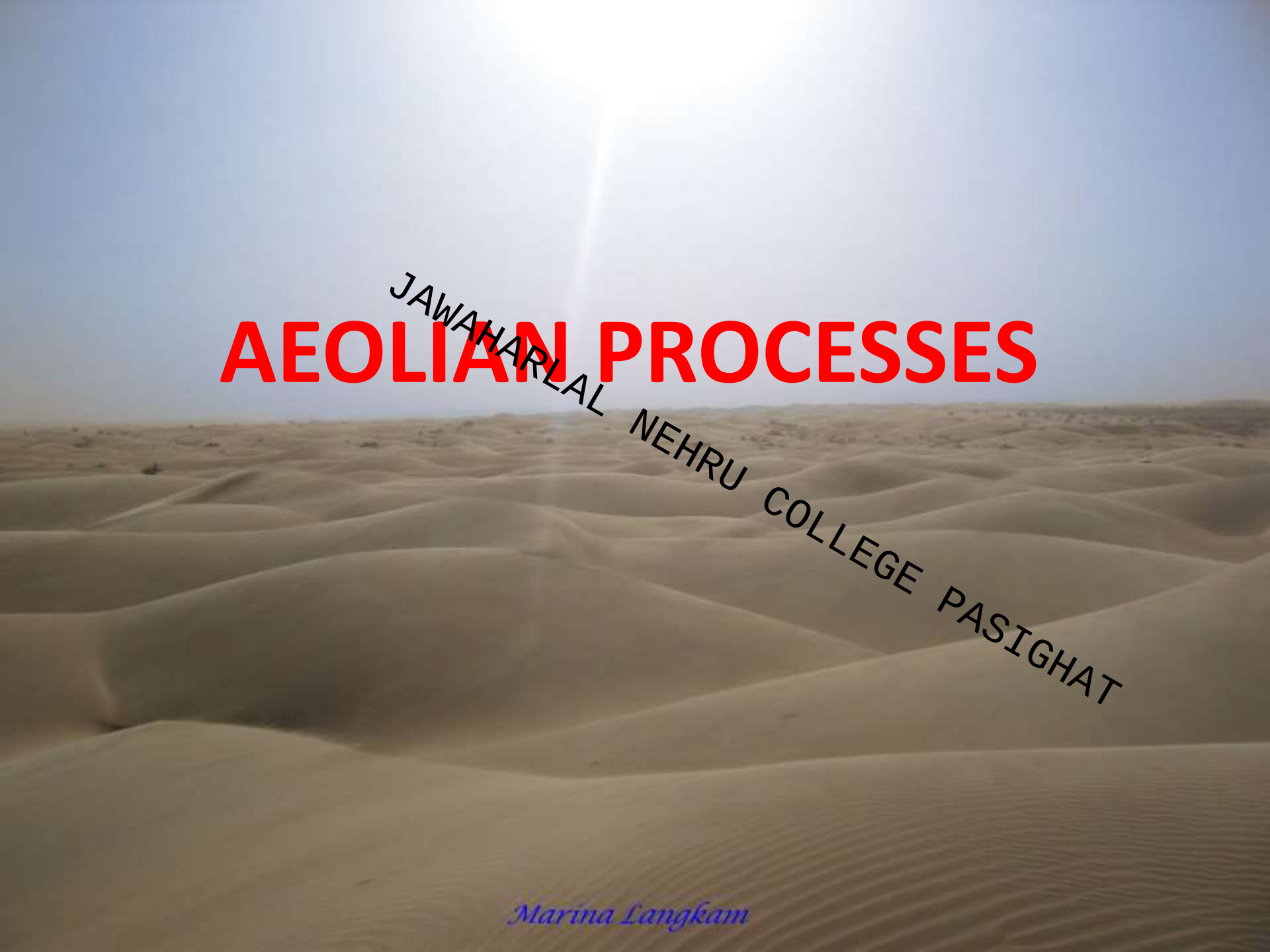

AEOLIAN PROCESSES

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- **AEOLUS is the Greek 'God of wind'**
- **Eolian processes include erosion, transportation and deposition activities of wind**
- **Eolian processes are important in arid and semi arid regions of tropical and temperate environments**
- **Recent investigations have shown that even in the deserts running water is a potent geomorphic agent**

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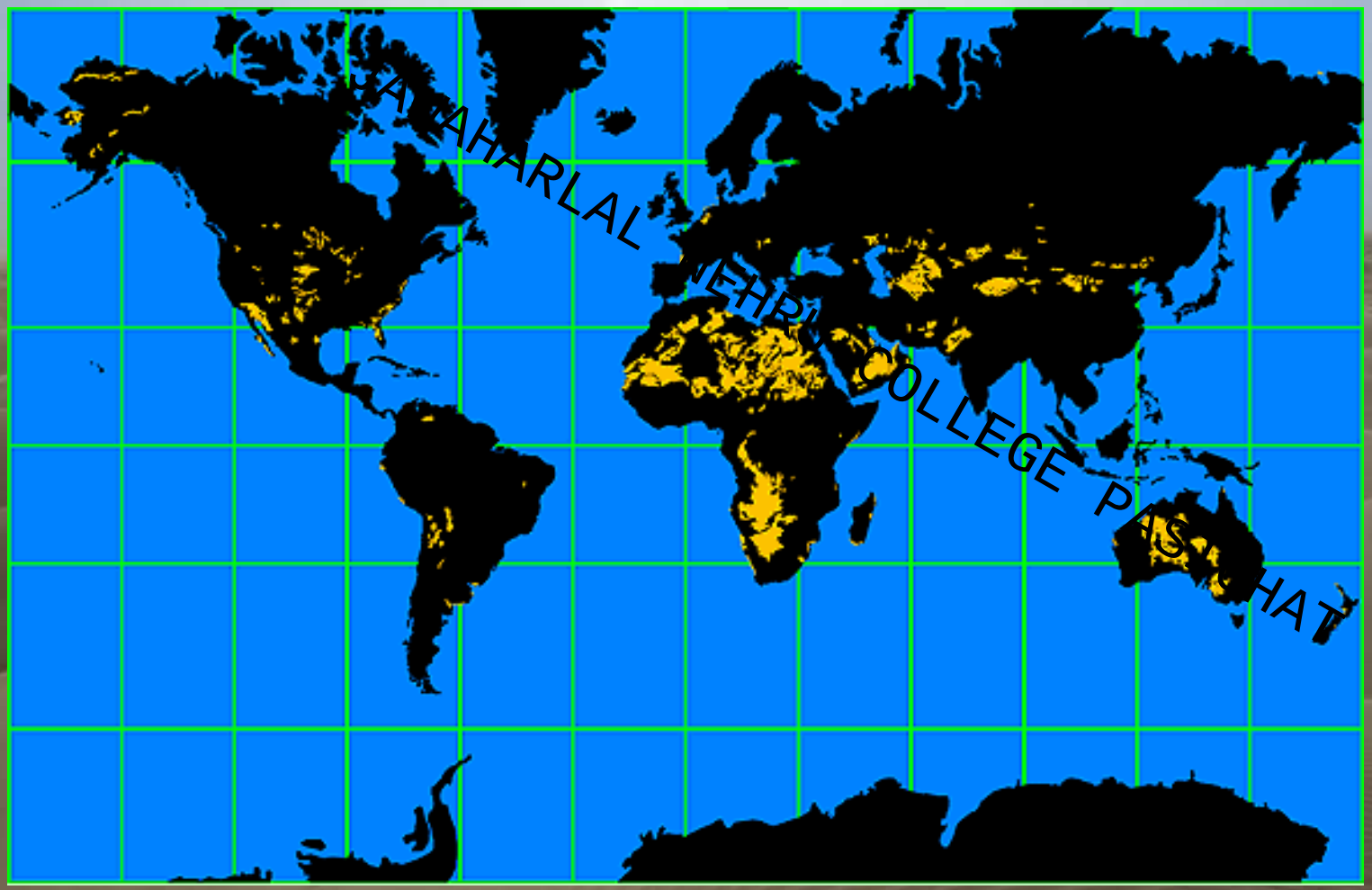
Global distribution of major deposits of Eolian derived sediments



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Factors affecting wind erosion

- **Wind Velocity**: Massive wind erosion with a significant increase in wind speed
- **Nature and amount of materials/ the size of the grain**: larger grains resist erosion by virtue of their greater size
- **Composition of rocks**
- **Nature of vegetation**

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WIND EROSION occurs in three ways:

- **DEFLATION**
- **ABRASION OR SANDBLASTING**
- **ATTRITION**

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DEFLATION

- ✓ Deflatus (Latin word) means blowing away
- ✓ Removing, lifting and Blowing away of surface materials by winds
- ✓ Deflation – wind blows loose soil away:
  - leaves coarser pebbles & cobbles, called Desert Pavement
  - Continued deflation removes most of loose materials and thus depressions or hollows are formed called Deflation Hollow or Blowouts.

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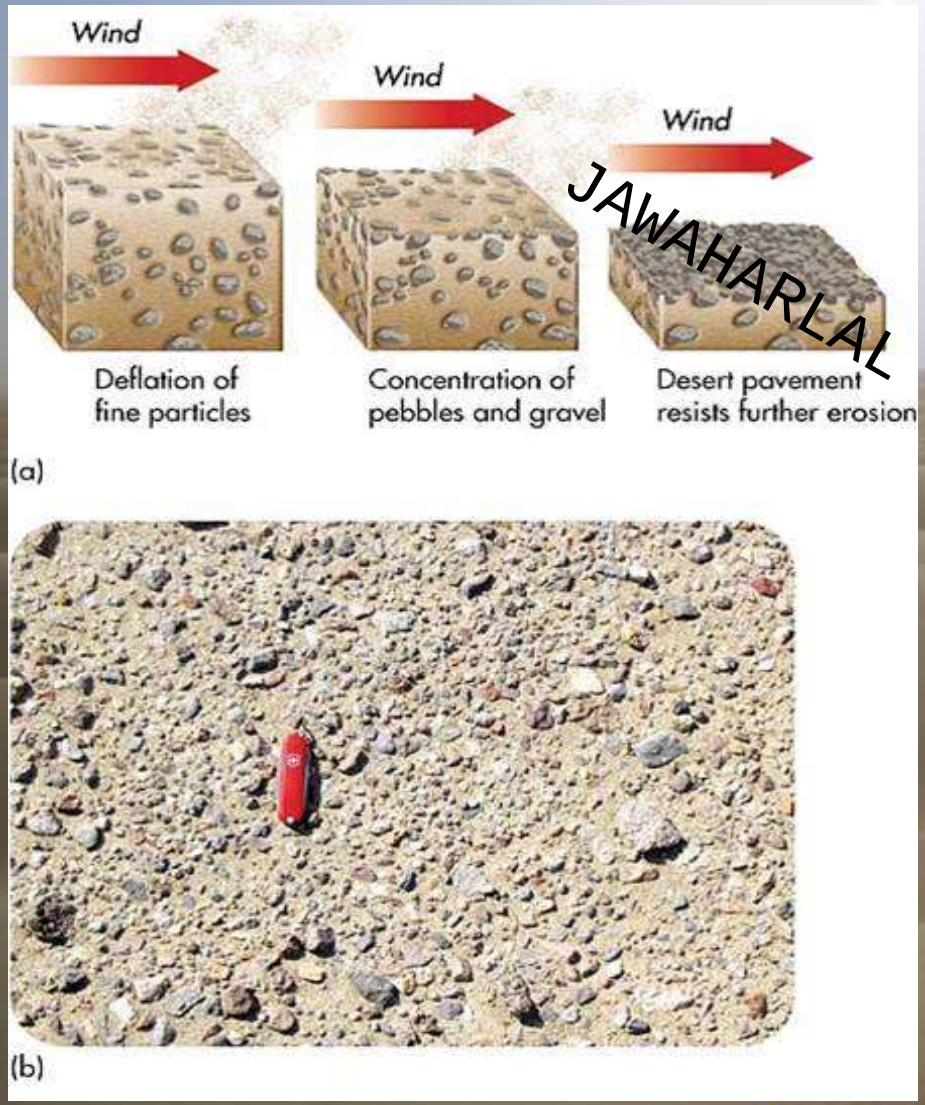
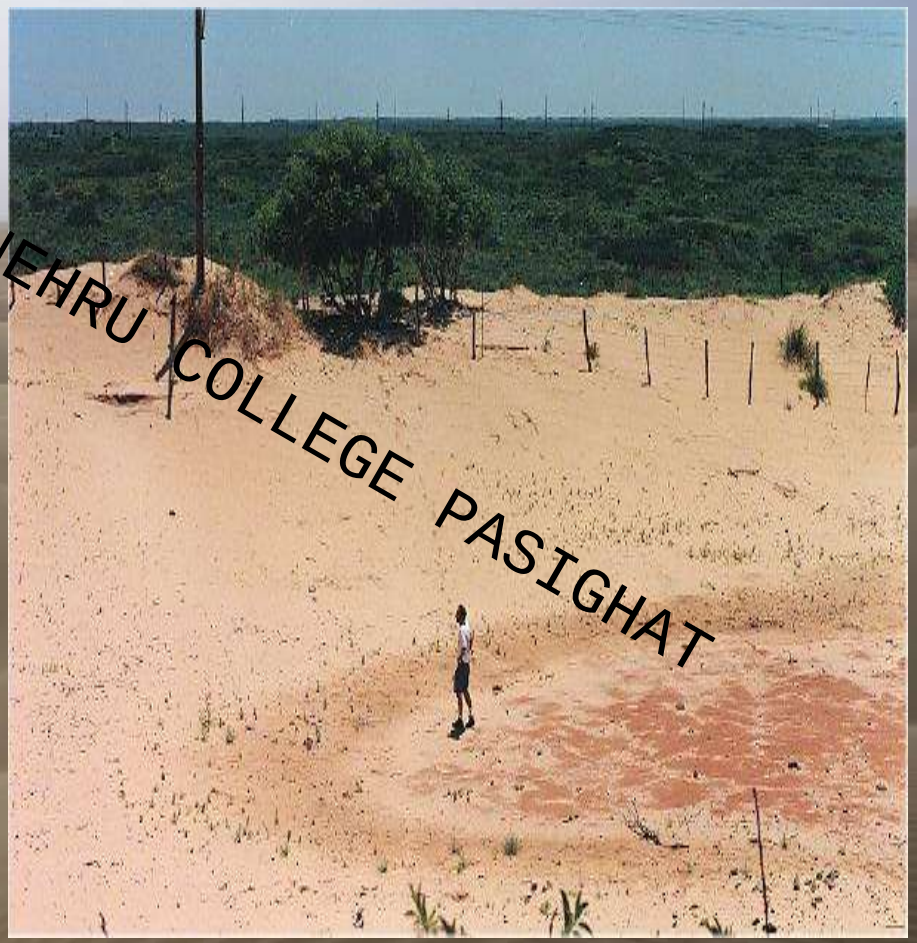
Deflation continues...

Desert Pavement



Deflation hollows or blowouts



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ABRASION OR SANDBLASTING

- Wearing down of surfaces by the grinding action and sand blasting of windborne particles
- Maximum abrasion occurs at the height between 20-25 cm from the ground surface

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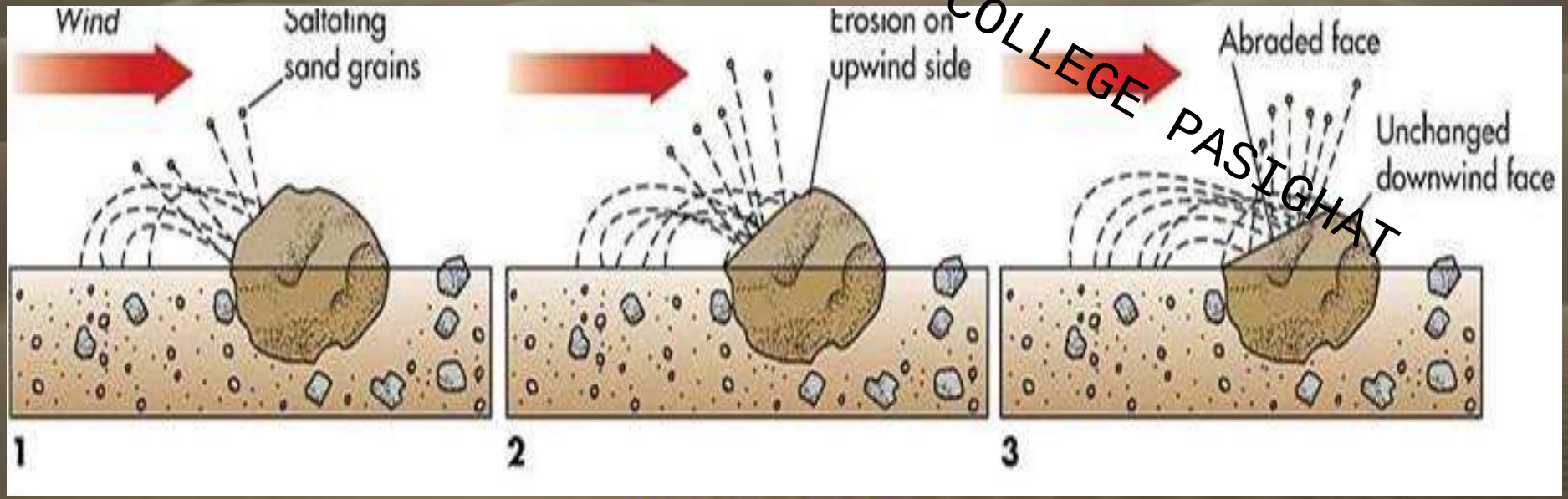

ATTRITION

- Mechanical tear and wear of the particles suffered by themselves while they are being transported by wind
- Results into gradual reduction in the size of rock particles (size of grains)

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TRANSPORTATIONAL PROCESSES

1. Suspension
2. Saltation
3. Surface creep or Traction

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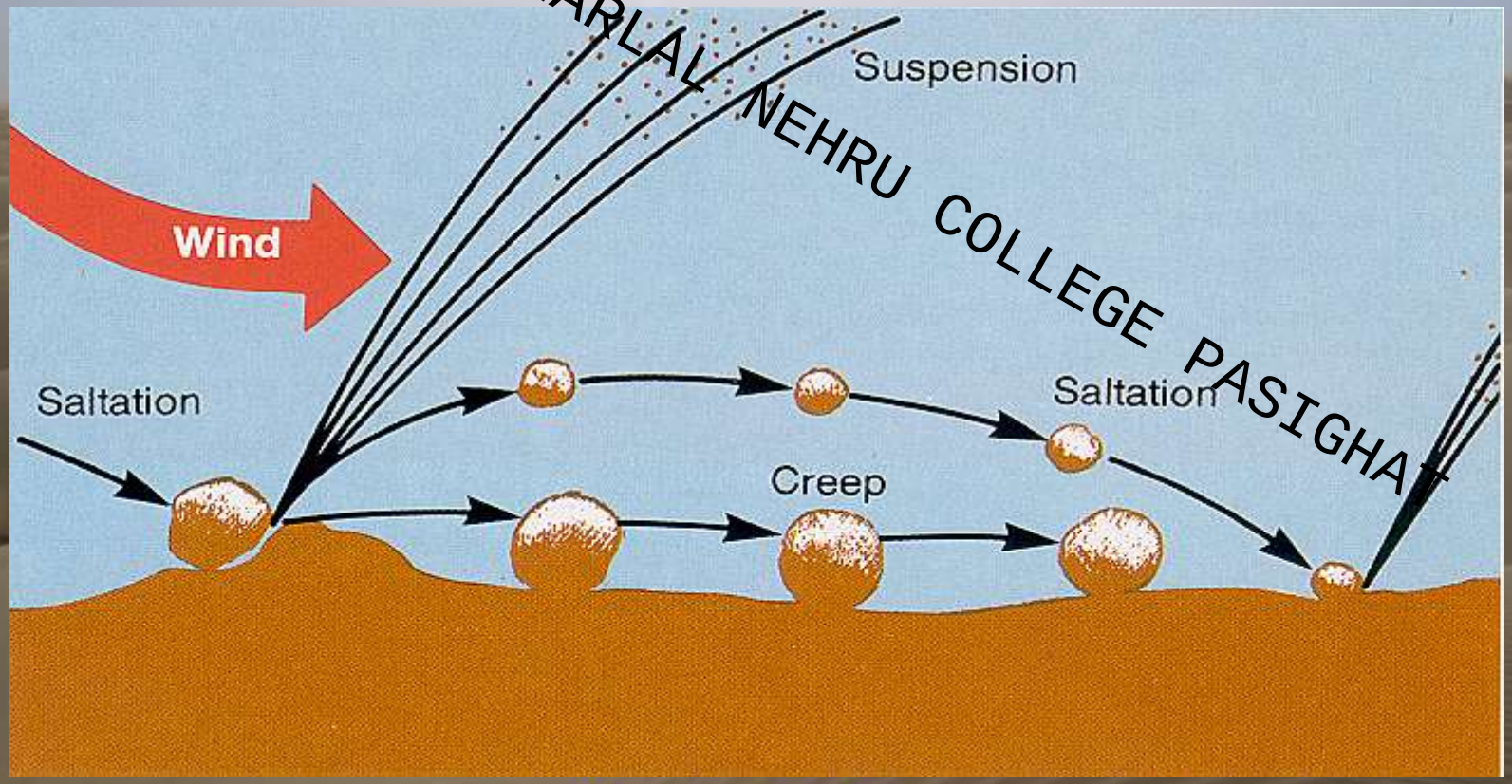

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SUSPENSION

- Smallest dust particles are carried
- Air suspends particles less than 0.2 mm in diameter
- Mostly fine silt and clay particles

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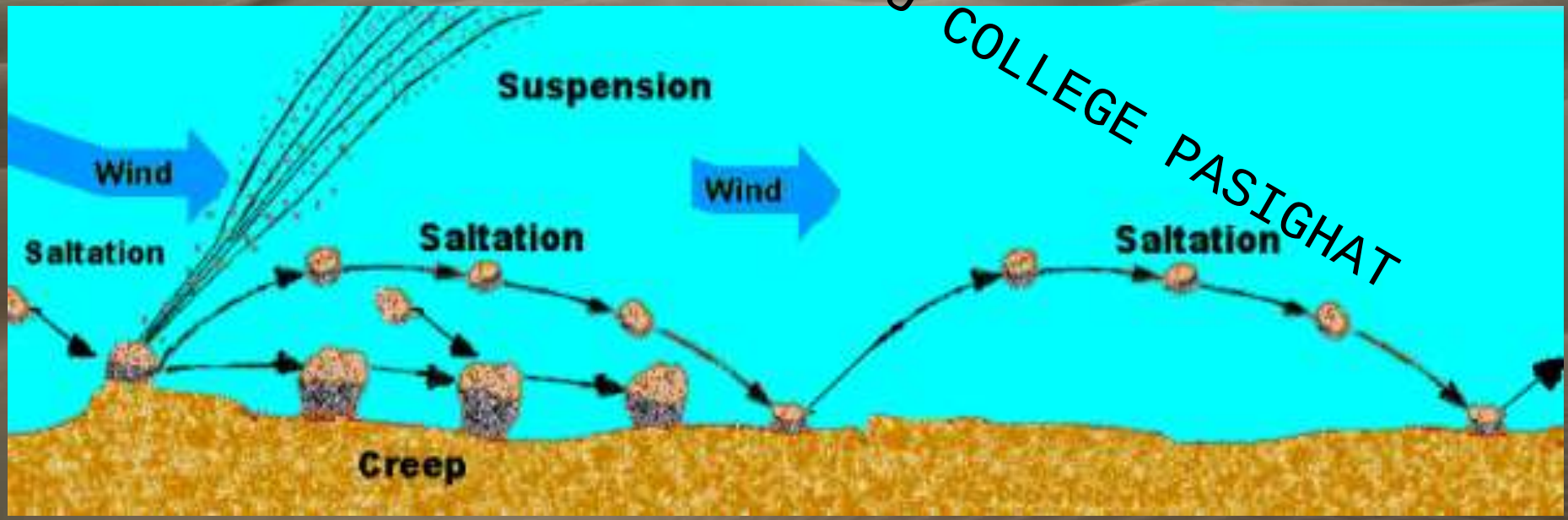

SALTATION

- Saltare (Latin word) means ‘to leap’
- Movement of sands and gravels through the mechanisms of bouncing, jumping and hopping by turbulent air flow

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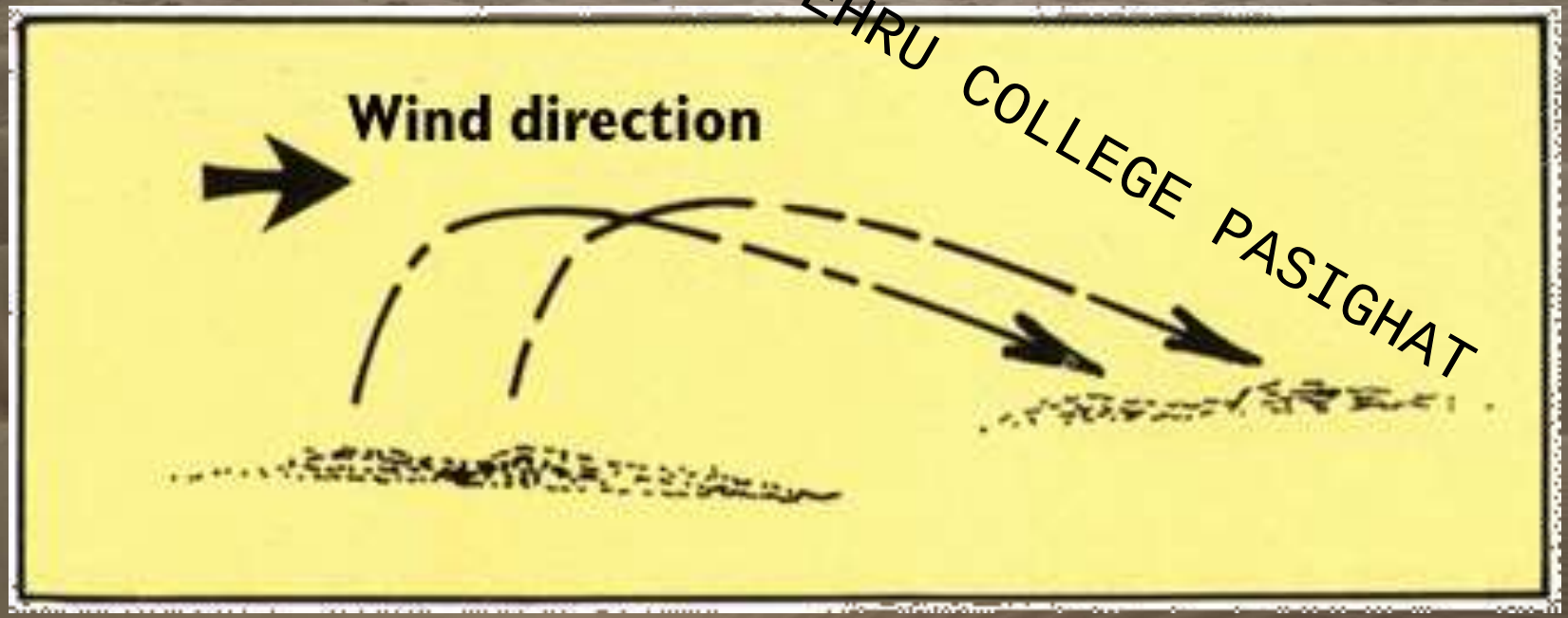

SURFACE CREEP OR TRACTION

- Movement of relatively bigger particles along the ground surface
- They are hit by smaller particles, which cause them to creep forward, very slowly
- Sliding and rolling

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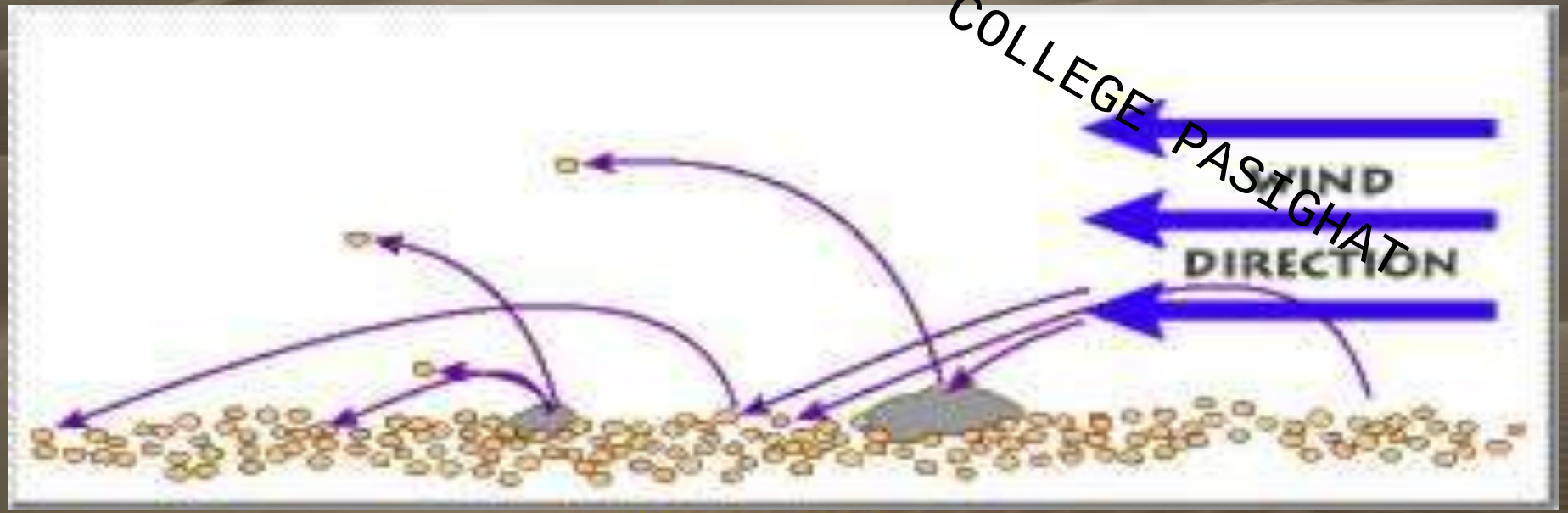

DEPOSITIONAL PROCESSES

- Deposition of sediments occurs due to:

  -marked reduction in wind speed

  -obstructions caused by bushes, forests, marshes and swamps, lakes, big river, walls, etc

- Deposition takes place with a sorting action (larger particles drop first due to reduced wind velocity)
- Wind-deposited sand bodies occur as sand sheets, ripples and dunes.

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Sand sheets and ripples

- ***Sand sheets*** **are flat, gently undulating sandy plots of sand surfaced by grains that may be too large for saltation.**
- **Wind blowing on a sand surface *ripples* the surface into crests and troughs whose long axes are perpendicular to the wind direction.**
- **Wind-blown sand moves up the gentle upwind side of the dune by Saltation or creep. Sand accumulates at the brink, the top of the slip face. When the buildup of sand at the brink exceeds the angle of repose, a small avalanche of grains slides down the slip face. Grain by grain, the dune moves downwind.**

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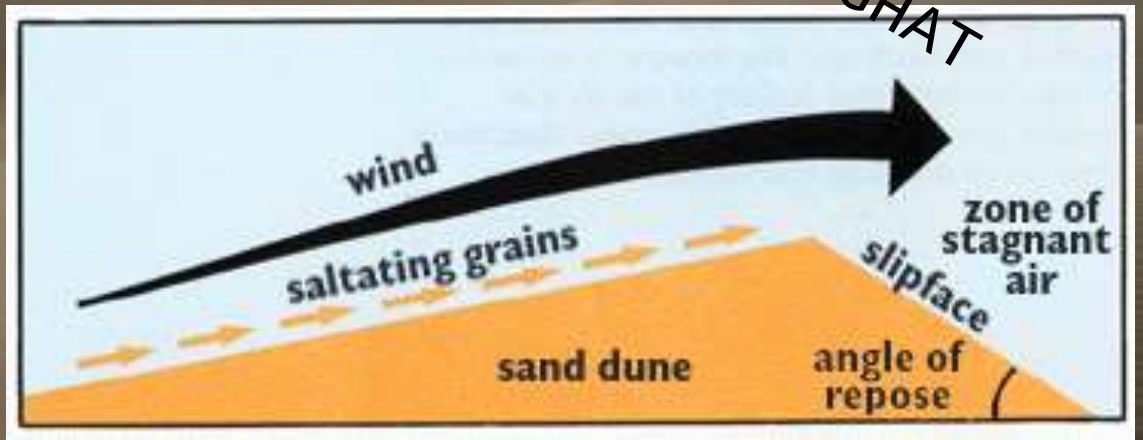

Thank
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FLUVIAL LANDFORMS
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Three Stages of a river

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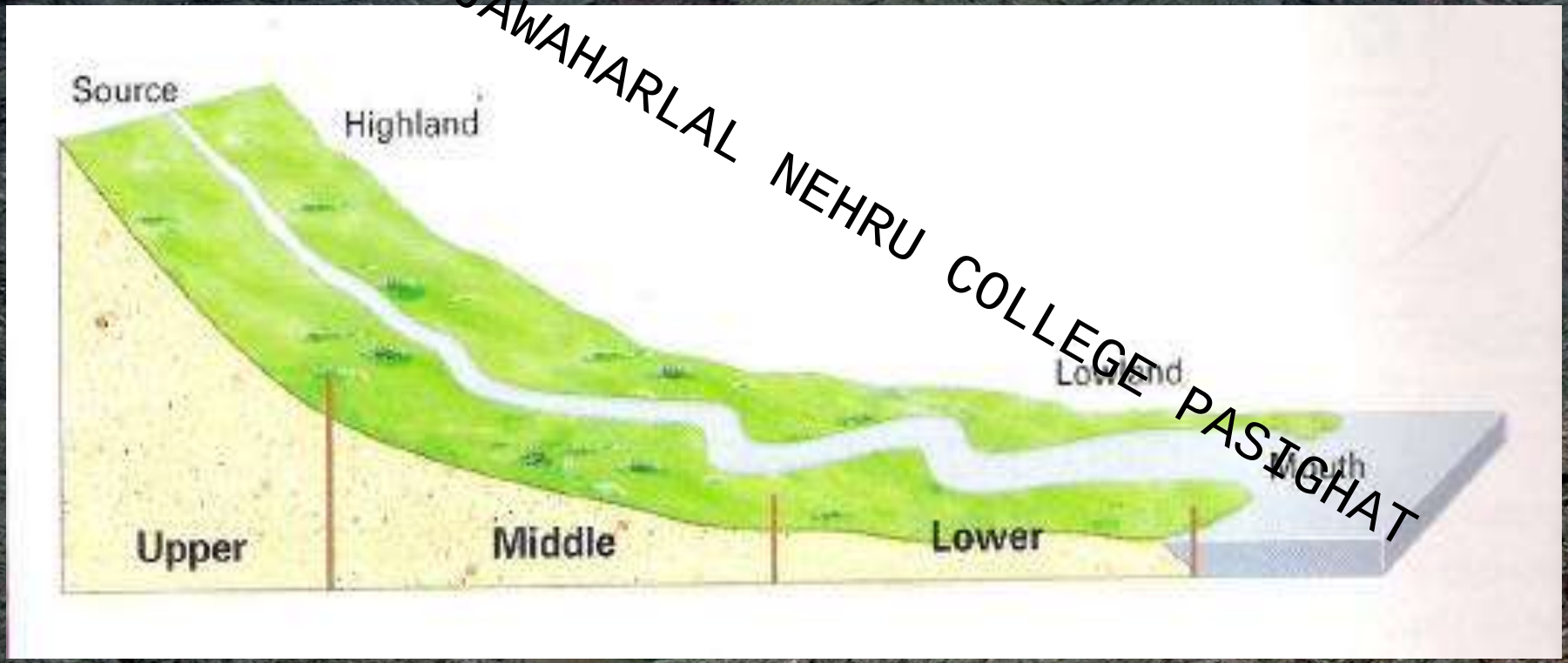

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Fluvial landforms in different stages of the river

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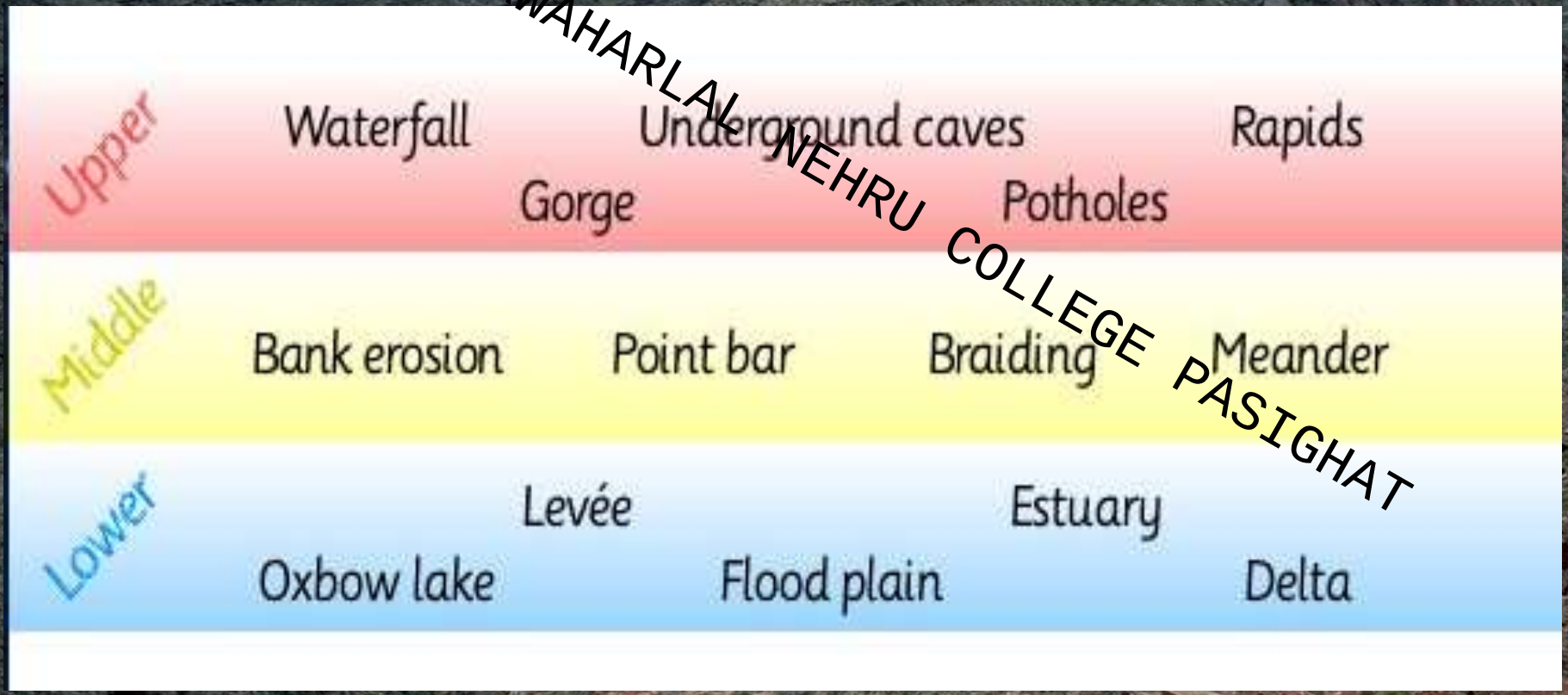

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FLUVIAL EROSIONAL LANDFORMS

- Canyon and Gorge
- River Valleys
- Waterfall
- Potholes
- Stream terraces
- Structural benches
- River Meanders
- Oxbow lakes

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WATERFALL

- A waterfall is when a river falls over a vertical slope.
- It is found in the youth stage of a river where there are areas of hard and soft rocks.

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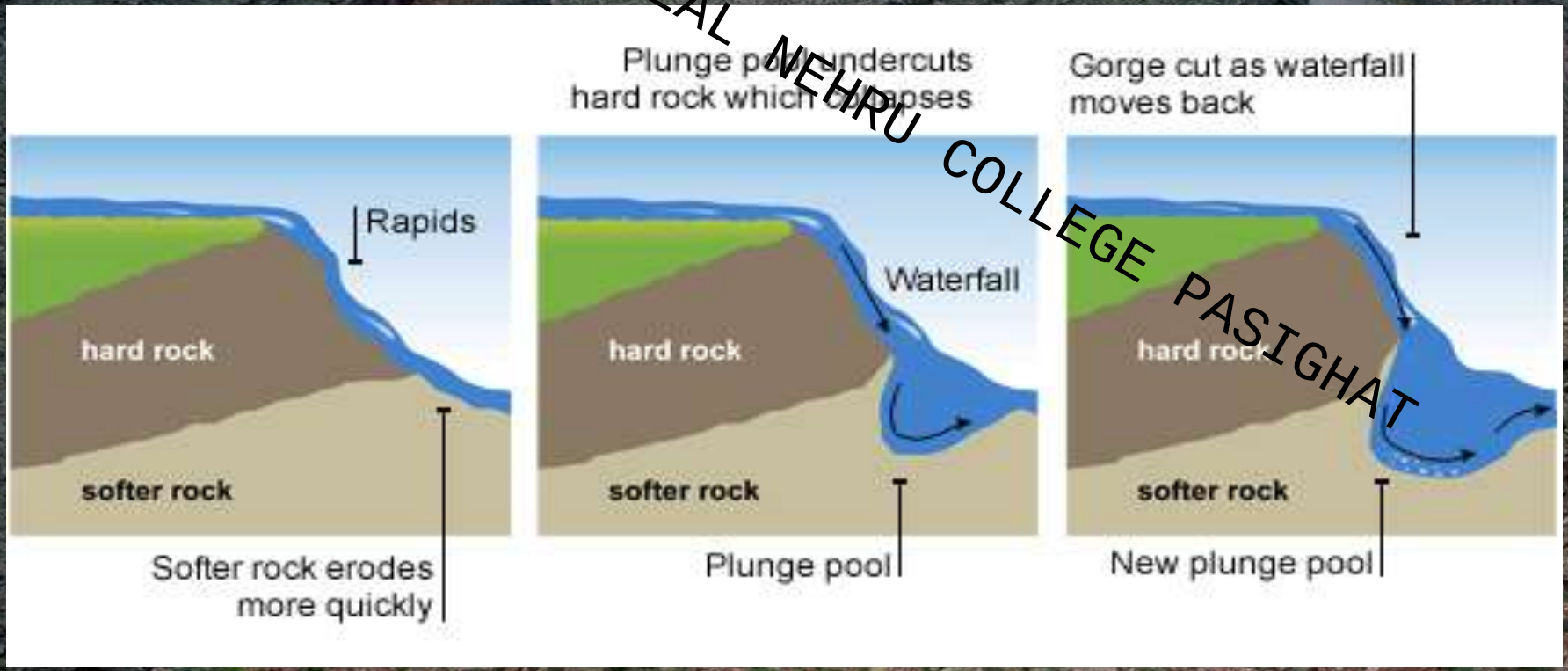

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waterfalls

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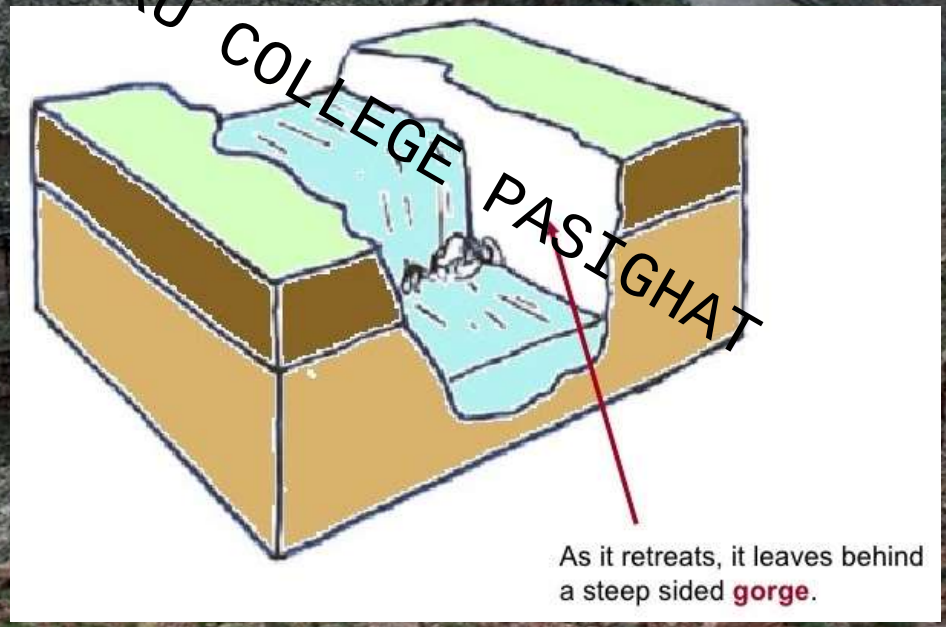
Canyon and Gorge

- ✓ Canyon (US) or Gorge (Europe) represents very deep and narrow valleys having very steep valley side slopes.
- ✓ They are mostly formed when the process of forming a waterfall is repeated frequently, as the waterfall retreats upstream



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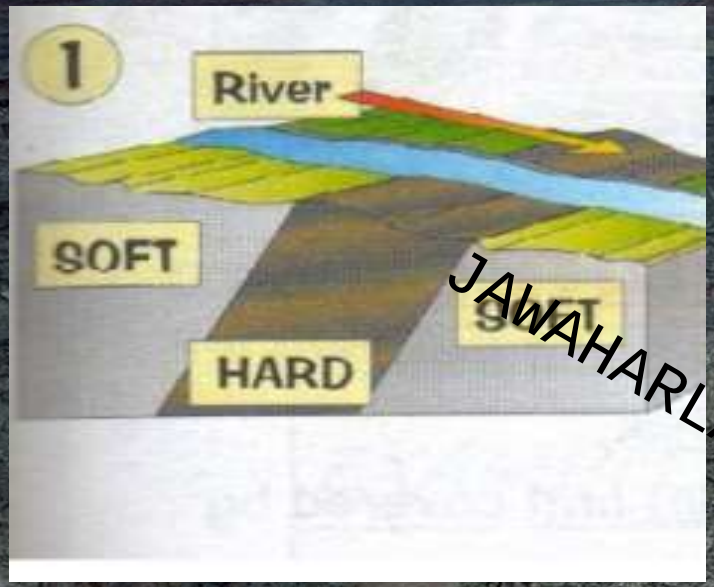
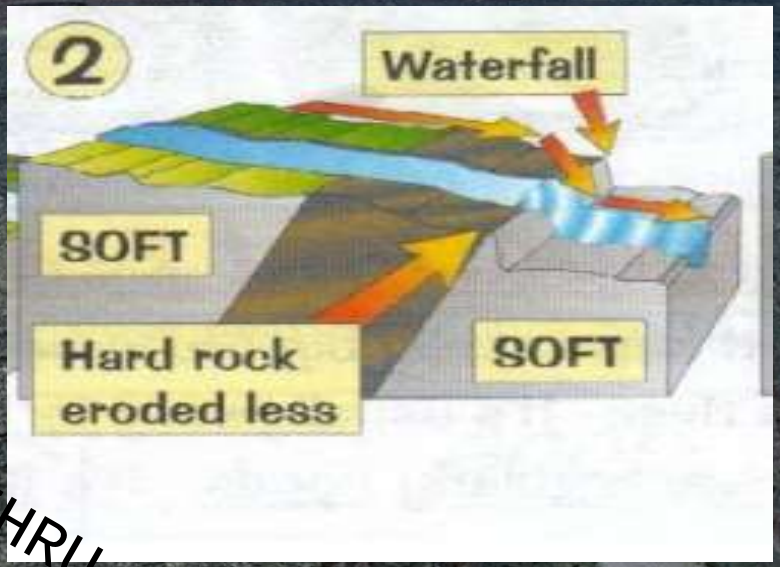
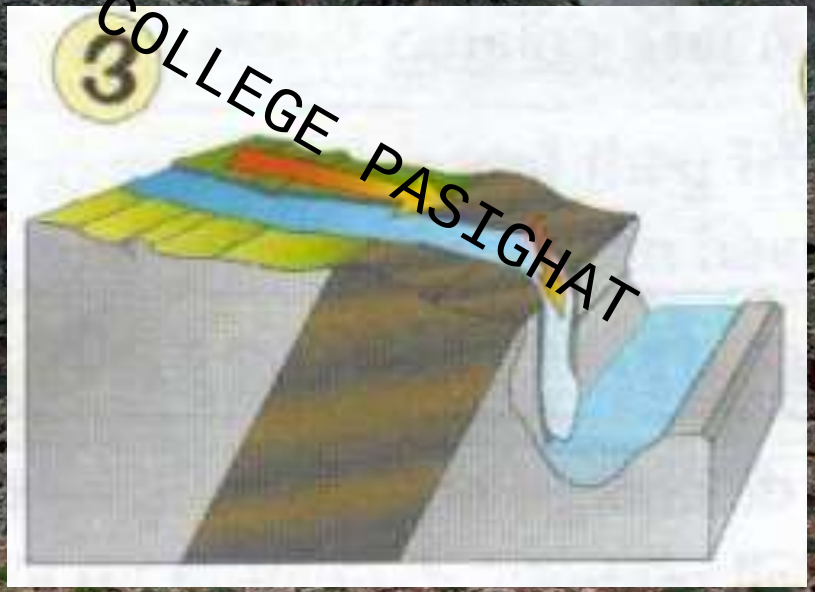
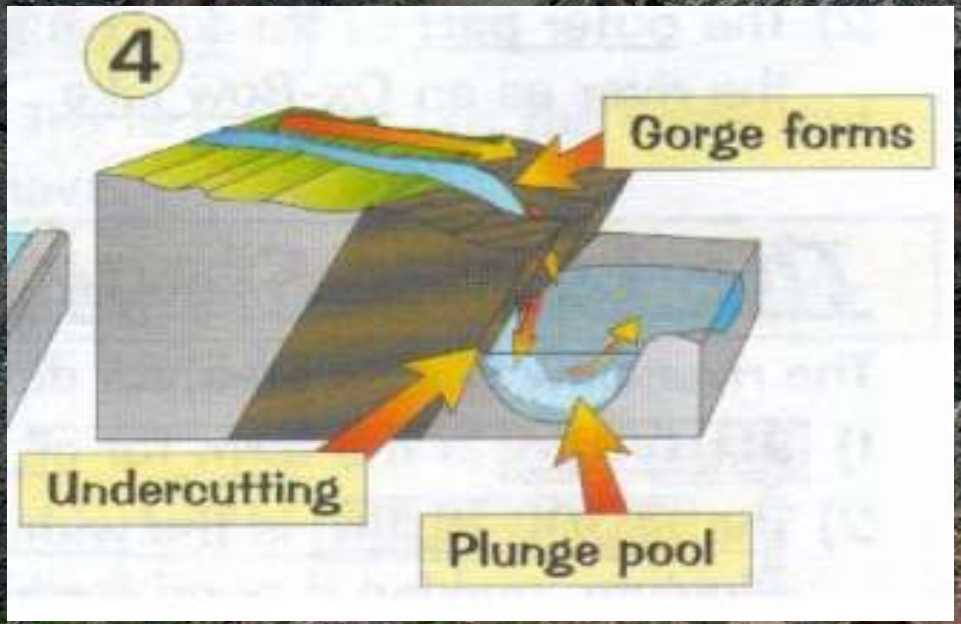
Formation of a gorge









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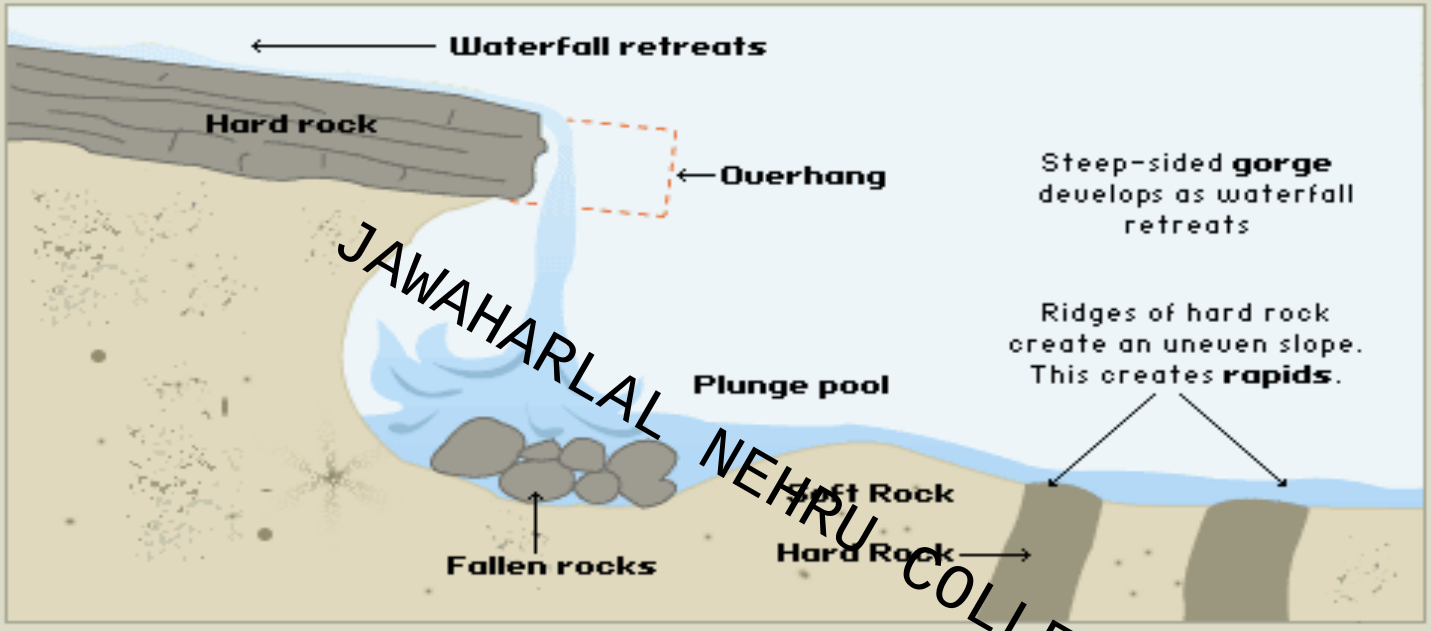
Waterfall and gorge formation



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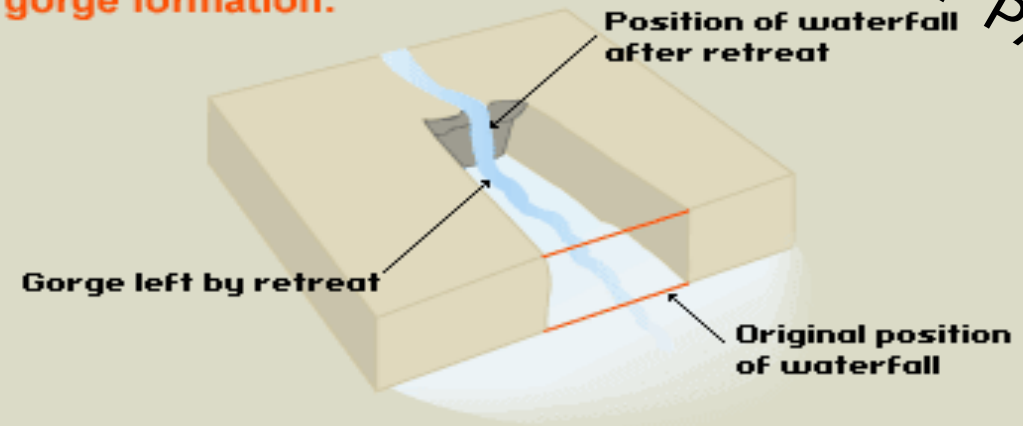
Block diagram showing gorge formation:



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Other cases of gorge formation

Gorges are also formed where:

-a river flows along a line of weakness.

-a river maintains its course across a landscape which is slowly being uplifted.

-a river cuts across a plateau composed of horizontal and alternate lavers of hard

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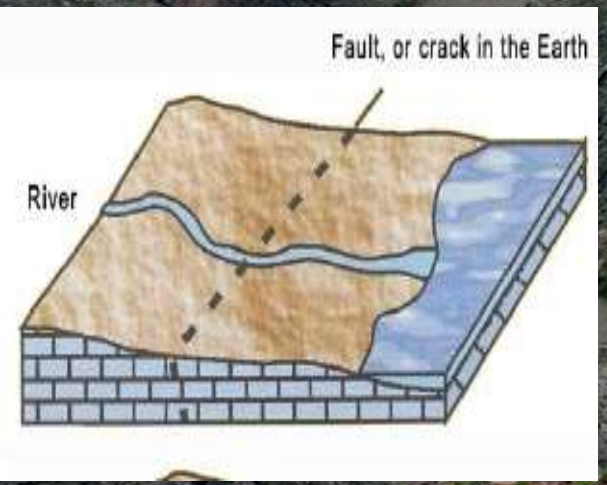

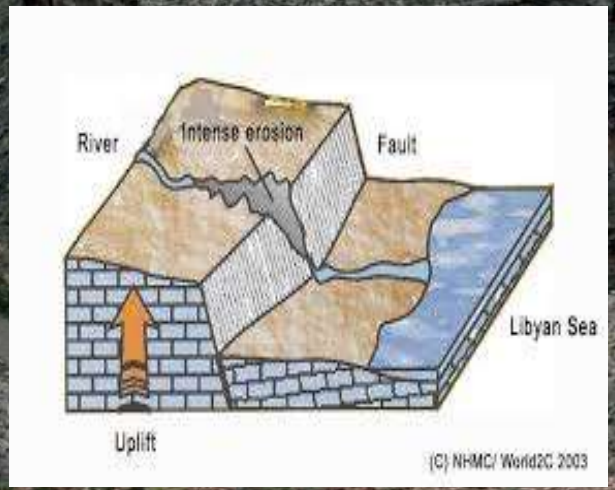

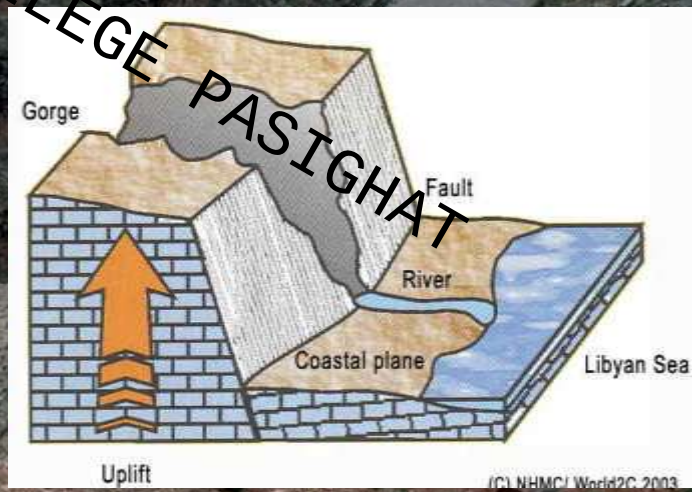

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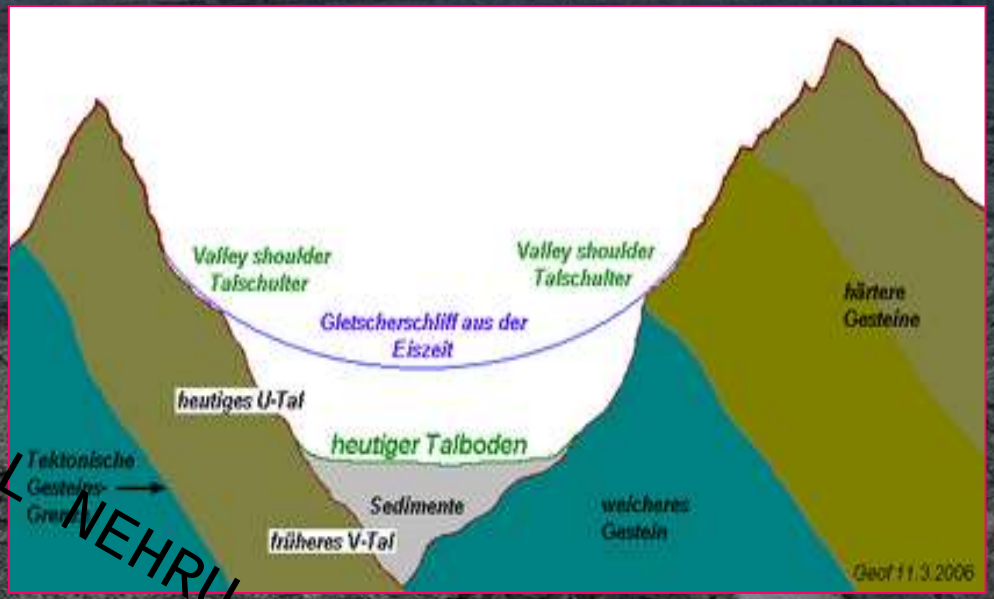
RIVER VALLEYS

An elongated lowland between ranges of mountains, hills, or other uplands, often having a river or stream running along the bottom



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RIVER VALLEYS

It is typically a low-lying area of land, surrounded by higher areas such as mountains or hills. It can also be seen as a path between two mountains, or a depression in a single mountain.

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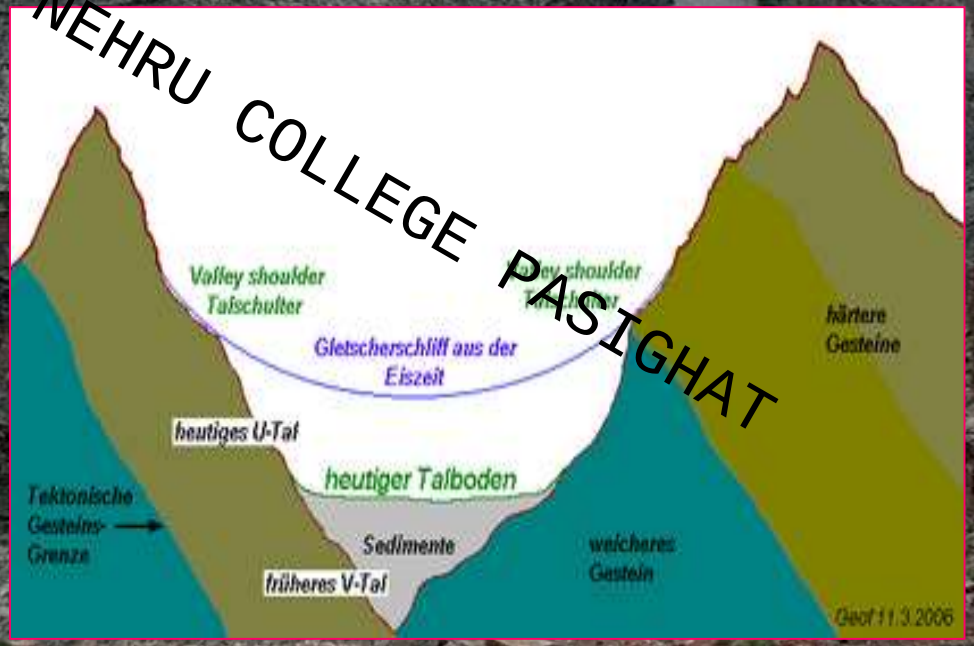

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POTHOLES

- Holes scoured into bedrock by swirling water/sediments
- Abrasion by sediment which enters a depression; bedrock scoured by swirling sediment
- Water able to erode due to power associated with velocity and cavitation; eddies

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STREAM TERRACES

- These are bench like ledges or flat surfaces that occur on the sides of many river valley
- From a distance they may appear as successions of several steps of big natural staircase rising up the river bed

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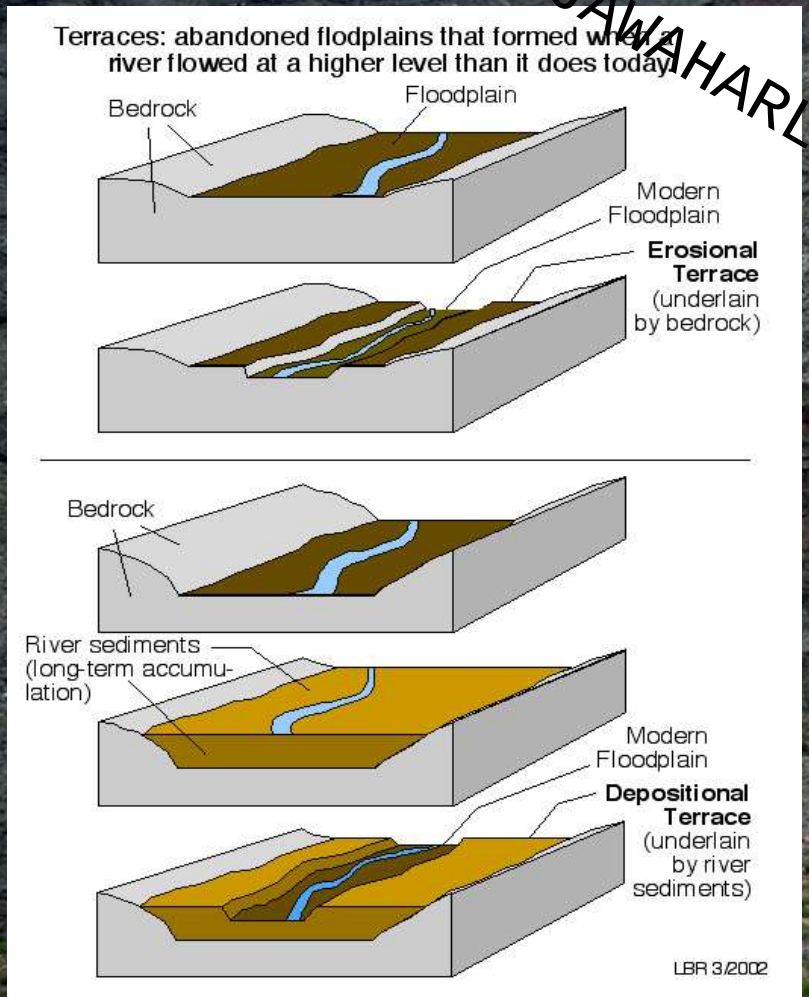
STREAM TERRACES

Stream terraces are features, often floodplains, left behind from periods when a stream was flowing at a higher elevation and has downcut to a lower elevation. Stream terraces often appear as plateaus on existing valley walls and indicate former elevations.



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STRUCTURAL BENCHES

- ✓Step like sequence of geomorphic surfaces
- ✓Differential erosion of alternately arranged hard and soft rocks forming step-like valleys known as structural benches

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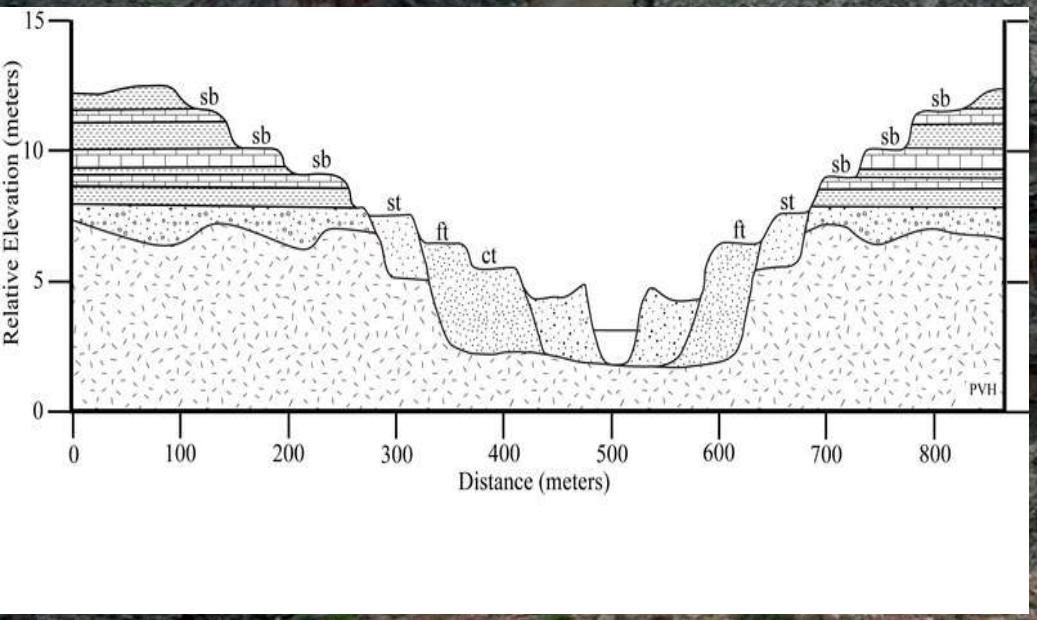

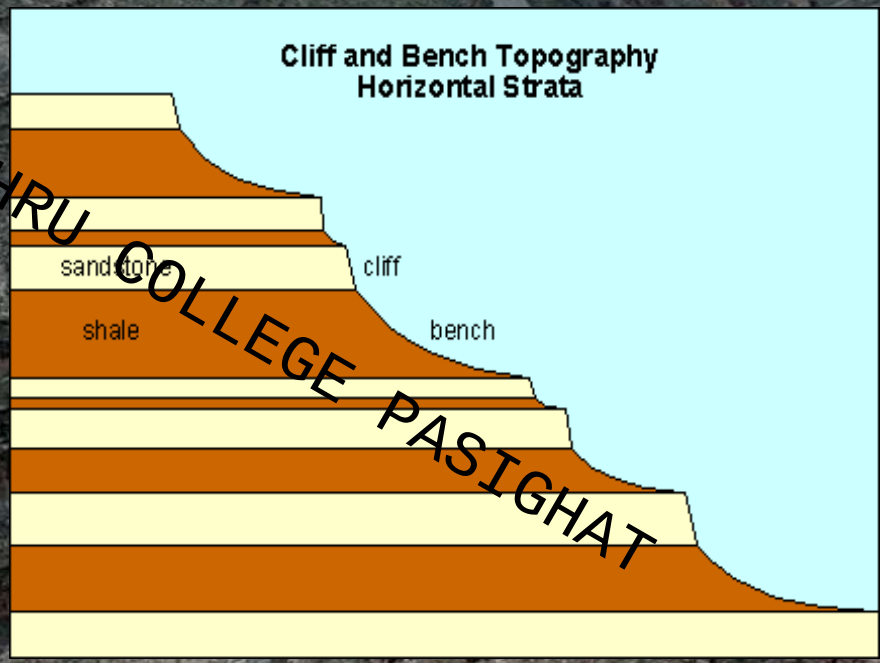

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RIVER MEANDERS

- Bending in the course of a river

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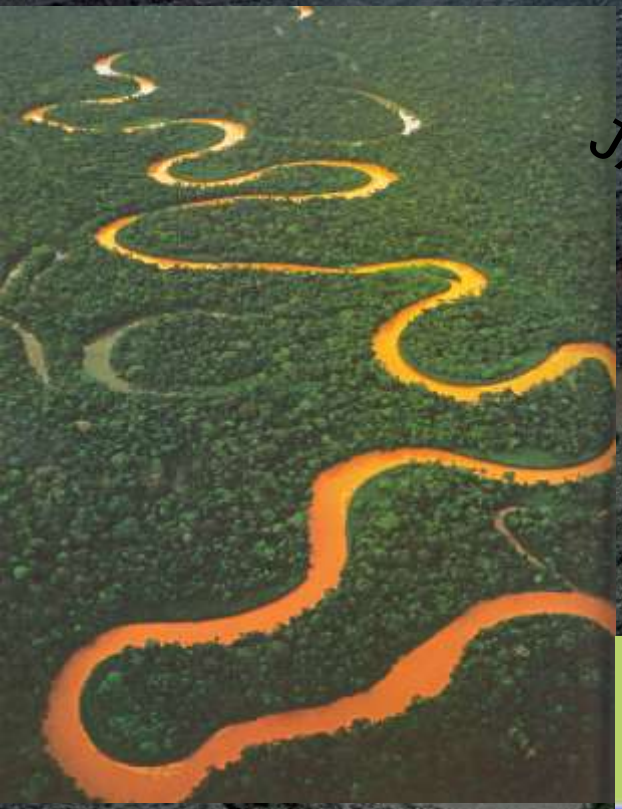
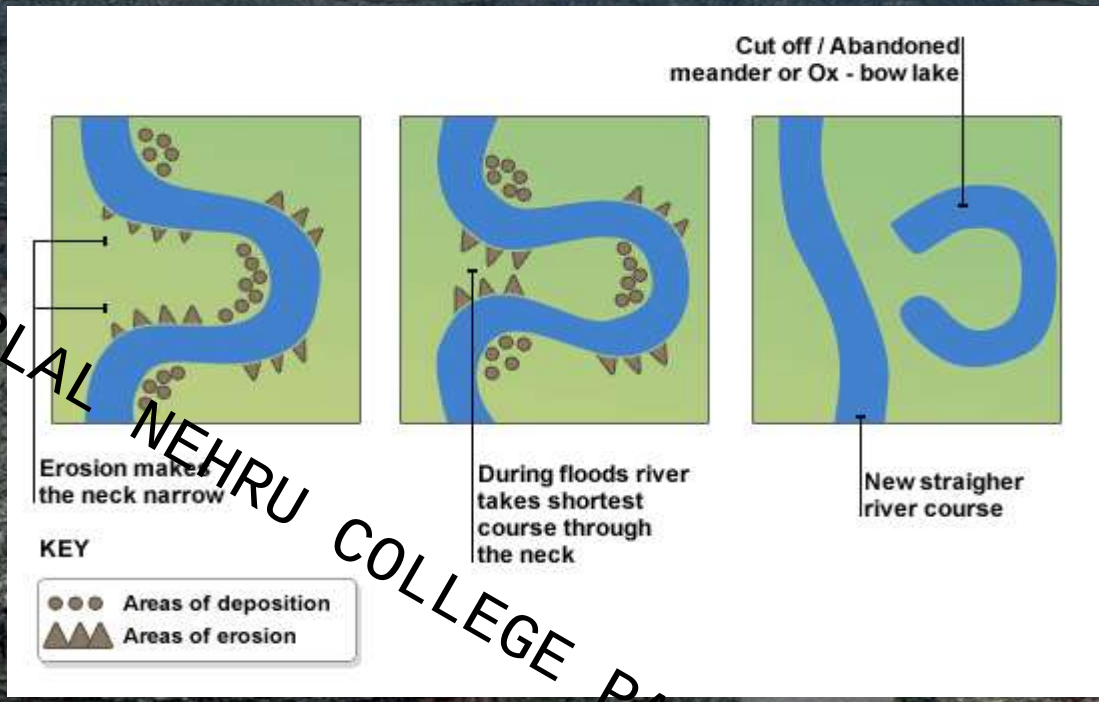
OXBOW LAKES

- Lakes formed due to impounding of water in the abandoned meander loops





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FLUVIAL DEPOSITIONAL PROCESSES

The deposition of load carried by the streams is affected by a variety of factors:

- decrease in channel gradient,
- spreading of stream water over larger area,
- obstructions in channel flow,
- decrease in the volume and discharge of water,
- decrease in the velocity of streams,
- increase in load.

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FLUVIAL DEPOSITIONAL LANDFORMS

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- Alluvial fans and Cones
- Natural Levees
- Flood Plain
- Channel and Sand bars
- Delta

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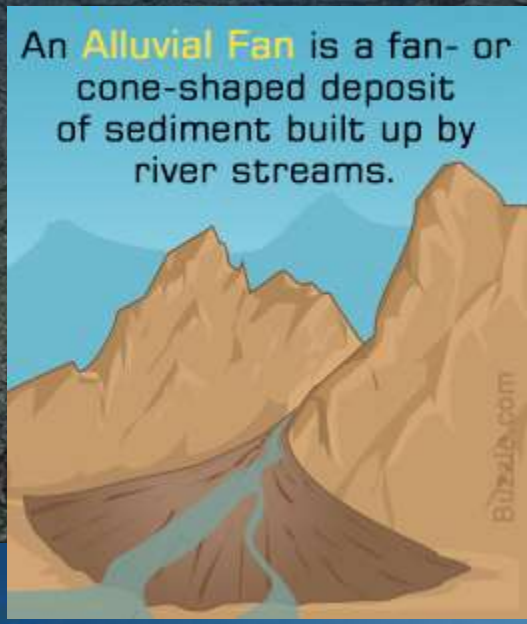
ALLUVIAL FANS AND CONES

- Alluvial fans are fan-shaped deposits of water-transported material (alluvium)
- Alluvial fans have gentler slopes than the cones

Alluvial Fans - Brodeur Peninsula, Baffin Island, Canada



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NATURAL LEVEES

- An embankment of silt and sand built up by a stream along both its sides
- Narrow belt of ridges of low height along the river banks
- Formed due to deposition of sediments during flood periods when the water overtops the river banks and spreads over adjoining flood plains
- Not all the streams build natural levees

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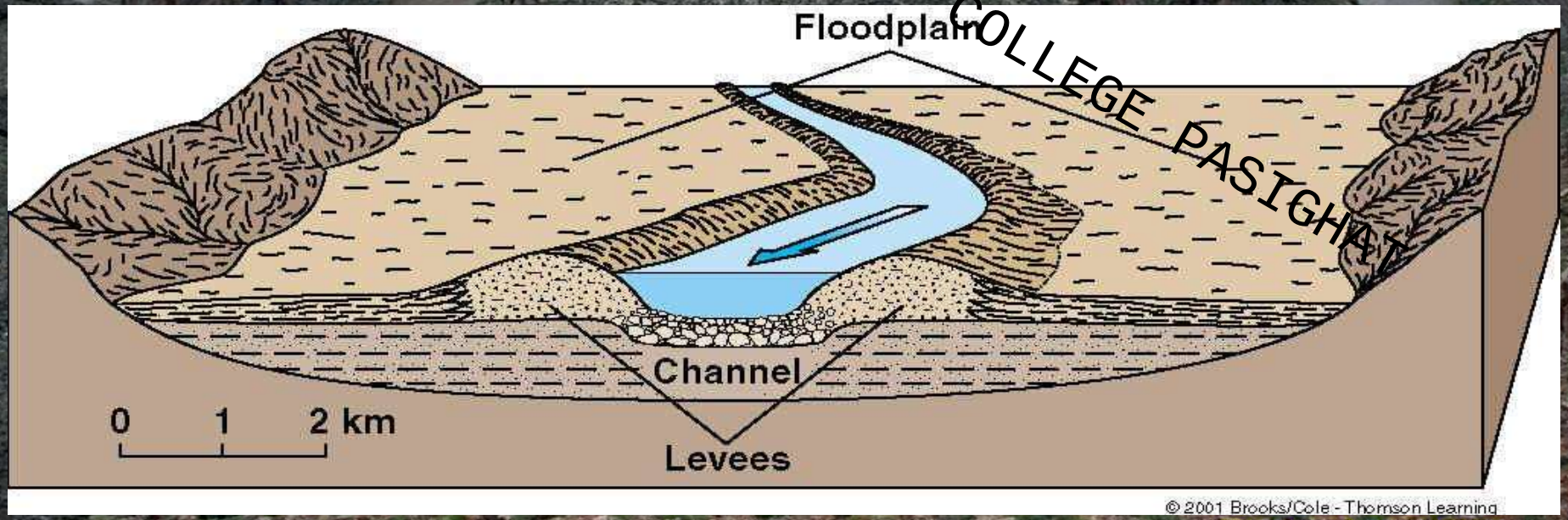

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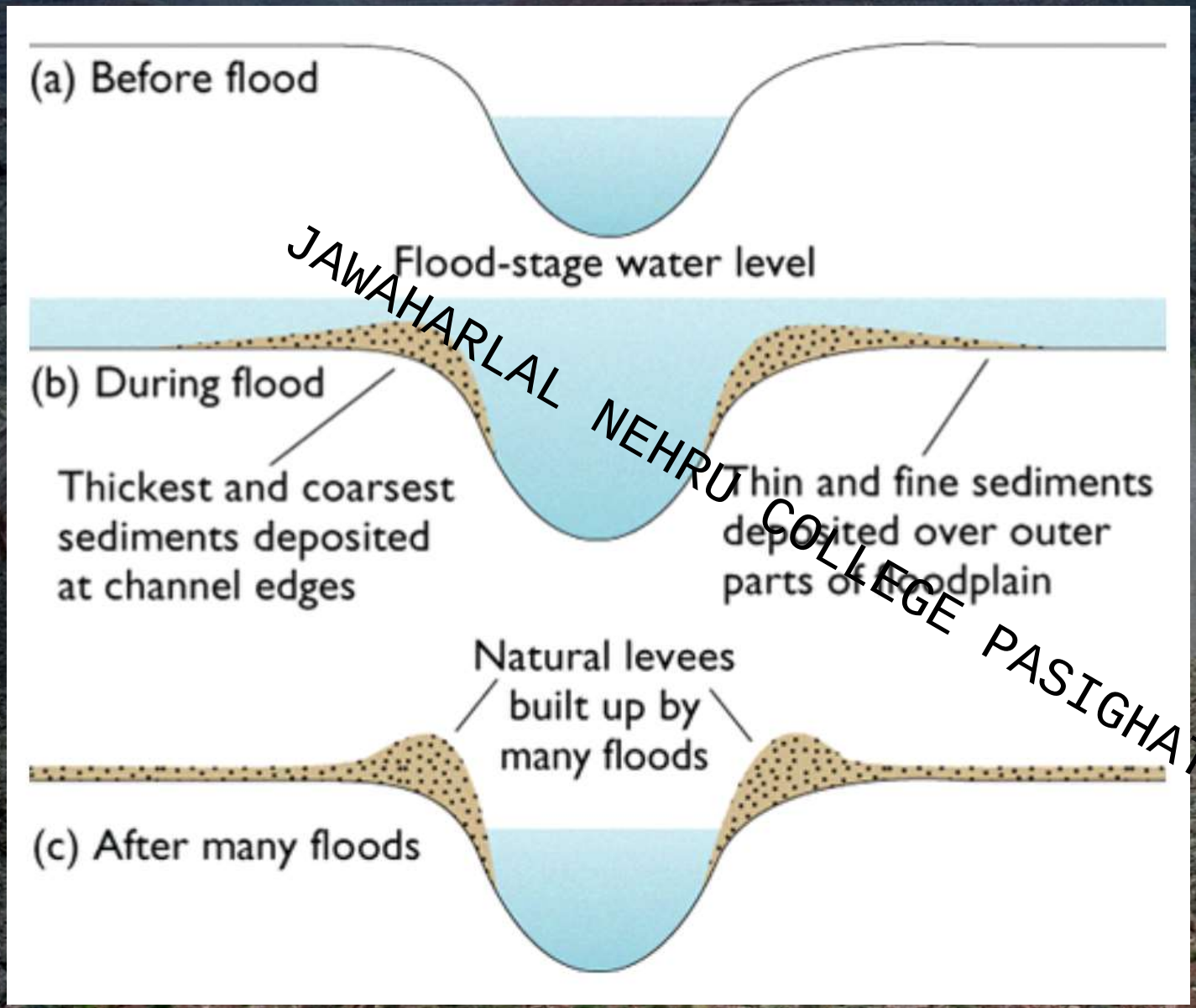
Natural Levees contd...



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FLOOD PLAIN

- An area of low, flat land along a stream or river, formed mainly of river sediments and is subject to flooding

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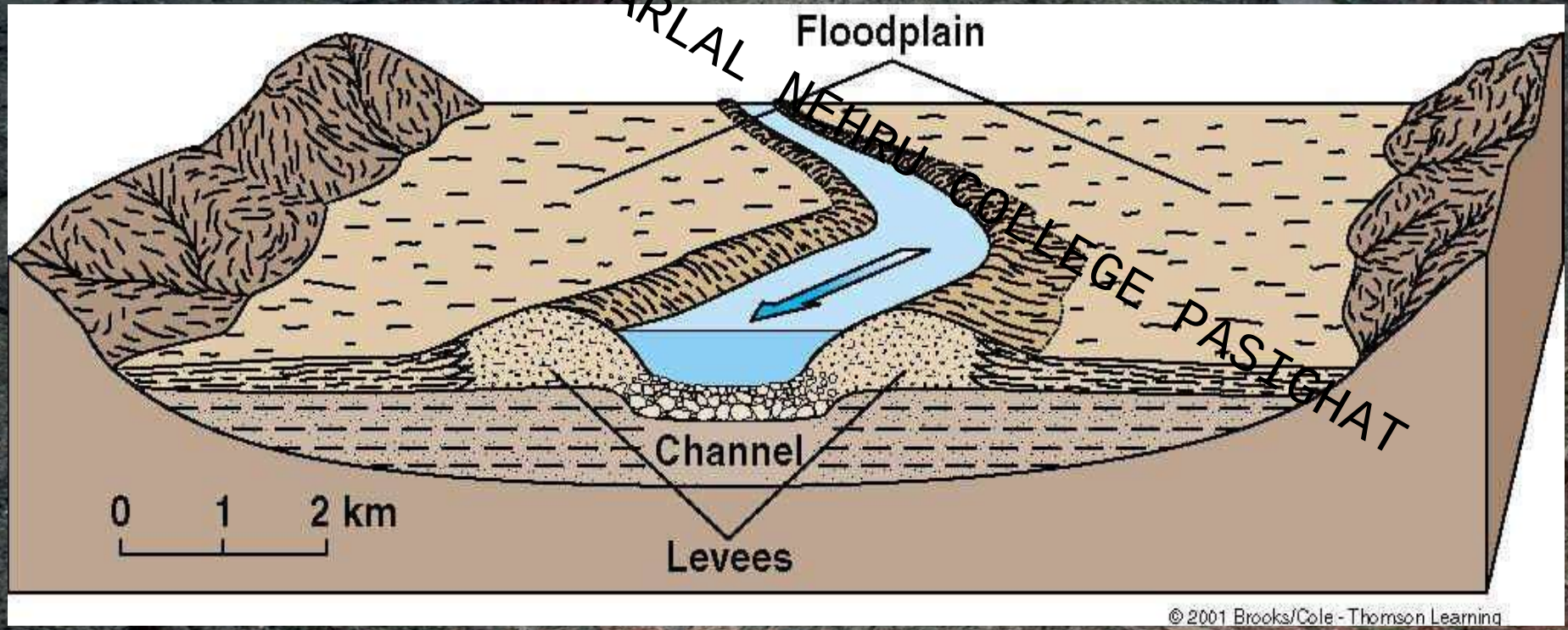

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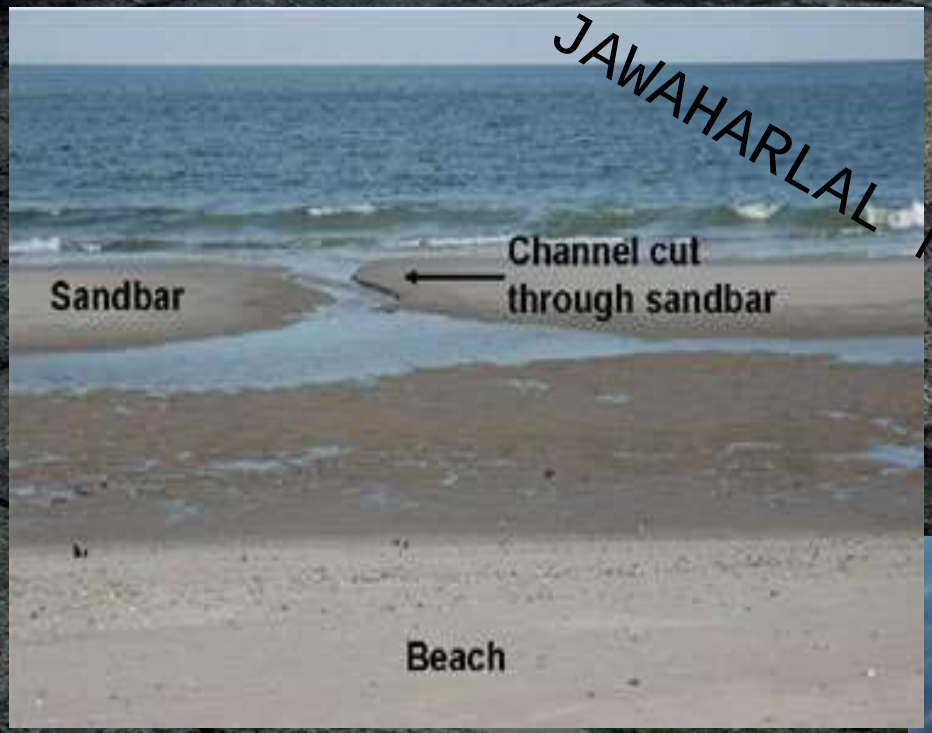
CHANNEL AND SAND BARS

- An elongate accumulation of sand, lying parallel to the shore
- An elevated region of sediment that has been deposited by the flow



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DELTA

- The depositional feature of almost triangular shape at the mouth of a river debouching either in a lake or a sea is called delta

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DELTA

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Thank You
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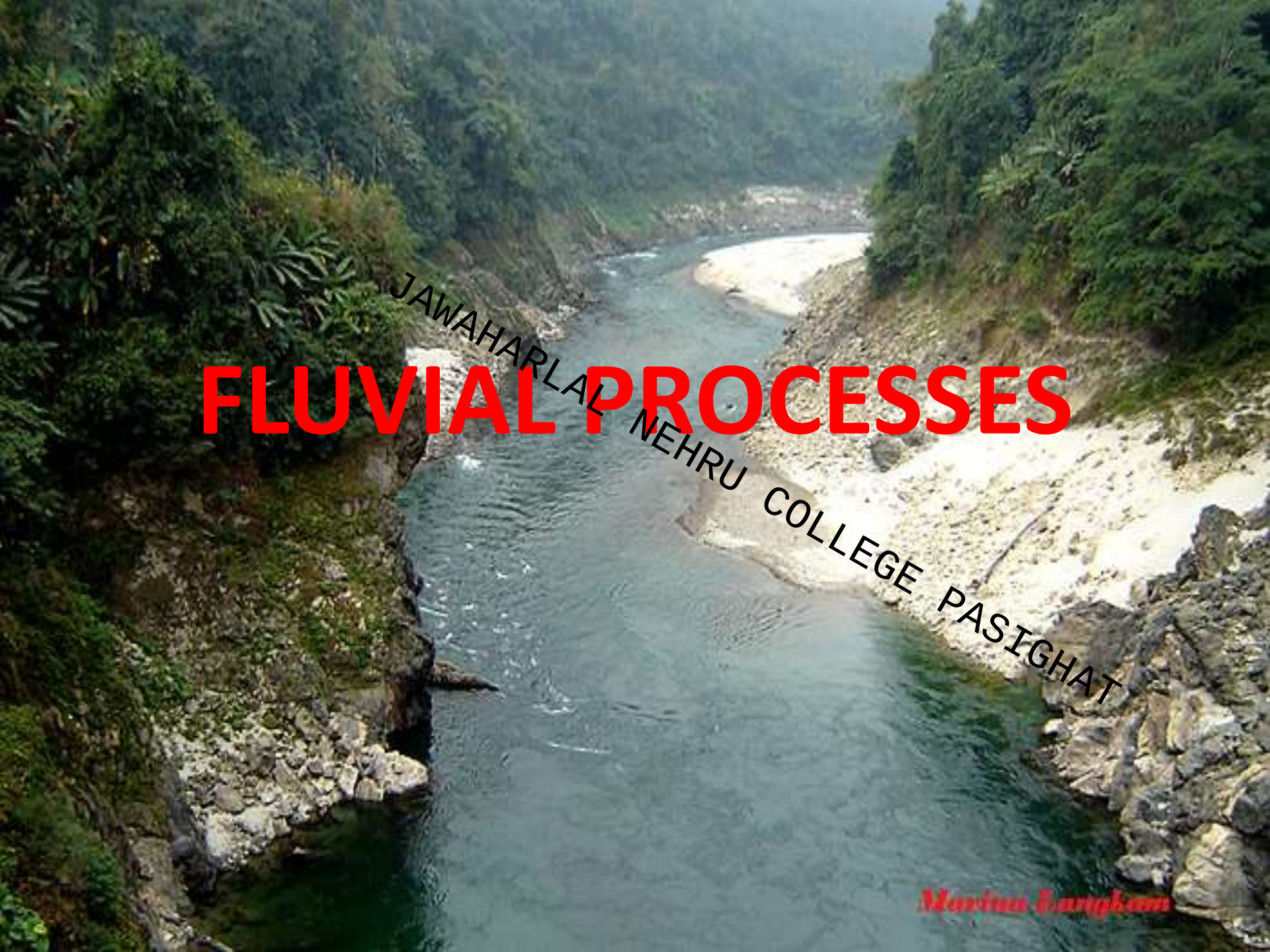
FLUVIAL PROCESSES
JAWAHARLAL NEHRU COLLEGE PASIGHAT
Marius Langkam

FLUVIAL PROCESSES
EROSION
TRANSPORTATION
DEPOSITION
JAWAHARLAL NEHRU COLLEGE PASIGHAT
Marina Langkam

EROSION PROCESS

Factors affecting river erosion

- **Water discharge: Volume of water passing through a given point in a given period of time.**
- **Velocity**
- **Channel gradient: slope of the stream.**
- **Sediment load**
- **Cross sectional areas: smooth and irregular cross sections.**

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River erosion typically occurs in the following ways:

1. Surface Erosion/ Overland flow
2. Channel Erosion/ Stream flow

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Surface Erosion

Water moving on the surface without being confined to a channel.

a) **Splash erosion**
b) **Sheet erosion**

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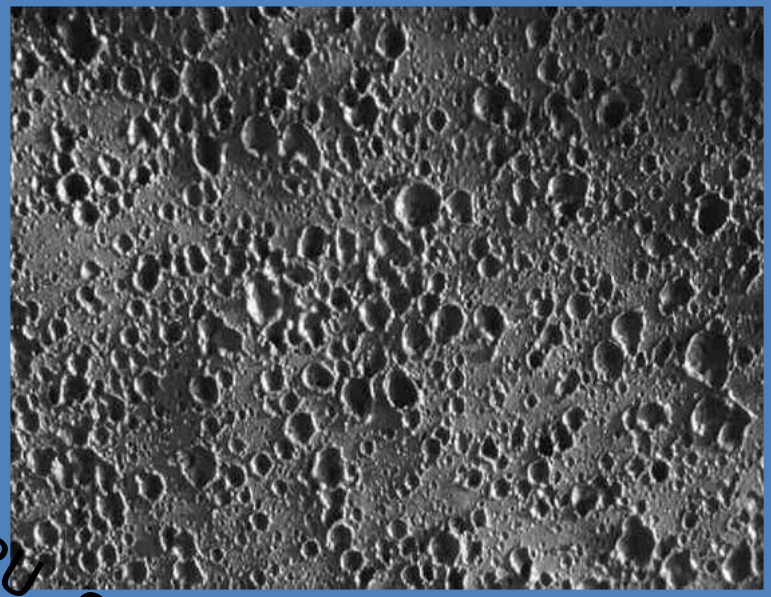
Surface erosion contd...

Splash erosion

- soil particles are loosened by rain-drop impact.
- First step in the erosion process.
- Especially effective in arid and semi-arid regions where rainfall is sporadic and torrential and the surface is loose and friable and there is no vegetation cover.



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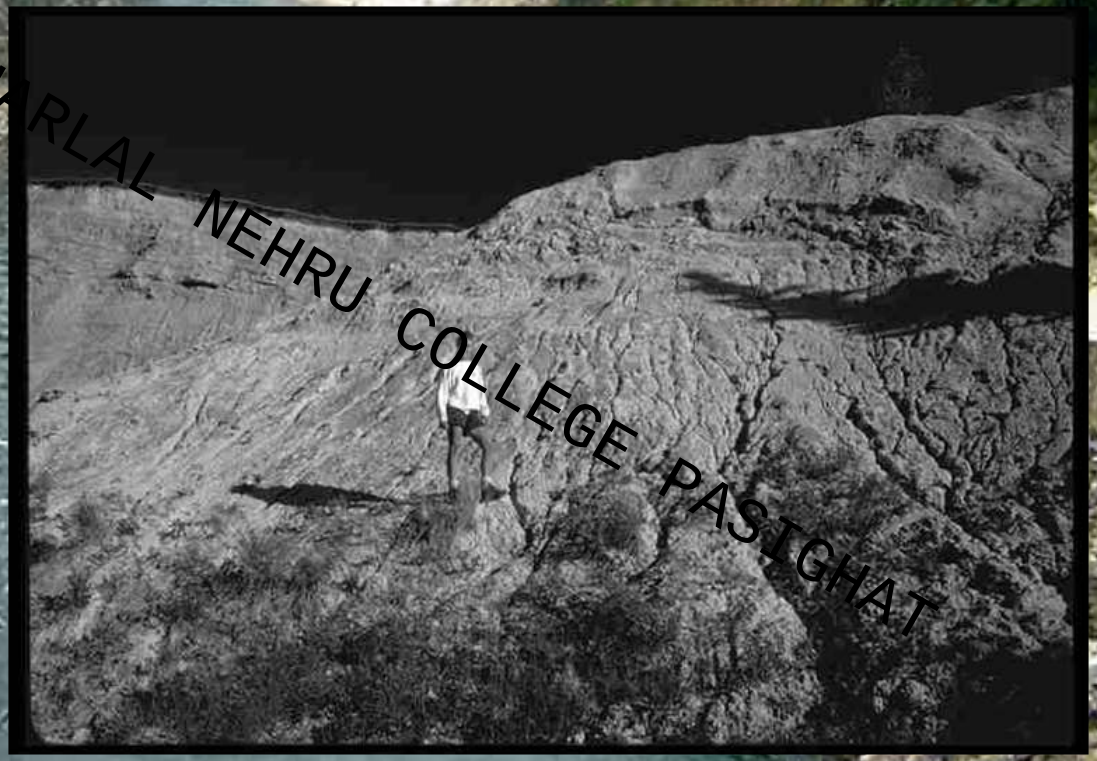
Sheet erosion

- entrainment of loose particles covering a considerable area in overland flow.

Channel Erosion/ Stream flow

Water is confined to long trough-like depressions called channel.

- *Rill erosion*
- *Gully erosion*
- *Streams*



Rills:

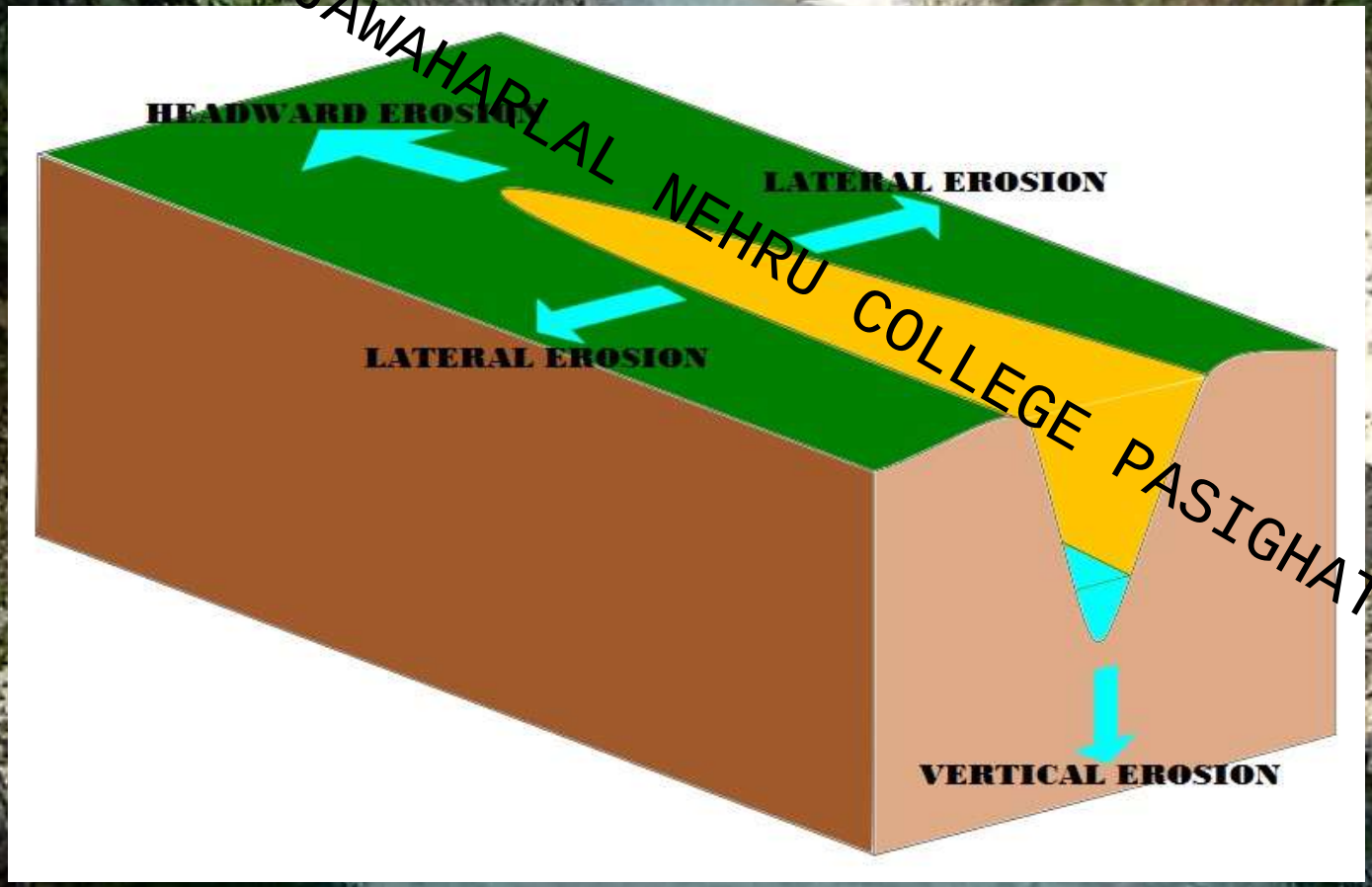
Tiny superficial and ill-defined channels.

Types of fluvial erosion

Lateral erosion

Vertical erosion

Headward erosion



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Vertical erosion

This is when the river cuts down vertically into the ground.

Or

Deepening of a river channel to create narrow v-shaped valley.

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Lateral erosion

- This is when the river erodes out laterally, across the valley, creating a flat valley bottom.
- Occurs normally in the lower course

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Headward erosion

- Lengthening of the river in the upstream direction.
- River cut its source.

MECHANISM OF STREAM EROSION

1. ***Hydraulic Action***:
   Erosion by the force of moving water.

2. ***Abrasion or Corrasion:***
   The river's load (rock fragments) wears away the bed and the sides.

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continues...

3. Attrition: Mechanical wear and tear of the erosional tools in themselves.

4. Solution or Corrosion: chemicals in the river water wearing away the bed and the banks.

5. Cavitation: The implosion of bubbles or cavities during rapid, turbulent stream flow usually occurs downstream of an obstruction.

6. Evorsion: erosion by eddies in the rock bed of a stream, forming pot holes.

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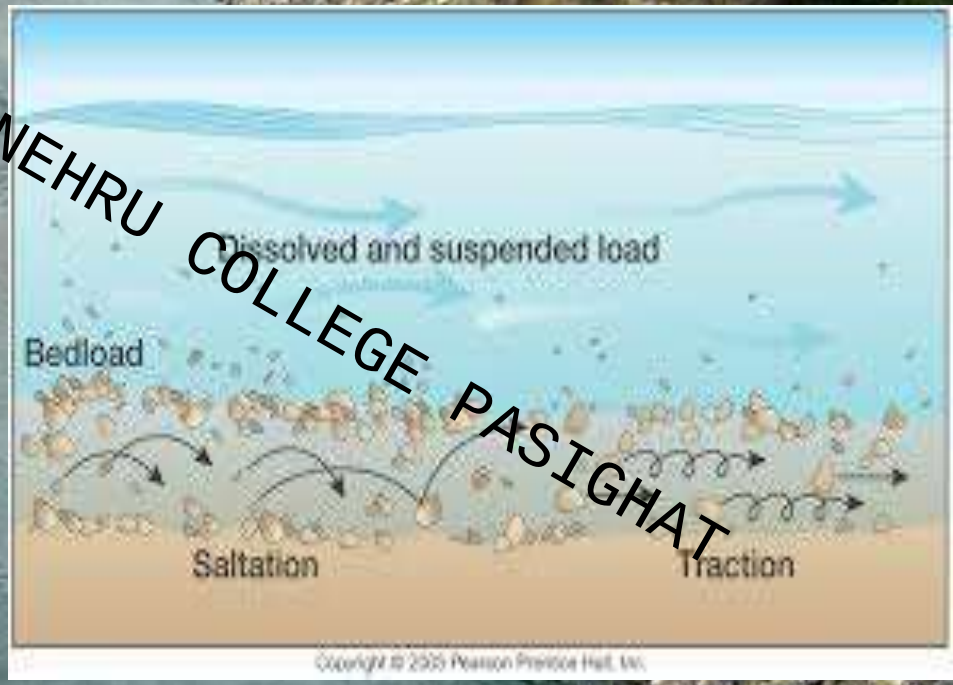
Continues...

Transportational work of streams

Sediment load carried by river:

1. **Suspended Load:** Fine particles which are suspended in water. E.g. Sand and silt.
2. **Bed Load:** Large fragments, coarse sand and pebbles which are carried along the bed.



NEHRU COLLEGE PASIGHAT

River transport their load in different ways:

- Solution
- Suspension
- Saltation
- Traction

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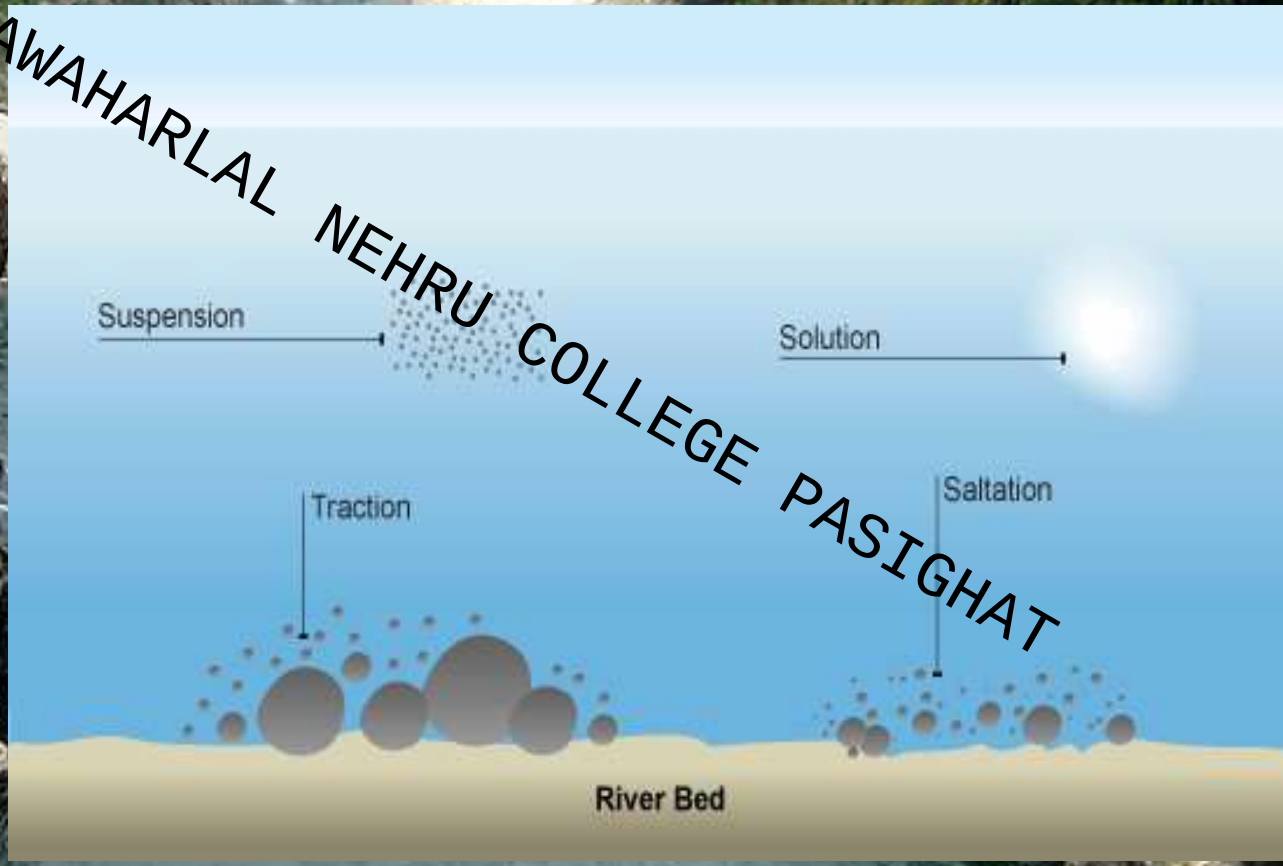

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1. **Solution**: The soluble materials are dissolved in water and become invisible.
2. **Suspension**: Sediments which remain suspended in water are easily carried away by the streams.

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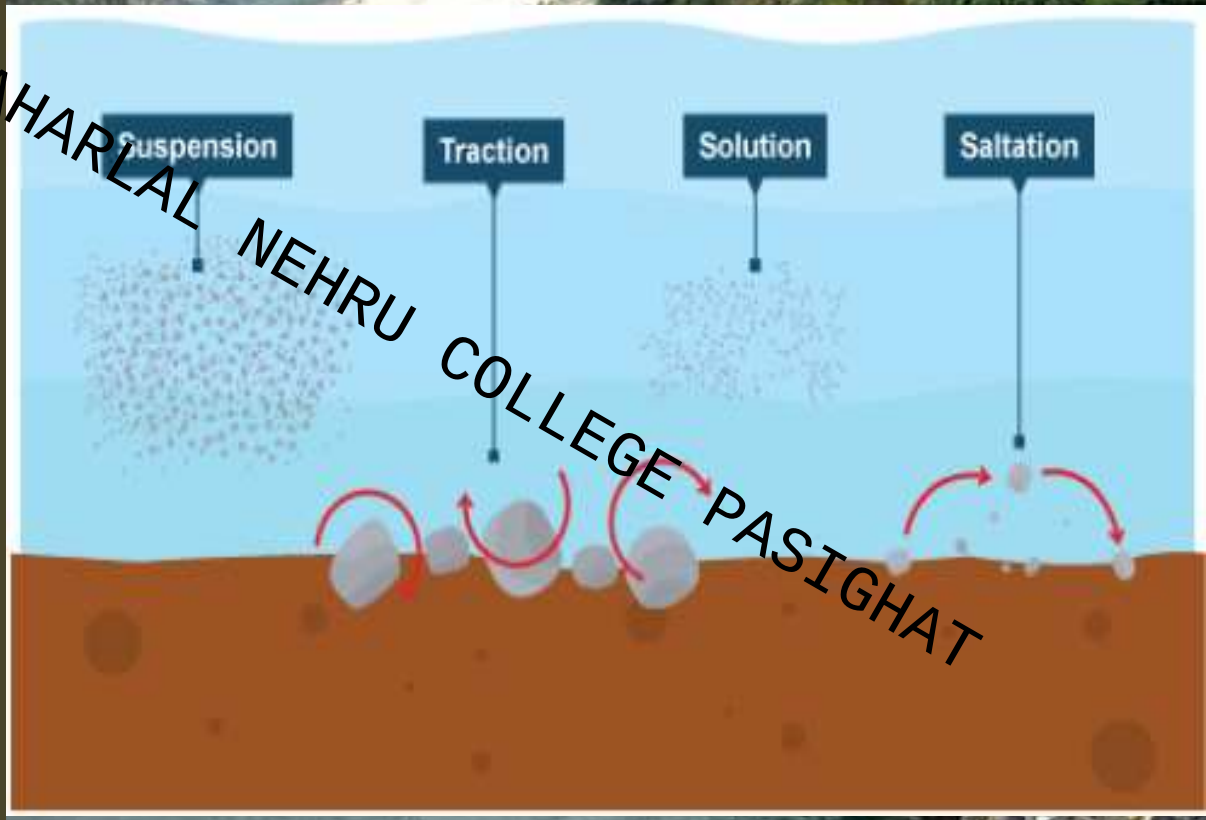


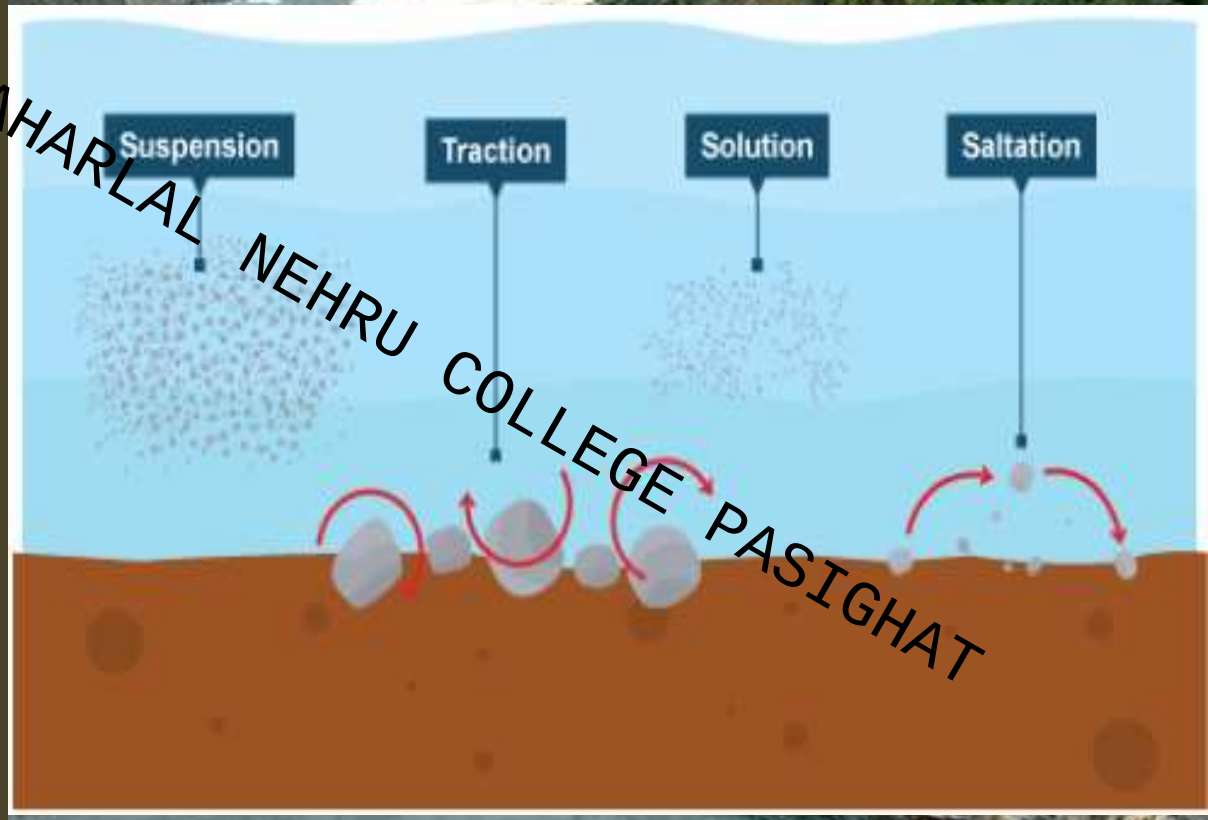
Continue...

3. Saltation:

Transportation of loads with water currents wherein coarse load moves downward by leaping and jumping.

4. Traction:

Transportation of boulders of bigger size which move as bed load by rolling or sliding.



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Depositional work of streams

The deposition of load carried by the streams is affected by a variety of factors:

- decrease in channel gradient,
- spreading of stream water over larger area,
- obstructions in channel flow,
- decrease in the volume and discharge of water,
- decrease in the velocity of streams,
- increase in load.

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THANK YOU
Marina Langkam

PLATE TECTONIC THEORY

JAWAHARLAL NEHRU COLLEGE PASIGHAT

- The Earth's crust and upper mantle (i.e lithosphere)are broken into sections called plates.

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TECTONIC PLATES/ LITHOSPHERIC PLATES

❖ These are massive, irregularly-shaped slab of solid rock, generally composed of both continental and oceanic **lithosphere**

The crust and part of the upper mantle = **lithosphere**

- ✓5-100 km thick in oceanic areas
- ✓ 200 km thickness in continental areas
- ✓Less dense than the material below it, so it "floats"

What is the **Asthenoshere**?

- The plastic/ductile layer below the lithosphere = asthenosphere
- The plates of the lithosphere float on the asthenosphere

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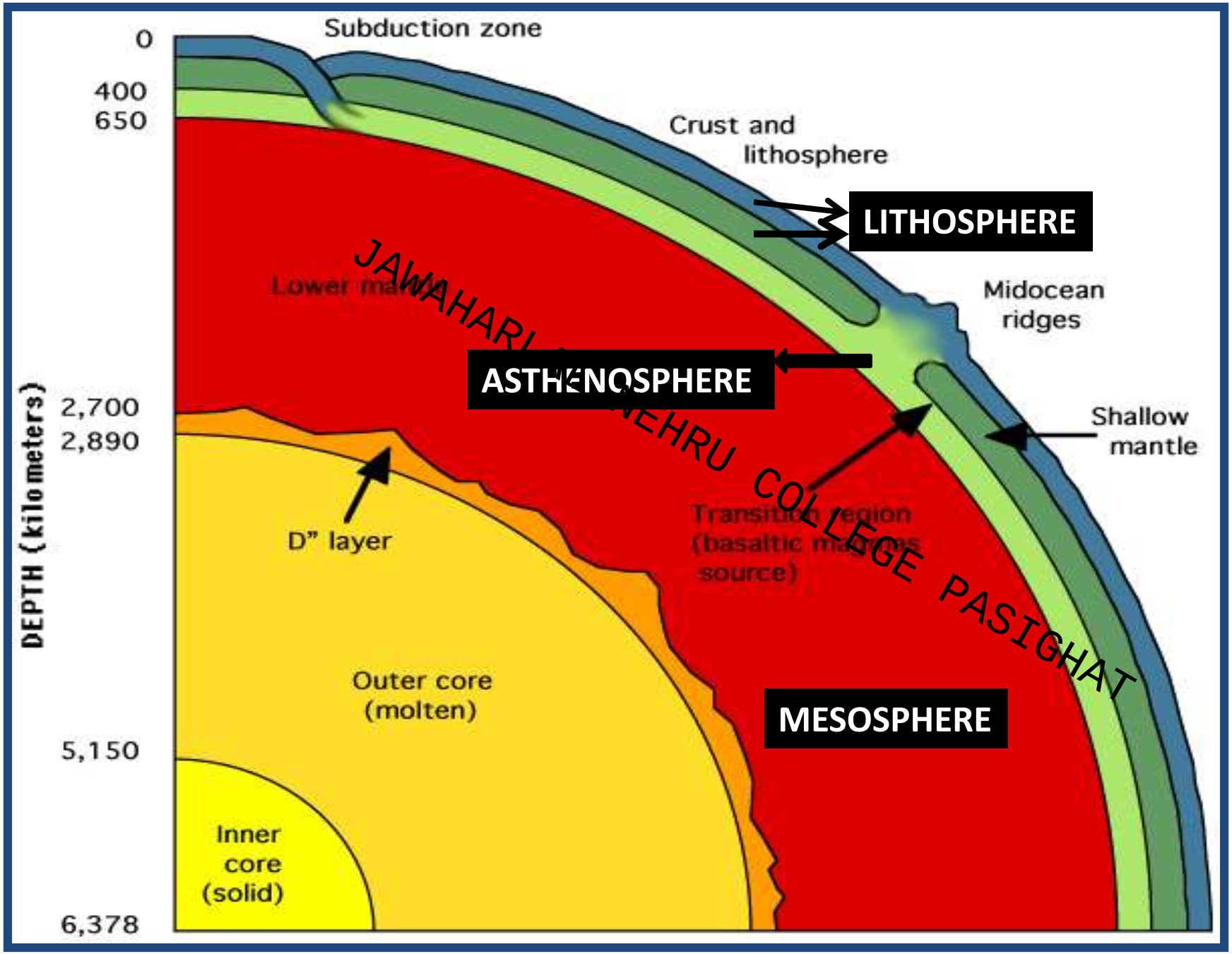

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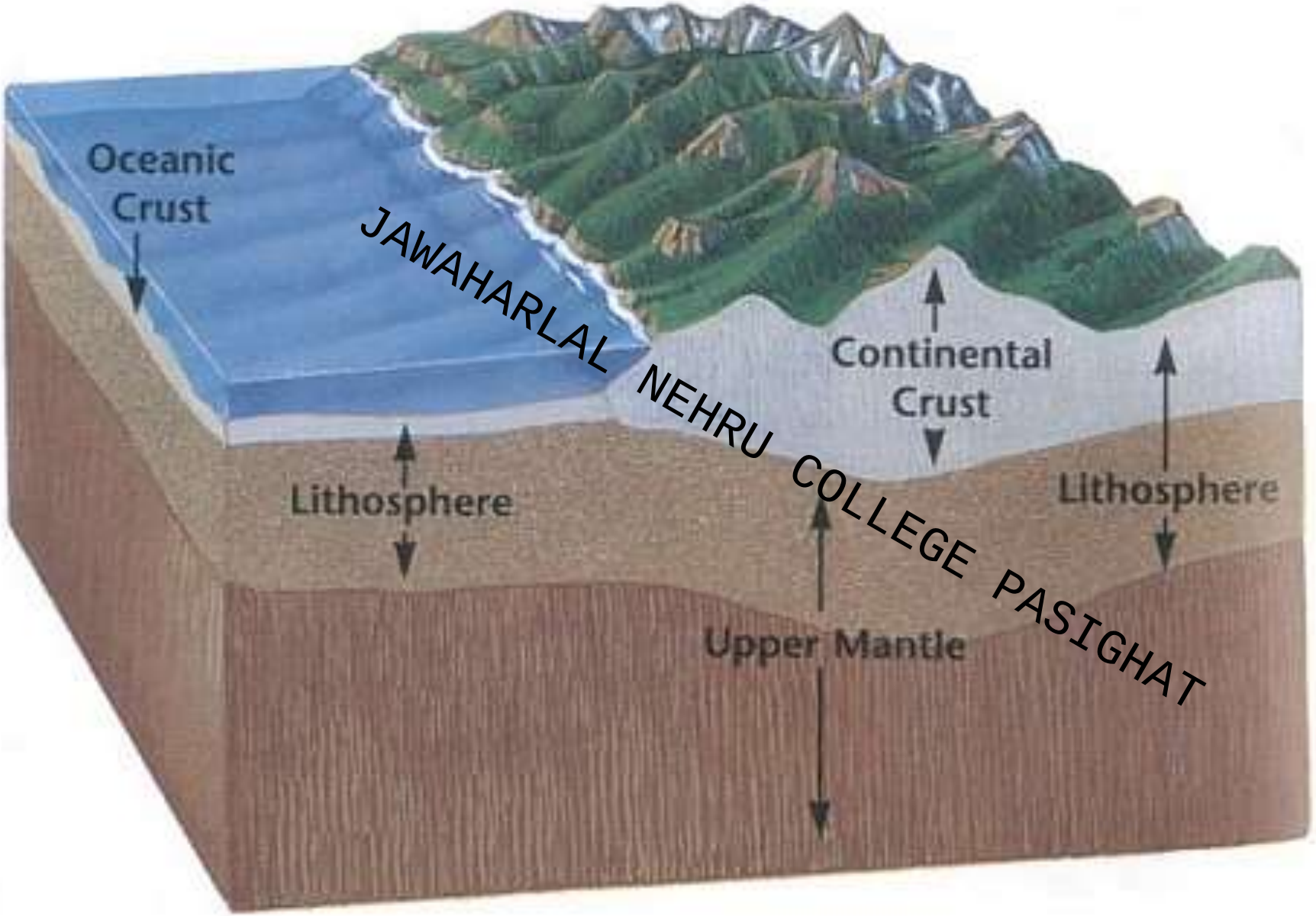

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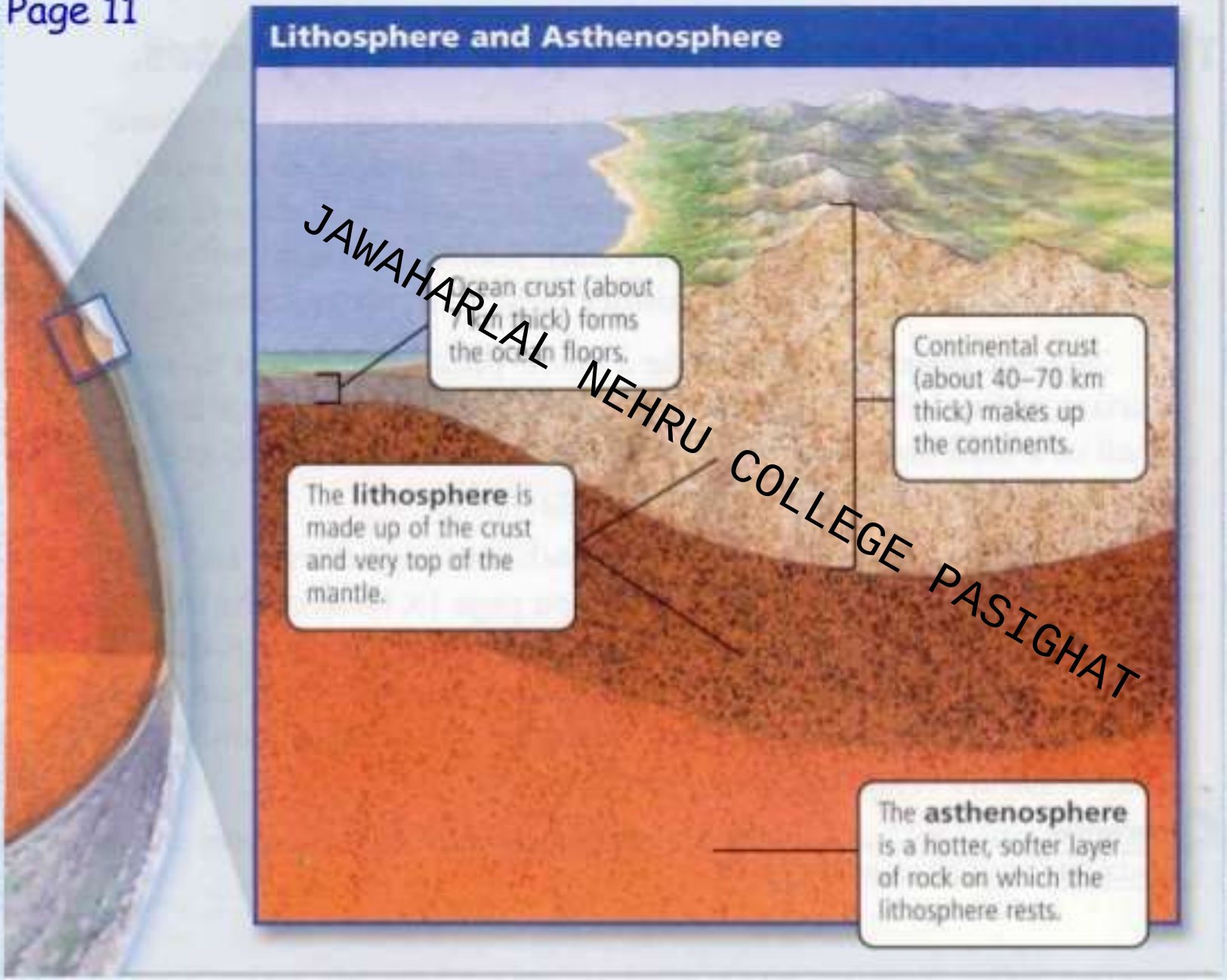
See Page 11



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Principles of plate tectonics

- The Earth is composed of a mosaic of thin rigid plates (pieces of lithosphere) that move horizontally with respect to one another
- Plates interact with each other along their plate boundaries
- Plate boundaries associated with tectonic activity (mountain building, earthquakes, active volcanoes)

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2 Types of Plates

- **Oceanic plates** – plates below the oceans
- **Continental plates** – plates below the continents

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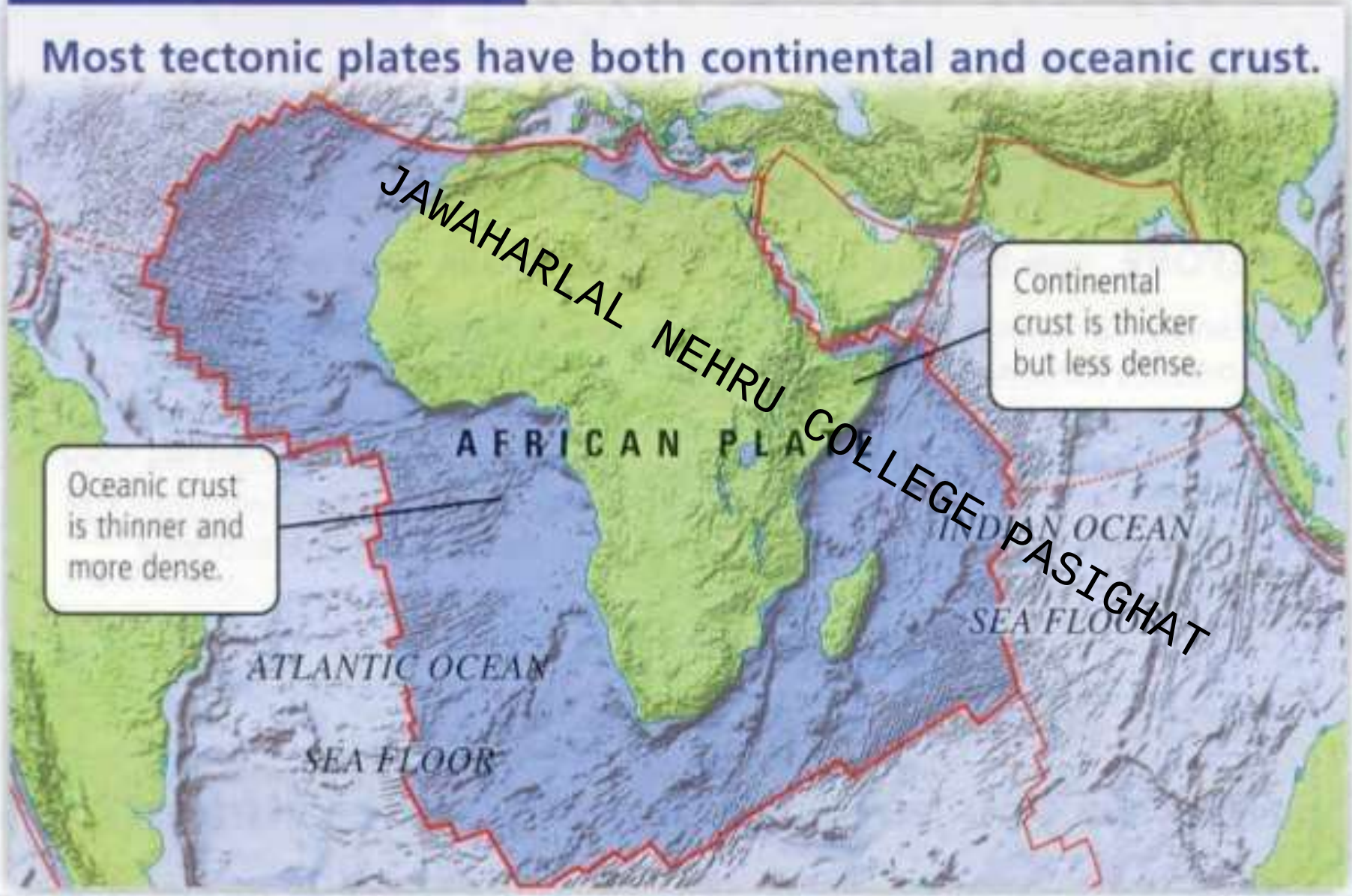
See Page 13

African Plate



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Major tectonic plates

- Antarctica and the surrounding oceanic plate
- North American plate
- South American plate
- Pacific plate
- India-Australia-New Zealand plate
- Africa with the eastern Atlantic floor plate
- Eurasia and the adjacent oceanic plate

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Minor tectonic plates

- Cocos plate: Between Central America and Pacific plate
- Nazca plate: Between South America and Pacific plate
- Arabian plate: Mostly the Saudi Arabian landmass
- Philippine plate: Between the Asiatic and Pacific plate
- Caroline plate: Between the Philippine and Indian plate (North of New Guinea)
- Fuji plate: North-east of Australia.
- Turkish plate,
- Aegean plate (Mediterranean region),
- Caribbean plate,
- Juan de Fuca plate (between Pacific and North American plates)
- Iranian plate.

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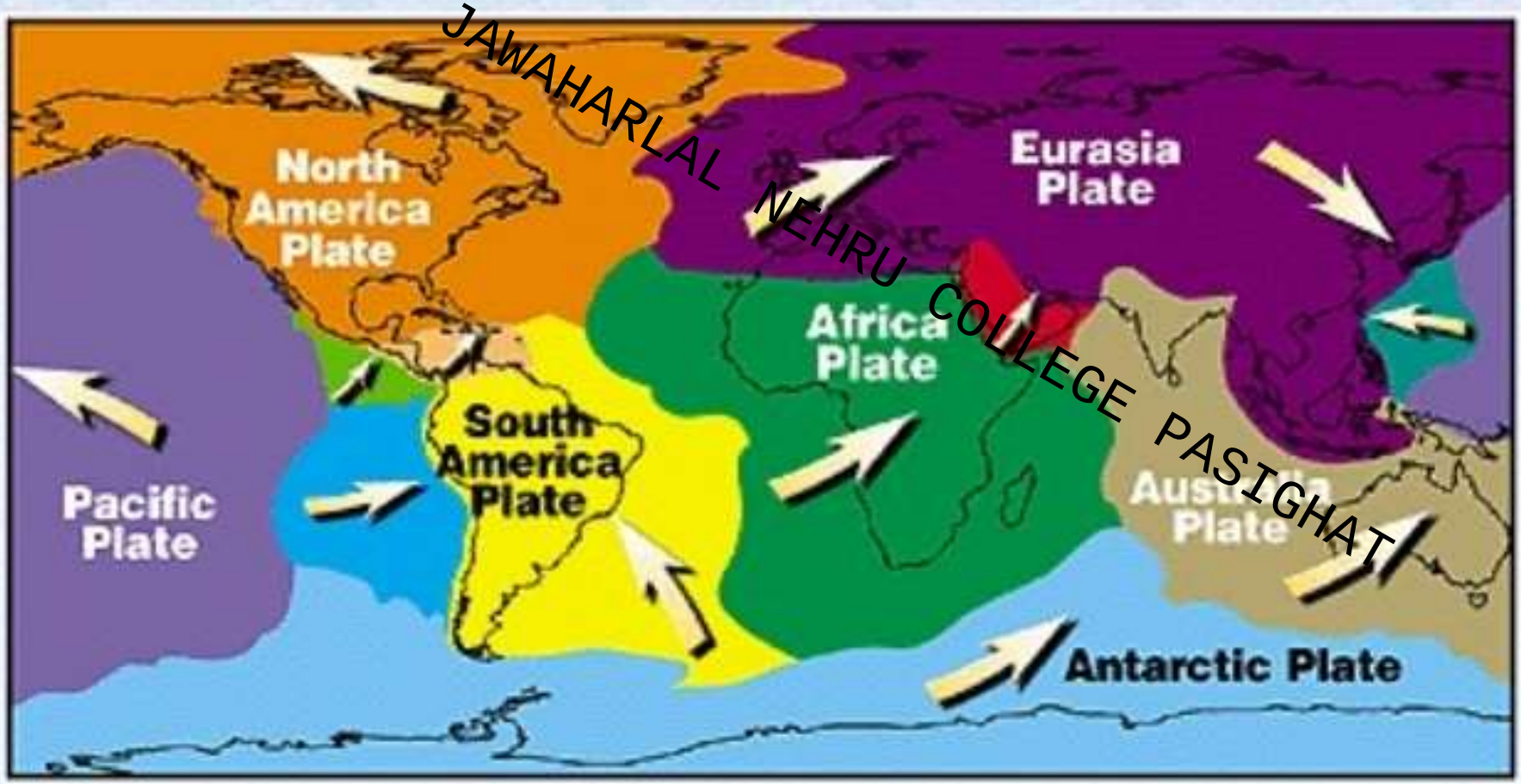
The lithosphere is made up of many plates.



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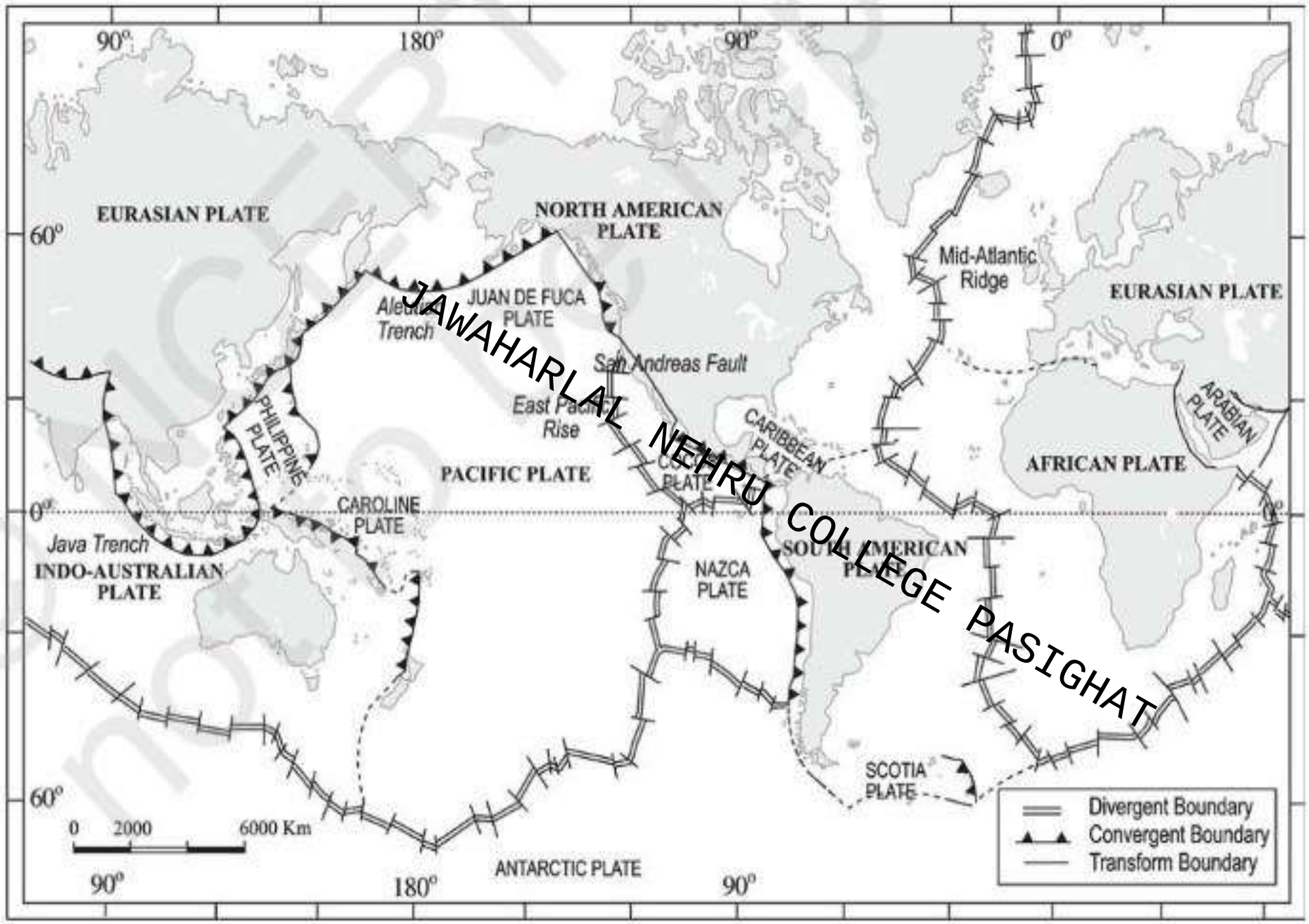

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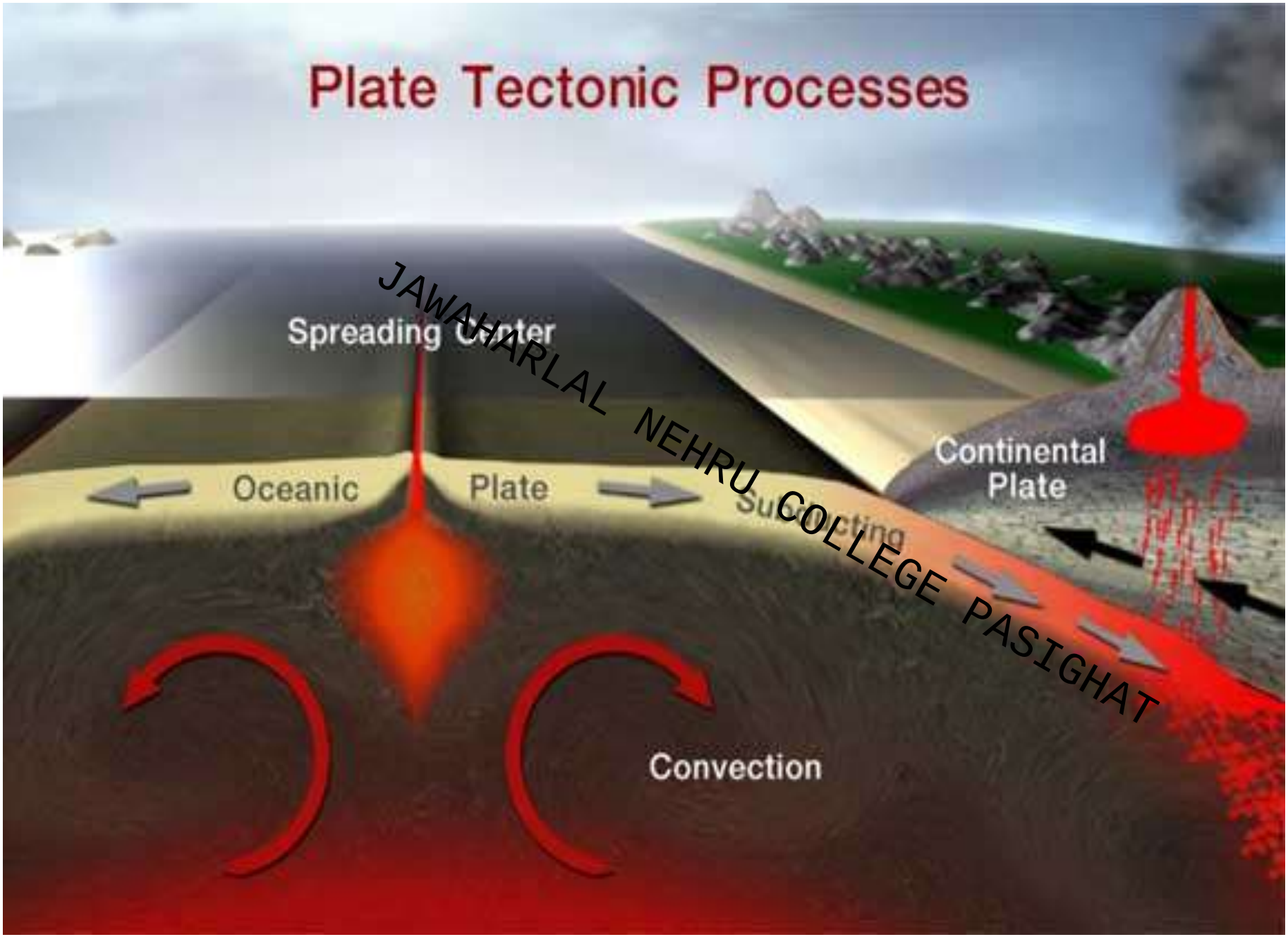
Figure 4.5 : Major and minor plates of the world



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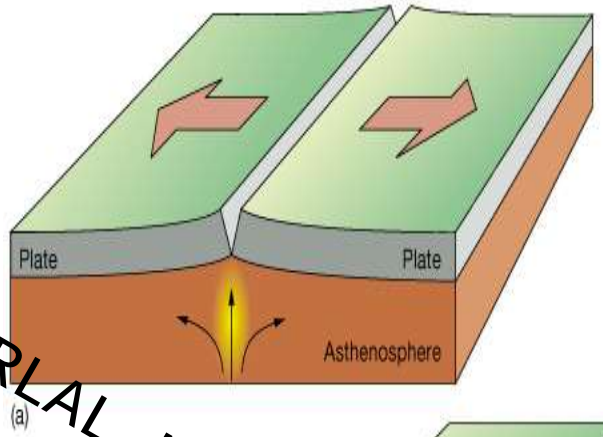
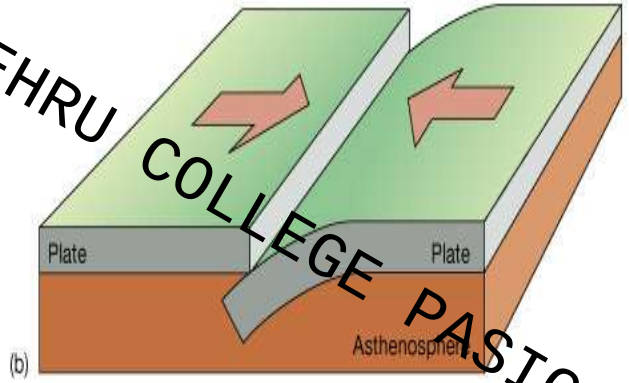
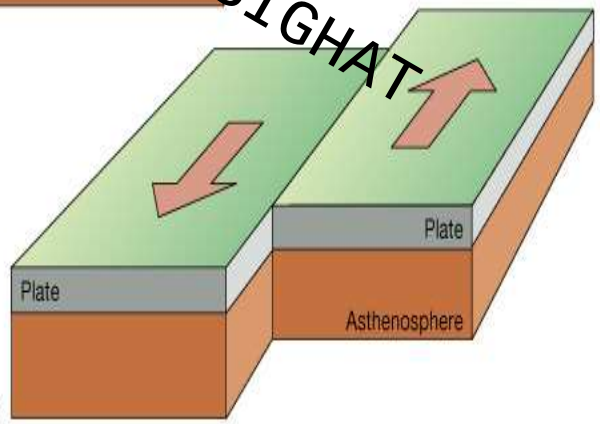
The 3 types of plate boundaries

- **1. Divergent**
- **2. Convergent**
- **3. Transform fault**







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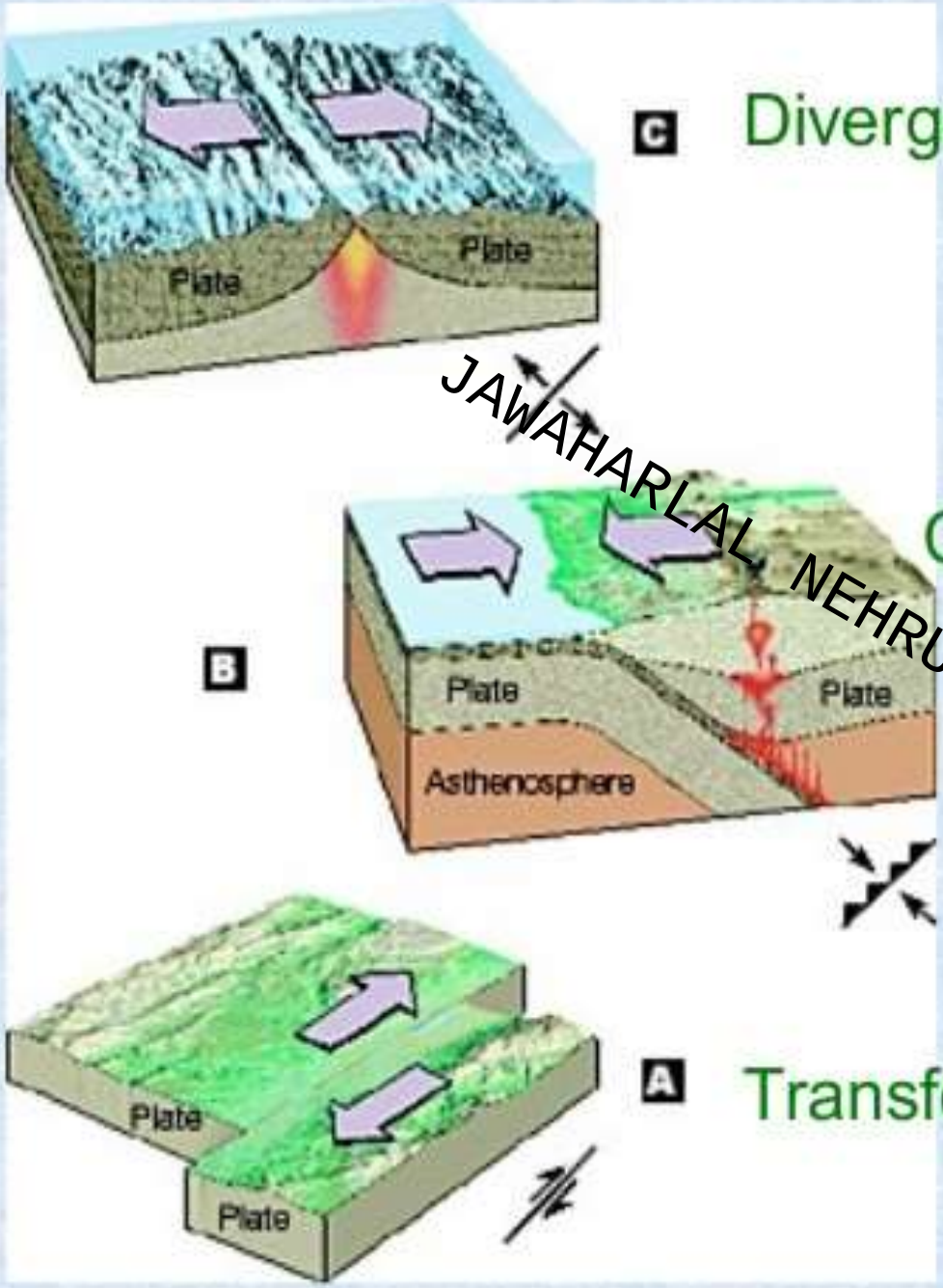

Divergent Boundary

Convergent Boundary

Transform Boundary

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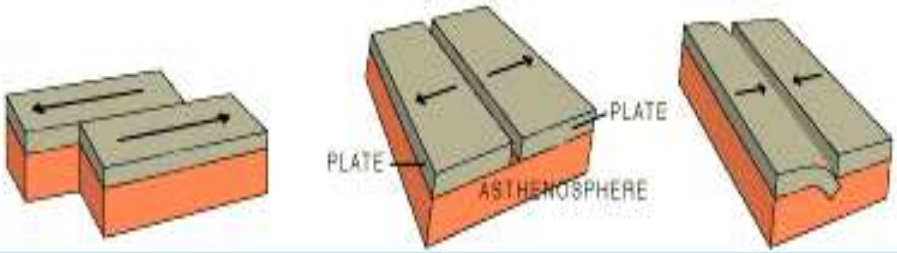

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CONVERGENT PLATE BOUNDARY

TRANSFORM PLATE BOUNDARY

DIVERGENT PLATE BOUNDARY

CONVERGENT PLATE BOUNDARY

CONTINENTAL RIFT ZONE (YOUNG PLATE BOUNDARY)

TRENCH

ISLAND ARC

STRATO-VOLCANO

SHIELD VOLCANO

OCEANIC SPREADING RIDGE

OCEANIC CRUST

CONTINENTAL CRUST

LITHOSPHERE

ASTHENOSPHERE

SUBDUCTING PLATE

HOT SPOT

Features of Divergent Boundaries

- Mid-ocean ridges
- rift valleys
- fissure volcanoes

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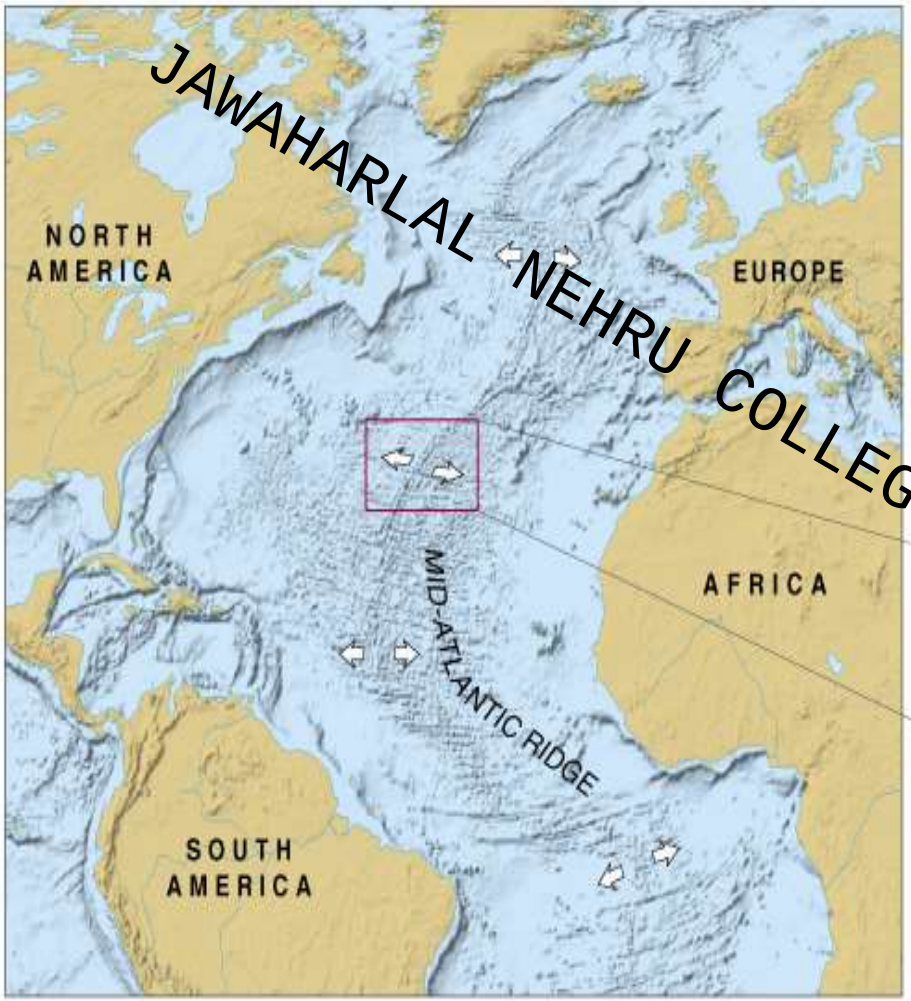
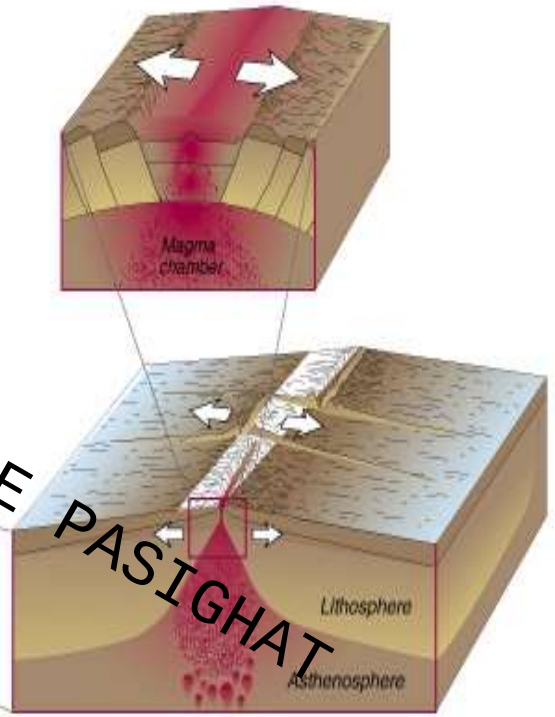
Divergent plate boundaries

The Mid-Atlantic Ridge is a divergent plate boundary where sea floor spreading occurs





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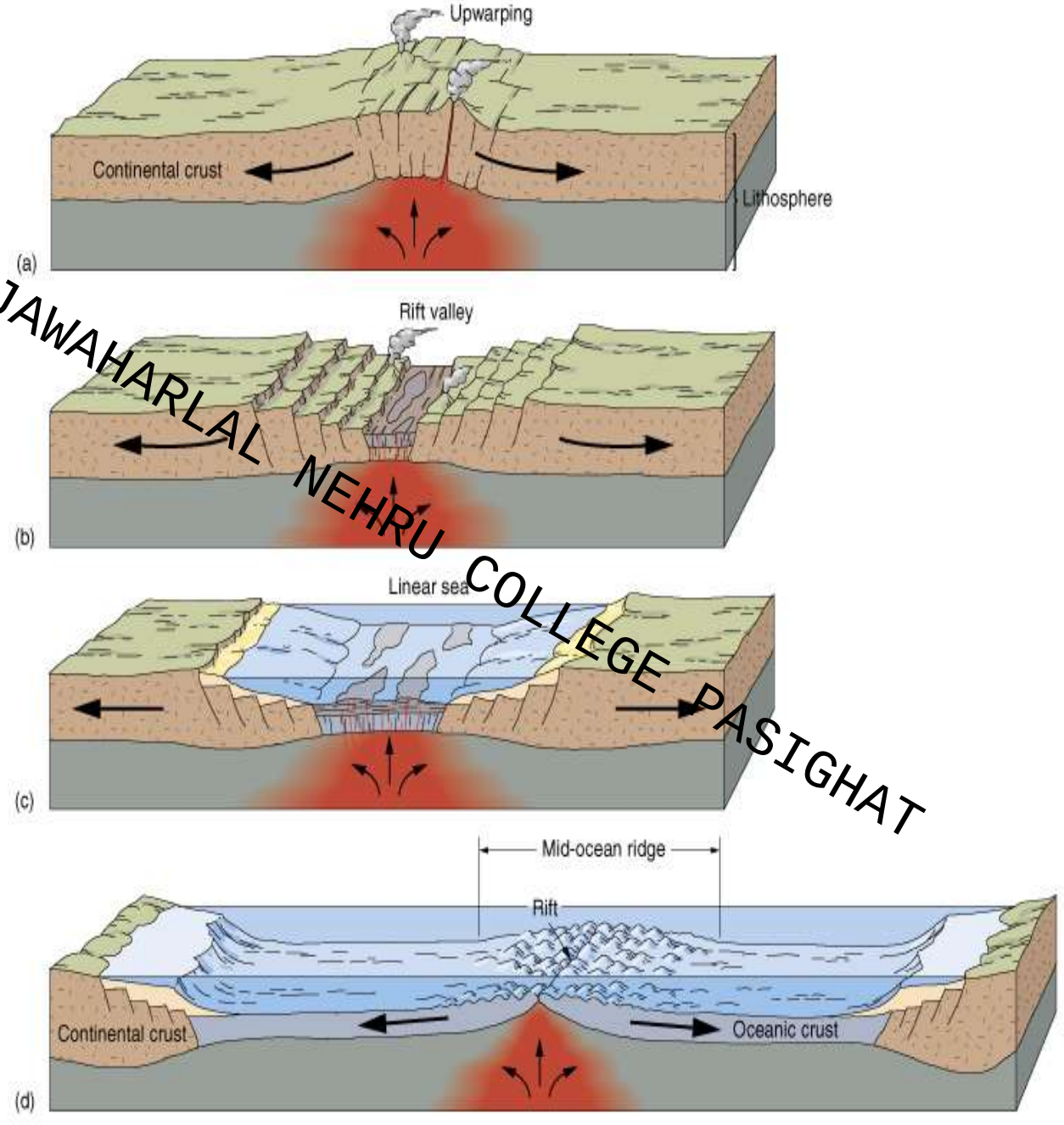
- Formation of an ocean basin by rifting and sea floor spreading



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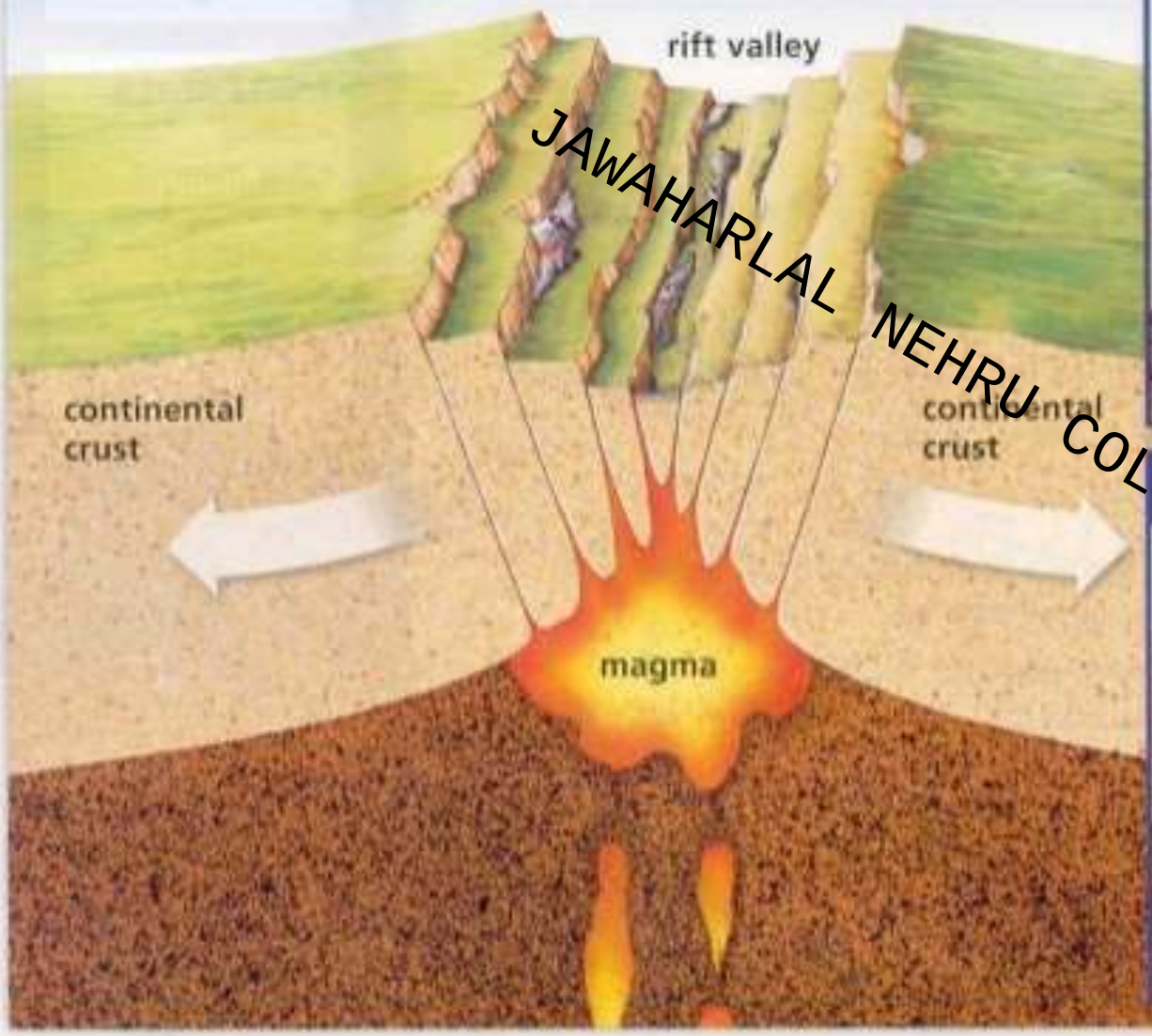
Divergent Boundary on Land

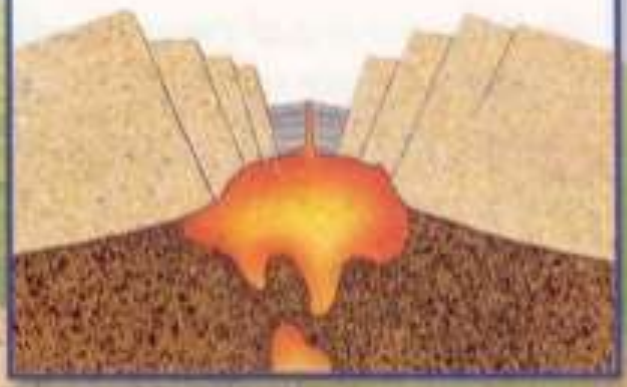
See Page 26

As rift valleys widen, continents begin to split apart.



Rift Valley Widens

As the rift widens, the valley floor thins and sinks.



Valley Fills With Water

The valley floor falls below sea level, which allows water to enter.

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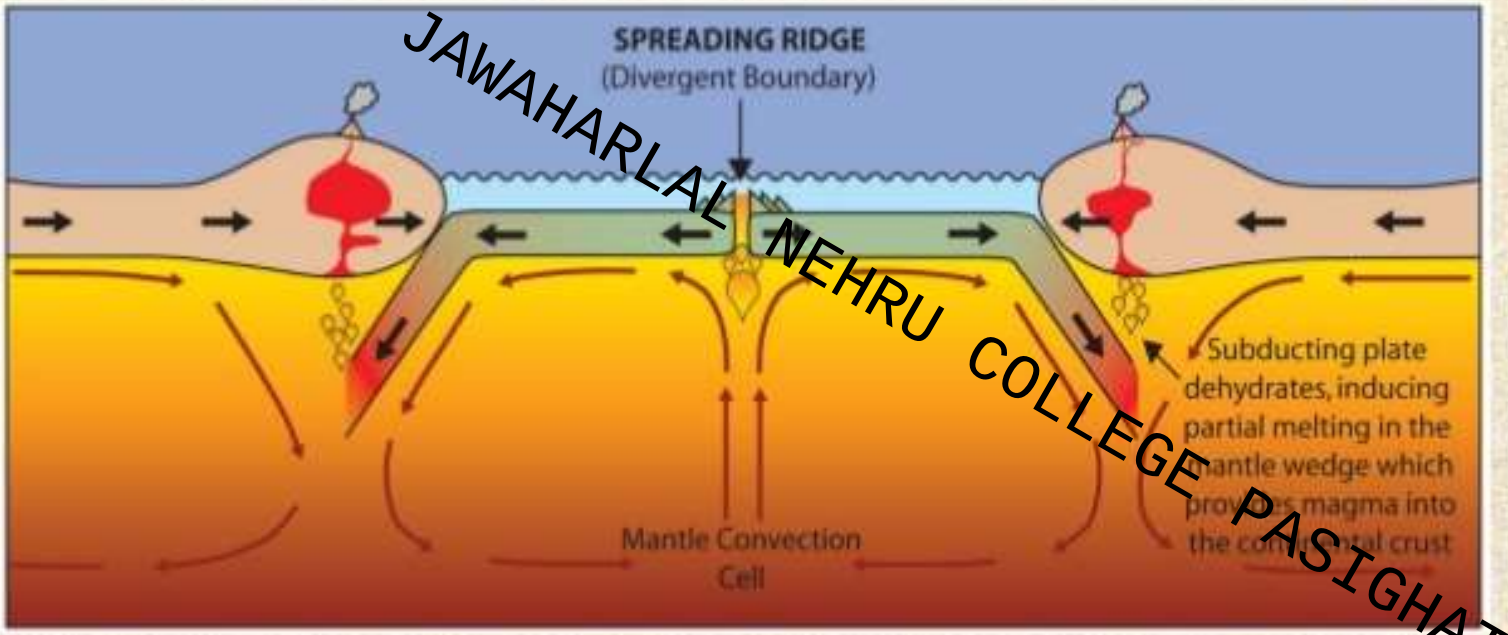
Divergent Boundaries



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- Spreading ridges
  - As plates move apart magma fills up the gap

Convergent Boundaries

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- There are three styles of convergent plate boundaries
  - Continent-continent collision
  - Continent-oceanic crust collision
  - Ocean-ocean collision

Continent-Continent Collision

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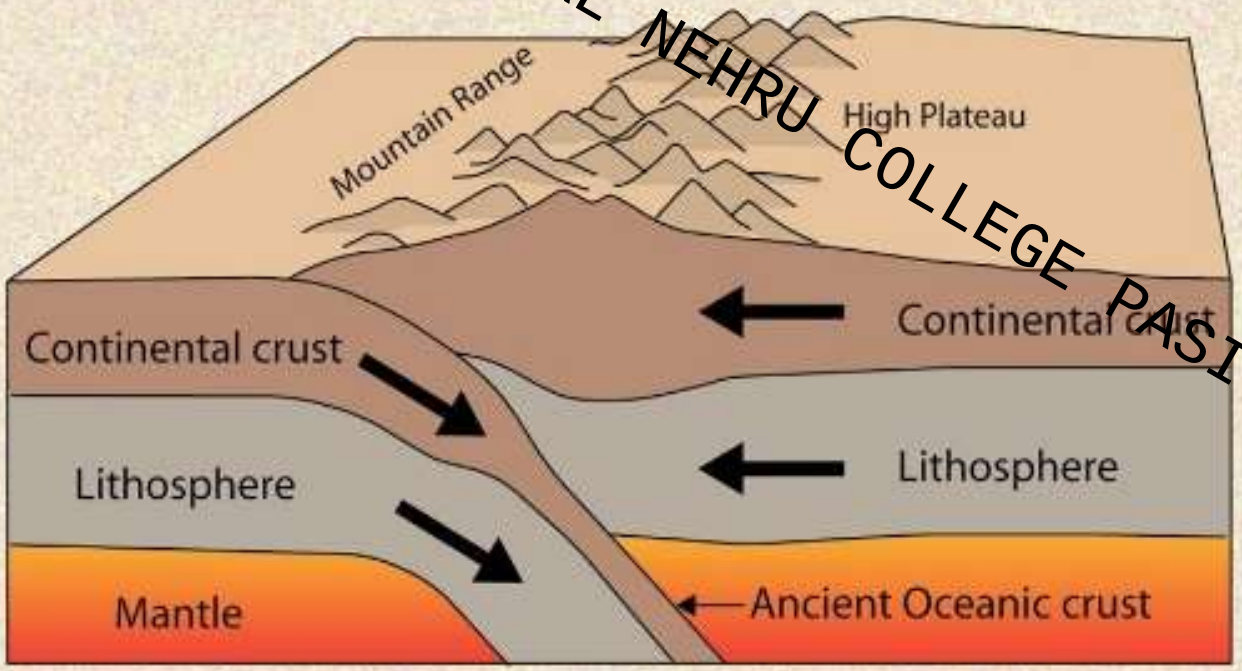
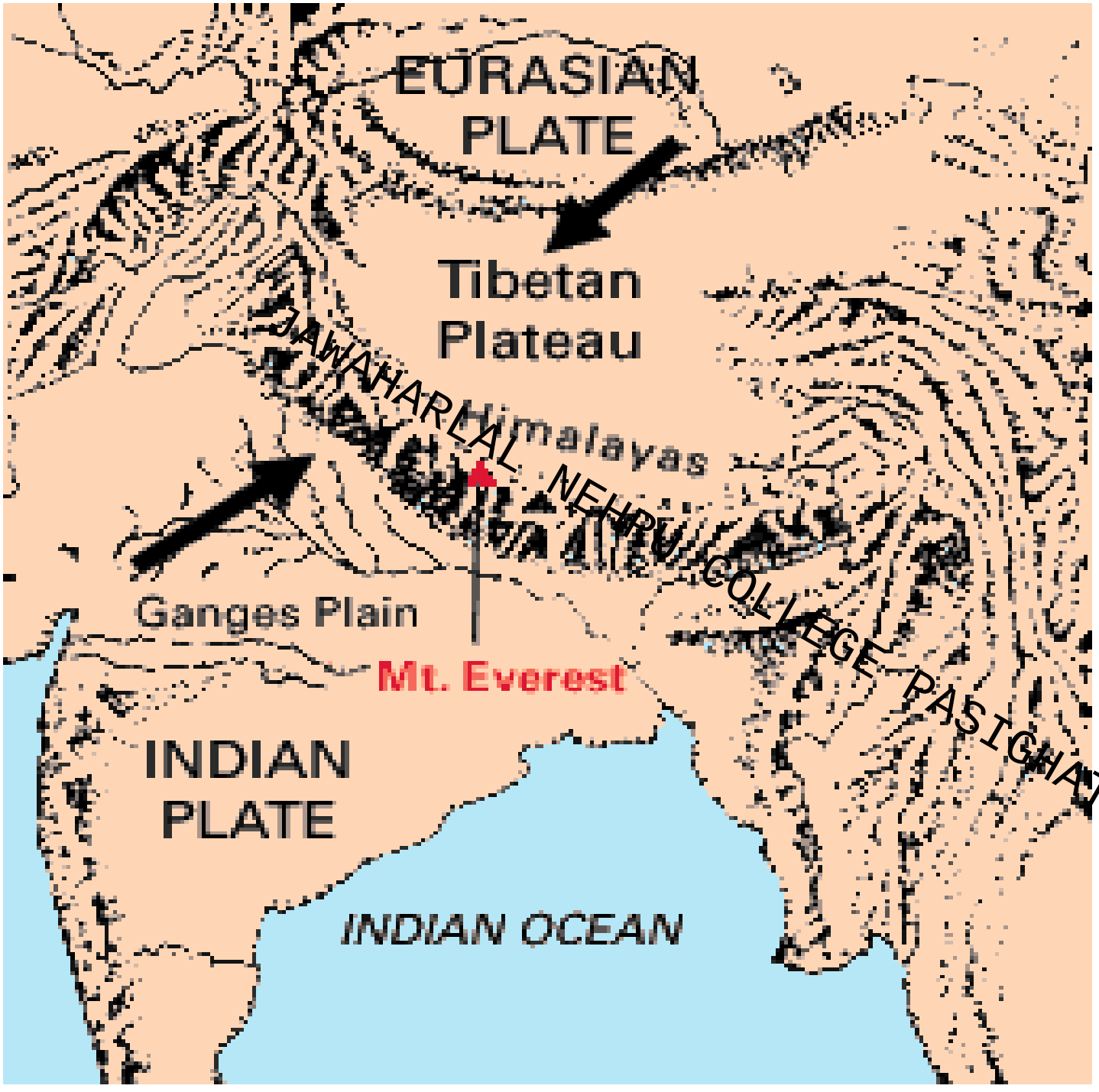
- Forms mountains, e.g. European Alps, Himalayas




EURASIAN
PLATE
Tibetan
Plateau
Himalayas
Ganges Plain
Mt. Everest
INDIAN
PLATE
INDIAN OCEAN
JAWAHARLAL NEHRU COLLEGE PASIGHAT

Continent-Oceanic Crust Collision

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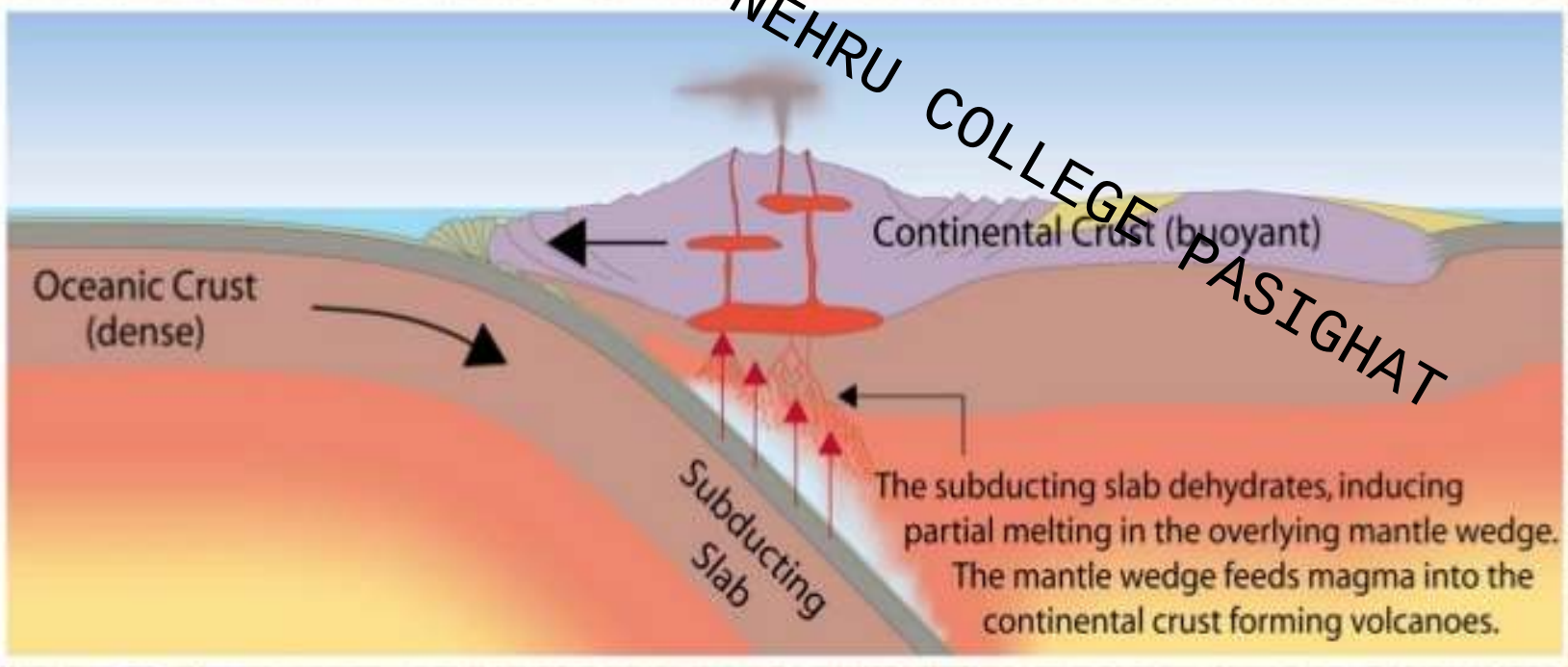
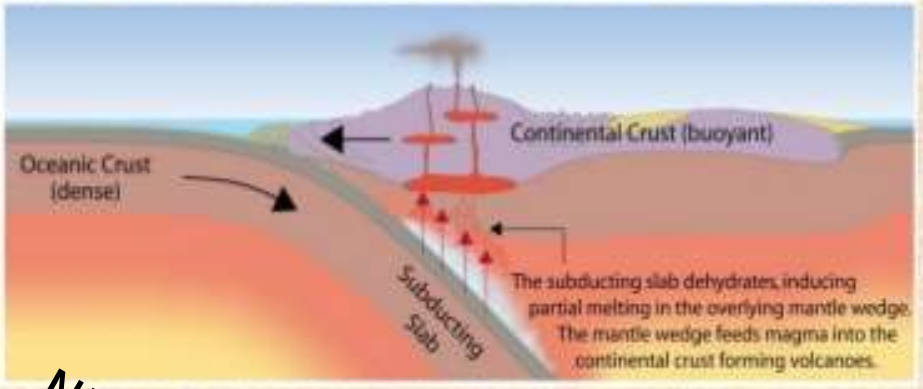
- Called SUBDUCTION



Subduction



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- Oceanic plates subducts underneath the continental plate
- Oceanic plate heats and melts
- The melt rises forming volcanoes
- E.g. The Andes

Ocean-Ocean Plate Collision

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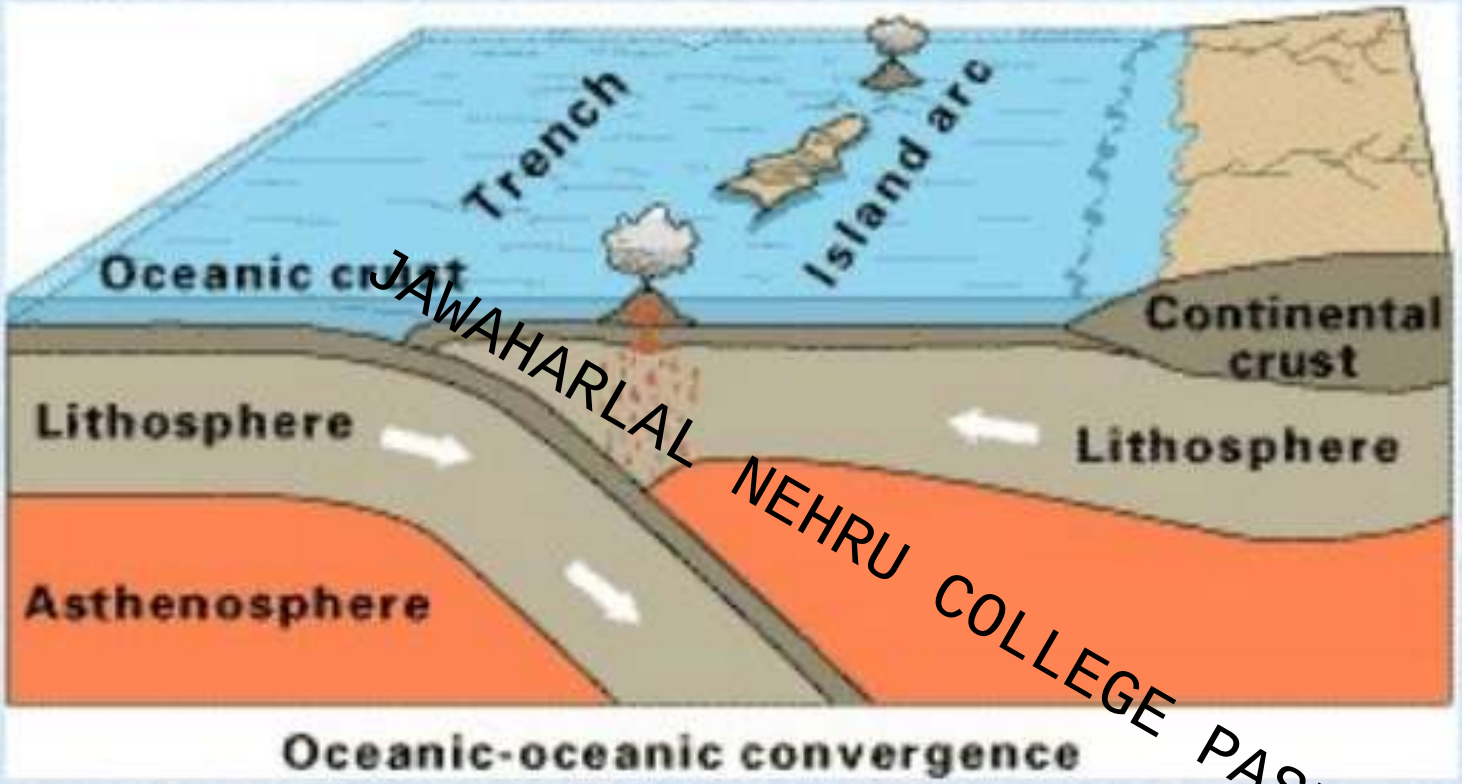
- When two oceanic plates collide, one runs over the other which causes it to sink into the mantle forming a **subduction zone**.
- The subducting plate is bent downward to form a very deep depression in the ocean floor called a **trench**.
- The worlds deepest parts of the ocean are found along trenches.
  - E.g. The Mariana Trench is 11 km deep!

Continued



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Oceanic-oceanic subductions: two oceanic plates collide and the older, denser plate sinks beneath the top plate, forming deep-ocean trenches and island arcs.

Transform Boundaries

- Where plates slide past each other

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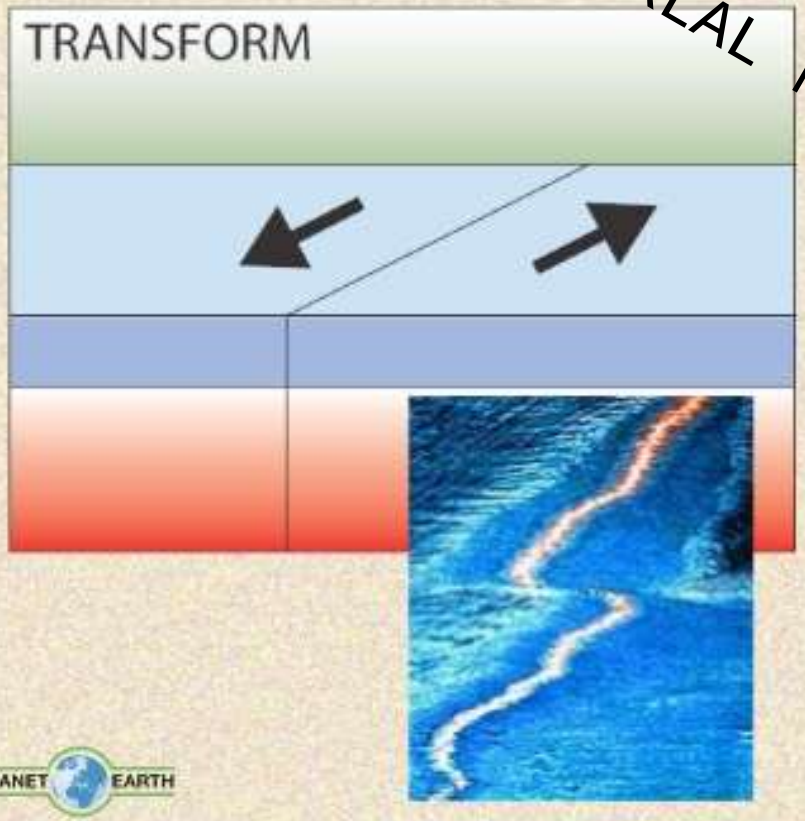

Above: View of the San Andreas transform fault

Comparing Boundaries

Divergent	*plates move apart *in ocean and on land *produce mid-ocean ridges, rift valleys, volcanoes, earthquakes
Transform	*plates move past each other in opposite directions *in ocean and on land
Convergent C-C Collision	*crumples and folds crust * produces mountains, earthquakes
Convergent O-O Subduction	*older, denser plate sinks * produce deep-ocean trenches, island arcs
Convergent O-C Subduction	*oceanic plate sinks under continental plate * forms deep-ocean trench, volcanic coastal mountains

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Causes of Plate Tectonics

Convection Currents

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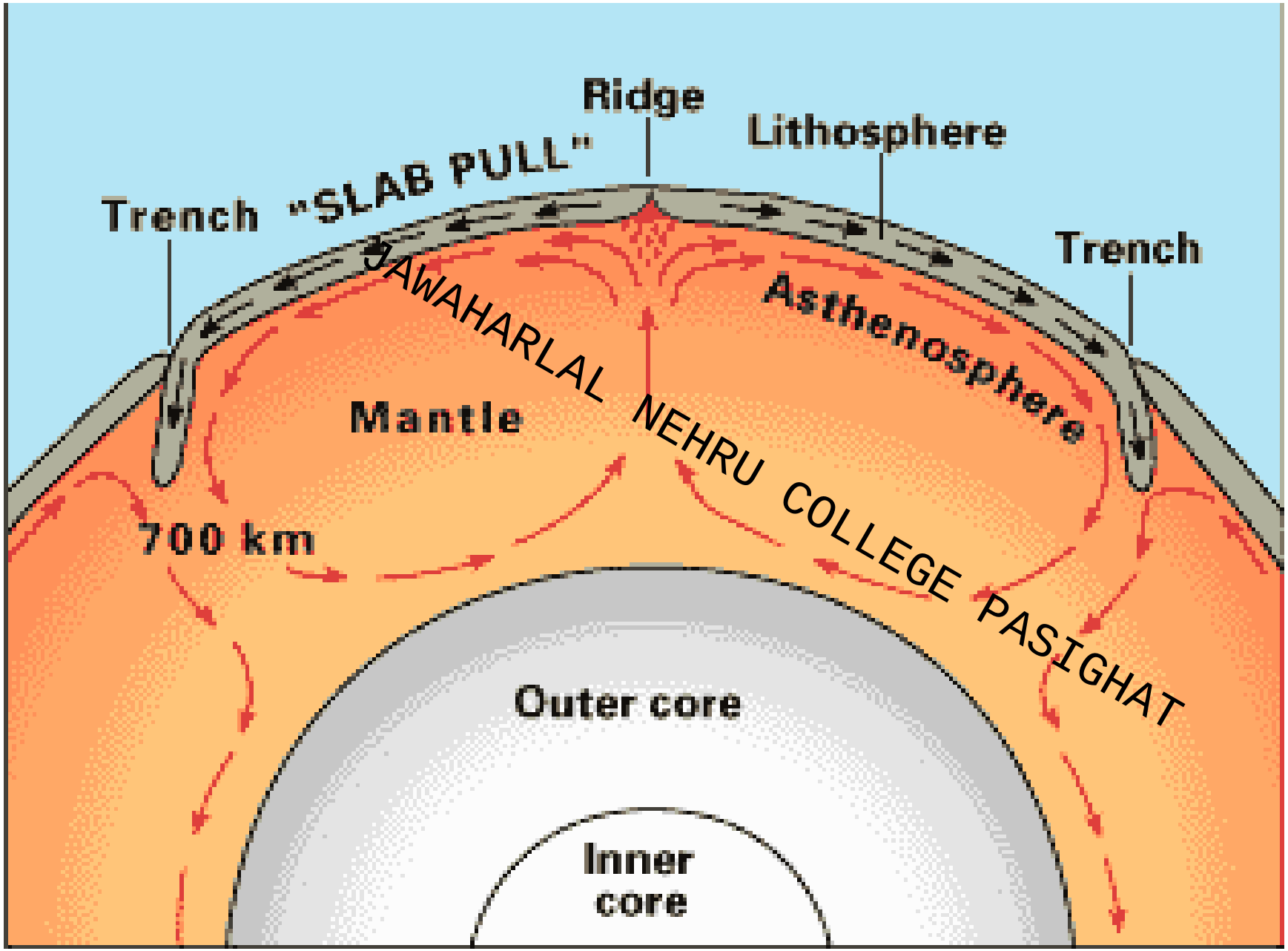
- Hot magma in the Earth moves toward the surface, cools, then sinks again.
- Creates convection currents beneath the plates that cause the plates to move.



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Comparison: Continental Drift – See Floor Spreading – Plate Tectonics

	Continental Drift	See Floor Spreading	Plate Tectonics
Explained by	**Alfred Wegener** in 1920s	**Arthur Holmes** explains Convectional Current Theory in 1930s. Based on convectional current theory, **Harry Hess** explains Sea Floor Spreading in 1940s	In 1967, McKenzie and Parker suggested the theory of plate tectonics. The theory was later outlined by Morgan in 1968
Theory	Explains Movement of Continents only	Explains Movement of Oceanic Plates only	Explains Movement of Lithospheric plates that include both continents and oceans.
Forces for movement	Buoyancy, gravity, pole fleeing force, tidal currents, tides,	Convection currents in the mantle drag crustal plates	Convection currents in the mantle drag crustal plates

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Contd...

Evidences	Apparent affinity of physical features, botanical evidence, fossil evidence, Tillite deposits, placer deposits, rocks of same age across different continents etc.	Ocean bottom relief, Paleomagnetic rocks, distribution of earthquakes and volcanoes etc.	Ocean bottom relief, Paleomagnetic rocks, distribution of earthquakes and volcanoes, gravitational anomalies at trenches, etc.
Drawbacks	Too general with silly and sometimes illogical evidences.	Doesn't explain the movement of continental plates	———————
Acceptance	Totally discarded	Not complete	Most widely accepted
Usefulness	Helped in the evolution of convectional current theory and see floor spreading theory	Helped in the evolution of plate tectonics theory	Helped understand various geographical features.

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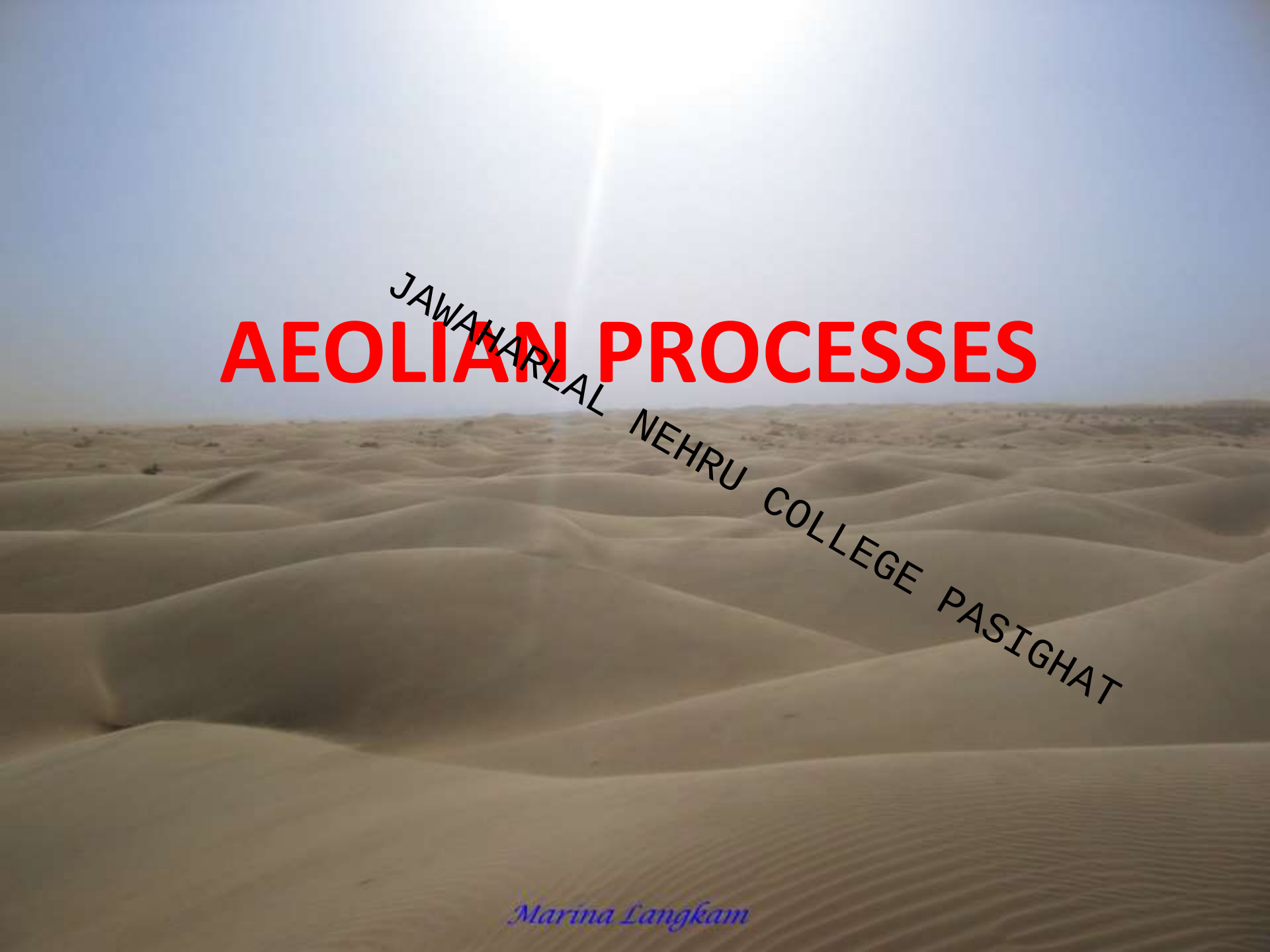

AEOLIAN PROCESSES

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- **AEOLUS is the Greek 'God of wind'**
- **Eolian processes include erosion, transportation and deposition activities of wind**
- **Eolian processes are important in arid and semi arid regions of tropical and temperate environments**
- **Recent investigations have shown that even in the deserts running water is a potent geomorphic agent**

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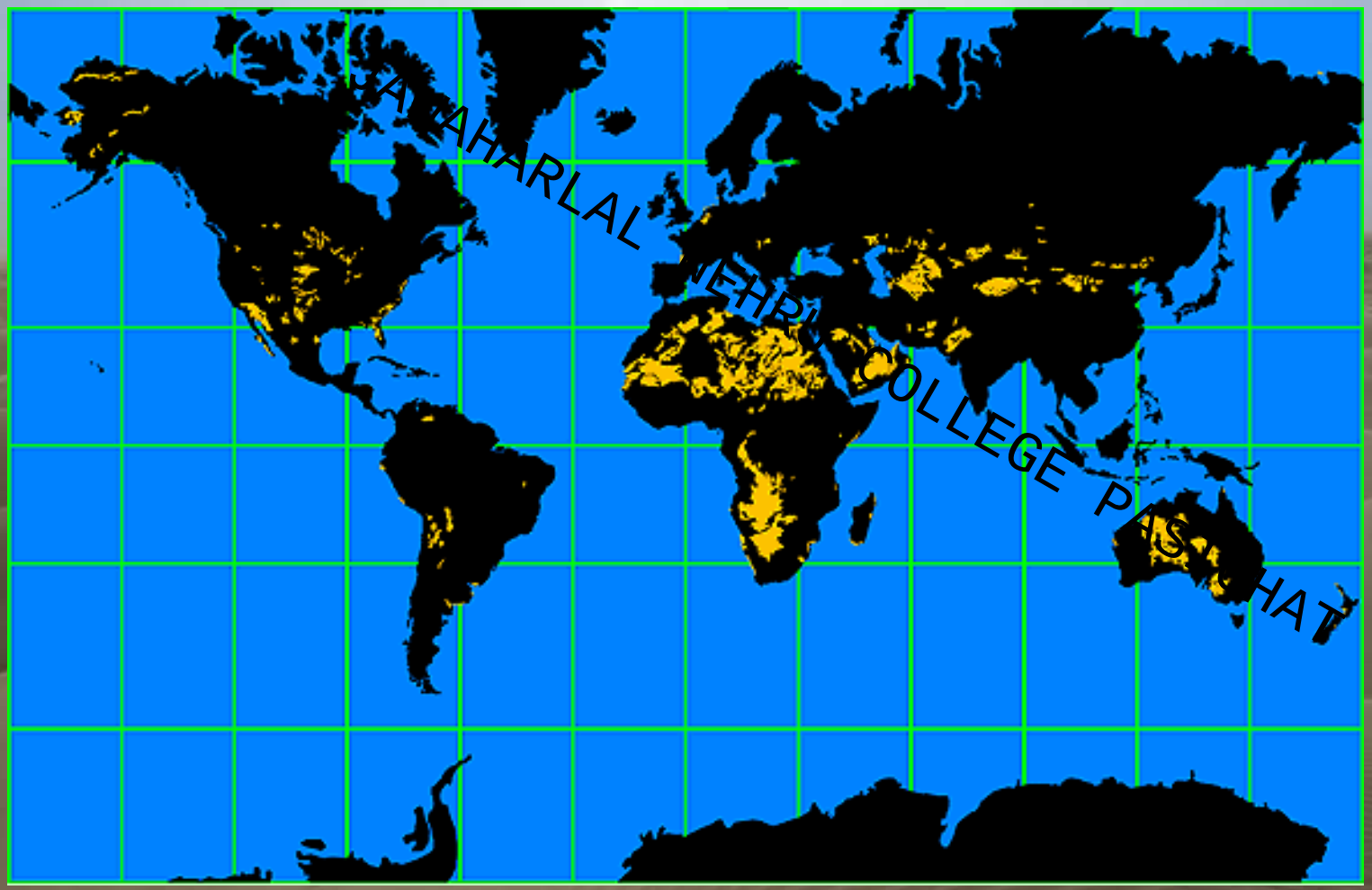
Global distribution of major deposits of Eolian derived sediments



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Factors affecting wind erosion

- **Wind Velocity**: Massive wind erosion with a significant increase in wind speed
- **Nature and amount of materials/ the size of the grain**: larger grains resist erosion by virtue of their greater size
- **Composition of rocks**
- **Nature of vegetation**

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WIND EROSION occurs in three ways:

- **DEFLATION**
- **ABRASION OR SANDBLASTING**
- **ATTRITION**

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DEFLATION

- ✓ Deflatus (Latin word) means blowing away
- ✓ Removing, lifting and Blowing away of surface materials by winds
- ✓ Deflation – wind blows loose soil away:
  - leaves coarser pebbles & cobbles, called Desert Pavement
  - Continued deflation removes most of loose materials and thus depressions or hollows are formed called Deflation Hollow or Blowouts.

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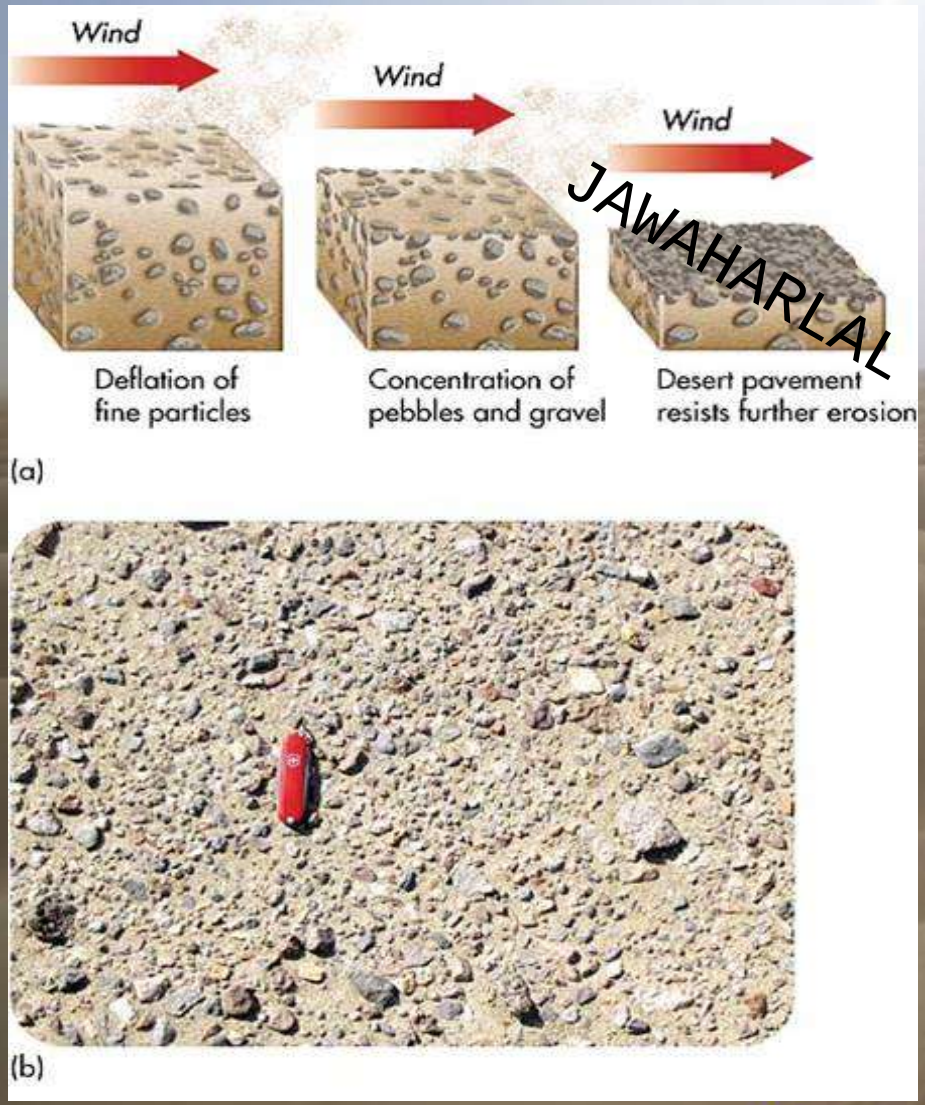
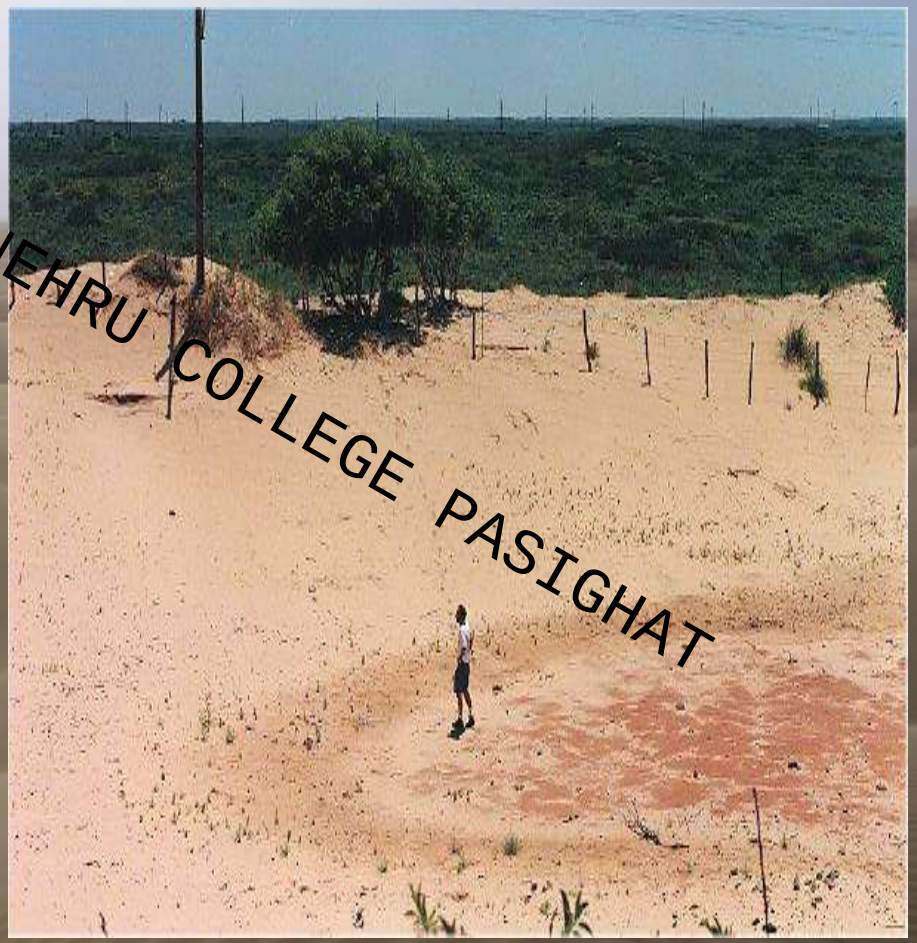
Deflation continues...

Desert Pavement



Deflation hollows or blowouts



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ABRASION OR SANDBLASTING

- Wearing down of surfaces by the grinding action and sand blasting of windborne particles
- Maximum abrasion occurs at the height between 20-25 cm from the ground surface

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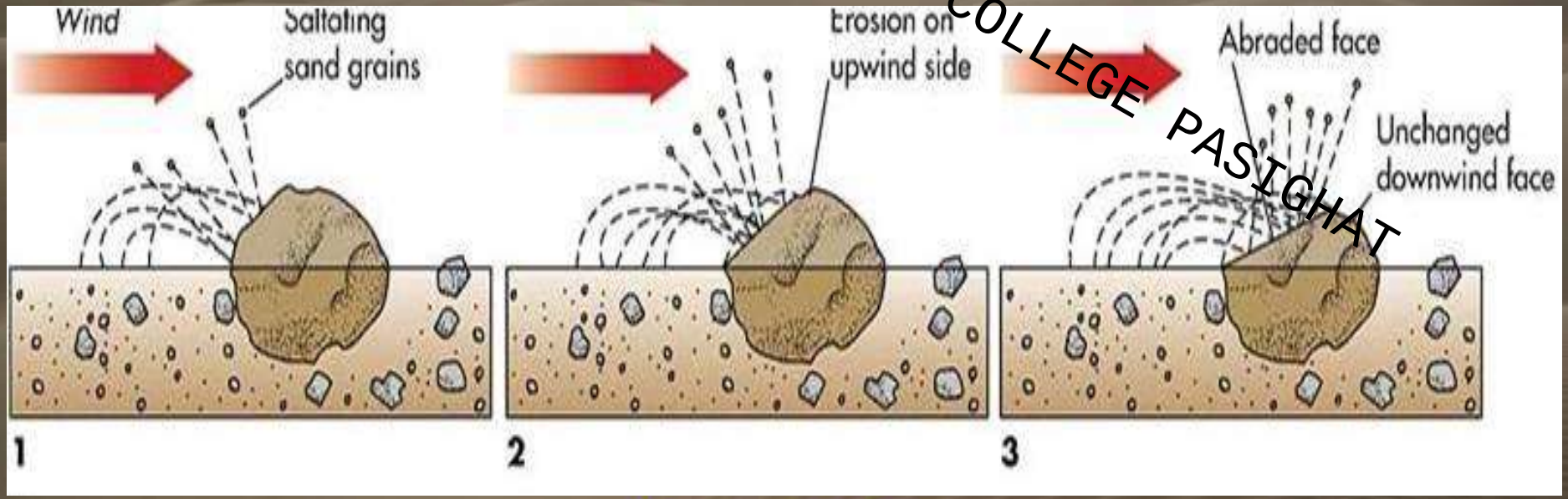

ATTRITION

- Mechanical tear and wear of the particles suffered by themselves while they are being transported by wind
- Results into gradual reduction in the size of rock particles (size of grains)

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TRANSPORTATIONAL PROCESSES

1. Suspension
2. Saltation
3. Surface creep or Traction

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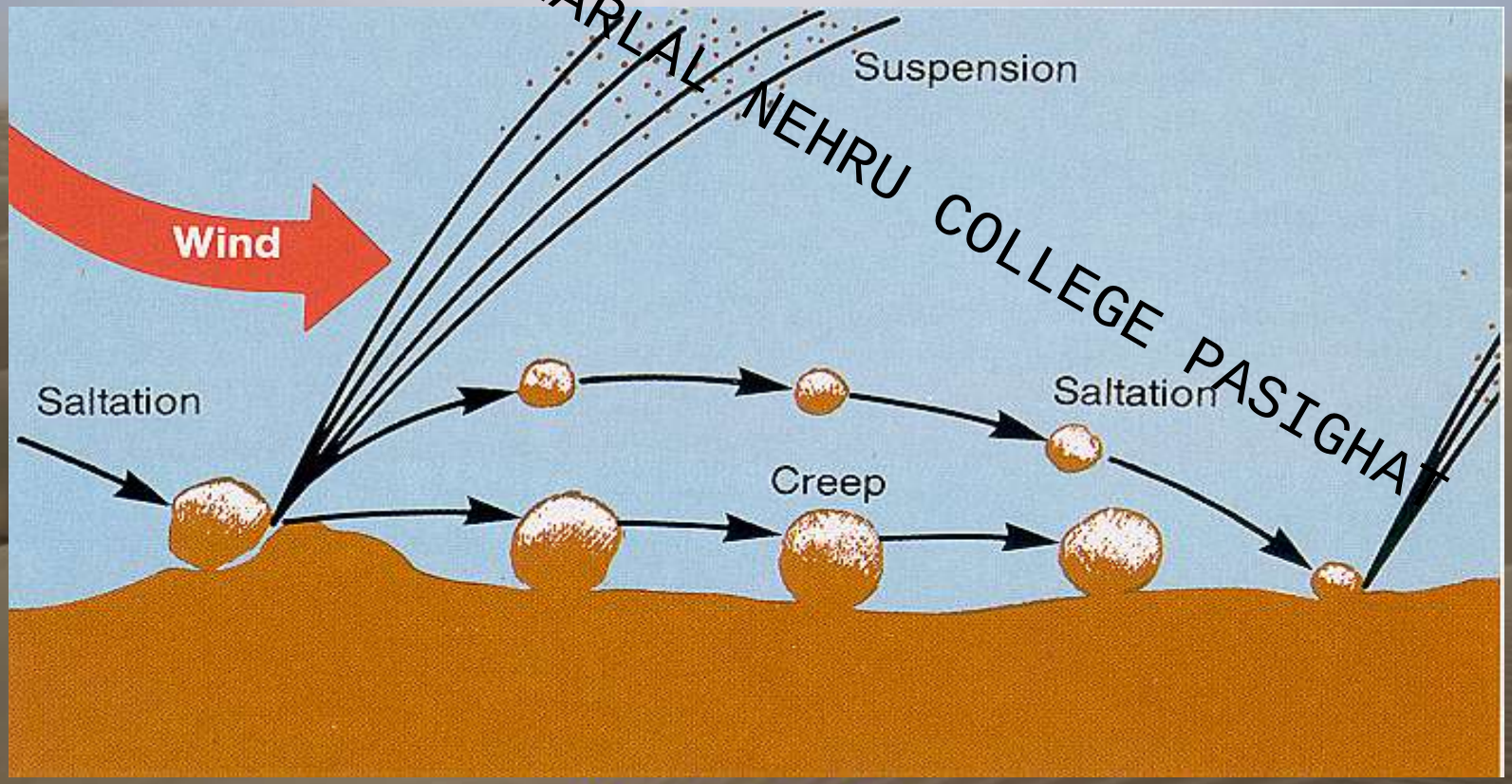

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SUSPENSION

- Smallest dust particles are carried
- Air suspends particles less than 0.2 mm in diameter
- Mostly fine silt and clay particles

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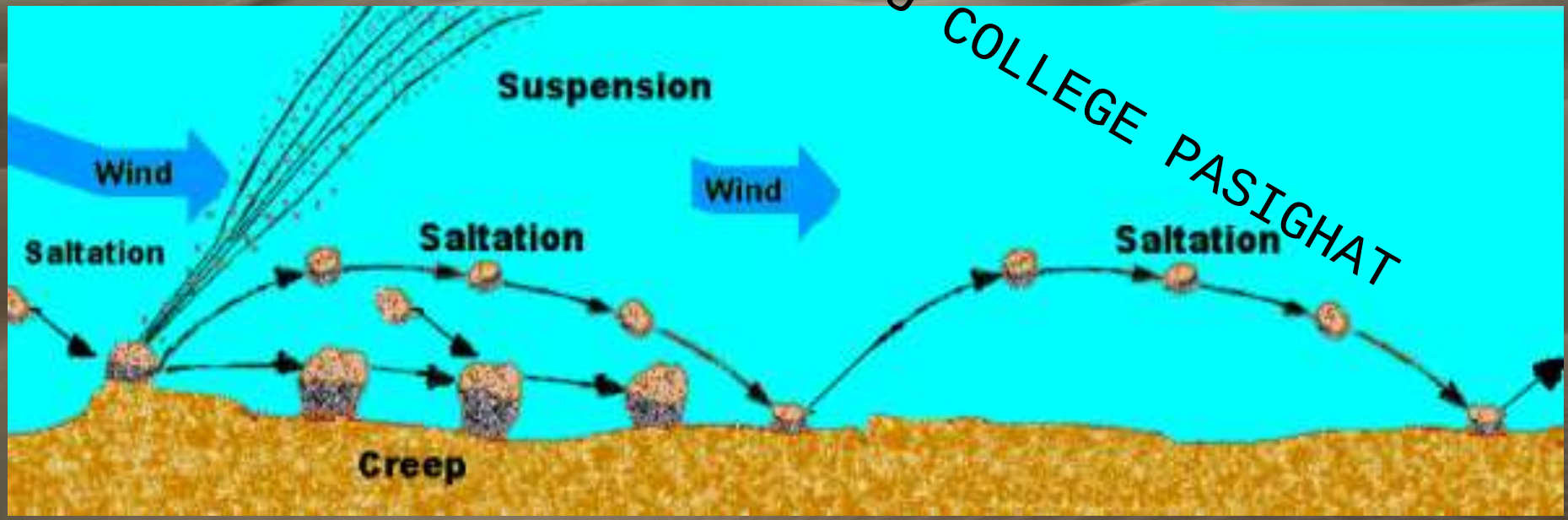

SALTATION

- Saltare (Latin word) means ‘to leap’
- Movement of sands and gravels through the mechanisms of bouncing, jumping and hopping by turbulent air flow

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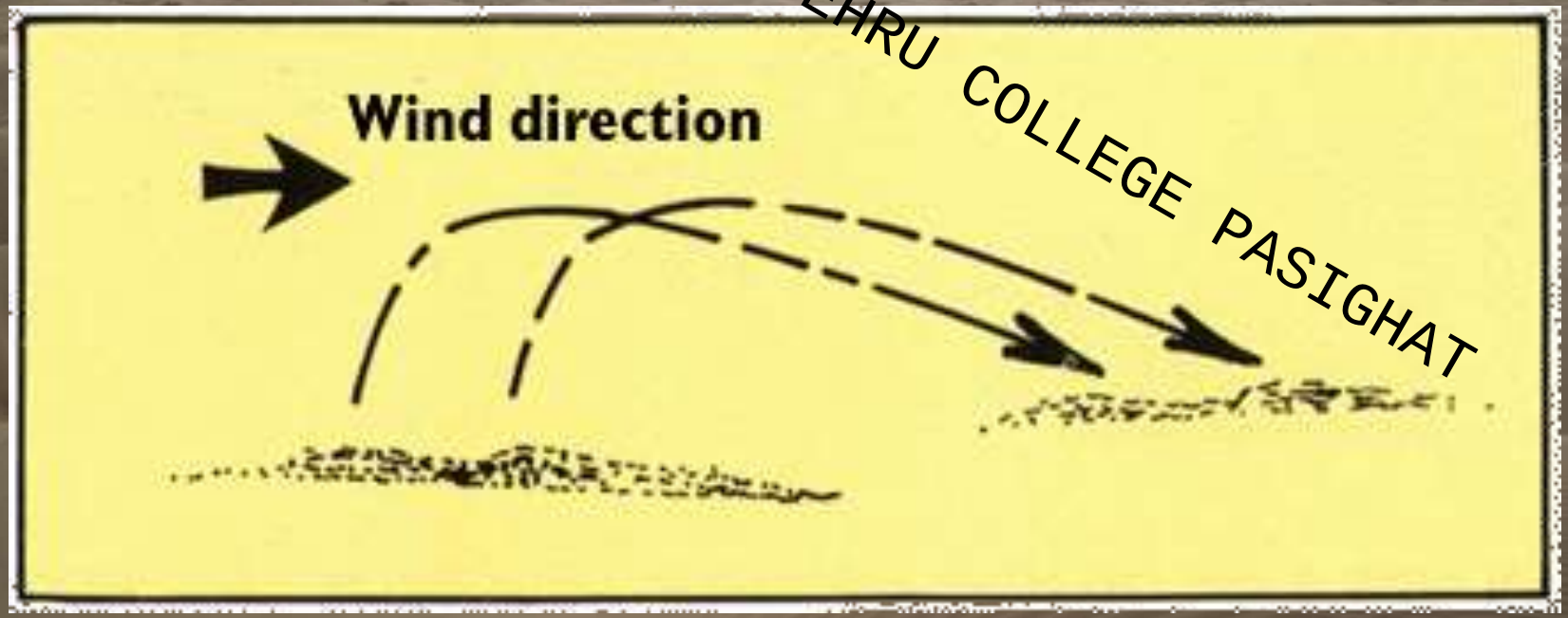

SURFACE CREEP OR TRACTION

- Movement of relatively bigger particles along the ground surface
- They are hit by smaller particles, which cause them to creep forward, very slowly
- Sliding and rolling

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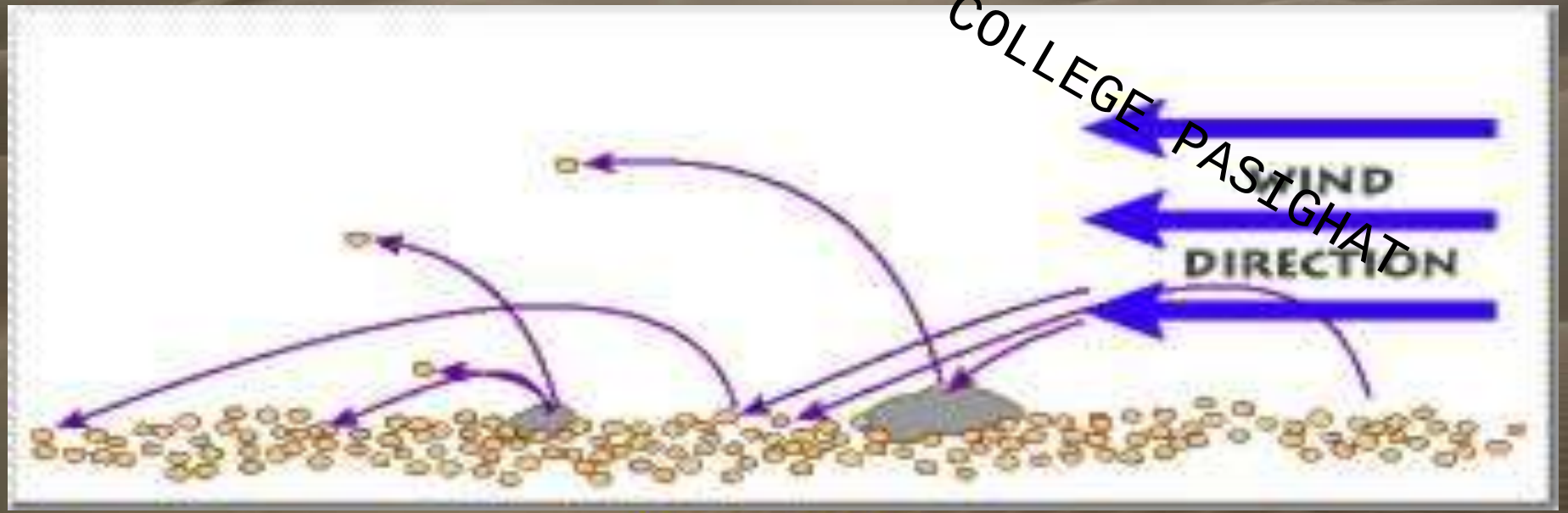

DEPOSITIONAL PROCESSES

- Deposition of sediments occurs due to:

  -marked reduction in wind speed

  -obstructions caused by bushes, forests, marshes and swamps, lakes, big river, walls, etc

- Deposition takes place with a sorting action (larger particles drop first due to reduced wind velocity)
- Wind-deposited sand bodies occur as sand sheets, ripples and dunes.

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Sand sheets and ripples

- ***Sand sheets*** **are flat, gently undulating sandy plots of sand surfaced by grains that may be too large for saltation.**
- **Wind blowing on a sand surface *ripples* the surface into crests and troughs whose long axes are perpendicular to the wind direction.**
- **Wind-blown sand moves up the gentle upwind side of the dune by Saltation or creep. Sand accumulates at the brink, the top of the slip face. When the buildup of sand at the brink exceeds the angle of repose, a small avalanche of grains slides down the slip face. Grain by grain, the dune moves downwind.**

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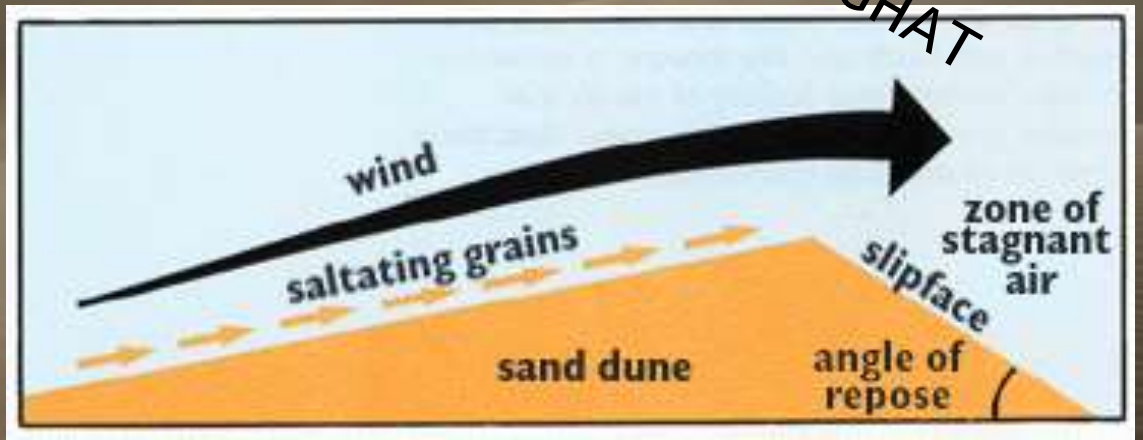

Thank
you
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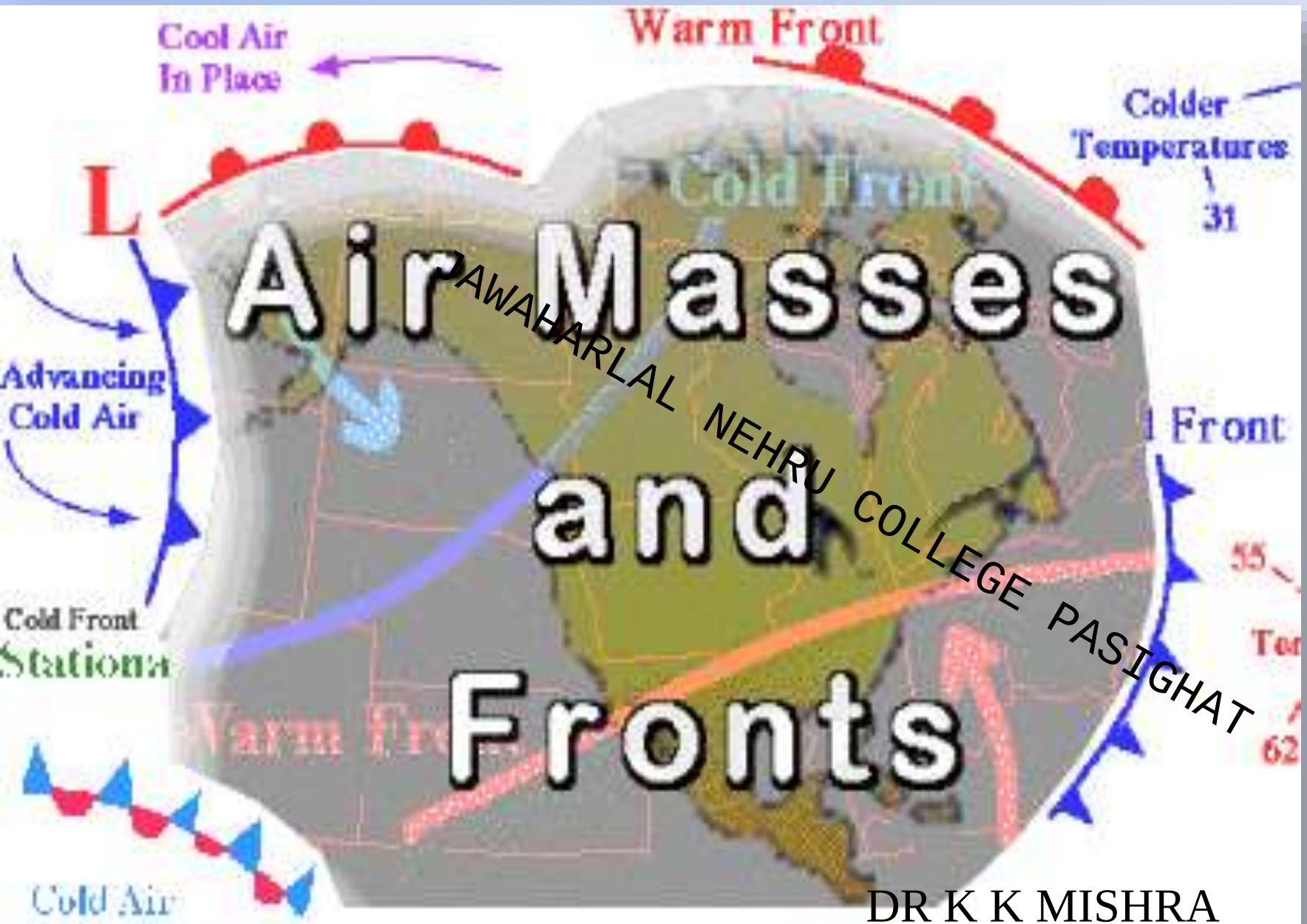
Marina Langkam



Air Masses and Fronts

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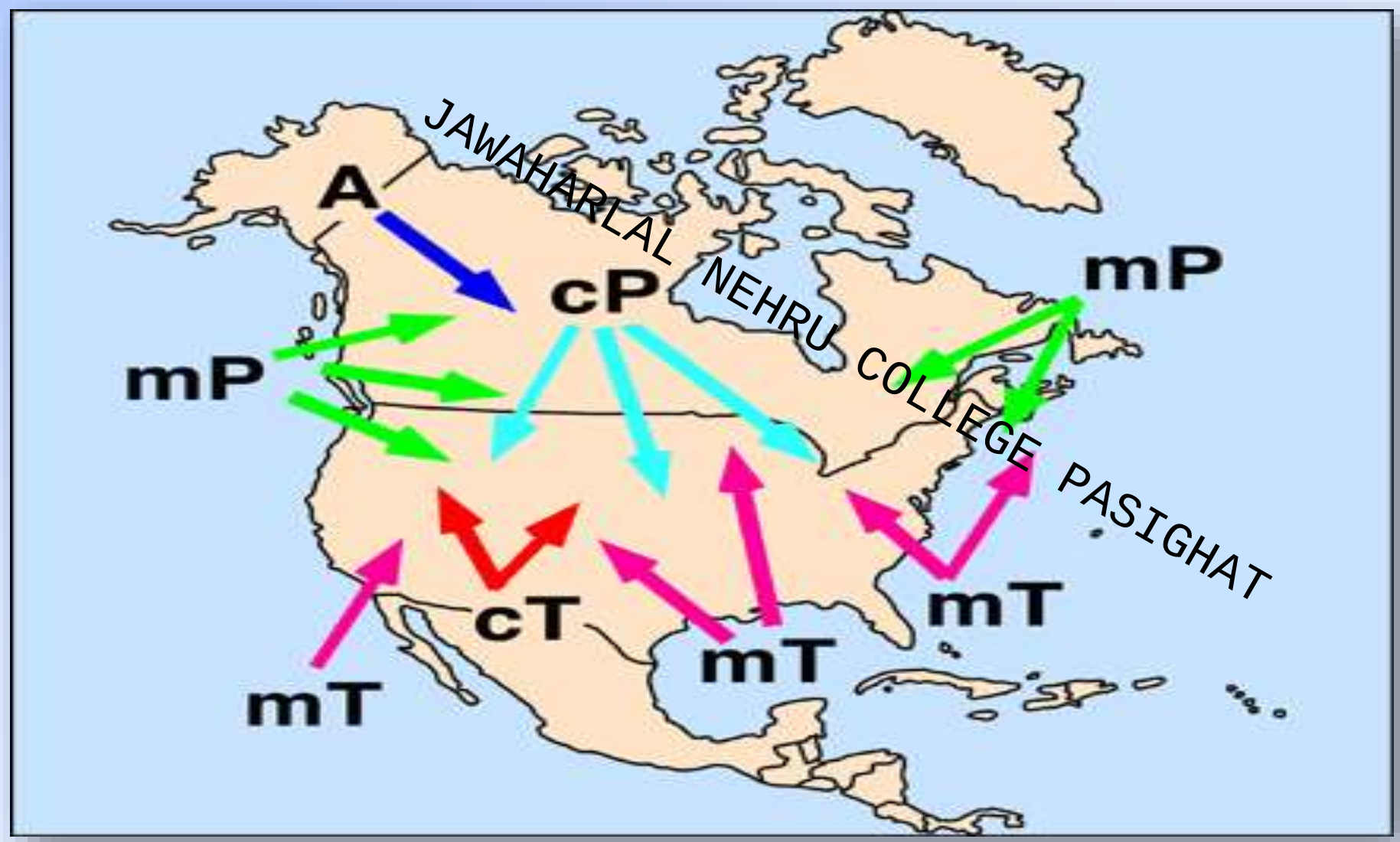
DR K K MISHRA

An air mass is a large body of air that has similar *temperature* and *moisture* properties



Once air masses move from where they form, their temperature and moisture content change. For example, as a polar air mass moves southward, it encounters warmer land masses and is heated by the ground below. Most air masses collide in the middle of the U.S., producing some violent weather.

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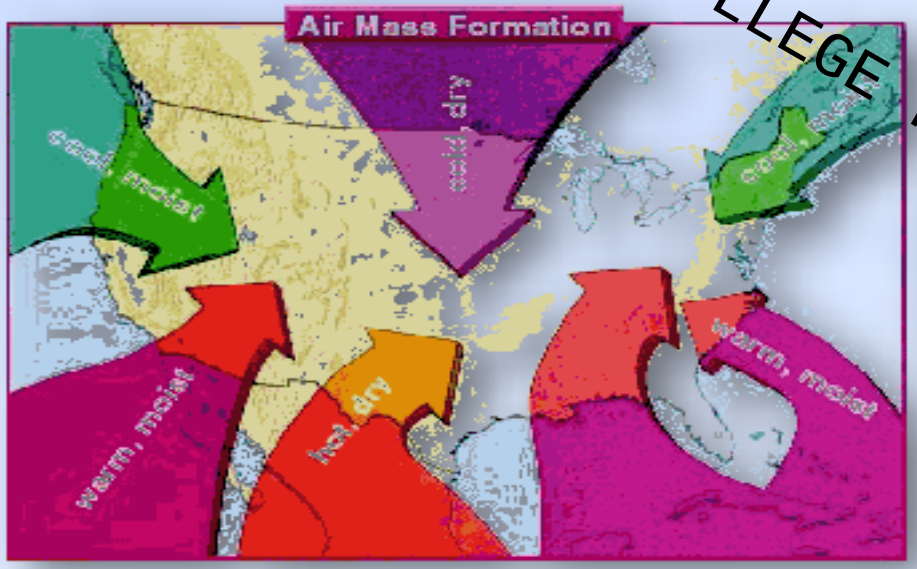
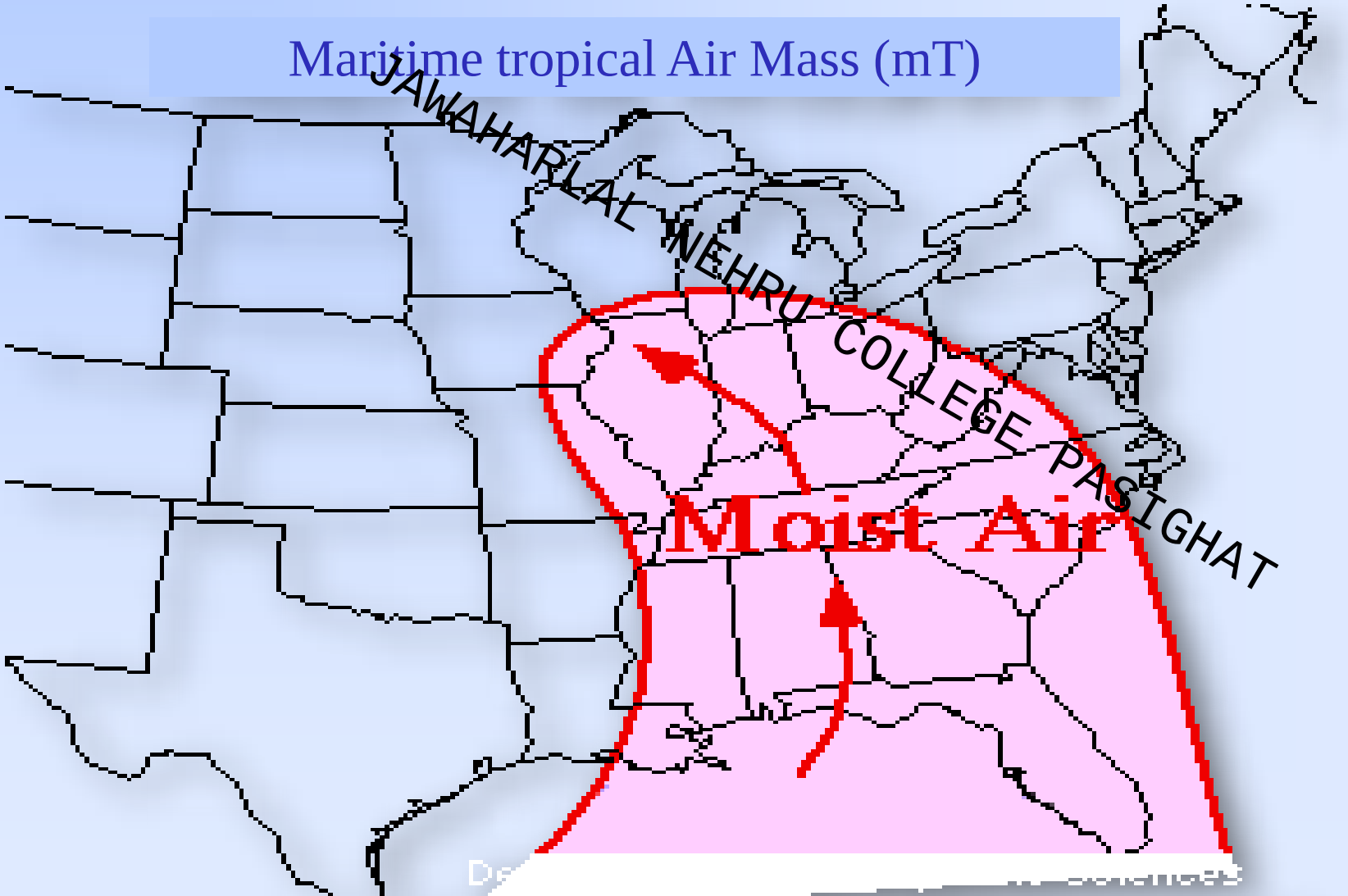
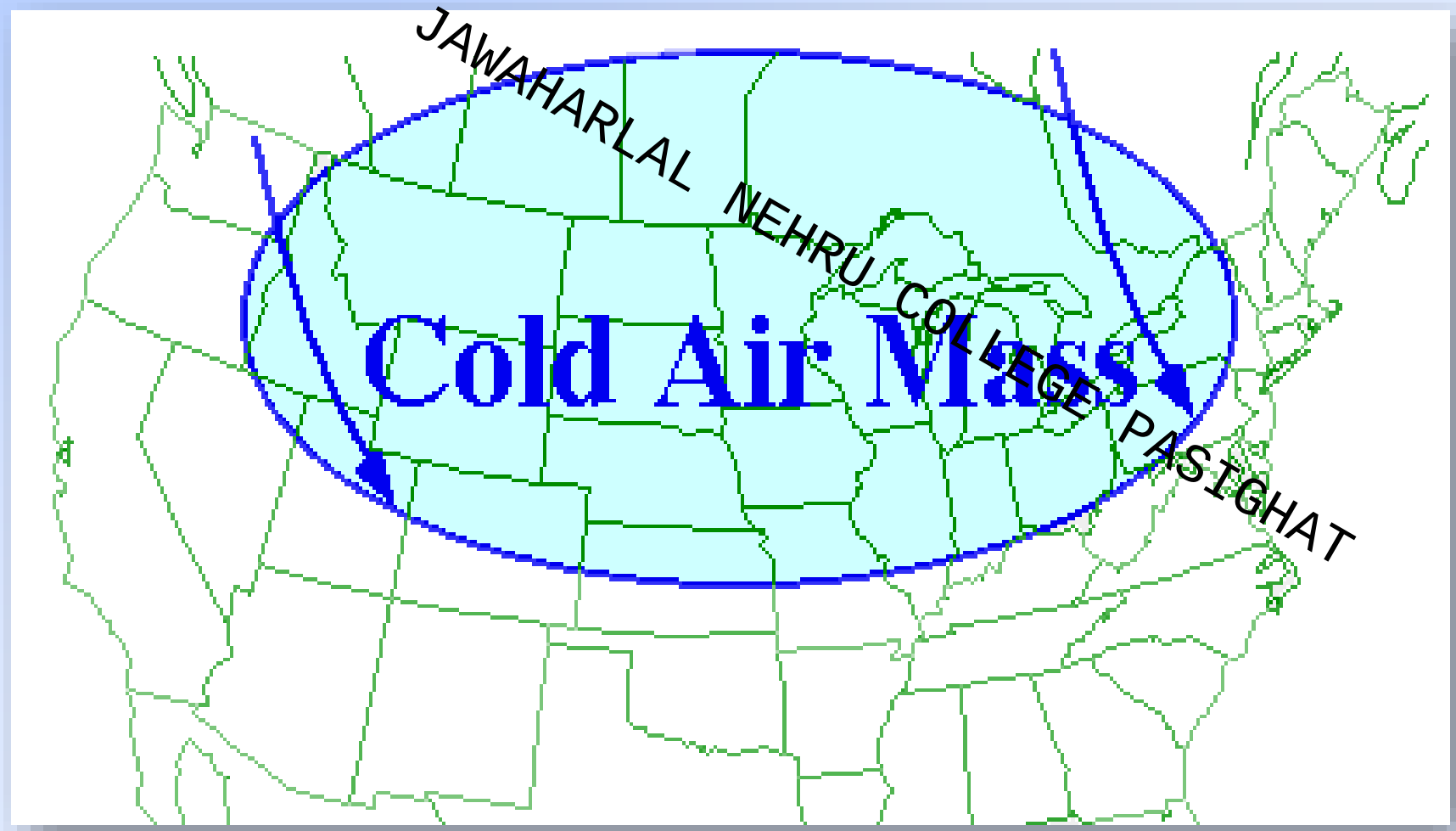
Air Masses



Maritime tropical air masses (mT) form over the warm waters of the tropics and Gulf of Mexico. The northward movement of these air masses brings *warm moist* air into the United States



Those who live in the northern United States expect cold weather during the winter months. These conditions usually result from the invasion of cold arctic air masses that form from the snow covered regions of northern Canada.



Cold air masses move southward and encounter warm air masses. When these air masses collide, various types of weather will result. The type of precipitation that might result from this collision depends on the air temperature.

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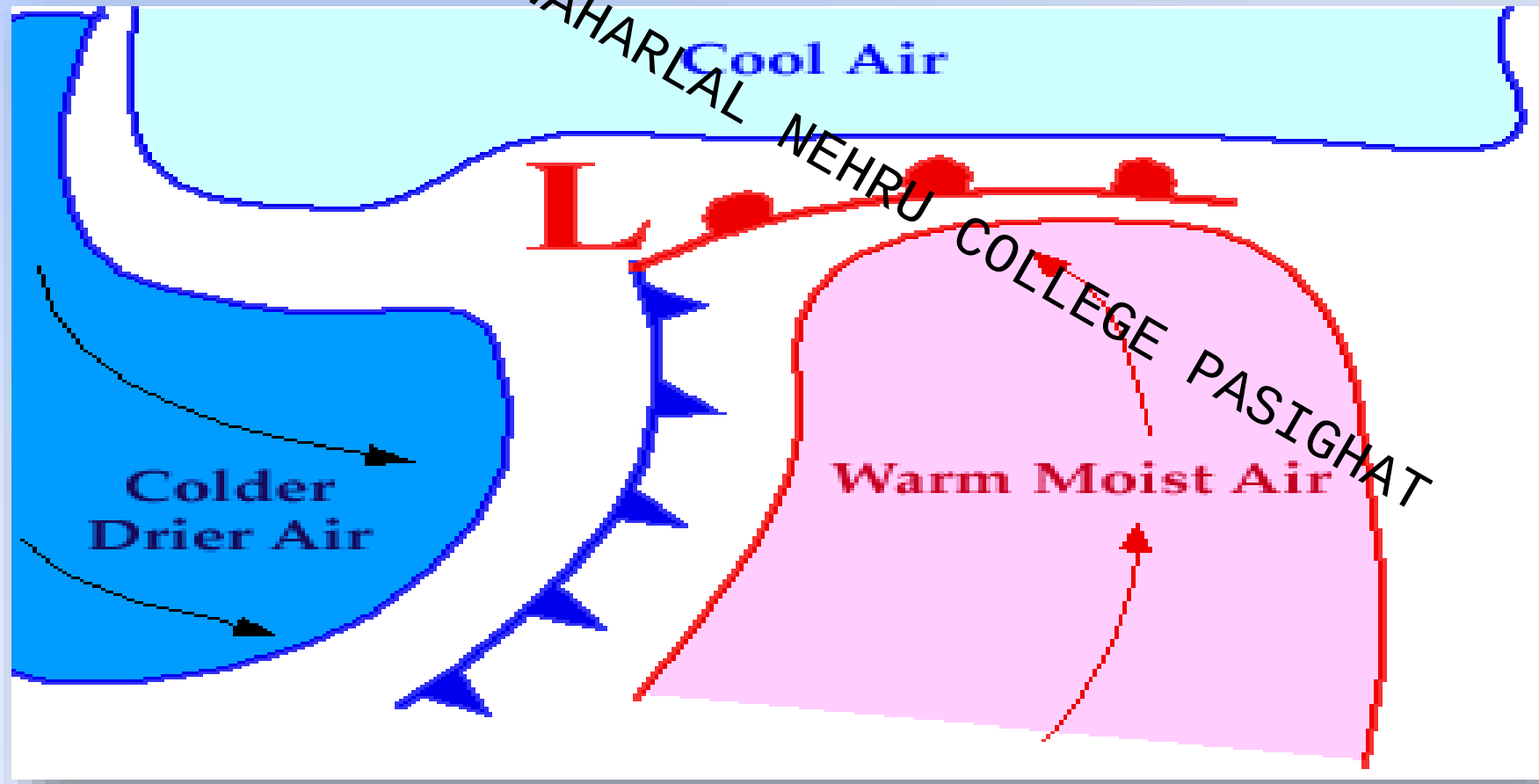
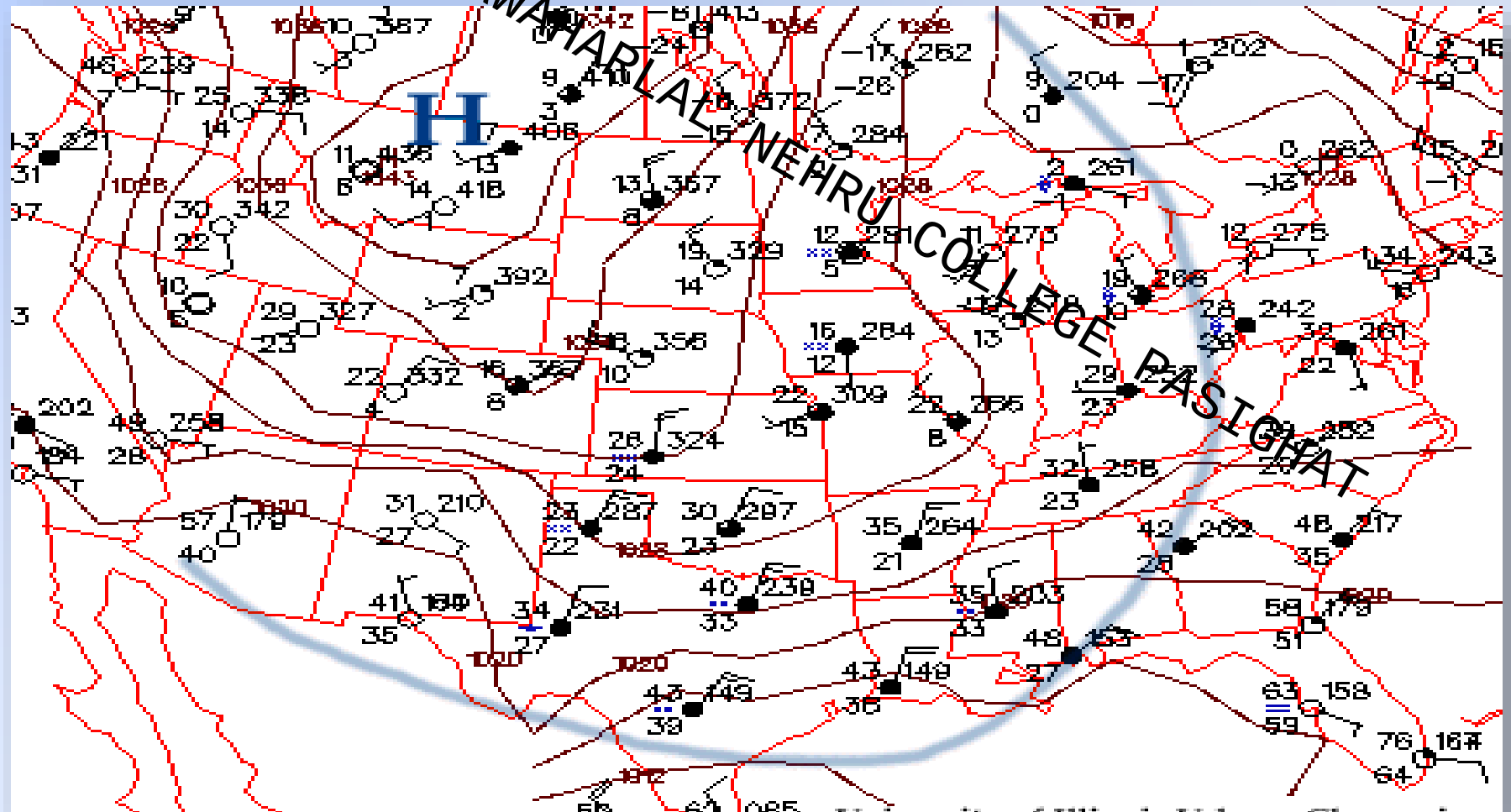
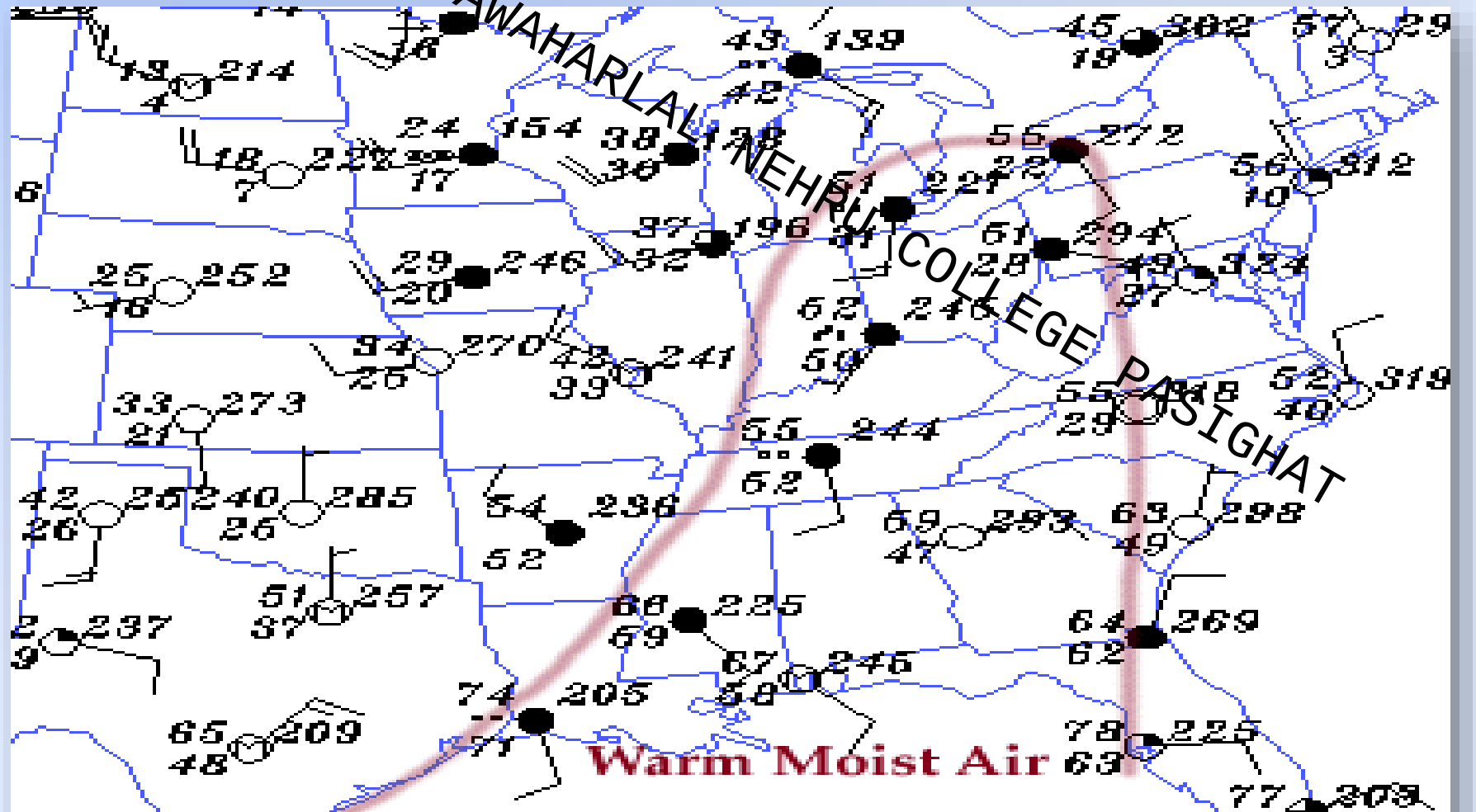


Notice the edge of the cold air mass is shown by the blue line. The center of this air mass is a high pressure center located in northern Montana (indicated by the blue "H").



The leading edge of a tropical air mass surging northward is shown by red line. Southerly winds behind the boundary indicate the northward movement of warm moist air.



A *front* is defined as the area between two air masses with different properties. Fronts extend not only in the horizontal direction, but in the vertical as well.

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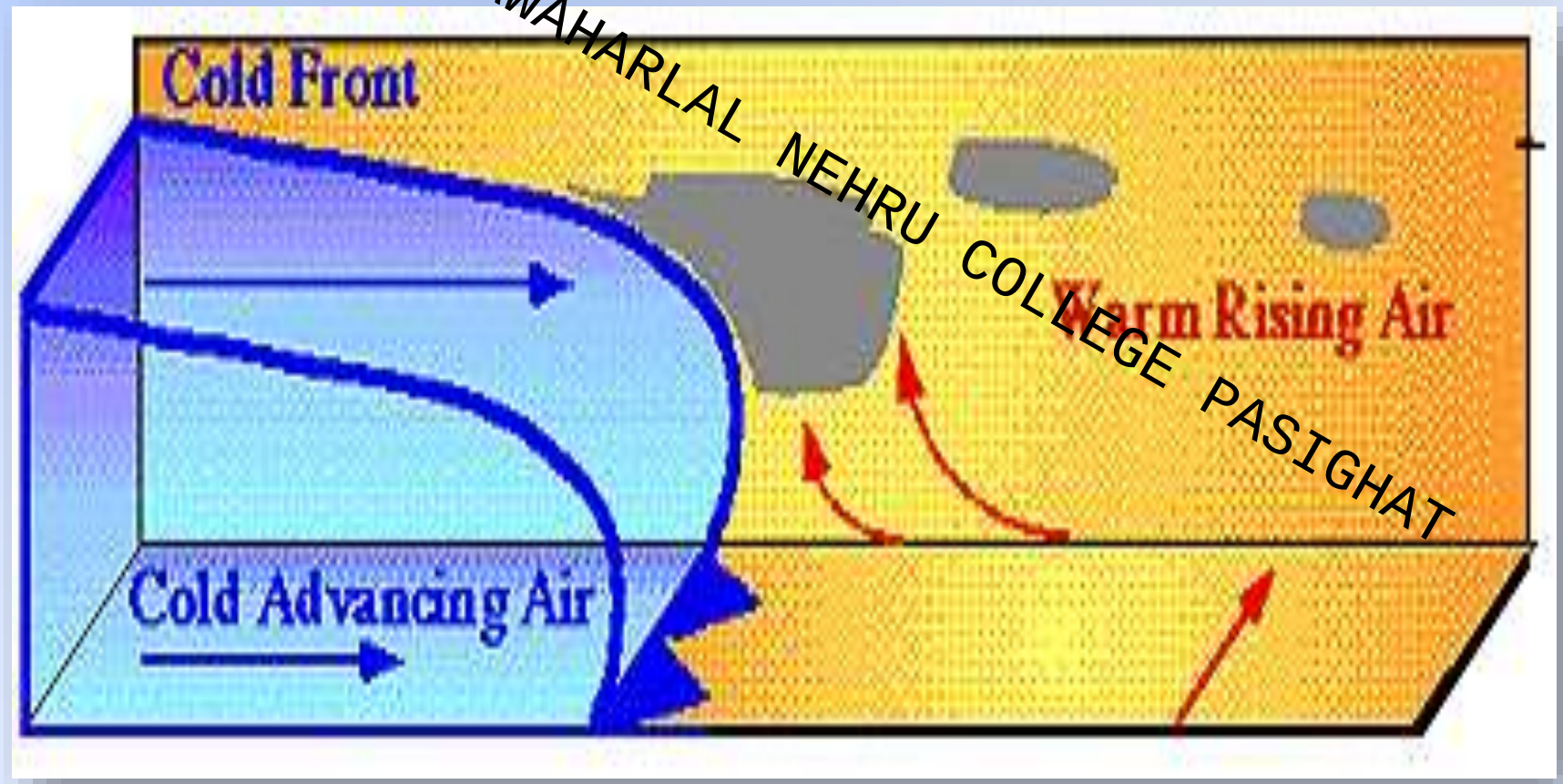

- A cold front is defined as the area where a **cold** air mass is replacing a **warmer** air mass.
- Cold fronts move from northwest to southeast. The air behind a cold front is colder and drier than the air ahead of it.
- When a cold front passes through, temperatures can drop more than 15 degrees within the first hour.

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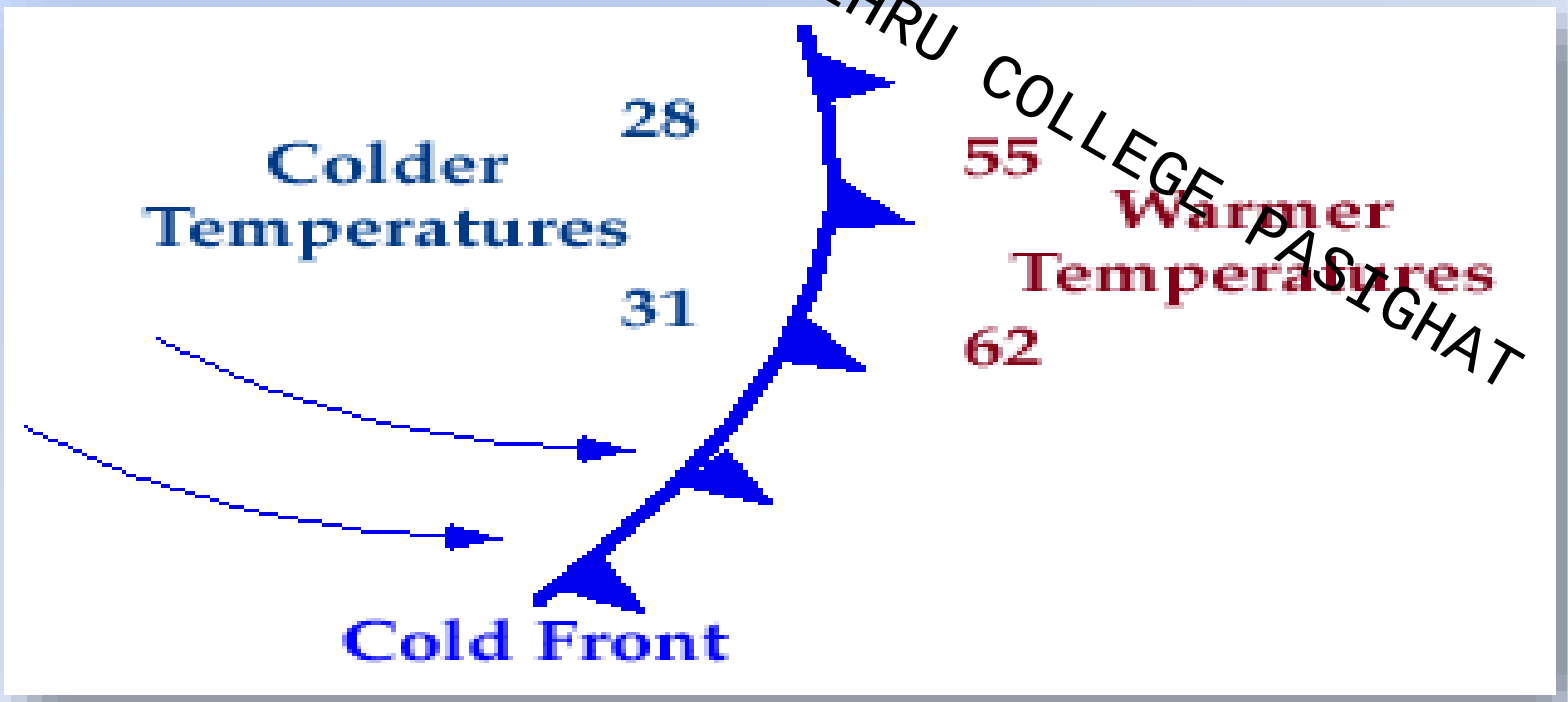
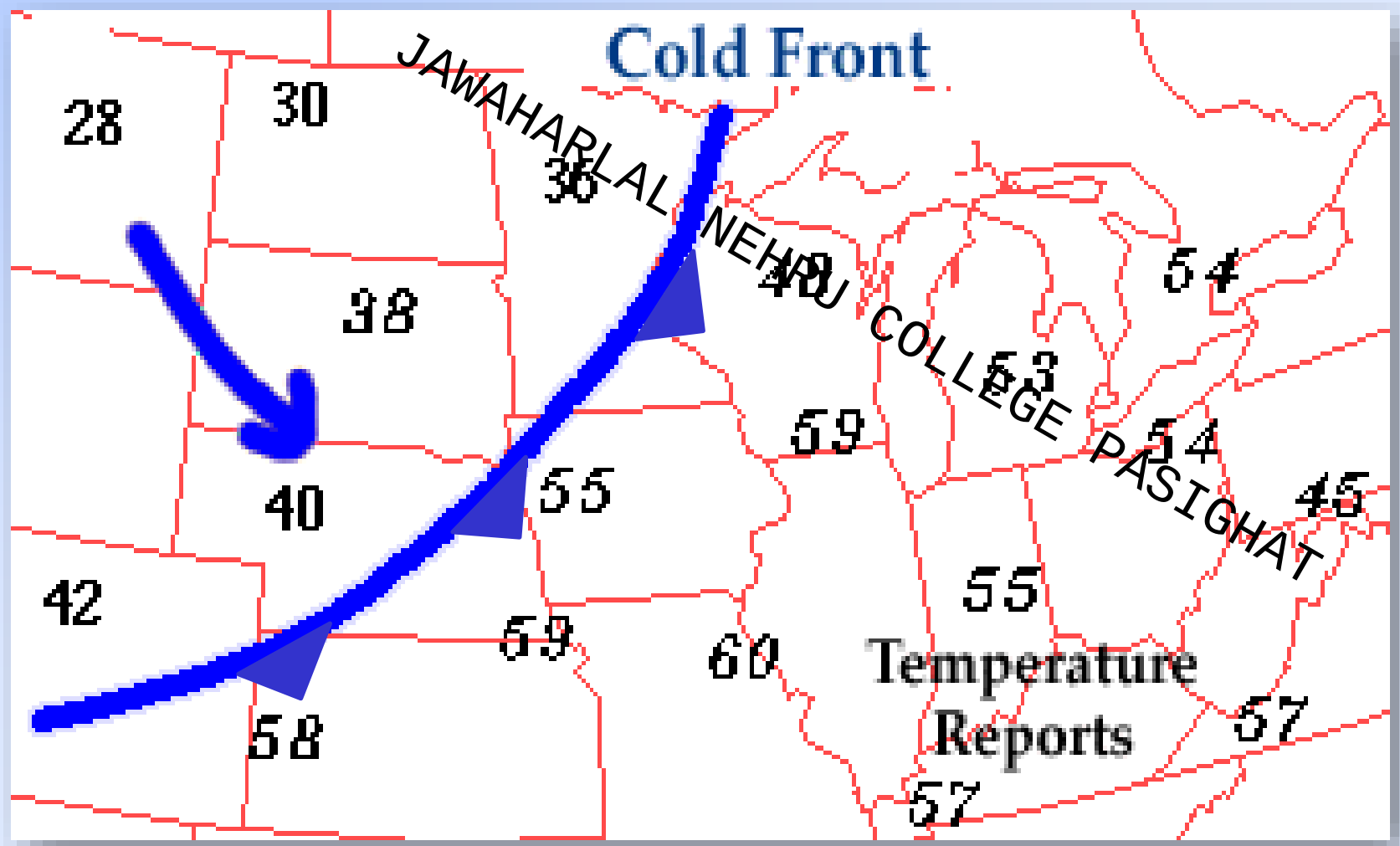
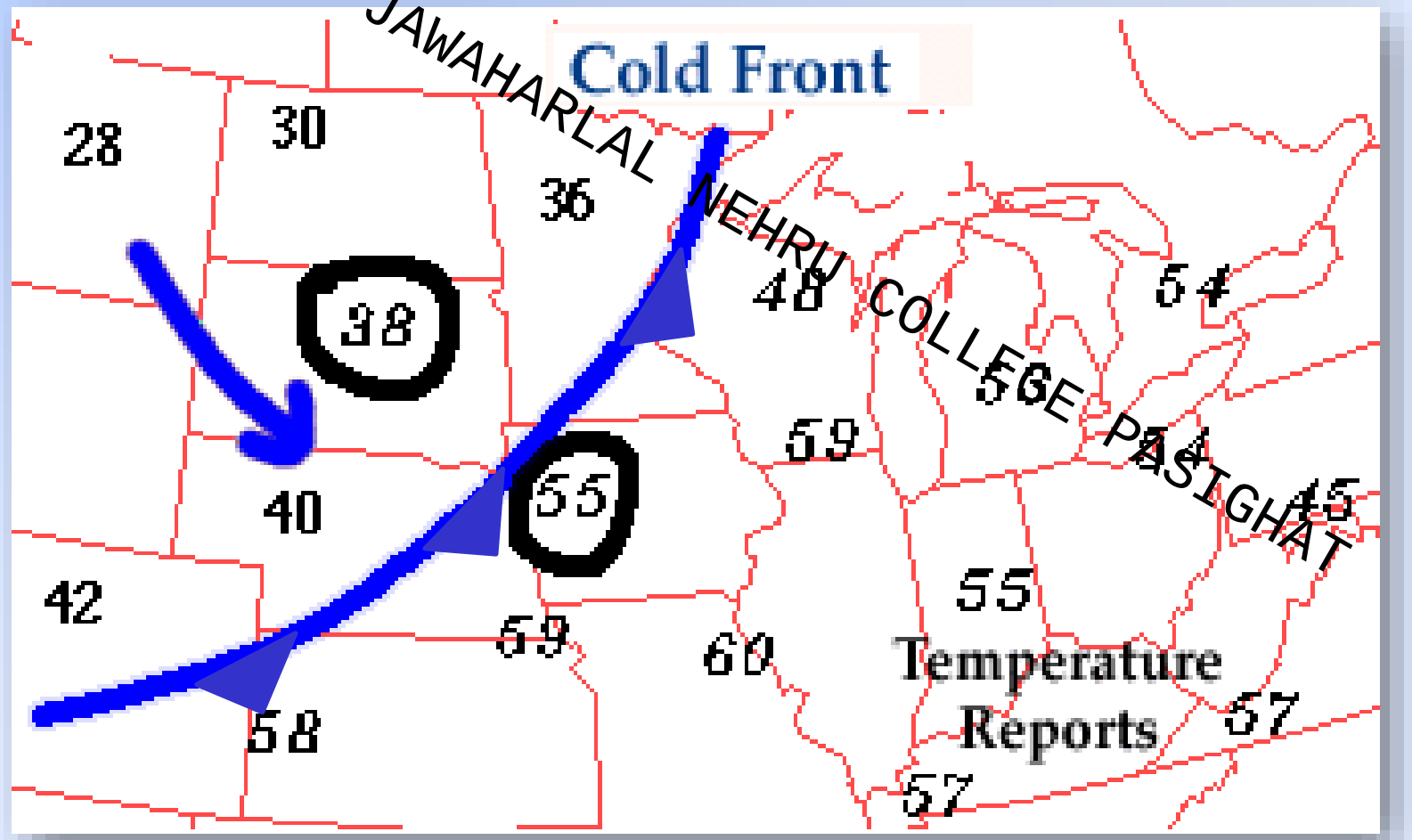


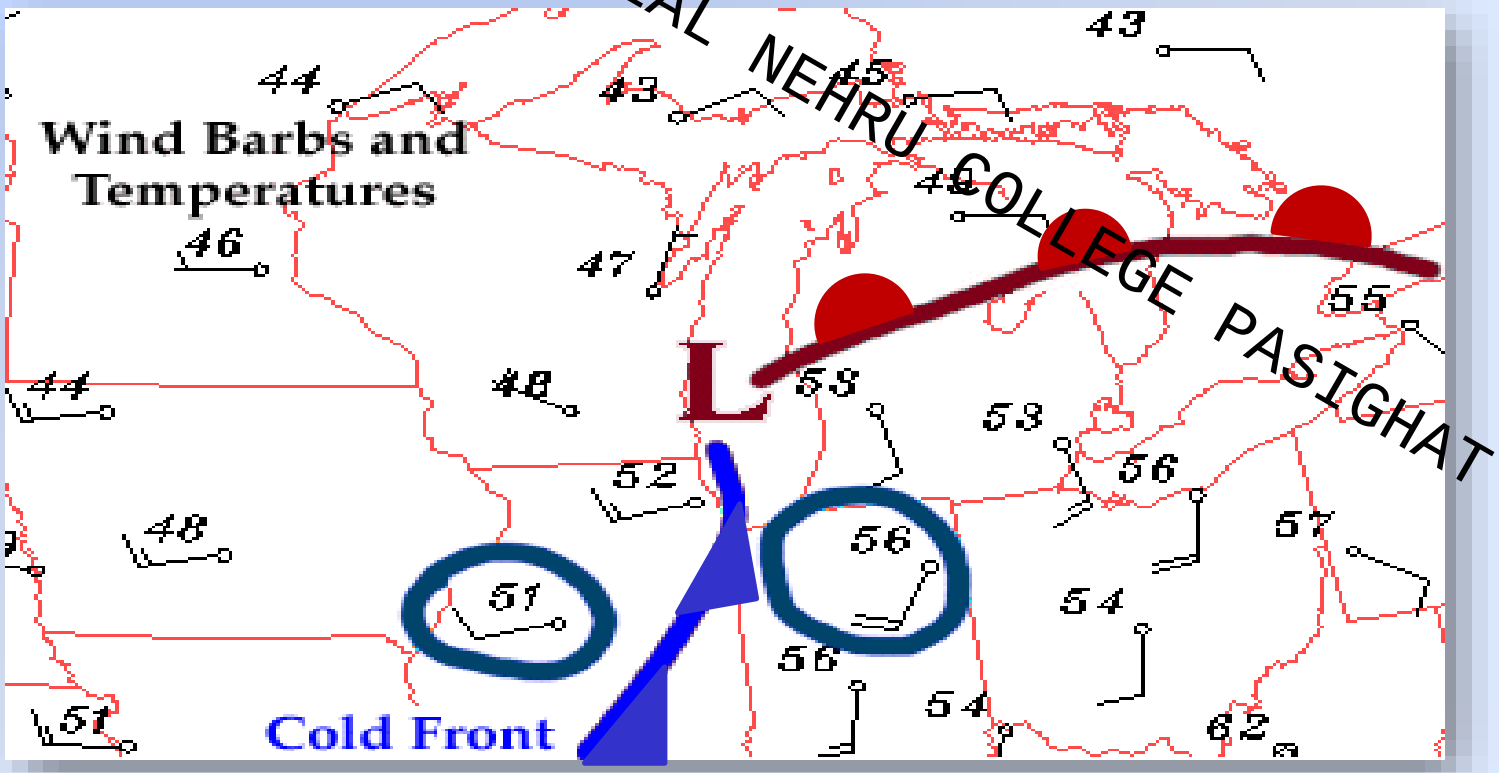
A cold front is represented by a solid blue line with triangles along the front pointing in the direction of movement.



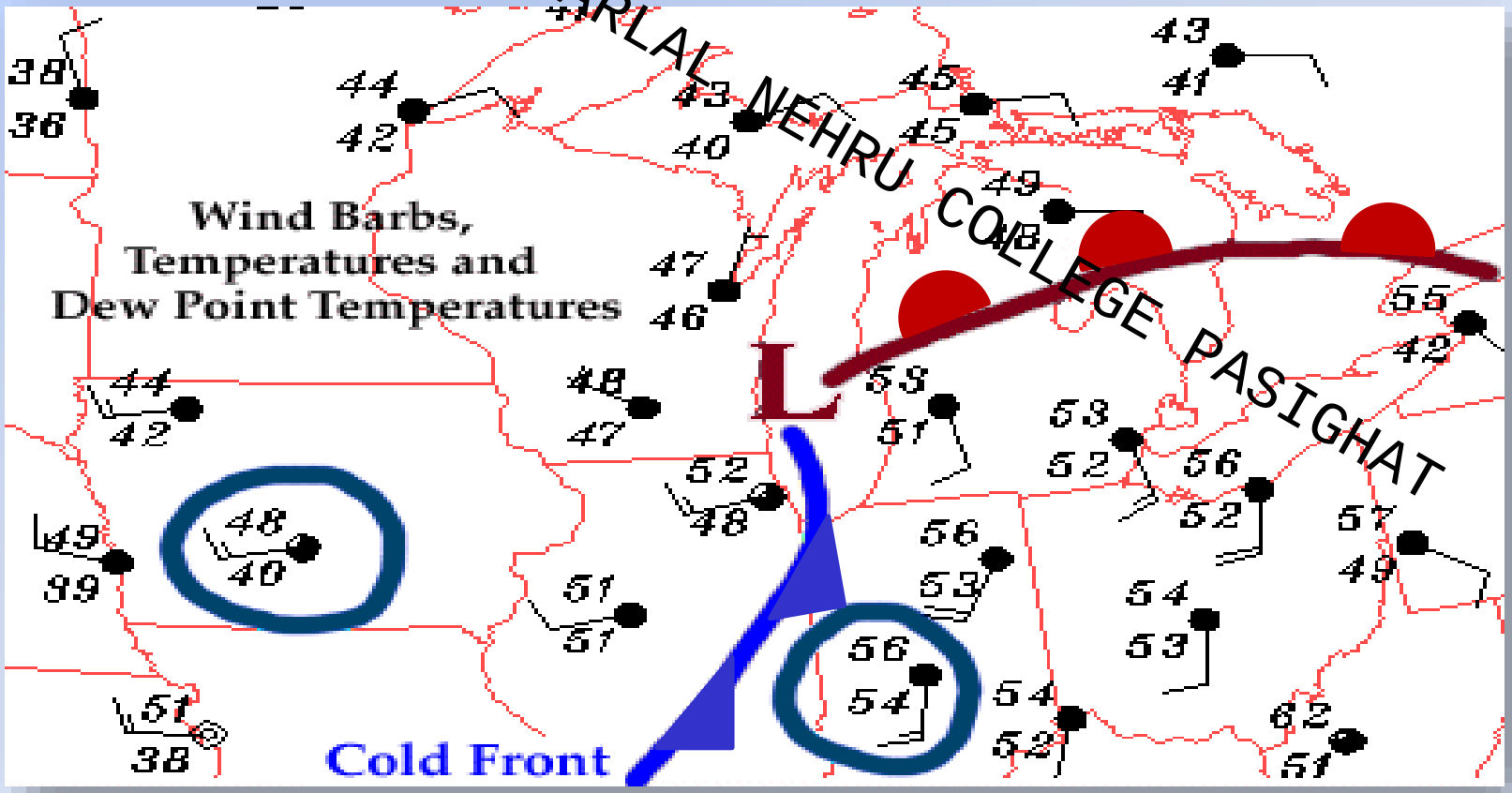
An rapid temperature change over a short distance is a good indicator that a front is located somewhere in between.



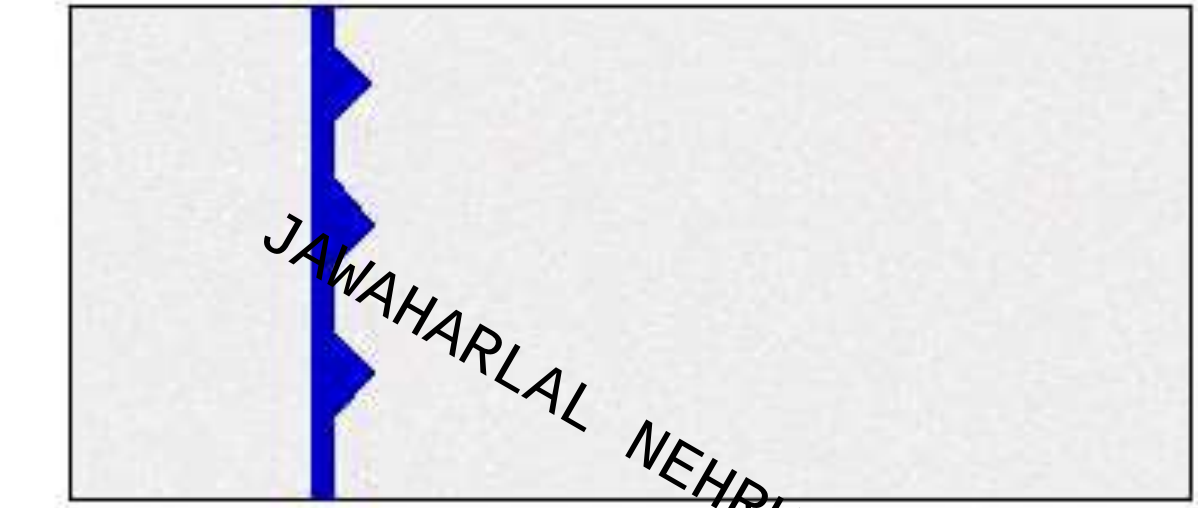
A change in wind direction from one side of the cold front to the other can also indicate where the front is located. Winds ahead of the cold front were generally from south-southwest, while behind the front, winds had shifted around and were blowing out of the west-northwest.



Another indication of a possible front is a change in the relative humidity. The air mass ahead of a cold front is more moist than the air mass behind it. Higher dew points indicate a higher moisture content of the air.



Cold Front



Top View

Side View

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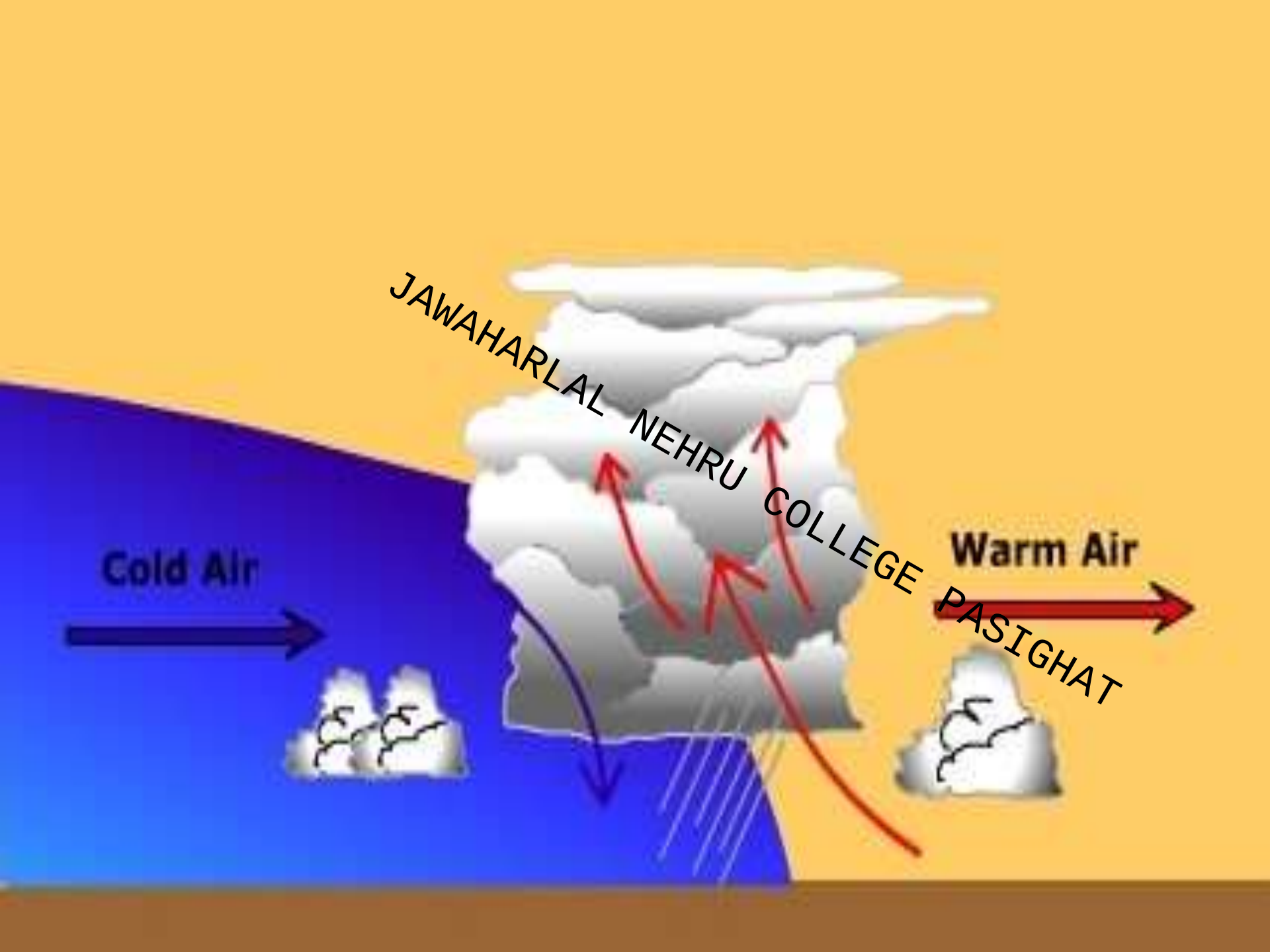
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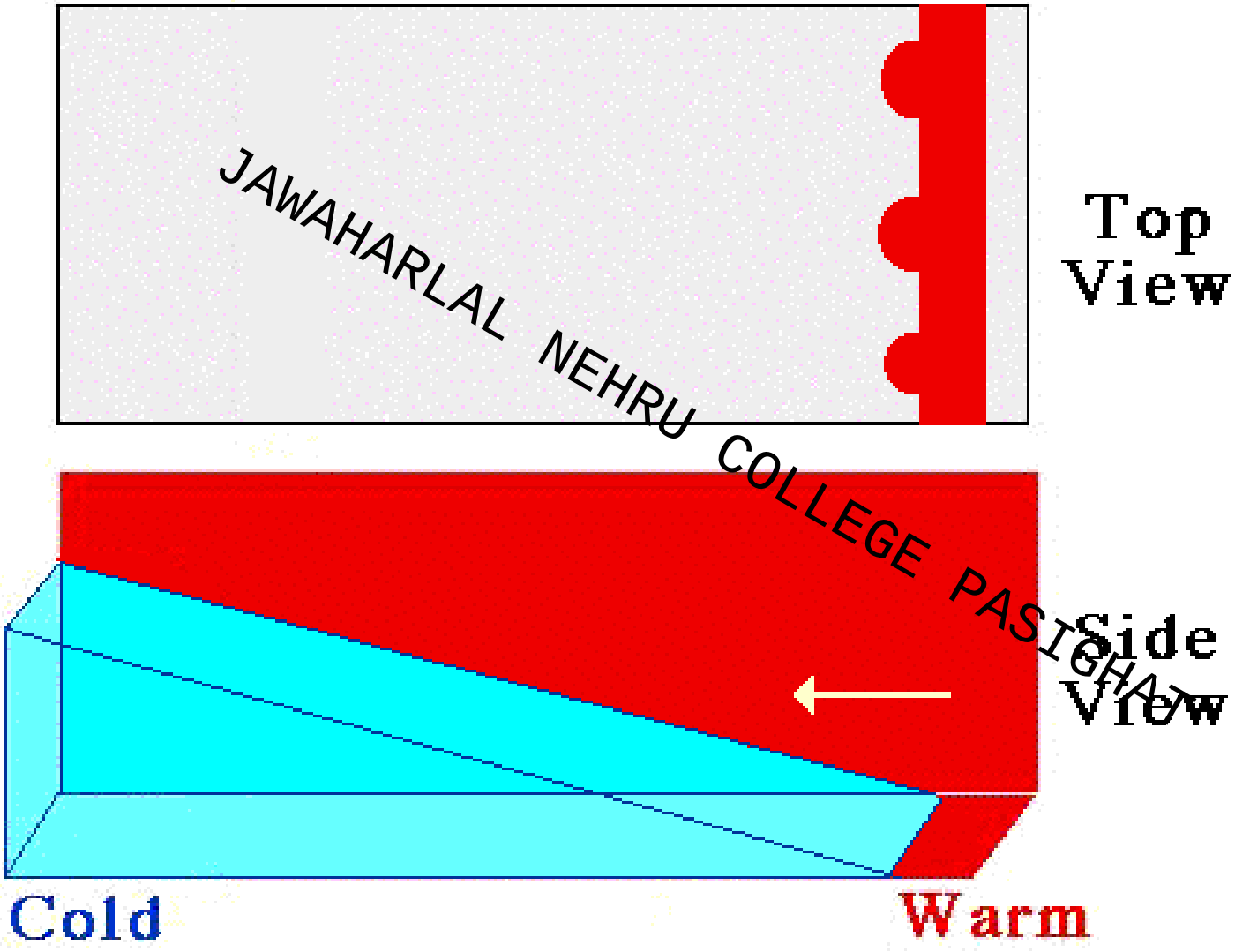
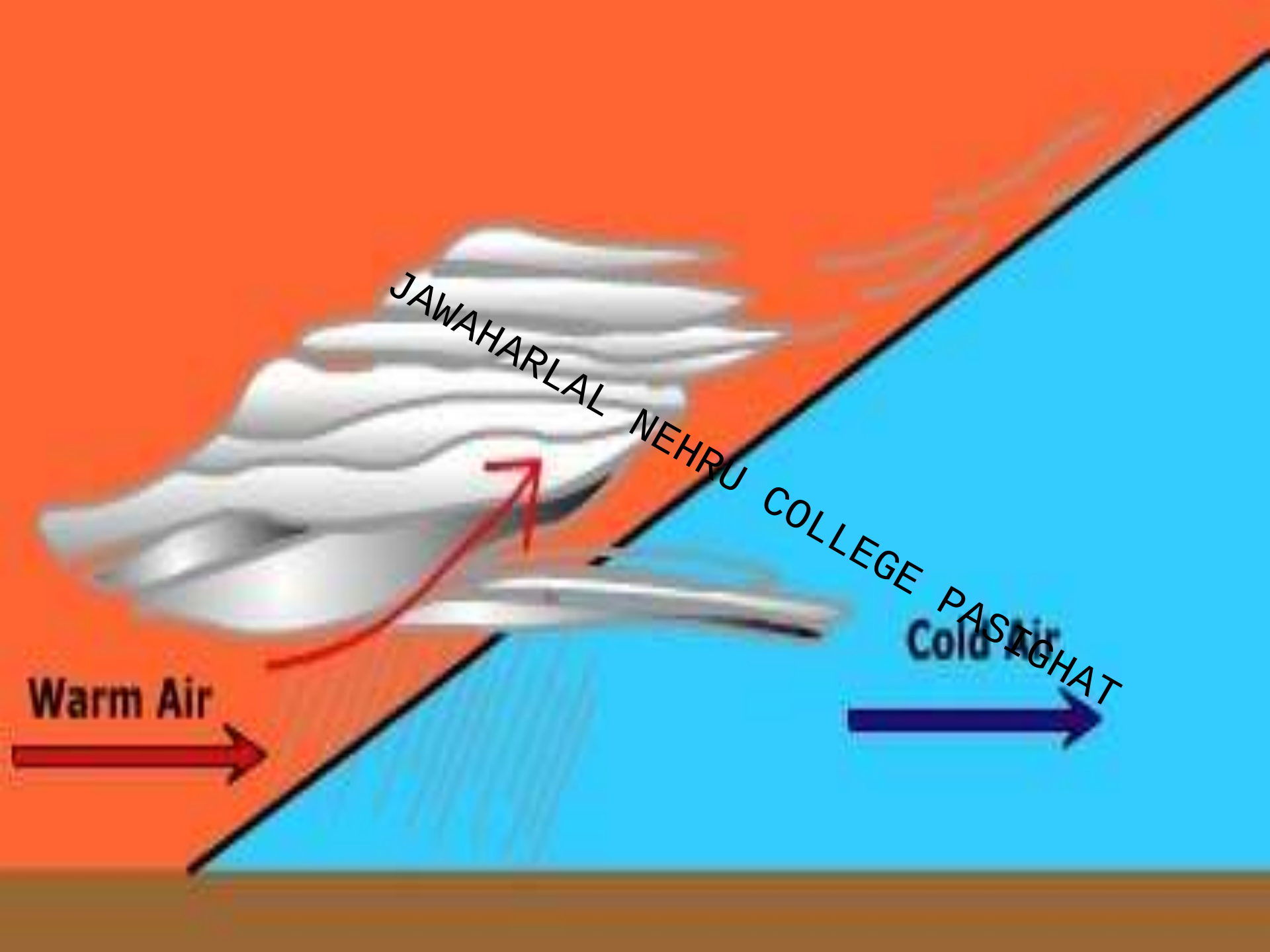
Cold Air
Warm Air

Warm Front


JAWAHARLAL NEHRU COLLEGE PASIGHAT
Top View
Side View
Cold
Warm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Warm Air
Cold Air

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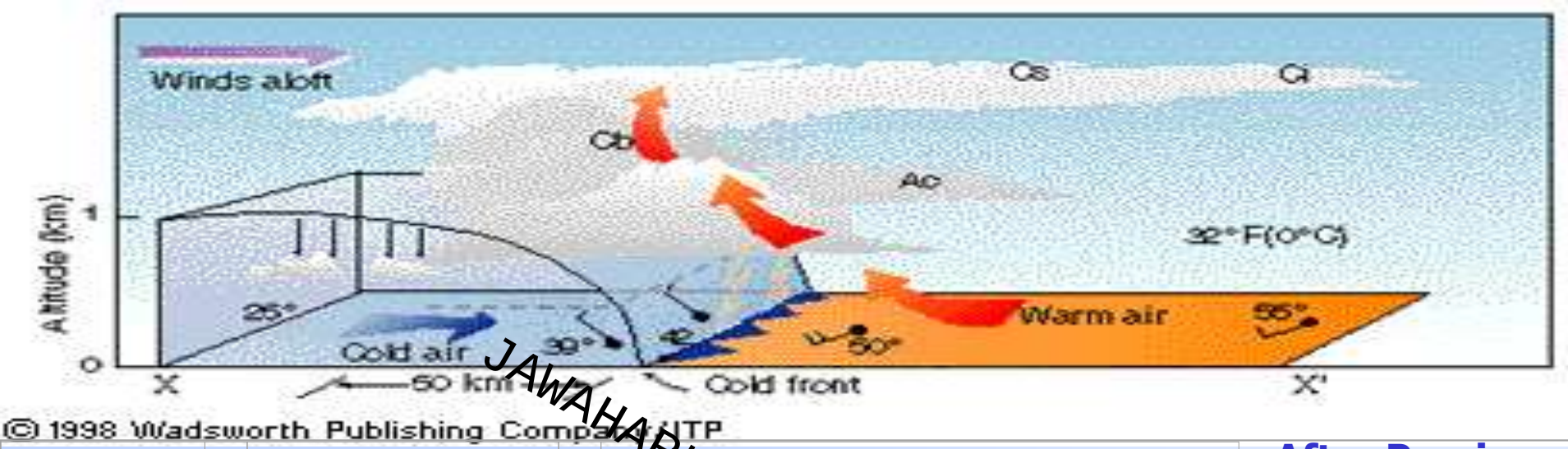

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	Before Passing	While Passing	After Passing
Winds	south-southwest	gusty, shifting	west-northwest
Temperature	warm	sudden drop	steadily dropping
Pressure	falling steadily	minimum, then sharp rise	rising steadily
Clouds	increasing: Ci, Cs and Cb	Cb	Cu
Precipitation	short period of showers	heavy rains, sometimes with hail, thunder and lightning	showers then clearing
Visibility	fair to poor in haze	poor, followed by improving	good, except in showers
Dew Point	high; remains steady	sharp drop	lowering

Atmospheric Temperature

DRKKMISHRA

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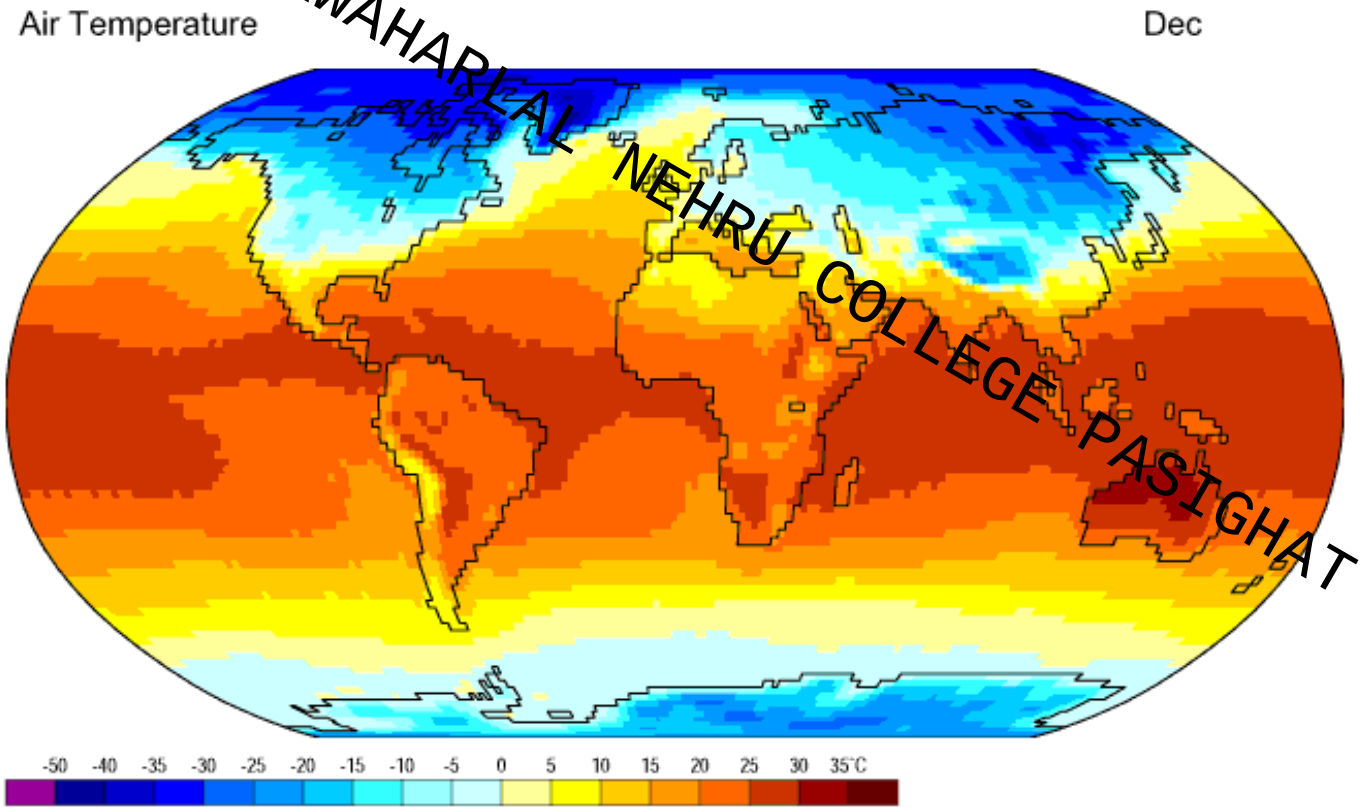

The Dynamic Atmosphere

- The Earth's atmosphere is a sensitive and dynamic system.
- Natural and Human influences greatly influence and can control atmospheric processes.
- The atmosphere can be analyzed at a local (regional) scale and global scale.
- Temperature varies due to several factors including location and the influence of the Sun.

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Heat and Temperature

- Temperature is a measure of the average kinetic energy (motion) of individual molecules of matter.
- Heat is a form of energy that flows from one system or object to another because the two are at different temperatures.
  - Temperature and heat are related because changes in temperature are caused by gain or loss of heat energy.

JAWAHARLAL NEHRU COLLEGE PRESIGHA

Earth – Atmosphere Energy System

- Earth's atmosphere and surface are driven by the sun's radiant energy.
- This solar energy is unevenly distributed by latitude.
- The Earth-Atmosphere Energy System includes incoming shortwave radiation (UV light) and outgoing longwave radiation (thermal infrared).

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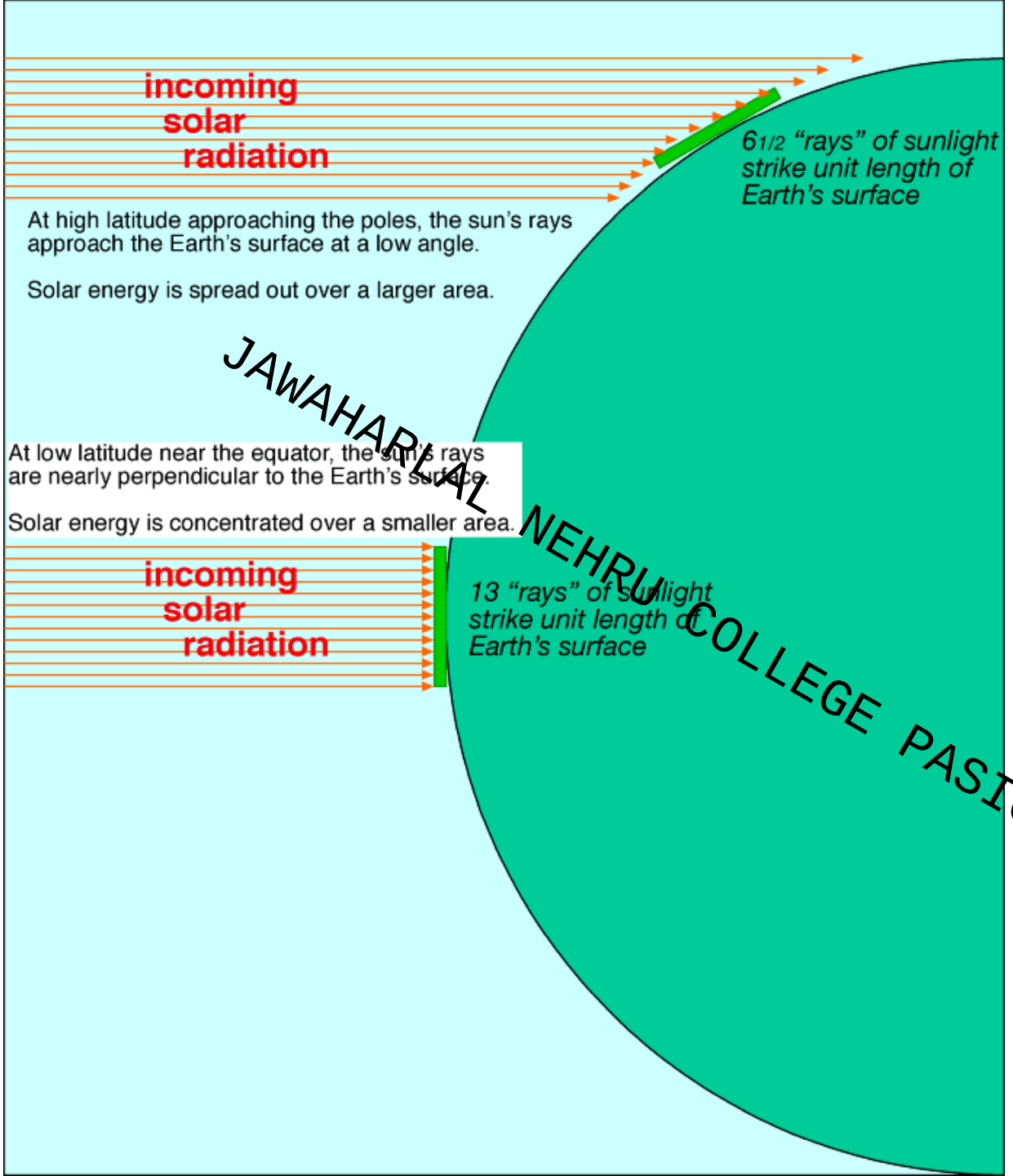
Insolation & Sub-Solar Point

- Insolation (Intercepted Solar Radiation) is solar radiation that arrives at the atmosphere and surface.
- Insolation intensity decreases as one moves away from the Sub-solar point.
- The Sub-solar Point receives maximum insolation as sun rays are perpendicular to the surface. It migrates annually between the Tropic of Cancer and the Tropic of Capricorn (between 23.5° N and 23.5° S).

GAUTAM HARSH NEHRU COLLEGE ASSISTANT



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Radiant (Heat) Energy

- The **Sun's light** is composed of electromagnetic waves that include a spectrum of radiant energy at different wavelengths.
  - Objects radiate energy with spectra related to their surface temperature.
  - The Sun is very hot (6000°C) and emits shorter wavelengths. The Earth is a cooler radiating body and emits longer wavelengths.
- Incoming radiant (sun) energy (shortwave) can be:
  - Absorbed at ozone layer and Earth's land and oceans
  - Reflected back to space (clouds, meteoric dust, earth's surface)

  redirected by gas and dust in the atmosphere, resulting a directional change of the light's movement (Scattering).

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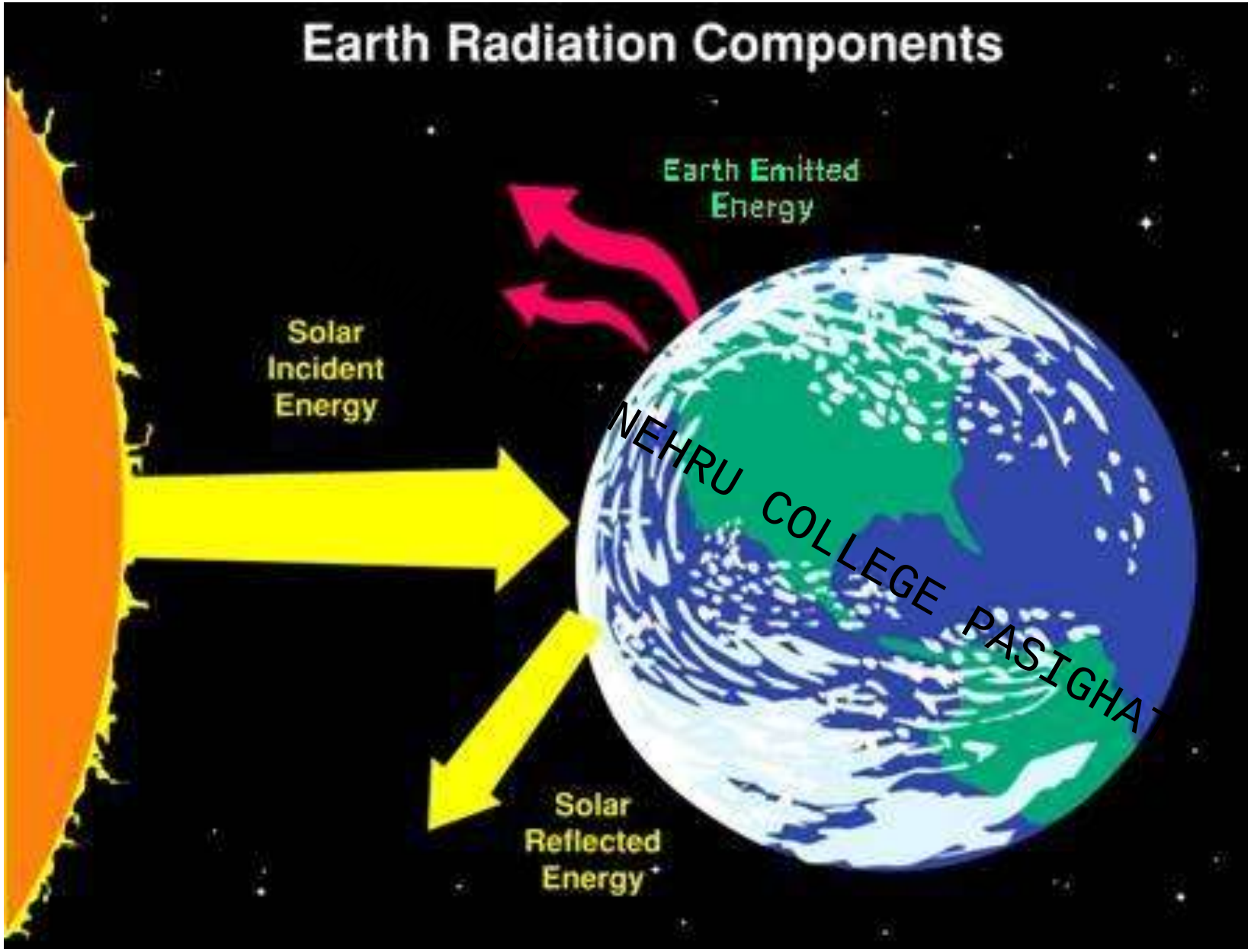
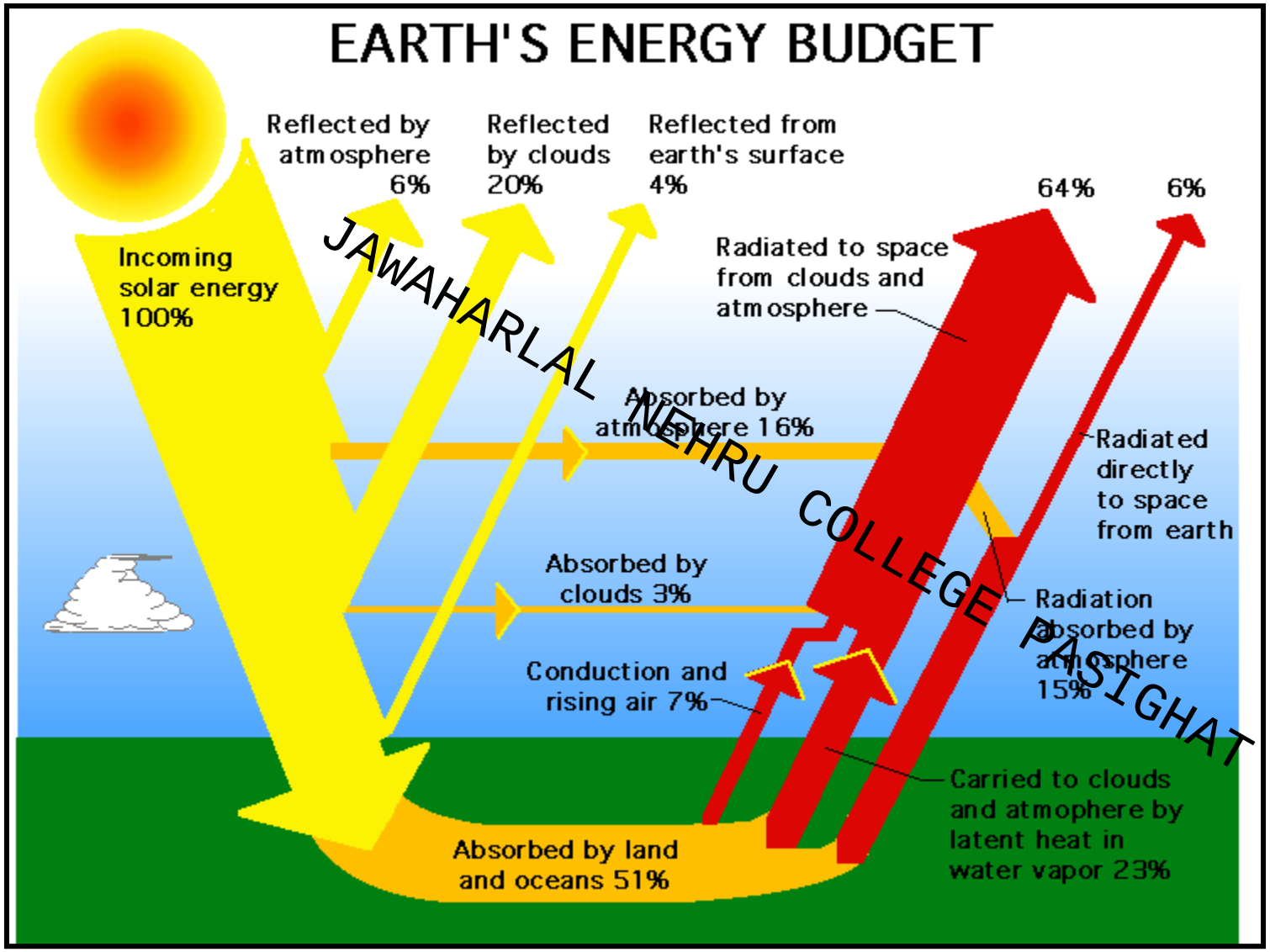
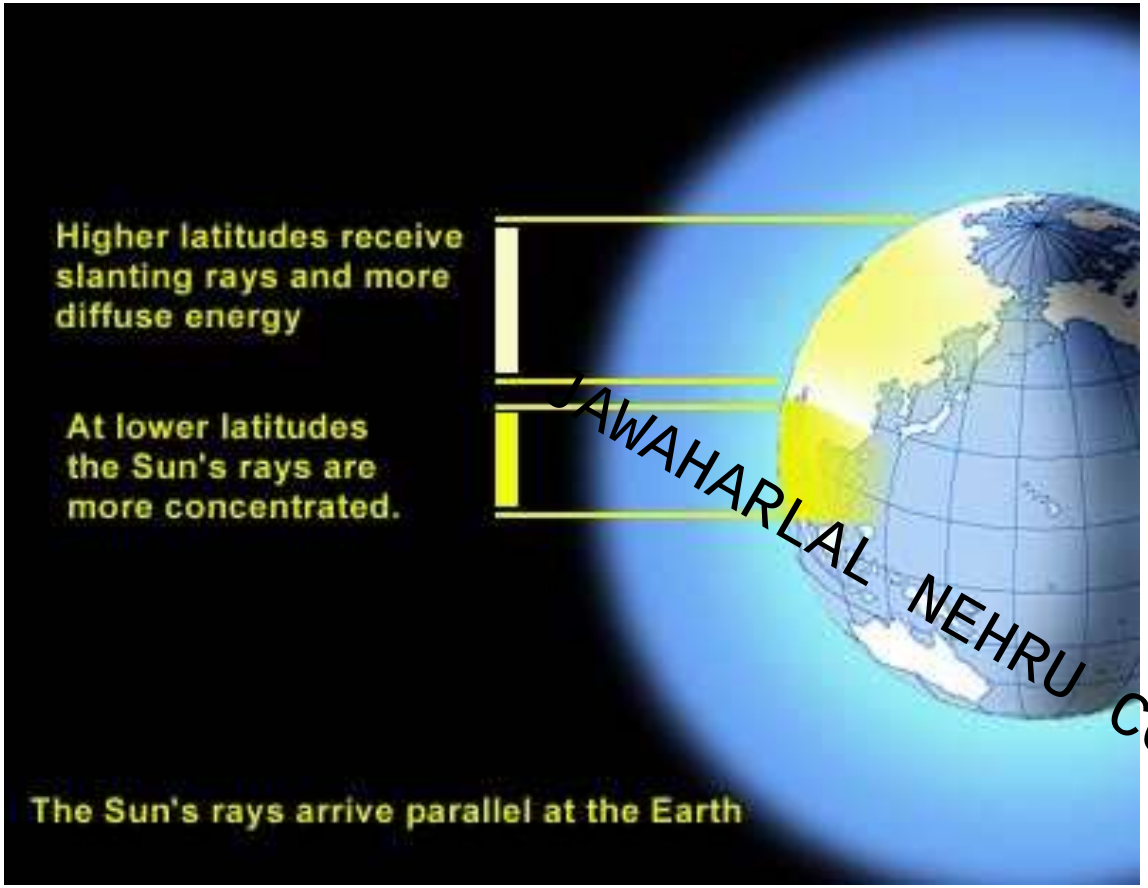

Earth Radiation Components
Earth Emitted Energy
Solar Incident Energy
Solar Reflected Energy
NEHRU COLLEGE PASIGHAT


EARTH'S ENERGY BUDGET
Reflected by atmosphere 6%
Reflected by clouds 20%
Reflected from earth's surface 4%
64%
6%
Incoming solar energy 100%
Radiated to space from clouds and atmosphere
Absorbed by atmosphere 16%
Radiated directly to space from earth
Absorbed by clouds 3%
Radiation absorbed by atmosphere 15%
Conduction and rising air 7%
Carried to clouds and atmophere by latent heat in water vapor 23%
Absorbed by land and oceans 51%
JAWAHARLAL NEHRU COLLEGE PASIGHAT

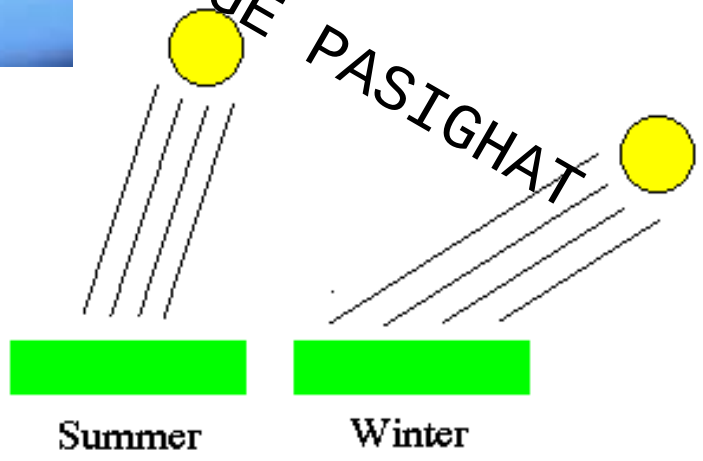
Factor # 1: Latitude

- The angel of the sun's rays at each latitude increases as one moves towards the equator.
  - Lower latitudes receive more concentrated energy from a more direct solar beam.
  - Higher latitudes receive slanting (oblique) rays and more diffused energy.
- As a result, differences in insolation and heating are present.

JAWAHARLAL NEHRU COLLEGE PASIGUAN



JAWAHARLAL NEHRU COLLEGE PASIGHAT



Factor #2: Altitude

- The Troposphere extends from the Earth's surface to 18km.
  - Within the Troposphere, temperatures decrease with increasing altitude above Earth's surface.
  - Temperatures decrease at an average of 6.4°C per kilometer. (*Normal Lapse Rate*)
- Worldwide, mountainous areas experience lower temperatures than do regions nearer sea level, even at similar latitudes.

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Altitude…

- At higher eleyations:
  - average air temperatures are lower
  - nighttime cooling is greater
  - the temperature range between day and night is greater than at low elevations.
- The density of the atmosphere also diminishes with increasing altitude.
  - ability to absorb and radiate sensible heat is reduced

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Factor # 3: Cloud Cover

- Approximately 50% of Earth is cloud covered at any given moment.
- Clouds lower daily maximum temperatures and raise nighttime maximum temperatures.
  - At night, clouds act as insulation and radiate longwave energy, preventing rapid energy loss.
  - Daytime, clouds reflect insolation.

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Factor # 4: Land-Water Heating Differences

- Land and water surfaces absorb and store energy differently.
- Moderate temperature patterns are found at water bodies and extreme temperature patterns occur inland.

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Why?

- Land heats and cools faster than water.
  - Light striking land is absorbed, heating the ground surface during the day and is rapidly lost at night.
  - Light striking the ocean penetrates the surface because of its transparency. Heat energy is distributed at a greater depth and volume allowing for the heat to be stored longer.
- Water requires far more energy to increase its temperature.
- Ocean currents allow warmer and cooler waters to mix allowing energy to be spread out even further.

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Marine Effect & Continental Effect

- **Marine Effect (Maritime):** Areas next to oceans exhibit more moderate temperature characteristics.

- **Continental Effect:** Areas less affected by the ocean have a greater range between maximum and minimum temperatures, both daily and yearly.

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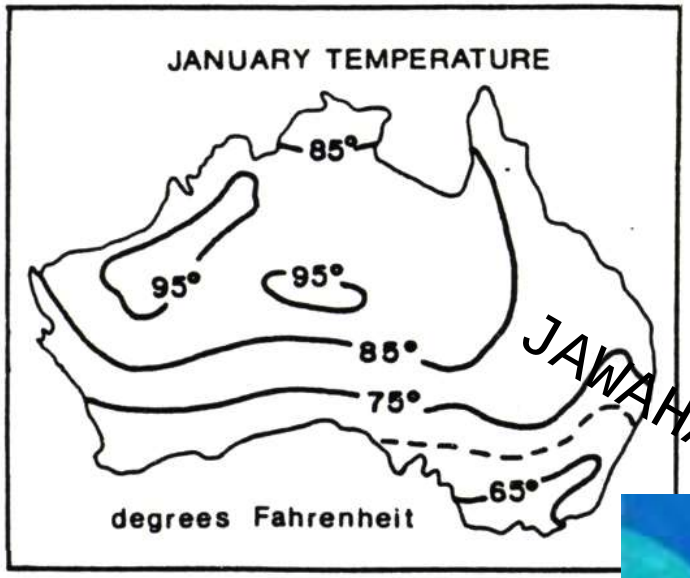
Isotherm Maps

- Isotherm: is a isoline that connects points of equal temperature.
- Isotherm maps allows Geographers to study the spatial analysis of temperatures.

JAWAHARLAL NEHRU COLLEGE PASIGHAT



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Cyclones and Anticyclones in the Mid Latitudes

DR K K MISHRA

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Anticyclones

- High pressure systems
- Just air masses with temperature and moisture varying slightly over large area
- Clear, calm, pretty dry
- Blob-like, with small pressure gradients and slower winds

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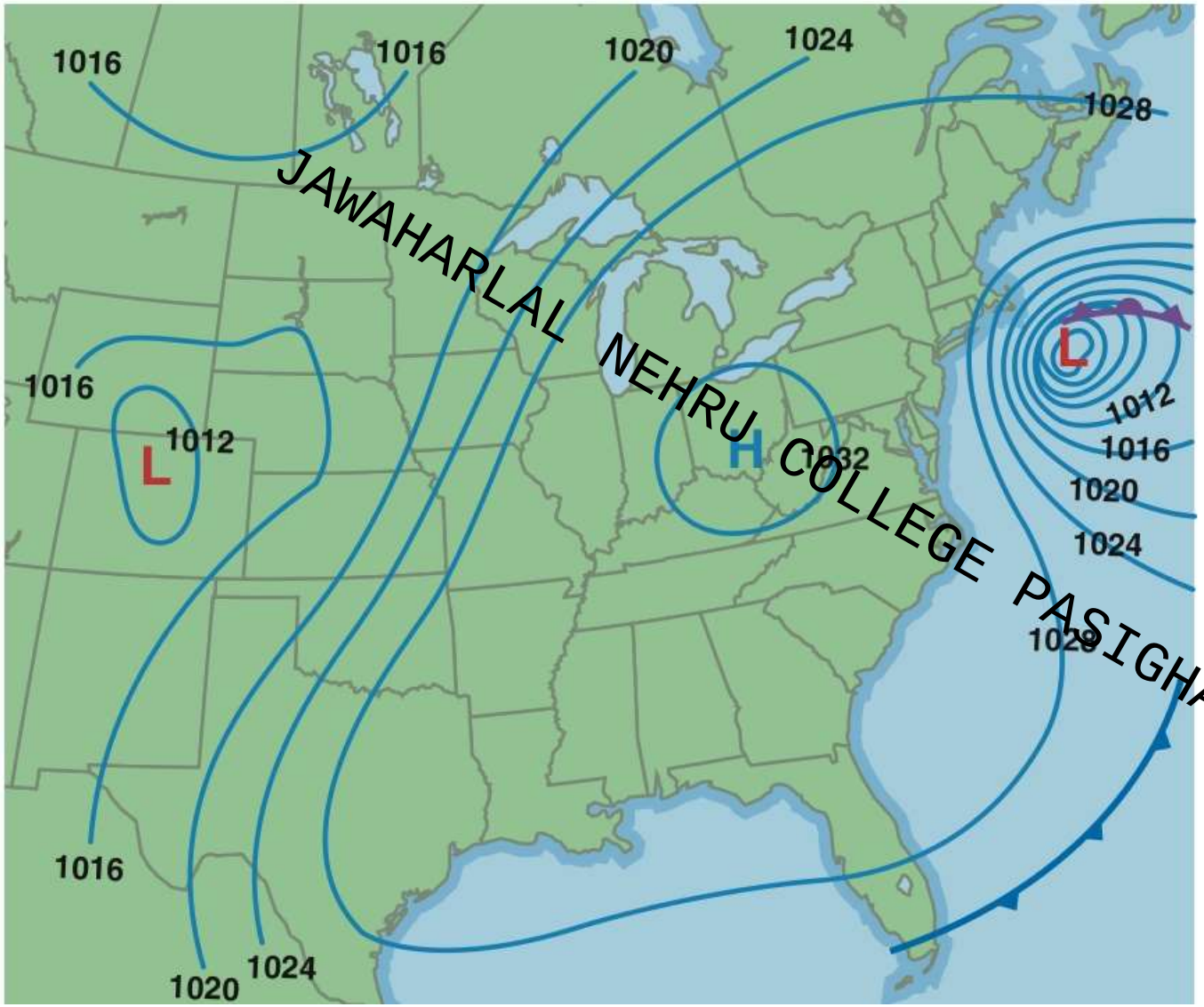
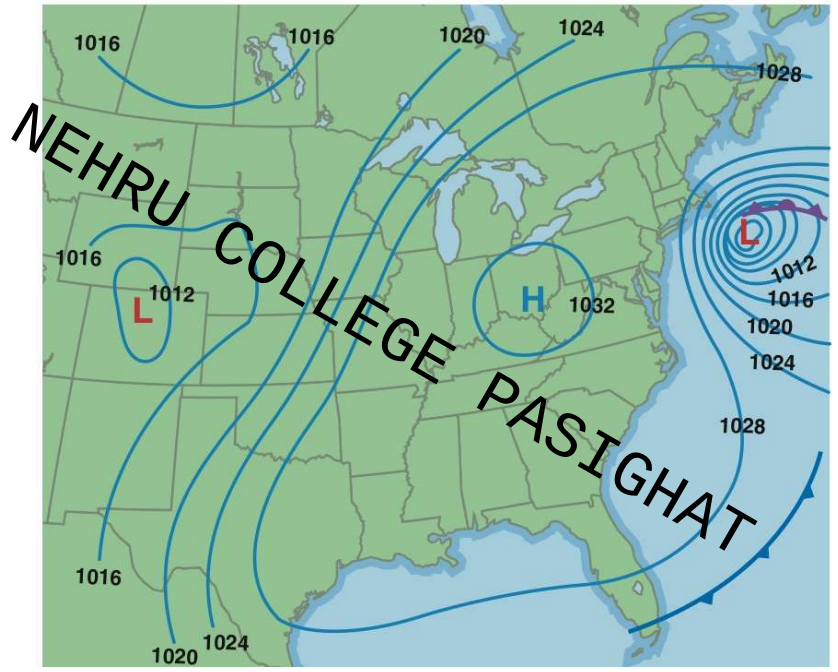
Anticyclone



Anticyclone (High)

- Which way does the wind blow?
- Does air diverge or converge at the surface?
- Does air converge or diverge above the high?



Anticyclone (High)

- Which way does the wind blow?
  -> anti-cyclonic = clockwise!
- Does air diverge or converge at the surface?
  ->Diverges!
- Does air converge or diverge above the high?
  -->Converges!

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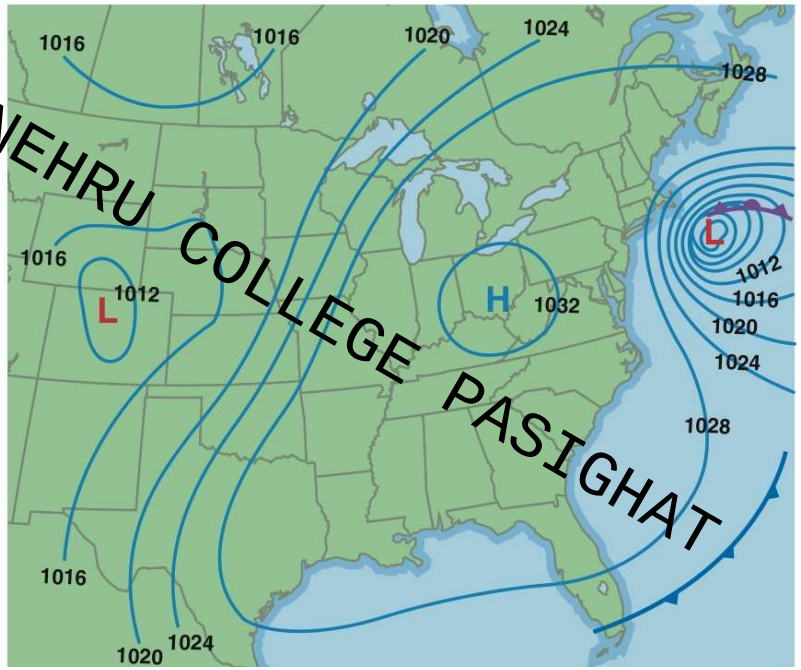

Anticyclones (Highs)

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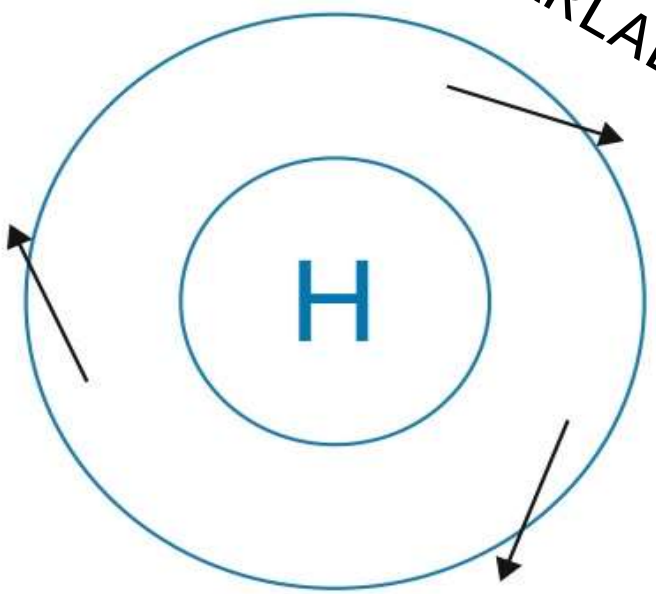
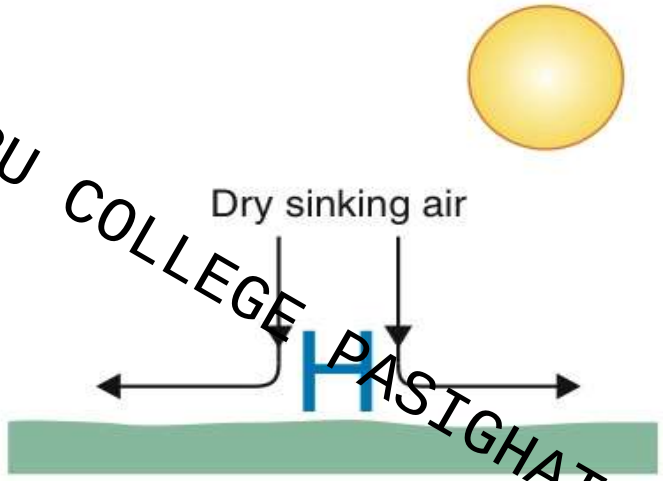
Surface winds blow clockwise around an anticyclone (high pressure) and diverge.



View from above



View from side

Anticyclones (Highs)

- Generally boring weather - clear, calm
- Linger for a while, but can be nice
- Trap air near surface (sinking motion)
- Blob-like air masses
- Air mass stays long can take on characteristics of land it is over

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Fronts and Cyclones!

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Fronts

- What about when two air masses meet?
- We get a front - large changes in temperature and moisture over small area

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What is a Cyclone?

- A cyclone is simply an area of low pressure around which the winds flow counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere
- Cyclones form and grow near the front
- Cyclones (lows) are cloudy, wet, stormy

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Cyclones have converging air at surface that rises!

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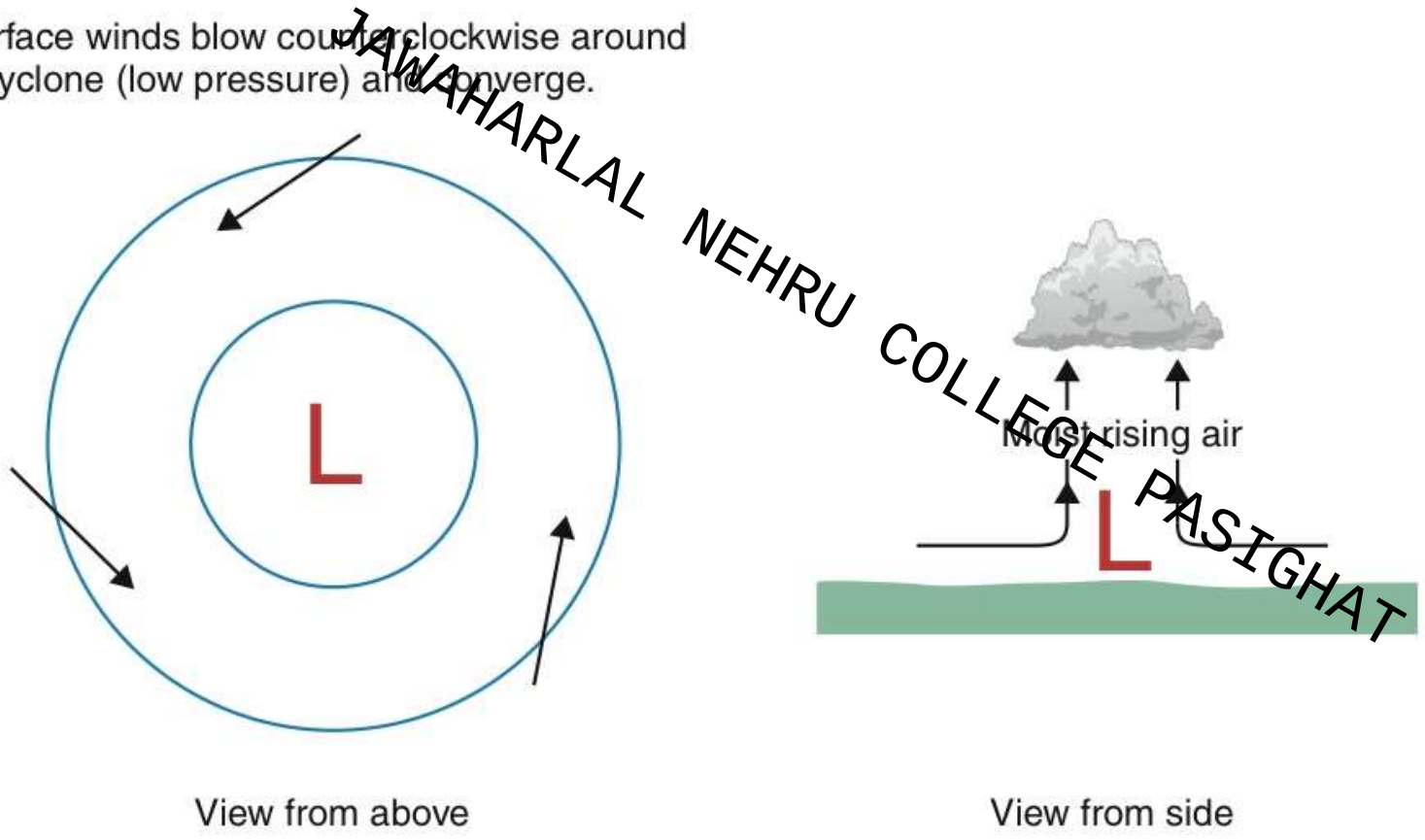
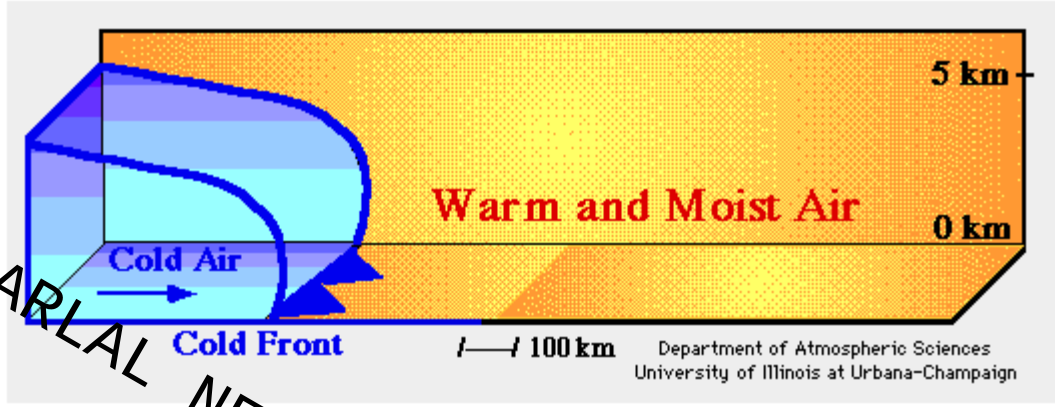


COLD FRONTS

Cold Front

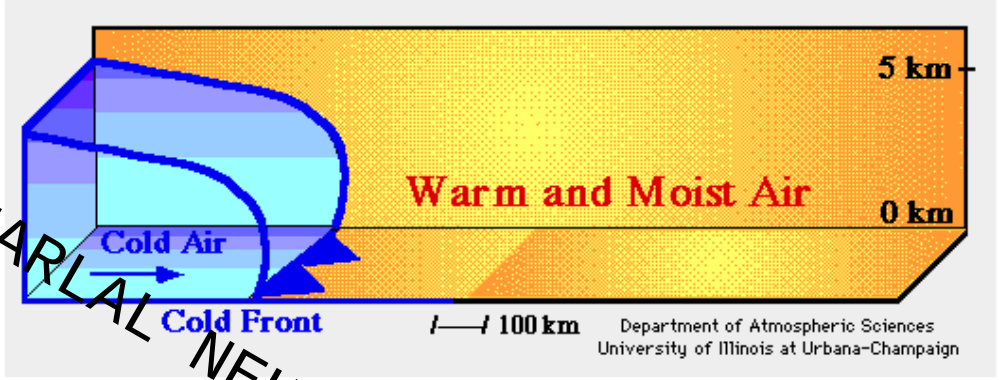


JAWAHARLAL NEHRU COLLEGE PASIGHAT

- A transition zone where a cold air mass replaces a warm air mass
- Drawn as a blue line with blue triangles pointing in the direction of the front's movement

Cold Fronts

Cold Front

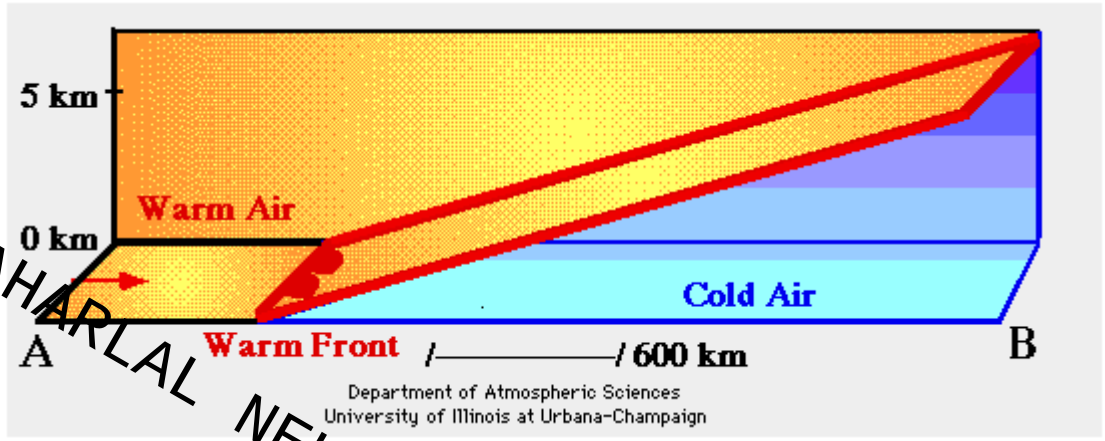


JAWAHARLAL NEHRU COLLEGE PASIGHAT

- Cold air is more dense than warm air.
- As the dense, cold air moves into the warm air region, it forces the warm air to rapidly rise just ahead of the cold front.
- This results in deep convective clouds, occasionally producing strong to severe thunderstorms (depending on how unstable the atmosphere ahead of the cold front is).
- Often, the precipitation along a cold front is a very narrow line of thunderstorms

Warm Fronts

Warm Front

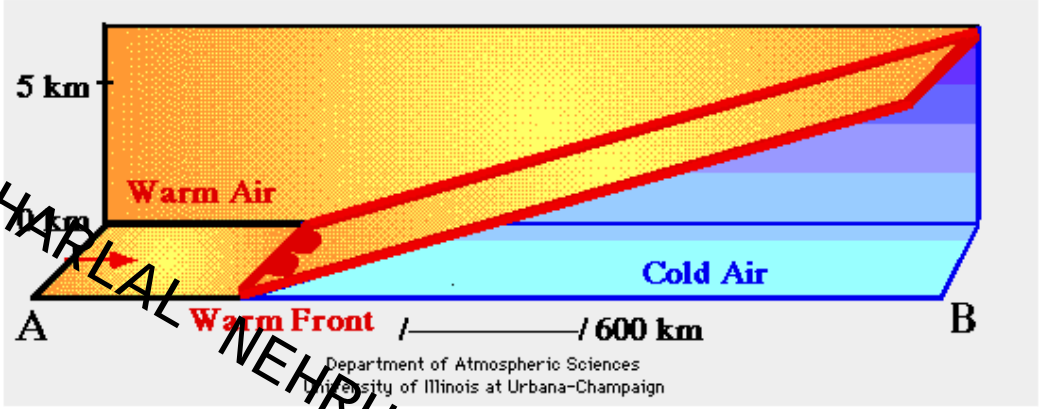


JAWAHARLAL NEHRU COLLEGE PASIGHAT

- A transition zone where a warm air mass replaces a cold air mass
- Drawn as a red line with red half-circles pointing in the direction of the front's movement
- TEMPERATURE CONTRAST ALONG WARM FRONTS IS GENERALLY LESS DISTINCT (SMALLER GRADIENT)

Warm Fronts

Warm Front



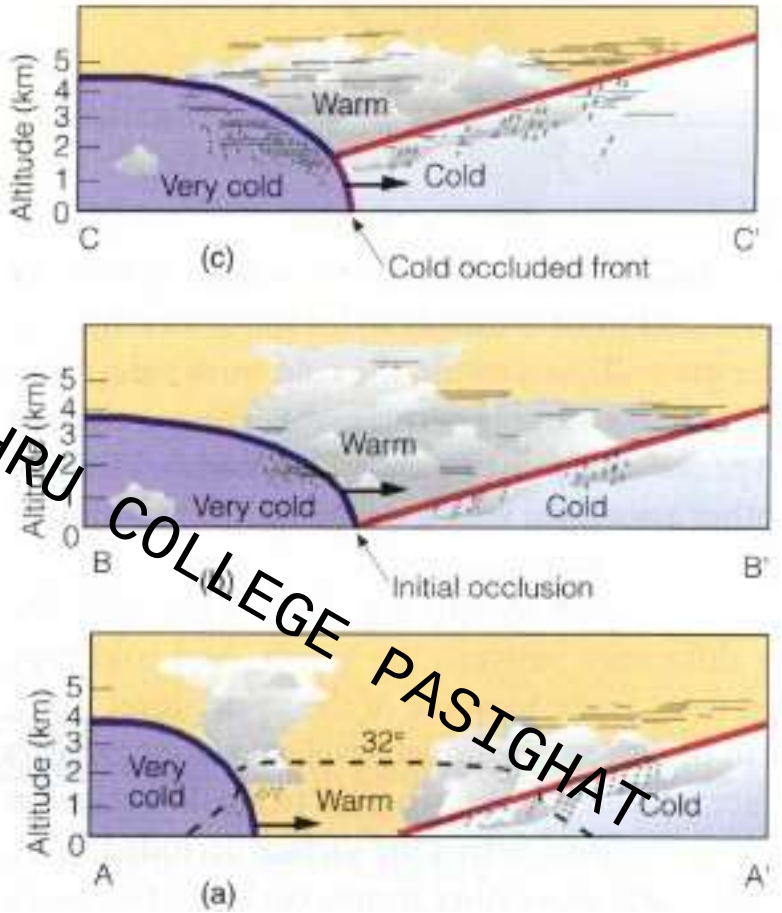
JAWAHARLAL NEHRU COLLEGE, PASIGHAT

- Again, warm air is less dense than cold air.
- As the warm air moves north, it slides up the gently sloping warm front.
- Because warm fronts have a less steep slope than cold fronts, the precipitation associated with warm fronts is more “stratiform” (less convective), but generally covers a greater area.

Occluded Fronts

Occluded Front

- A region where a faster moving cold front has caught up to a slower moving warm front.
- Generally occurs near the end of the life of a cyclone
- Drawn with a purple line with alternating semicircles and triangles



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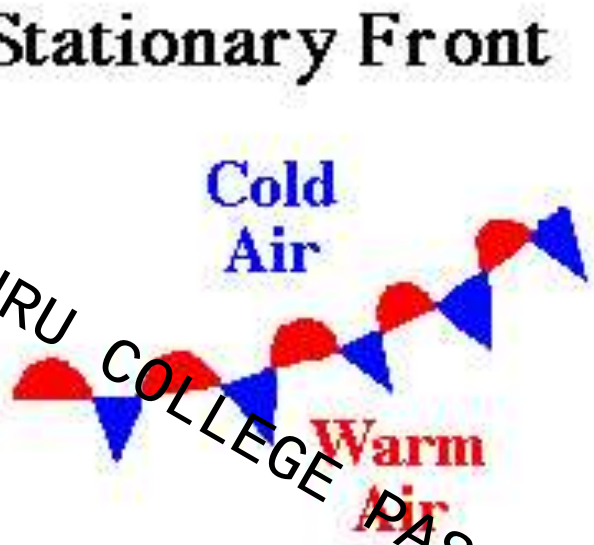
Stationary Fronts

- Front is stalled
- No movement of the temperature gradient
- But, there is still convergence of winds, and forcing for ascent (and often precipitation) in the vicinity of a stationary front.
- Drawn as alternating segments of red semicircles and blue triangles, pointing in opposite directions



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Locating Fronts

Fronts are associated with . . .

- Strong temperature gradients
- Positive vorticity (counter-clockwise rotation)
- Lower pressure
- Regions of convergence of the winds
- Often precipitation and clouds (regions of ascent)

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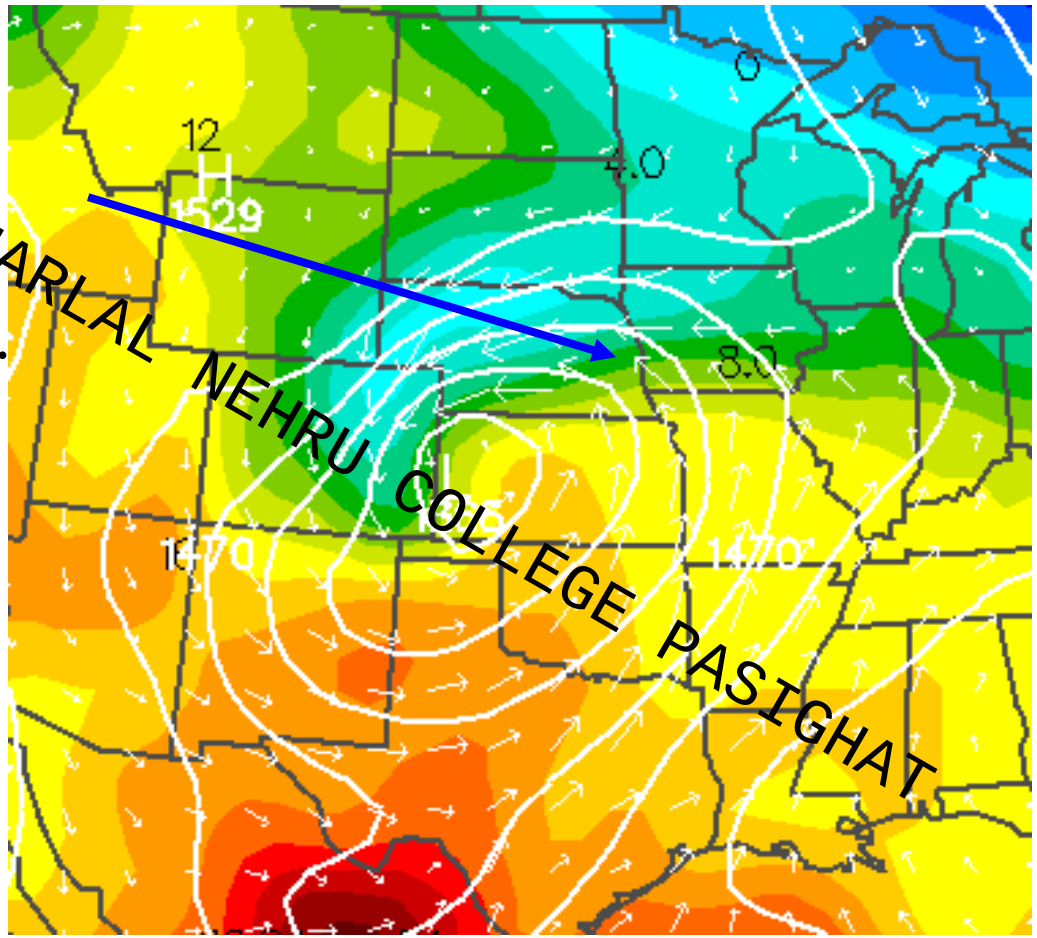
Locating Fronts

Here, the winds are rapidly changing counterclockwise across this temperature gradient.

The winds are blowing warm air from the south.

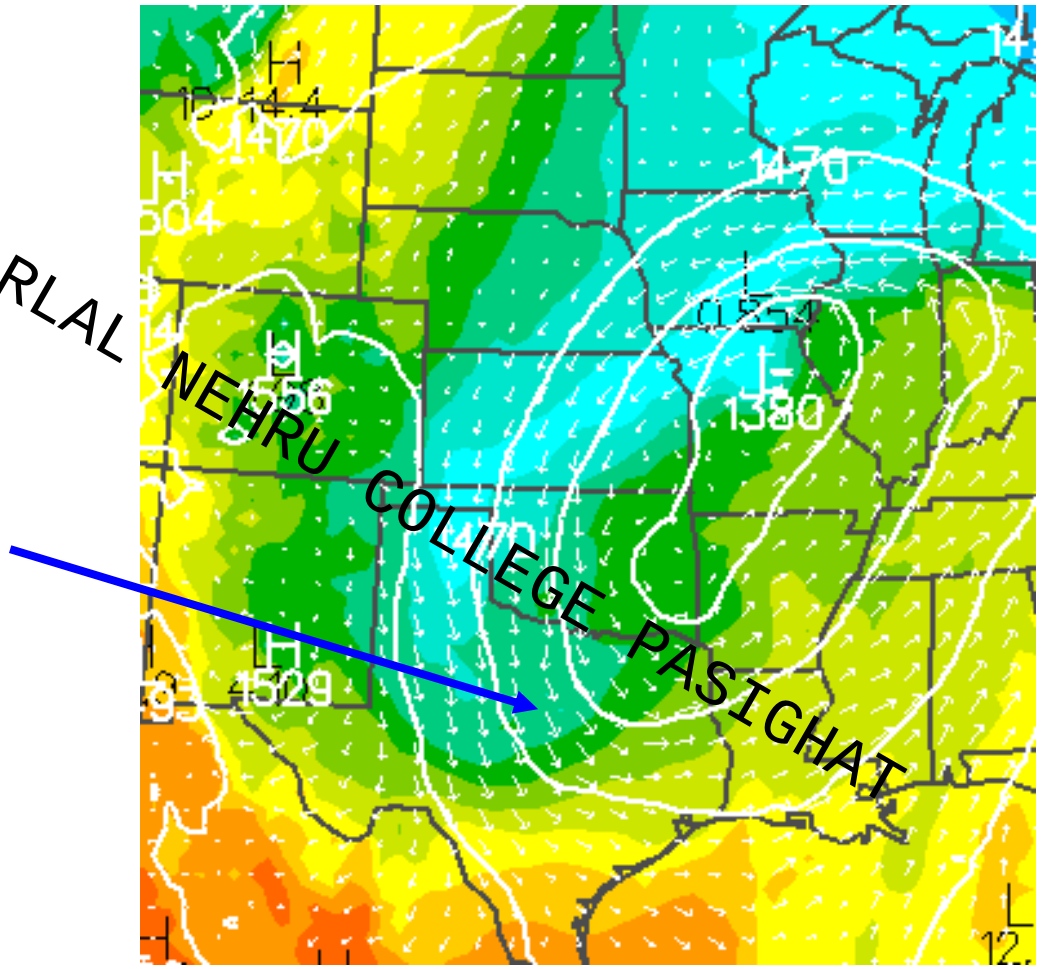
This is a **warm front**.



Locating Fronts

In this case, the winds are also rapidly changing counterclockwise across this temperature gradient, indicating positive vorticity.

The winds are blowing cold air from the northwest.



This is a **cold front.**

Locating Fronts

To find the cyclone:

• Find the center of cyclonic circulation

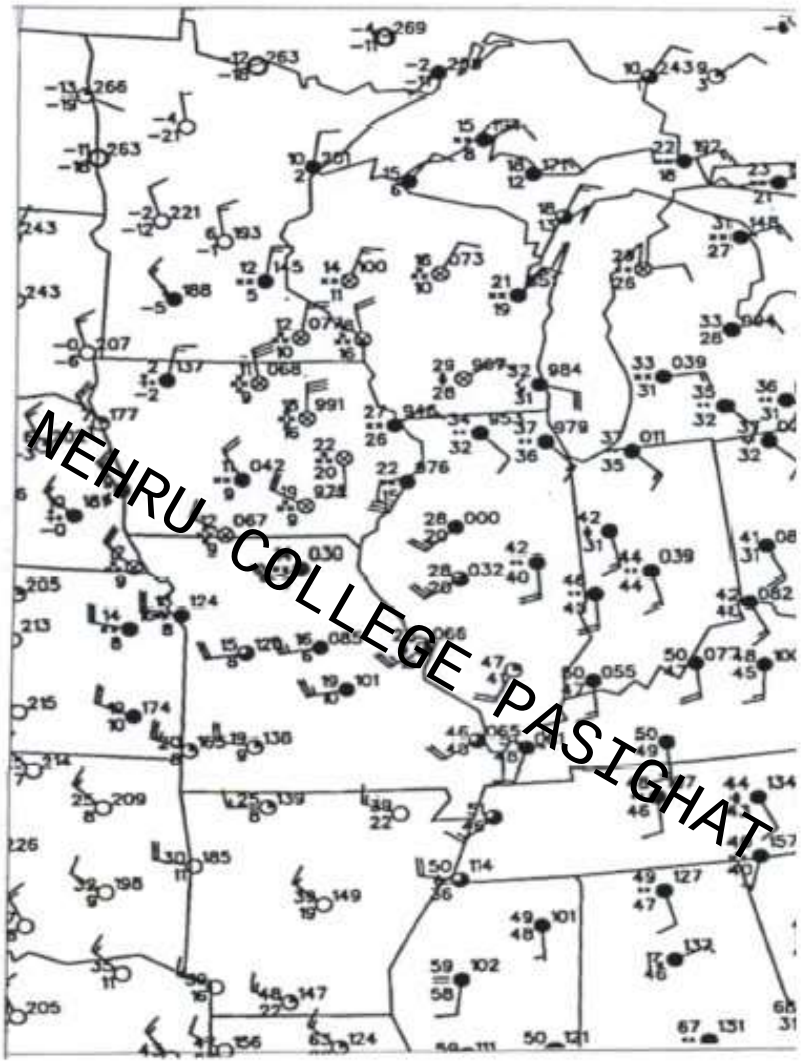
To find the fronts:

• Find large temperature gradients

• Identify regions of wind shifts

• Look for specific temperature advection (warm/cold)

• Look for kinks in the isobars (regions of slightly lower pressure)



27 Jan 1996 0000 UTC

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Locating Fronts

To find the cyclone:

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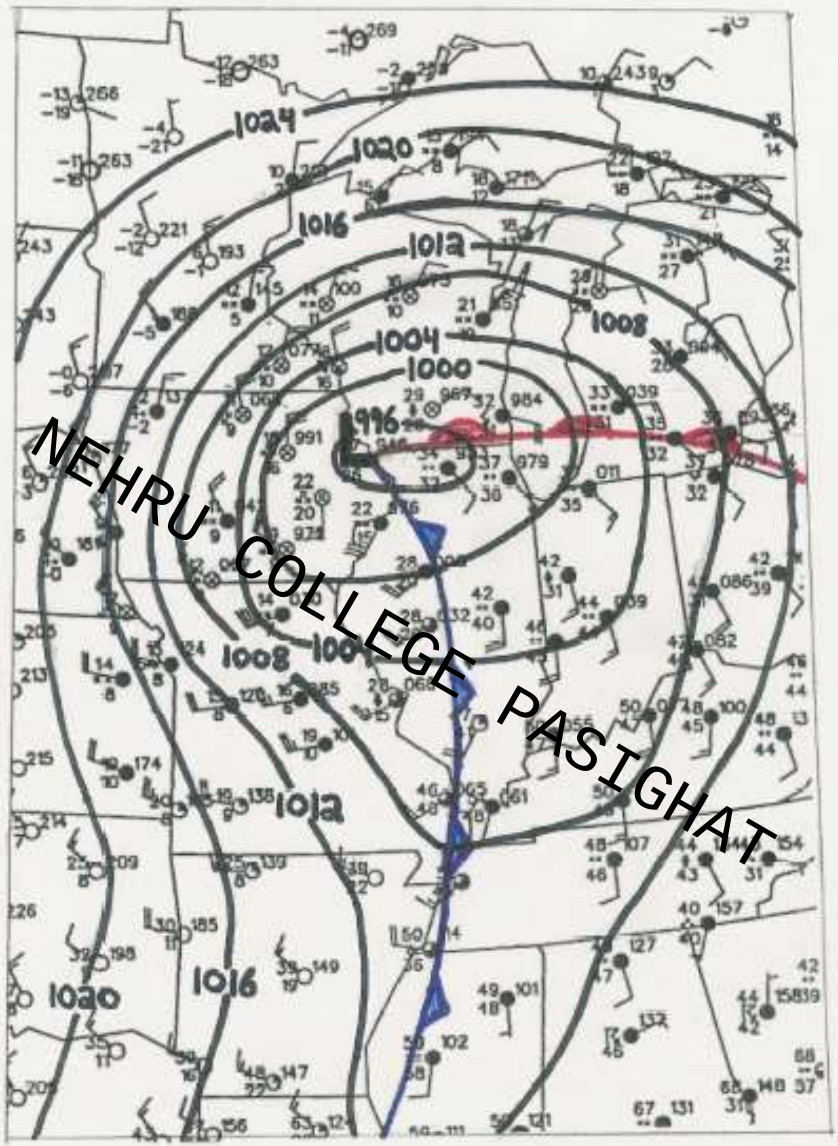

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The Life Cycle of Extra-tropical (Mid-Latitude) Cyclones

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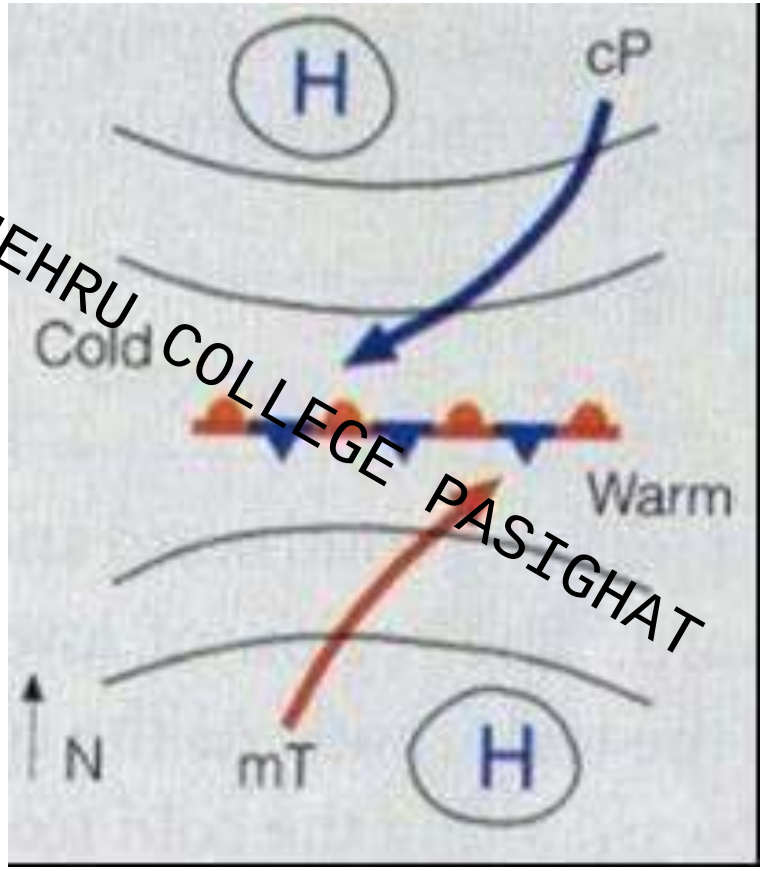
The Birth of a Cyclone

- A mid-latitude cyclone is born in a region where their is a strong temperature gradient with forced lifting, perhaps an old stationary front

- At the polar front!



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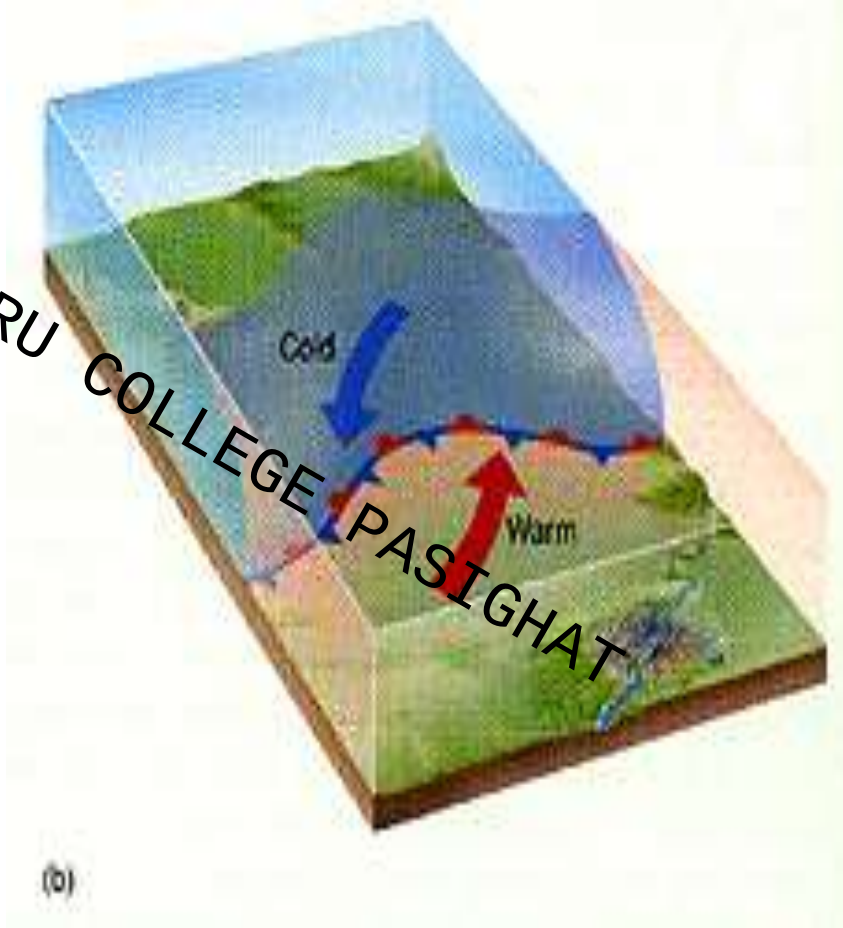
Stage Two

- An instability (kink) forms
- Warm air pushes to the northeast
- Cold air pushes to the southwest
- This will create the fronts!



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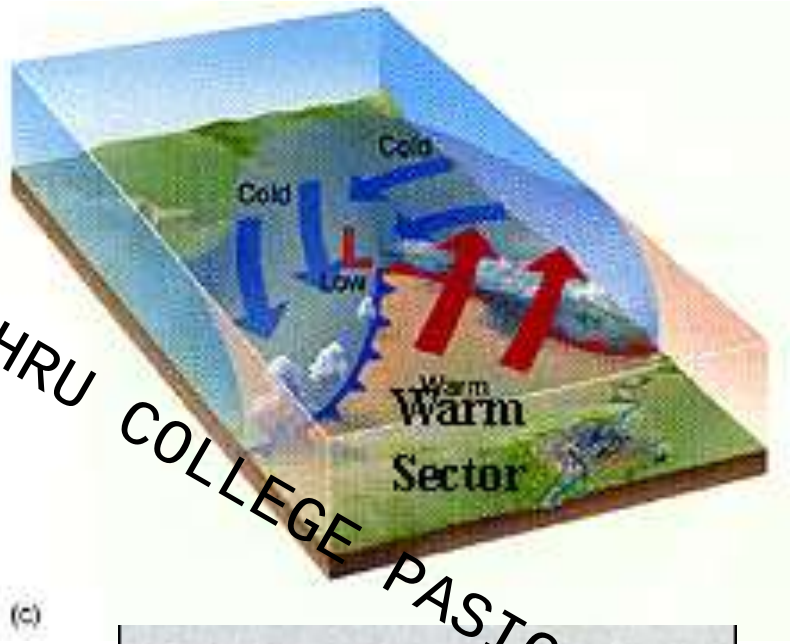
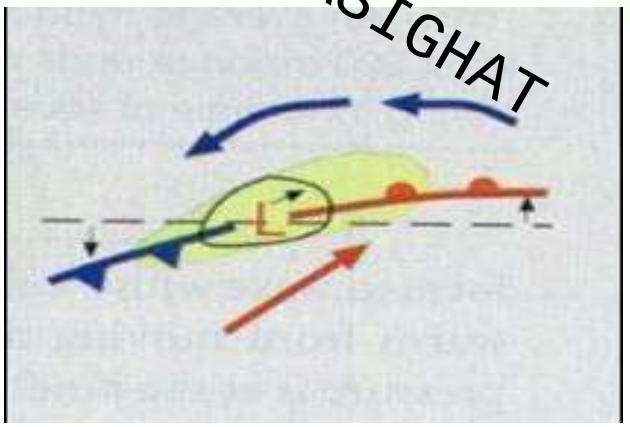
Mature Stage

- Takes 12-24 hours to develop
- Warm front moves NE
- Cold front moves SE
- Region between fronts called warm sector
- Low pressure lowers (deepens)
- Wide-spread precip ahead of warm front
- Narrow band of precip at cold front
- Wind speeds increase

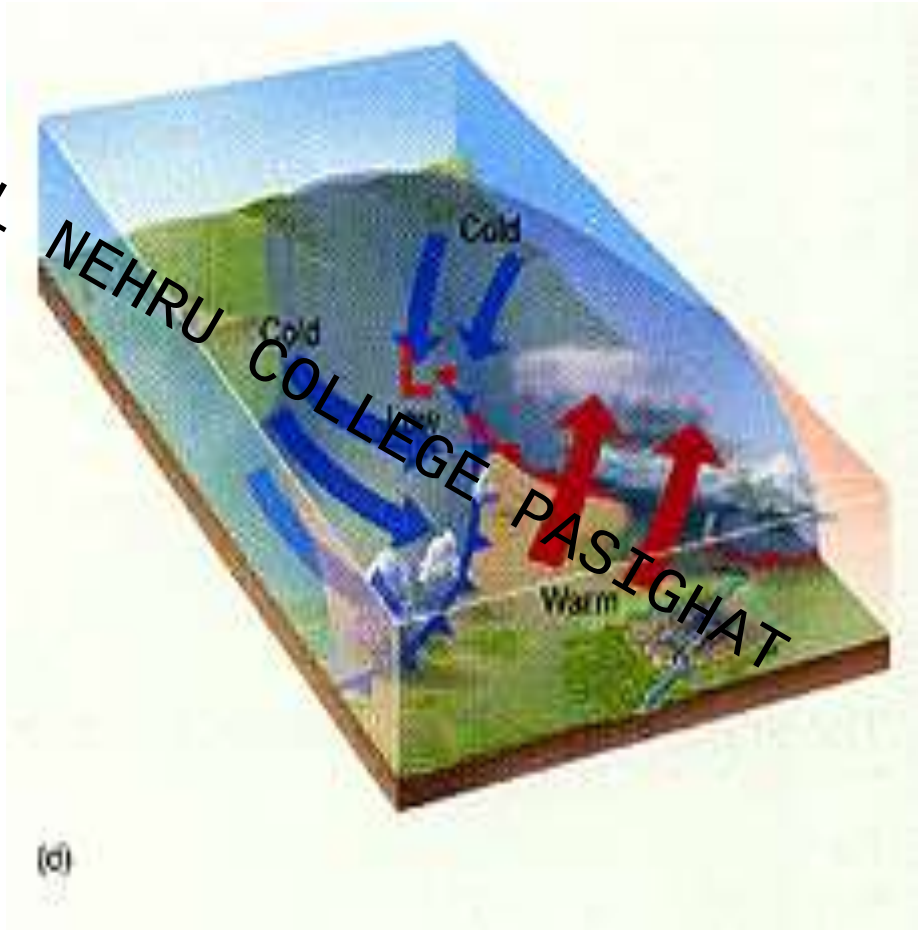
JAWAHARLAL NEHRU COLLEGE PASIGHAT





Cyclone Movement

- Cyclone moves eastward (or to NE)
- Starts to occlude (cold front catching up)
- Storm most intense
- Triple point is where cold, warm, and occluded fronts meet



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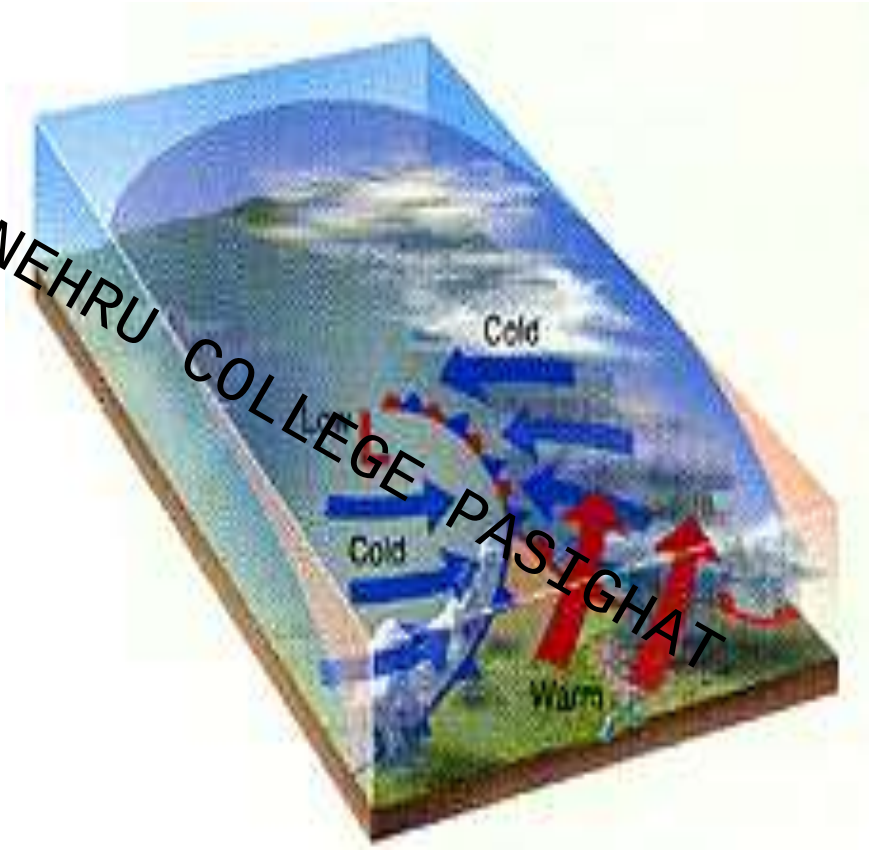
Final Stage

- Warm sector shrinks
- Occlusion grows
- All energy from temperature contrast has been used up
- Warm air has been lifted
- Cold air has sunk
- STABLE



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Polar Front Theory – Norwegian Model

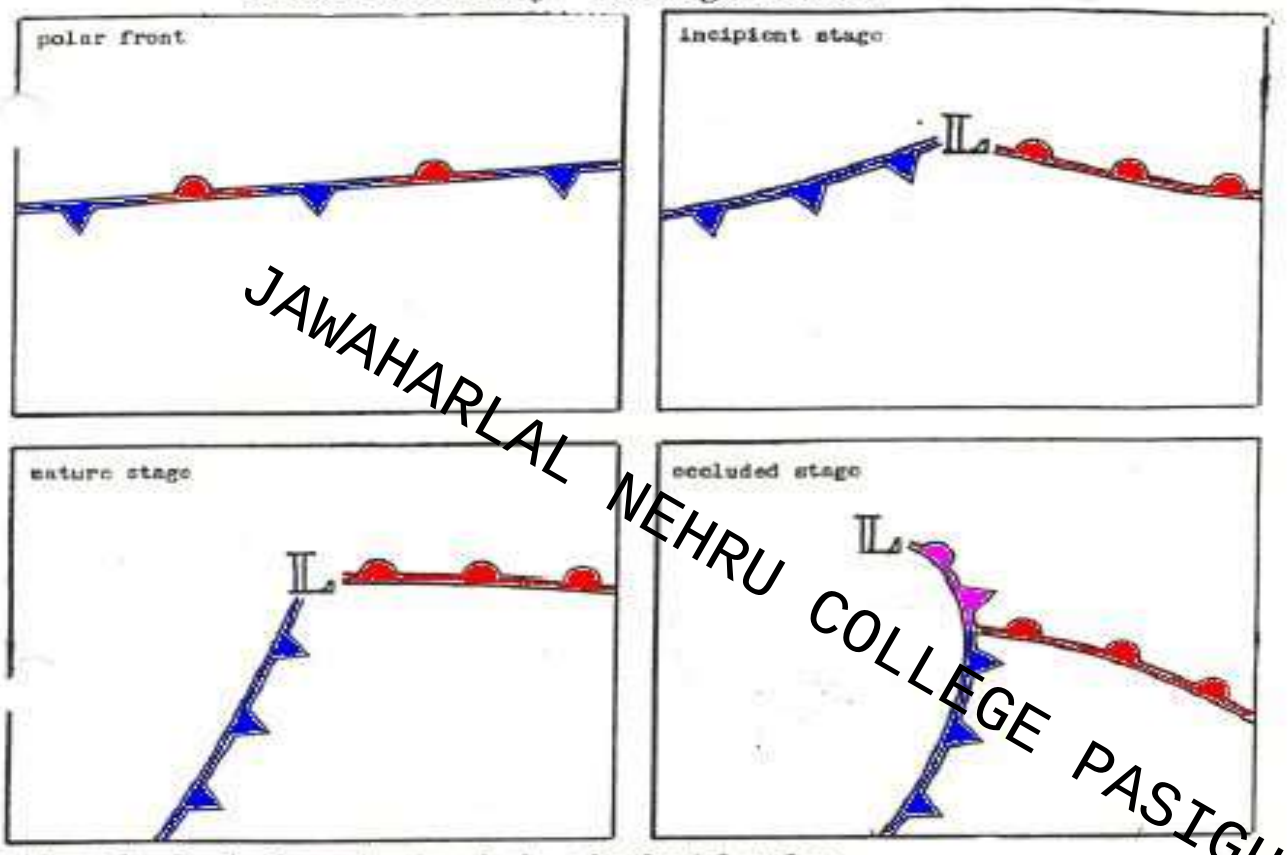

Figure 1: The development and occlusion of a frontal cyclone.

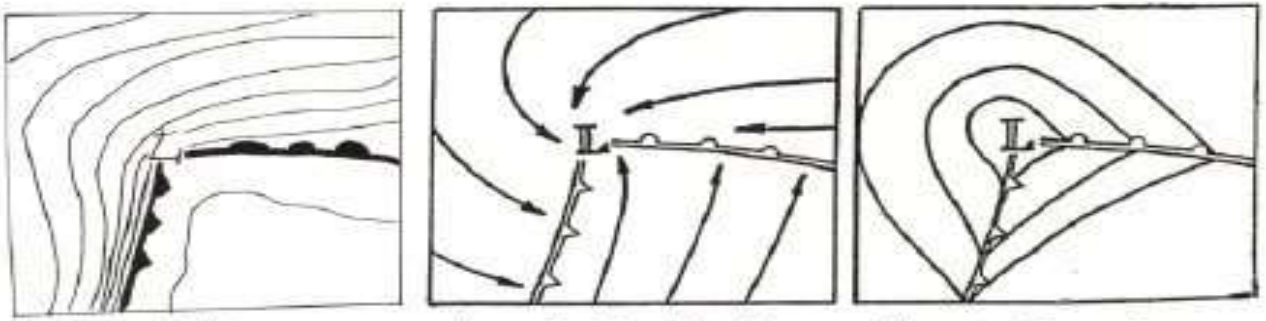

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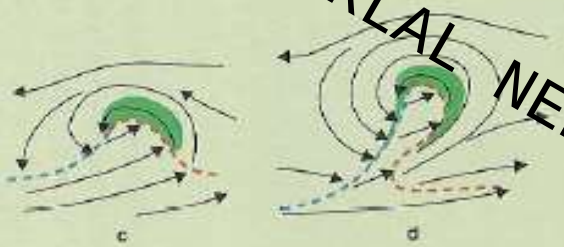
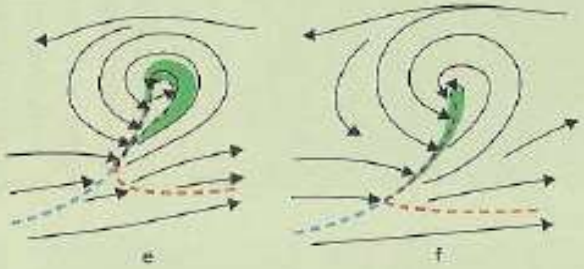
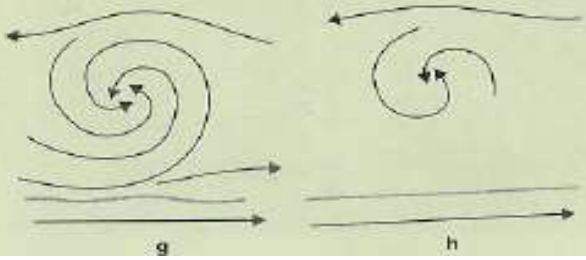
TABLE 10.1 The Life Cycle of the Extratropical Cyclone, based on the Bergen School model.

Stage	*Weather Map Depiction of Norwegian Cyclone Model*	*Typical Satellite Image of Life-Cycle Stage*	*Typical Sea-Level Pressure at Cyclone Center*
Birth (frontal wave)			1000–1010 mb
Young adult (open wave)			980–1000 mb
Mature (occluded cyclone)			960–990 mb
Death (cut-off cyclone)			Slowly rising from 960-990 mb up to 1010 mb

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Weather with the Cyclone of late fall or early spring

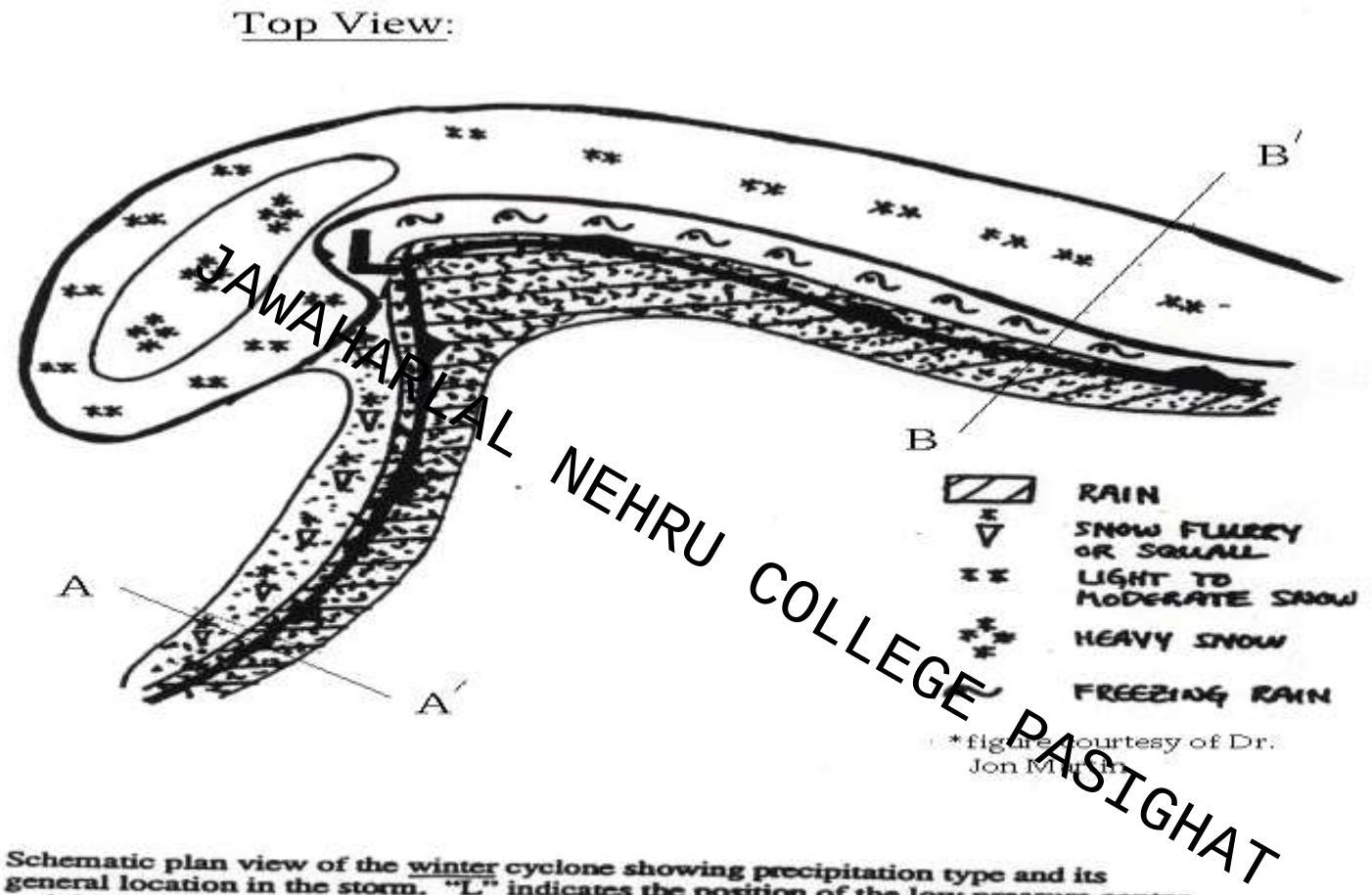

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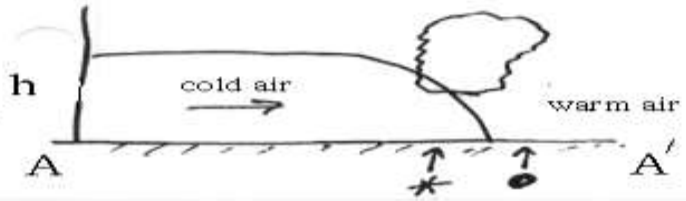
Fig. 2 Schematic plan view of the winter cyclone showing precipitation type and its general location in the storm. "L" indicates the position of the low pressure center and the cold and warm fronts are marked by solid lines.

Side View: (Cross section through fronts):

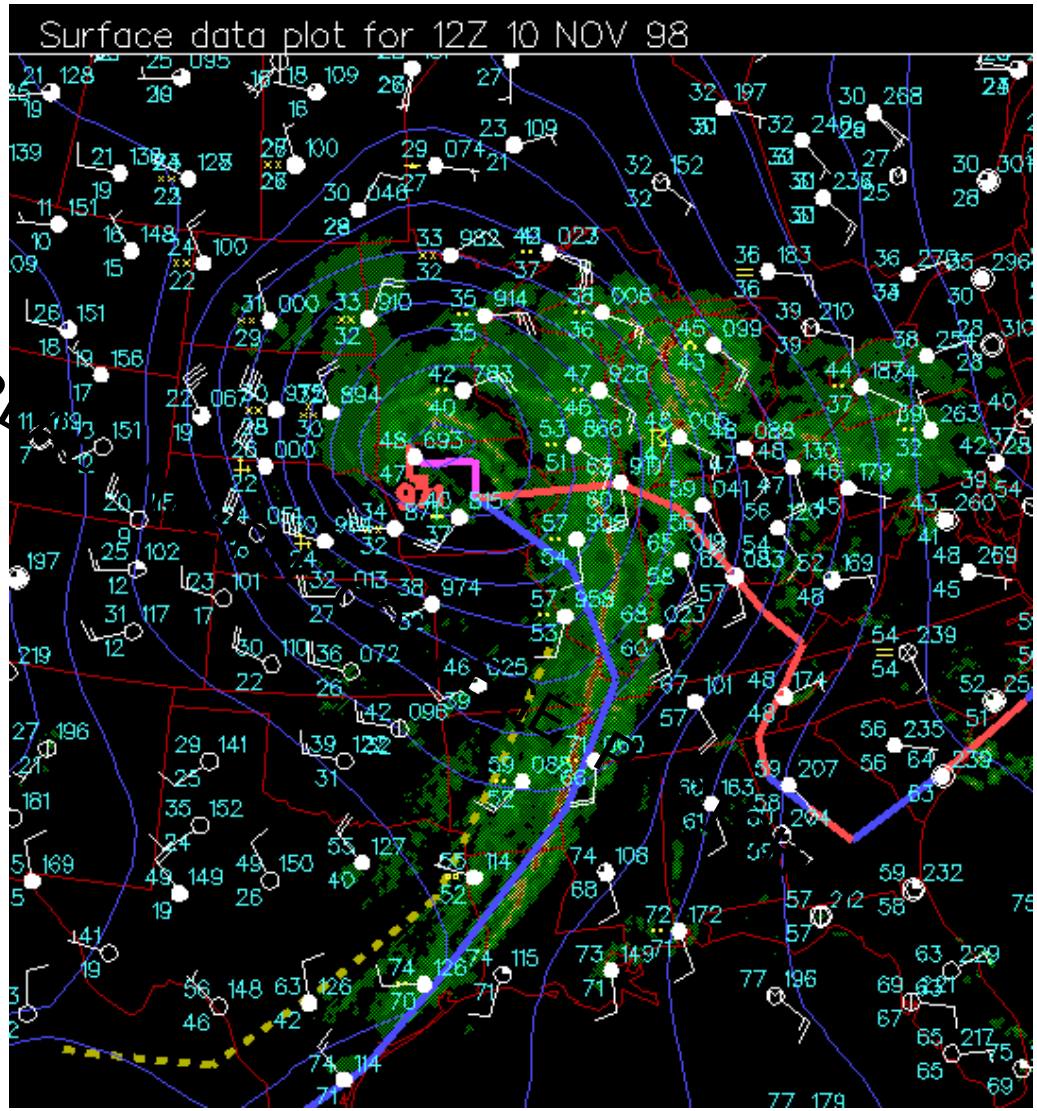


Precipitation Around a Cyclone and its Fronts

To the right is a major cyclone that affected the central U.S. on November 10, 1998.

Around the cold front, the precipitation is more intense, but there is less areal coverage.

North of the warm front, the precipitation distribution is more "stratiform": Widespread and less intense.



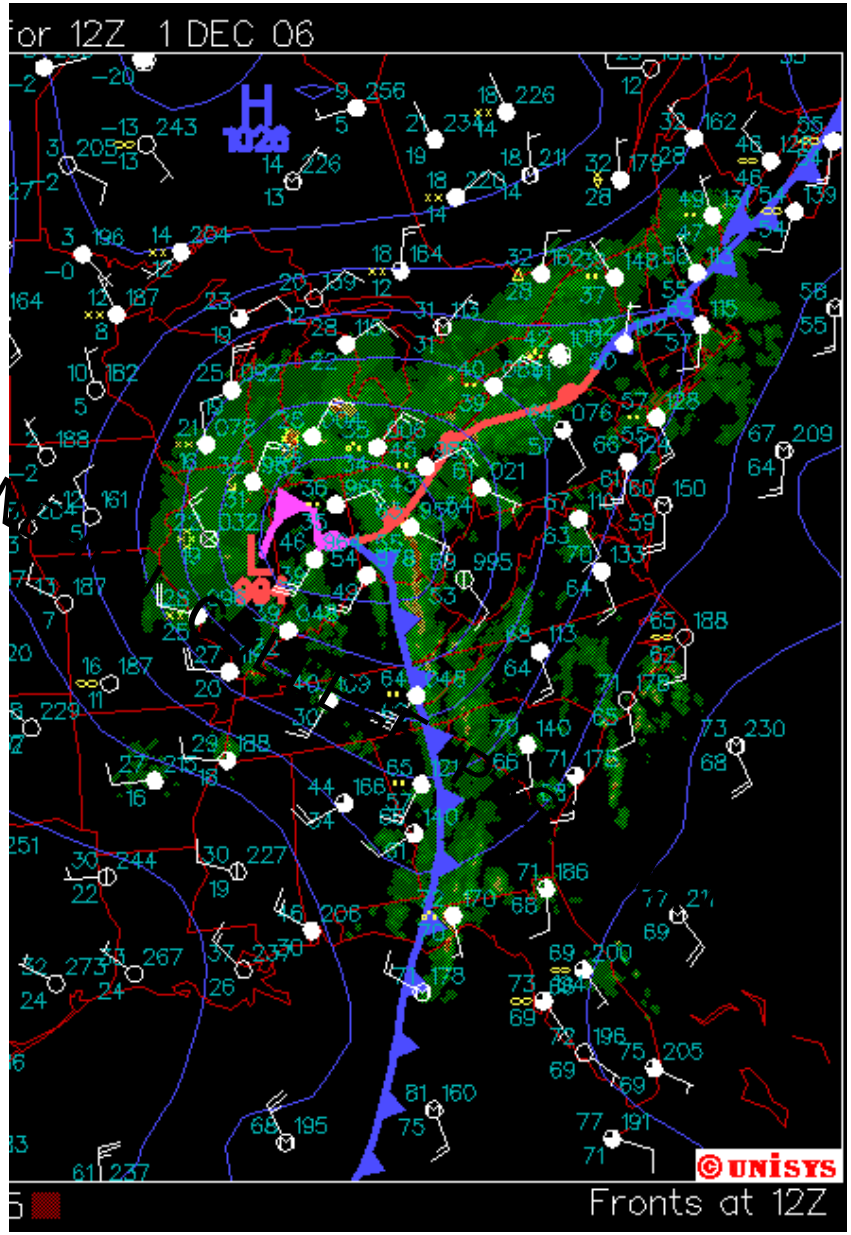
http://weather.unisys.com

Precipitation Around a Cyclone and its Fronts

Again, in this radar and surface pressure distribution from December 1, 2006, the precipitation along the cold front is much more compact and stronger.

North of the warm front, the precipitation is much more stratiform.

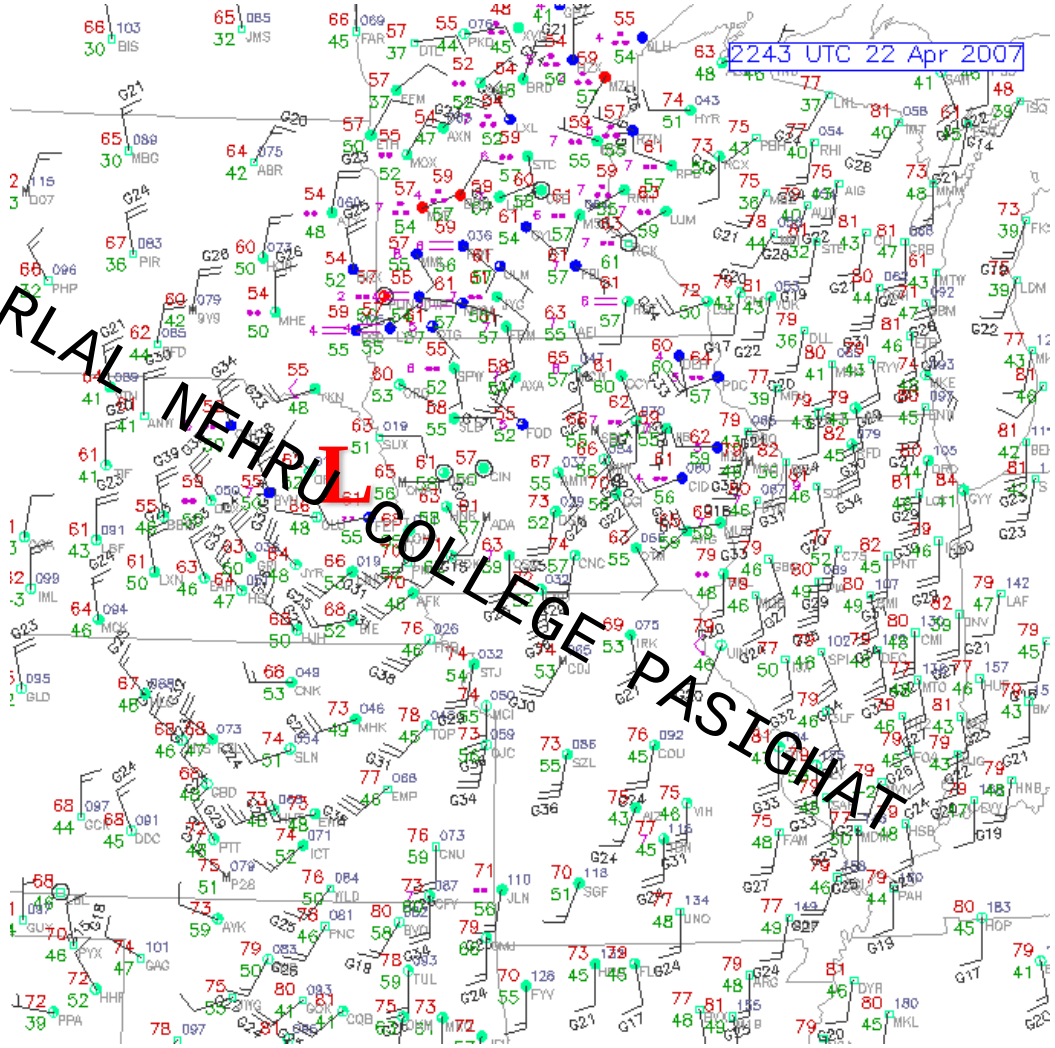
Also note the kink in the isobars along the cold front!



Locating a Cyclone

1. Find the region of lowest sea level pressure

2. Find the center of the cyclonic (counter-clockwise) circulation



What about Vertical Structure?

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Pressure…

- If we have converging air at the surface, must have divergence aloft!
- Otherwise, air would “fill up” the low and the pressure would rise

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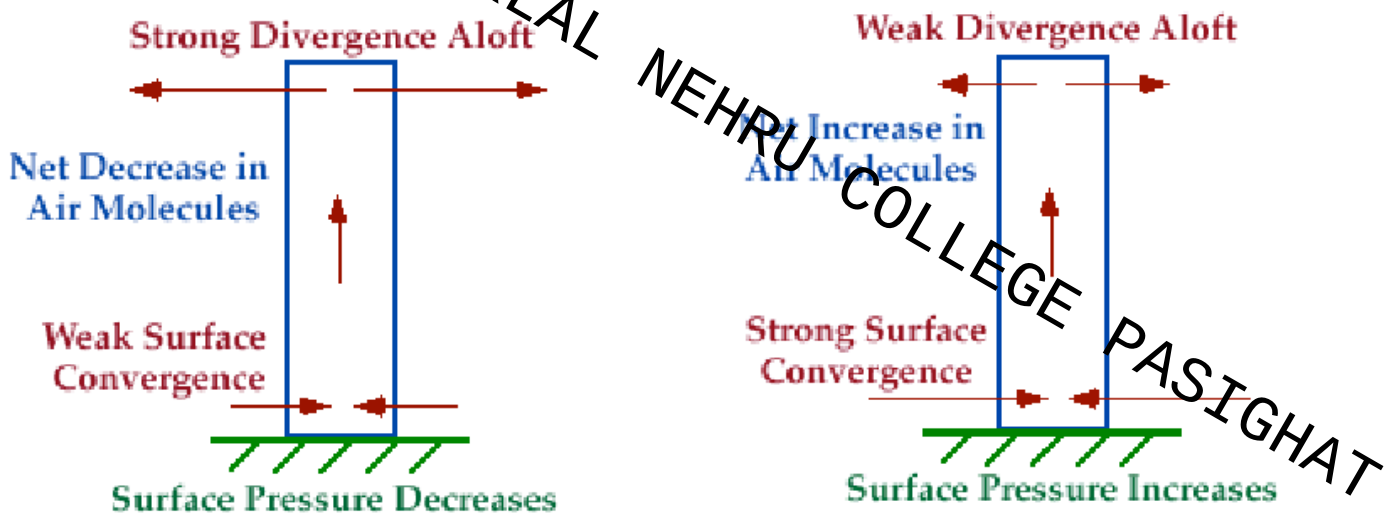

Intensifying Sfc Cyclone

Weakening Sfc Cyclone

Review

• Winds converge at a surface low pressure center

•Winds diverge from a surface high pressure center

(this is because of the **frictional force** at the surface)

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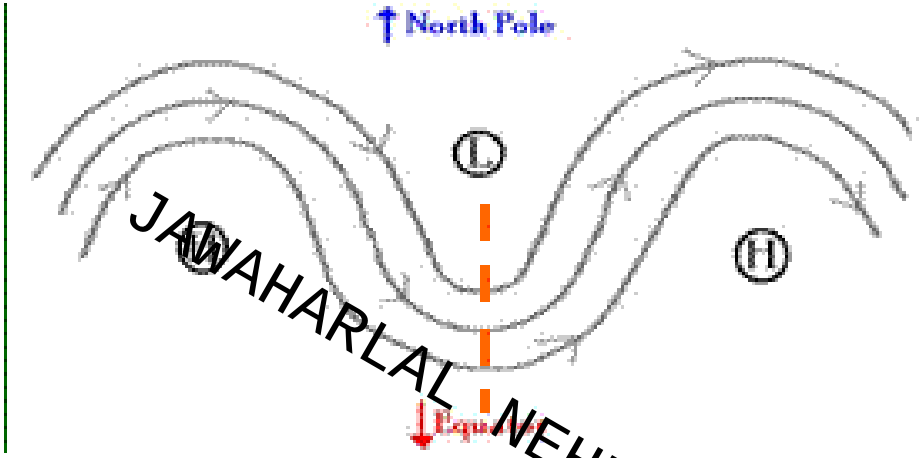
• This Convergence/Divergence suggests that there must be movement of air in the vertical (can't lose air parcels)

• Flow in the upper troposphere is generally in **geostrophic balance,** so we do not get divergence/convergence high up caused by friction

• How do we get divergence/converge up high?

Upper Tropospheric Flow



Typical 500 mb height pattern

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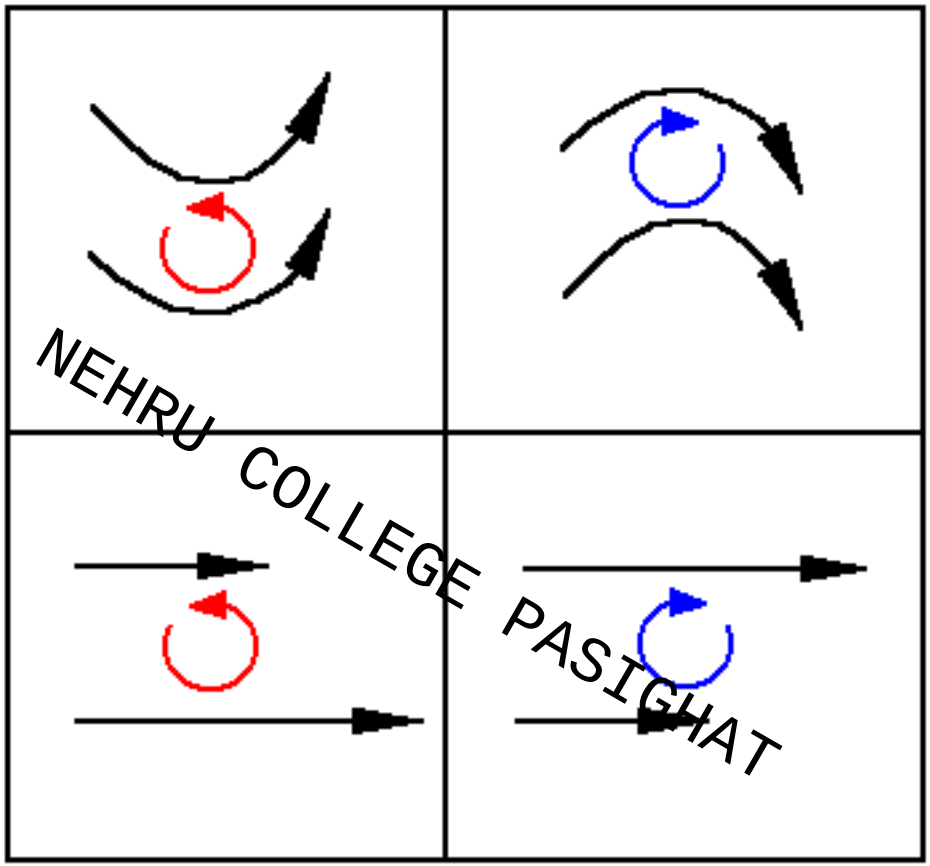
- Notice the troughs (dotted line) and ridges
- The troughs and ridges are successive
- In the northern hemisphere, lower pressure is generally to the north of higher pressure

Relative Vorticity

If the wind has counterclockwise spin, it has **positive vorticity** (left)

If the wind has clockwise spin, it has **negative vorticity** (right)

Vorticity can be directional (top), or speed shear vorticity (bottom)



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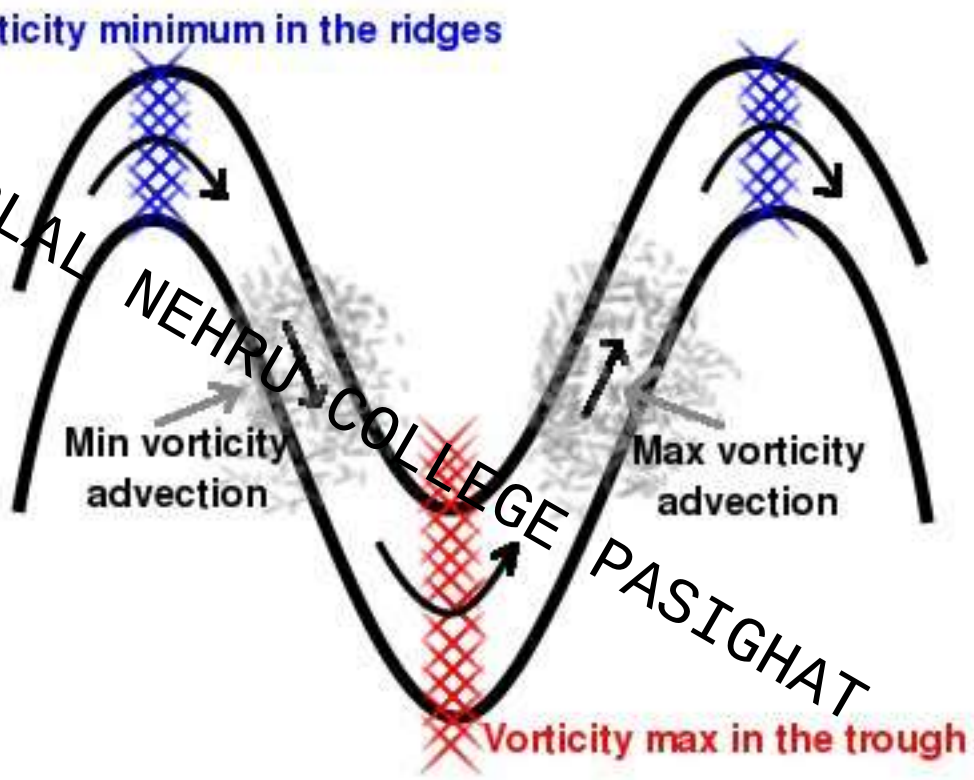
Vorticity in the Upper Troposphere

Where is there vorticity advection?

Pinpoint vorticity **minima** and **maxima**

Negative vorticity advection (**NVA**) occurs just "downstream" from a ridge axis (vorticity minimum)

Positive vorticity advection (**PVA**) occurs just "downstream" from a trough axis (vorticity maximum)



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Vorticity Advection and Vertical Motion

* Positive vorticity advection (**PVA**) results in ***divergence*** at that level

* Negative vorticity advection (**NVA**) results in ***convergence*** at that level

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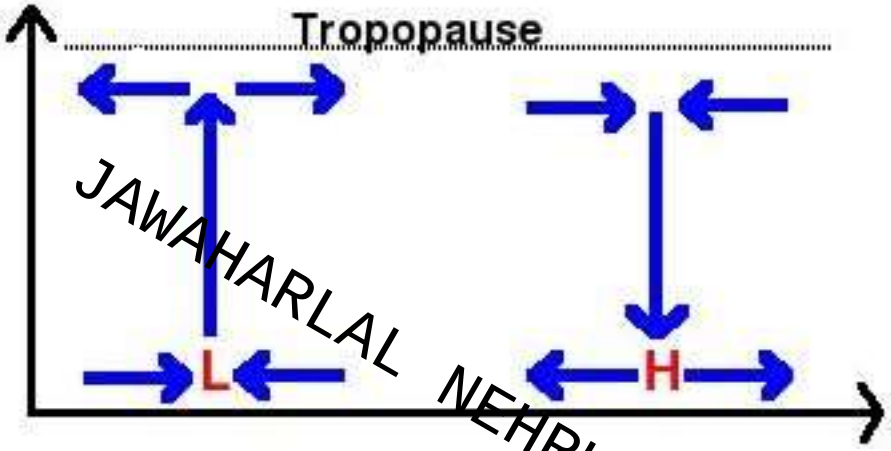
Vorticity Advection and Vertical Motion



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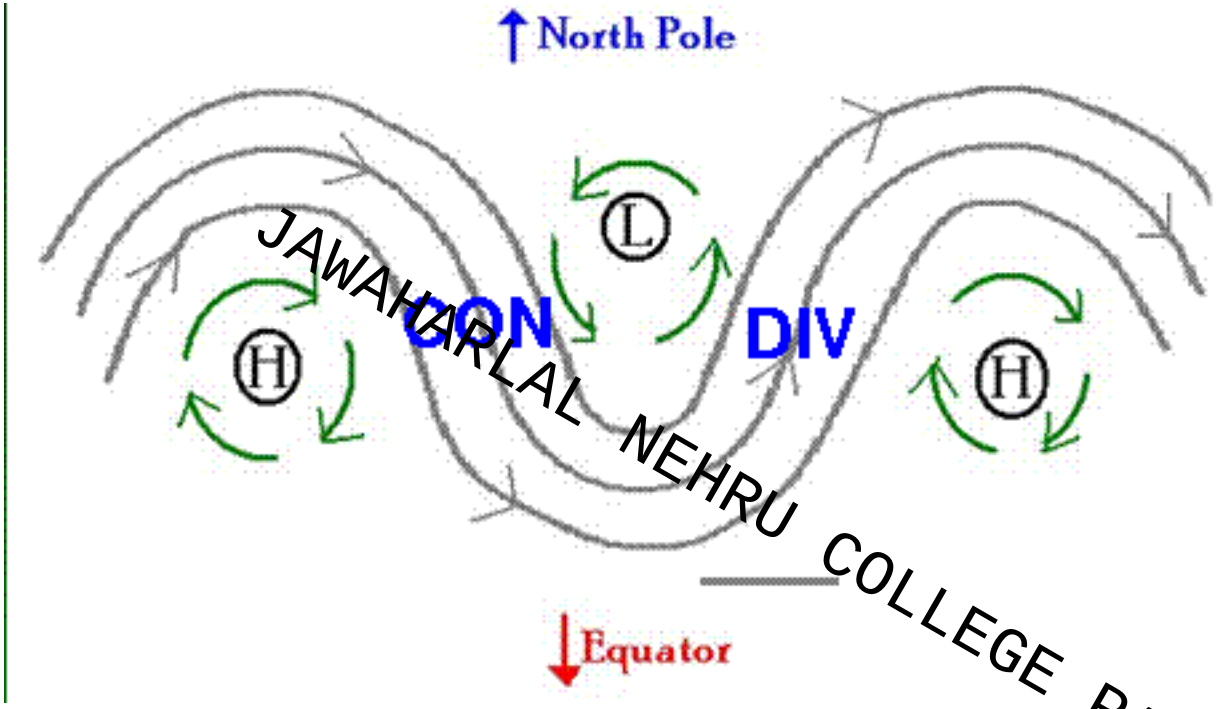
Remember that ***convergence*** at upper levels is associated with downward vertical motion (subsidence), and ***divergence*** at upper levels is associated with upward vertical motion (ascent).

Then, we can make the important argument that . . .

Upper Tropospheric Flow and Convergence/Divergence



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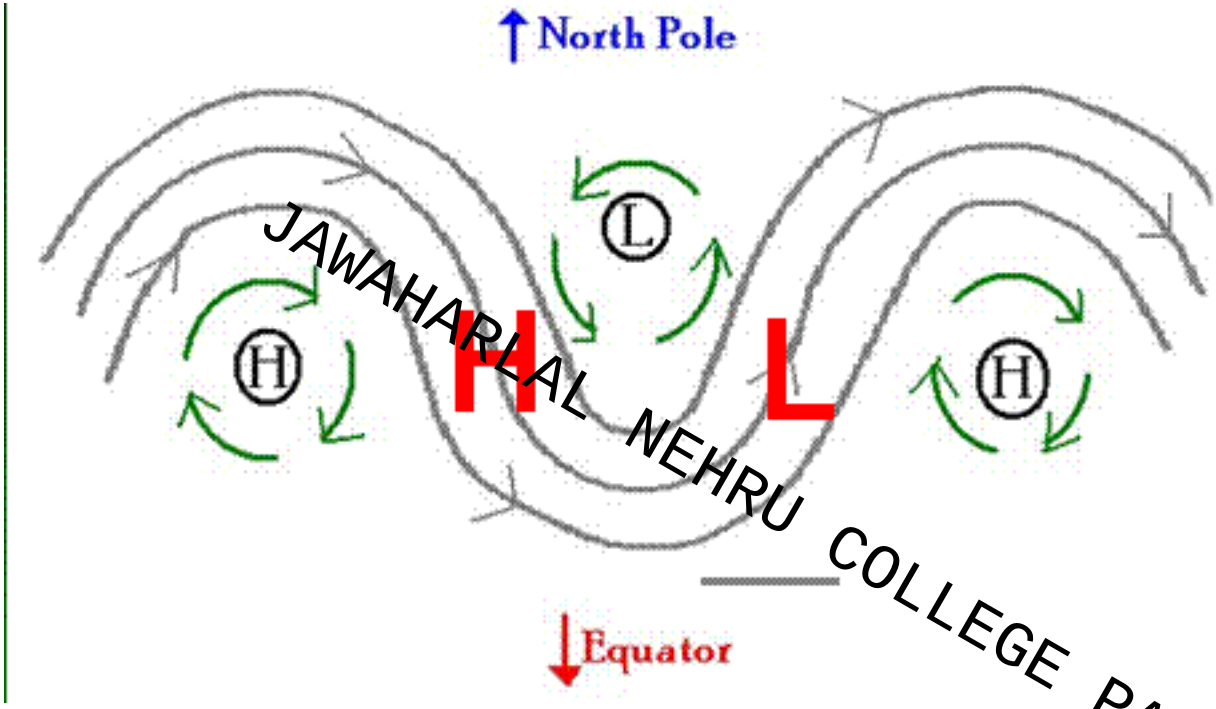
• Downstream of an upper tropospheric ridge, there is convergence, resulting in subsidence (downward motion).

• Likewise, downstream of an upper tropospheric trough, there is divergence, resulting in ascent (upward motion).

Upper Tropospheric Flow and Convergence/Divergence



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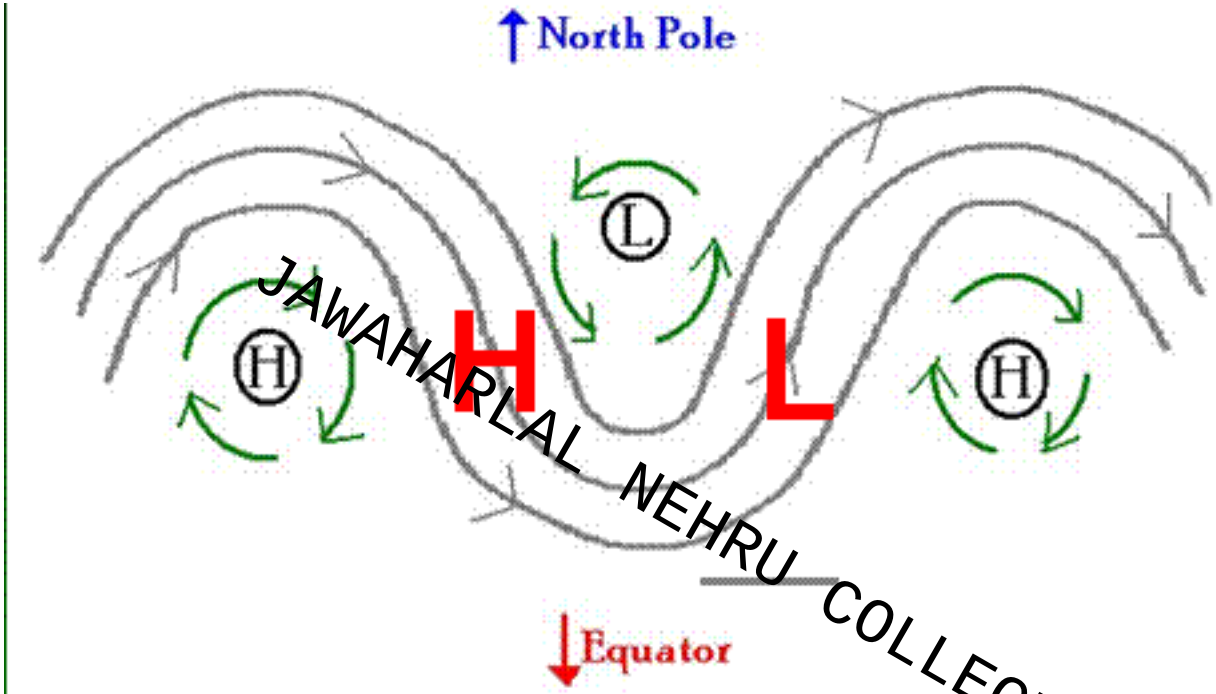
• Downstream of an upper tropospheric ridge axis is a favored location for a **surface high pressure.**

• Downstream of an upper tropospheric trough axis is a favored location for a **surface low pressure** center.

Upper Tropospheric Flow and Convergence/Divergence



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• Surface cyclones move in the direction of the upper tropospheric flow!

•The storm speed and direction can also be identified on the 500 mb map. Cyclones move in the direction of the 500 mb flow, the 500 mb flow is also called the *steering flow*. The cyclone also moves at about half the speed of the 500 mb flow.

• The surface low pressure center in diagram above will track to the northeast along the upper tropospheric jet
(along the surface temperature gradient)

Vertical Structure of Cyclones

What else do these diagrams tell us?

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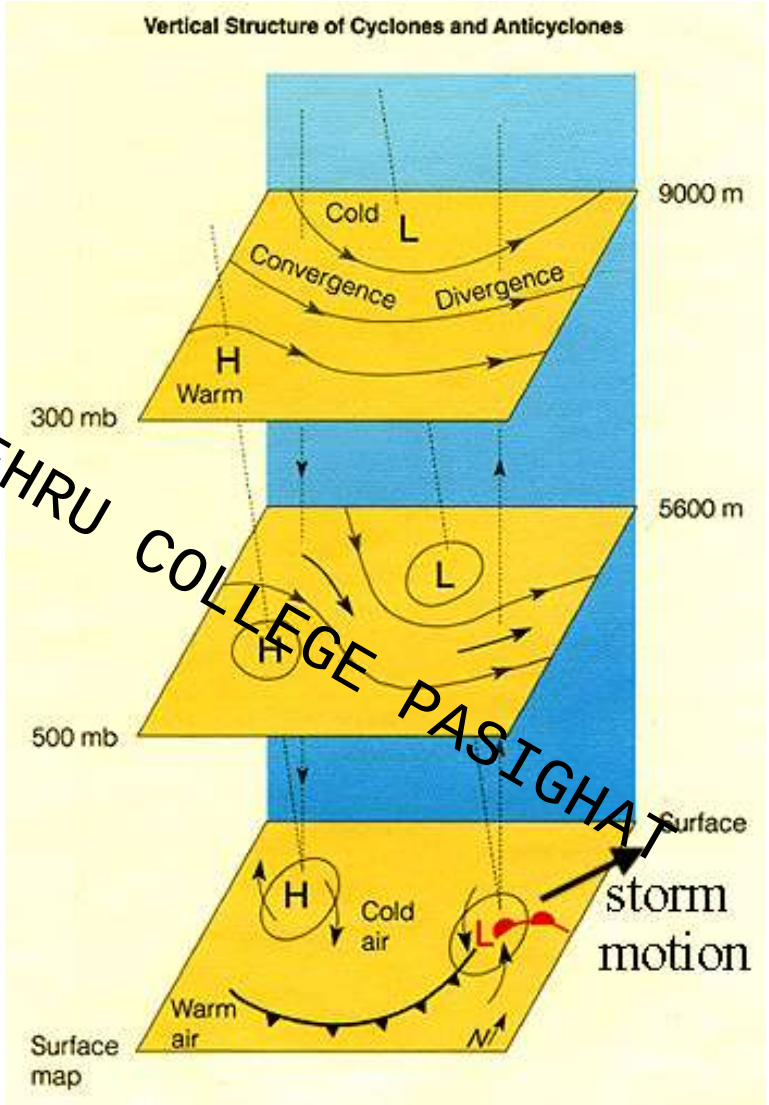
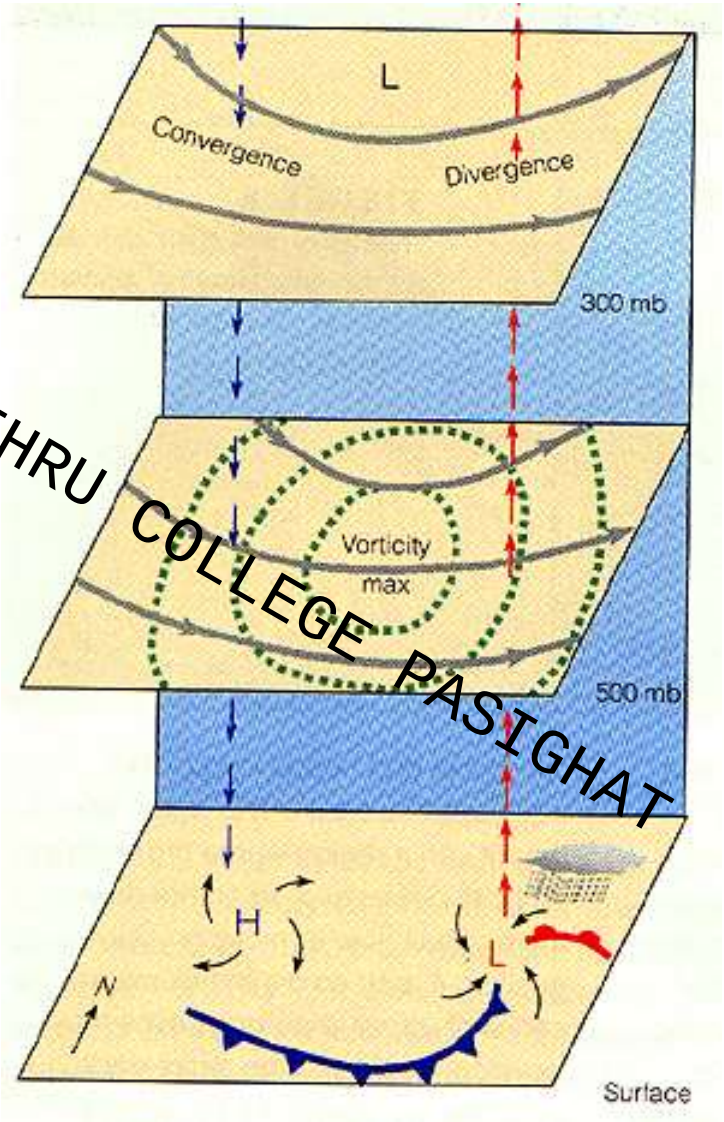
- Surface cyclone is downstream from the upper tropospheric (~500 mb) trough axis
- Mid-latitude cyclones generally tilt westward with height!



Vertical Structure of Cyclones

- 500 mb positive vorticity advection causes divergence and ascent
- This induces a surface cyclone
- Cyclone formation occurs because of this upper-level divergence!



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Longwaves and Shortwaves

The flow in the upper troposphere is characterized as having . . .

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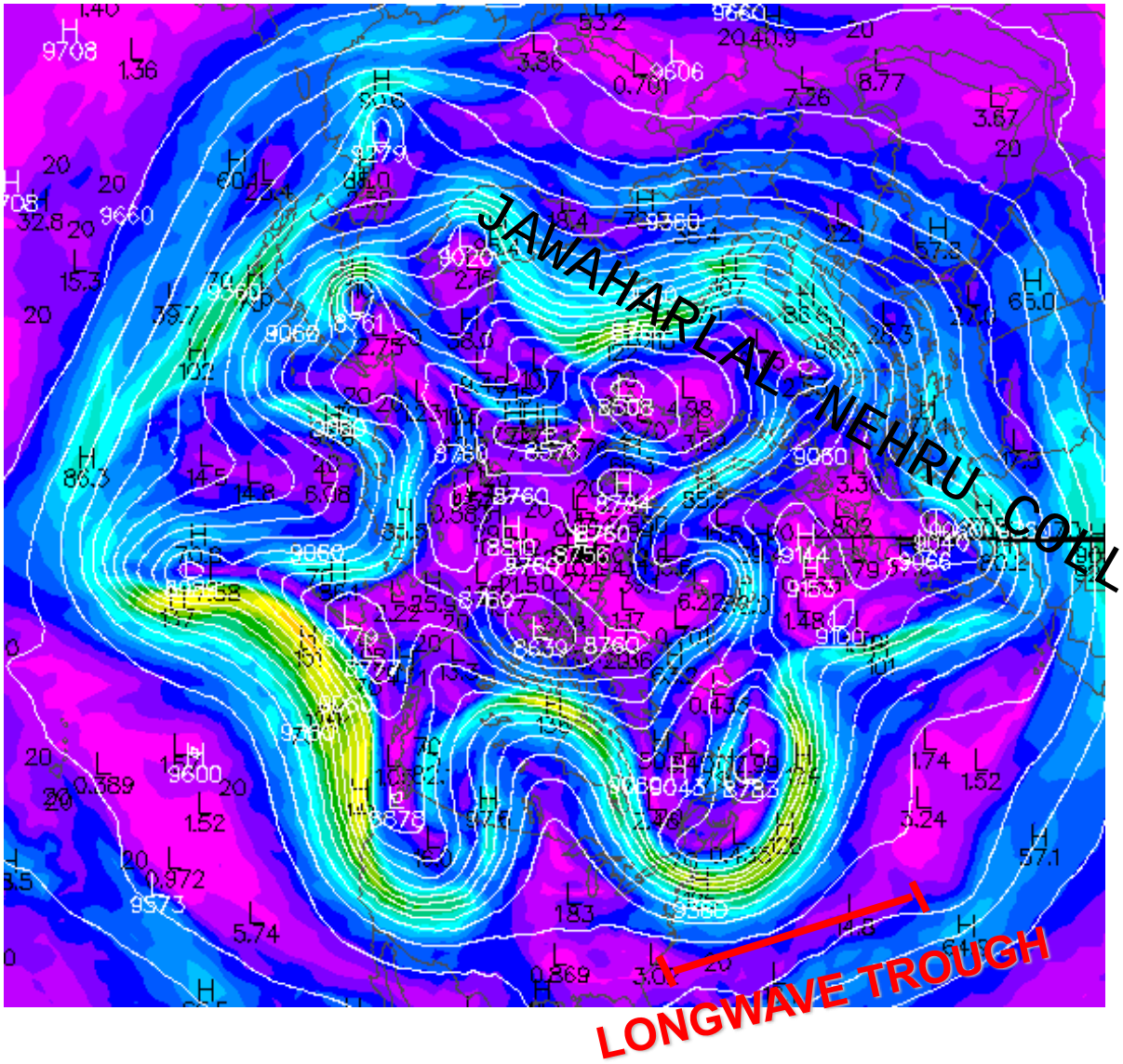
• **Longwaves**: There are typically 4-6 of these around the planet. The longwave pattern can last for as long as 2-3 weeks on occasion, and can result in long periods of anomalous weather

• **Shortwaves**: Embedded in the longwave pattern are smaller scale areas of high vorticity (lots of curvature). They move quickly east within the longwaves, and generally strengthen when they hit a longwave trough. Often, shortwaves result in huge "cyclogenesis" events such as nor-easters or midwest snowstorms.

Longwaves vs. Shortwaves



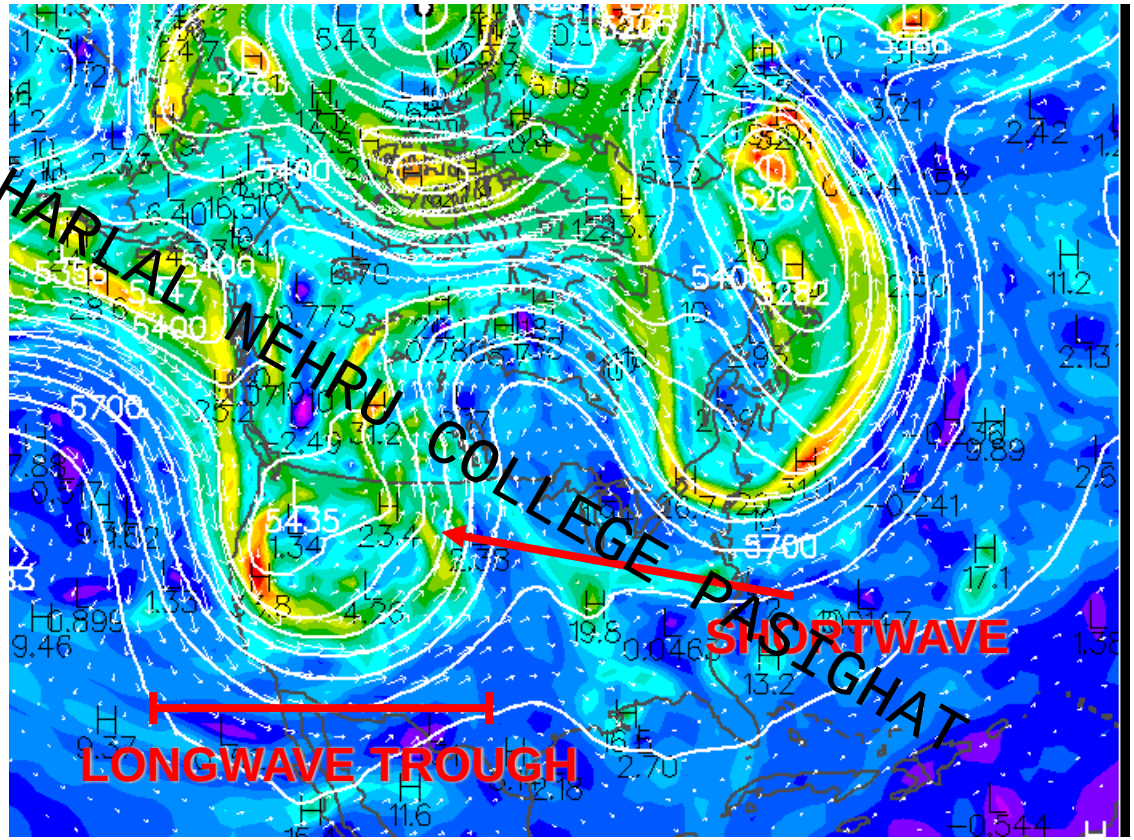
To the left is a North Pole projection of 300 mb heights (contoured) and wind speed (colors)

- North Pole is at the center, equator is at the edges
- Note the prominent longwave troughs and ridges--- especially over North America

Longwaves vs. Shortwaves

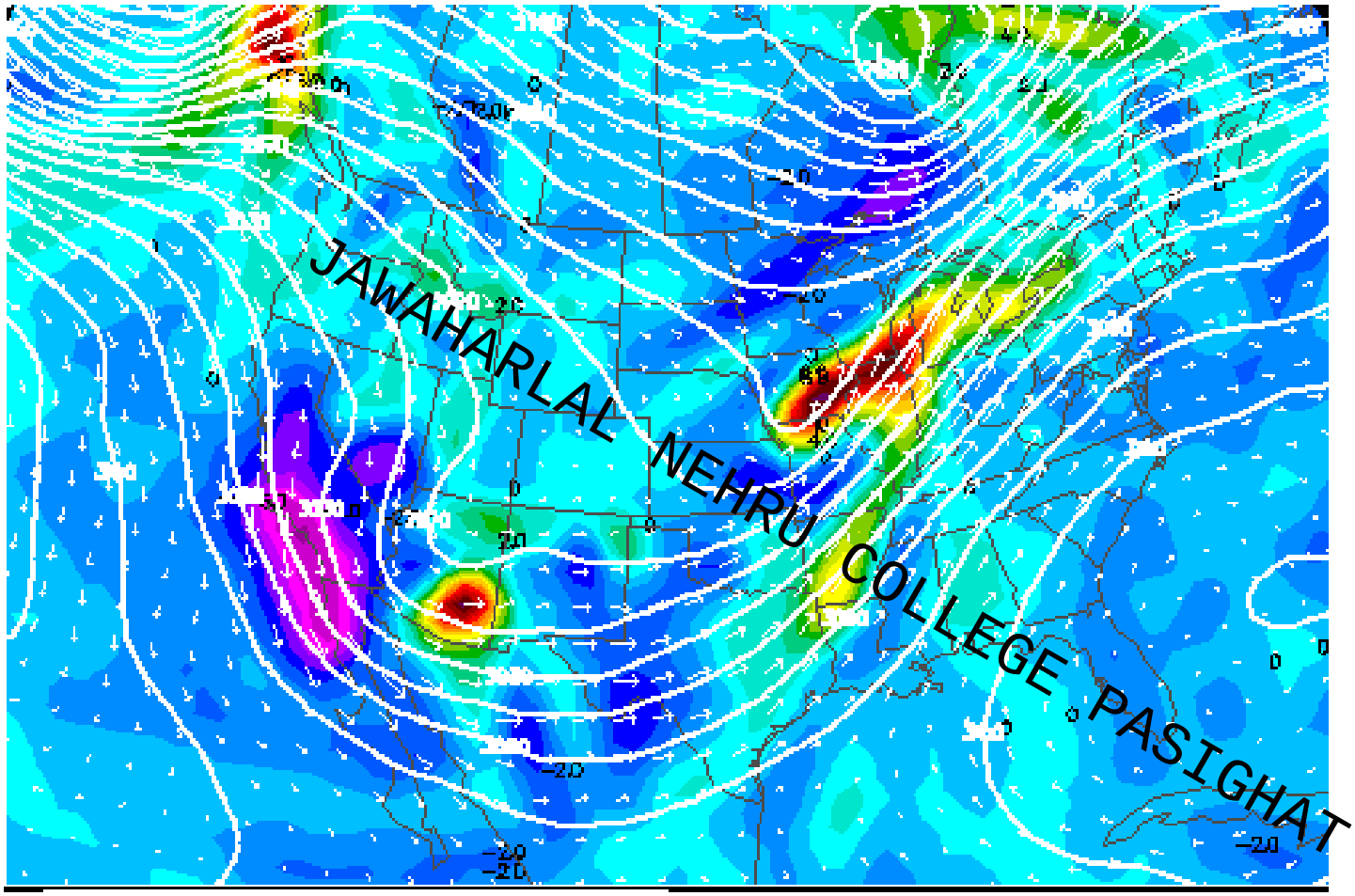
Notice two longwave troughs in this 500 mb height (contour) and vorticity (colored) map. One over the NW U.S., and one over eastern Canada.

Also, note a very subtle shortwave over Montana/Wyoming (you can see this in the vorticity field as a strip of anomalously large vorticity.



Vertical Structure of Cyclones

700mb



- Downstream from **troughs** are favorable locations for **ascent** (red/orange)
- Downstream from **ridges** are good locations for **descent** (purple/blue)

Cyclone Intensification/Weakening

How do we know if the surface cyclone will intensify or weaken?

• If **upper tropospheric divergence** > **surface convergence**, the cyclone will intensify (the low pressure will become lower)

• If **surface convergence** > **upper tropospheric divergence**, the cyclone will weaken, or “fill.”

• Think of an intensifying cyclone as exporting mass, and a weakening cyclone as importing mass.

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Pressure…

- If we have converging air at the surface, must have divergence aloft!
- Otherwise, air would “fill up” the low and the pressure would rise

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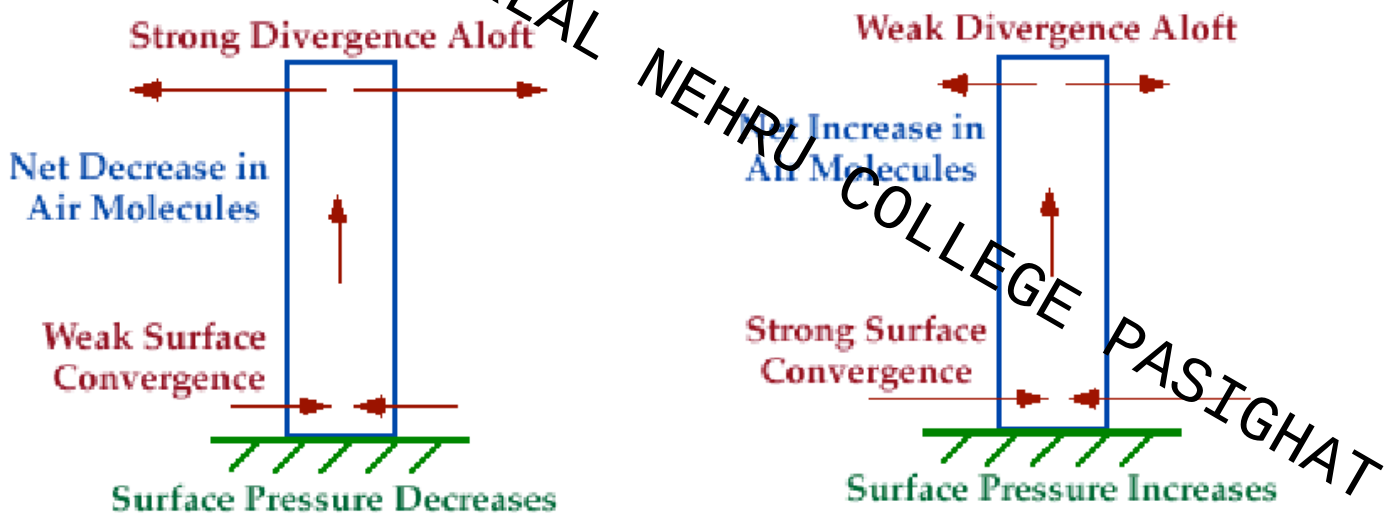
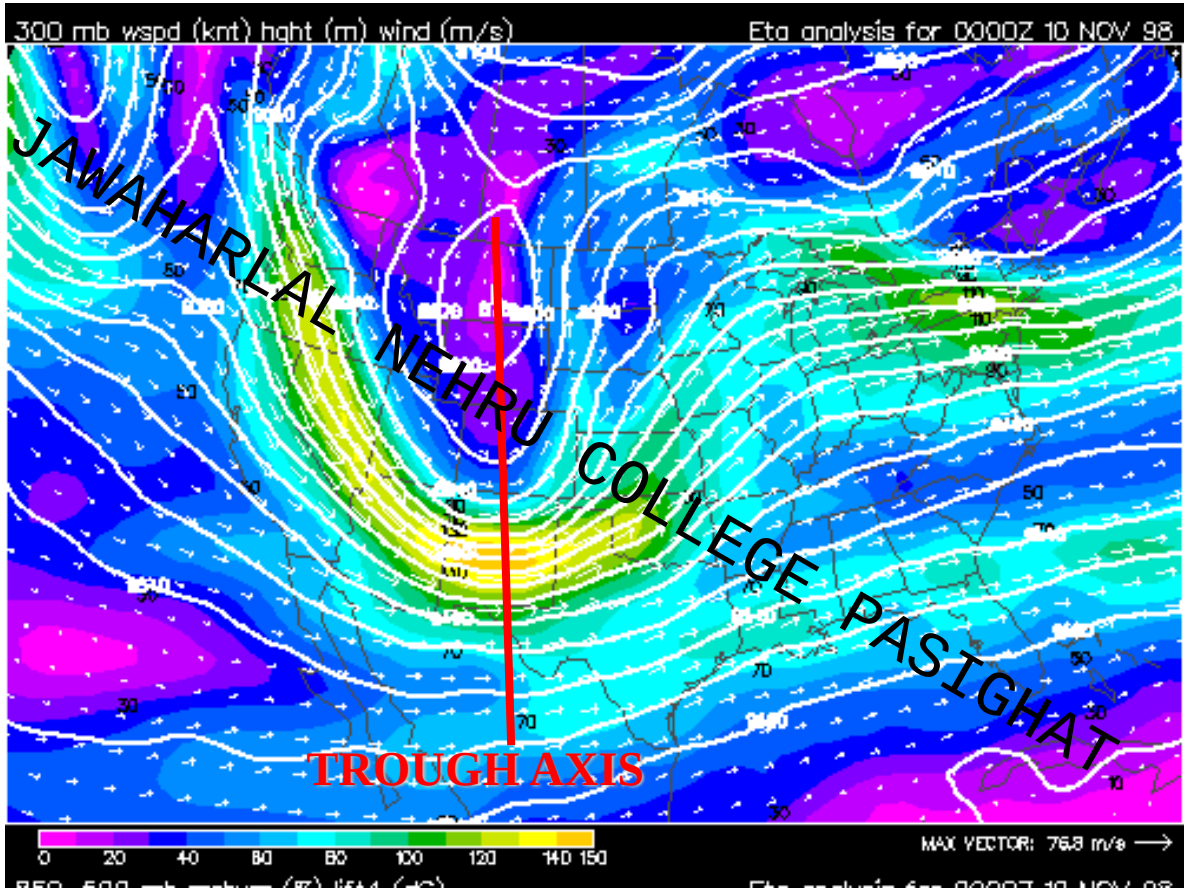


Intensifying Sfc Cyclone

Weakening Sfc Cyclone

Example of Cyclone Development Forced by Upper Flow

Example 300 mb flow which resulted in a massive cyclone development over the midwest.

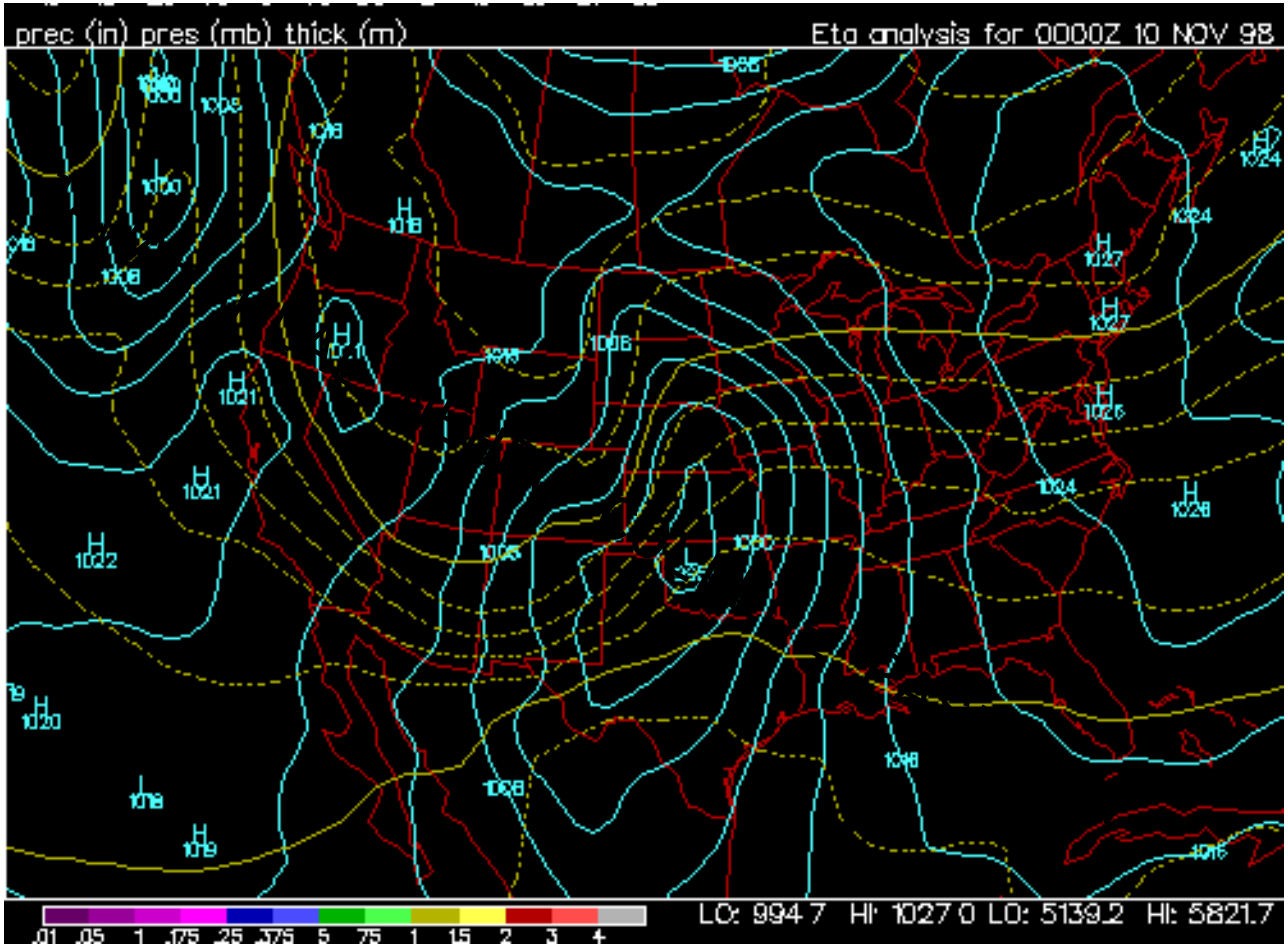


http://weather.unisys.com

Example of Cyclone Development Forced by Upper Flow

Surface cyclone (over NW Oklahoma) is positioned just downstream of the trough axis in the previous image.

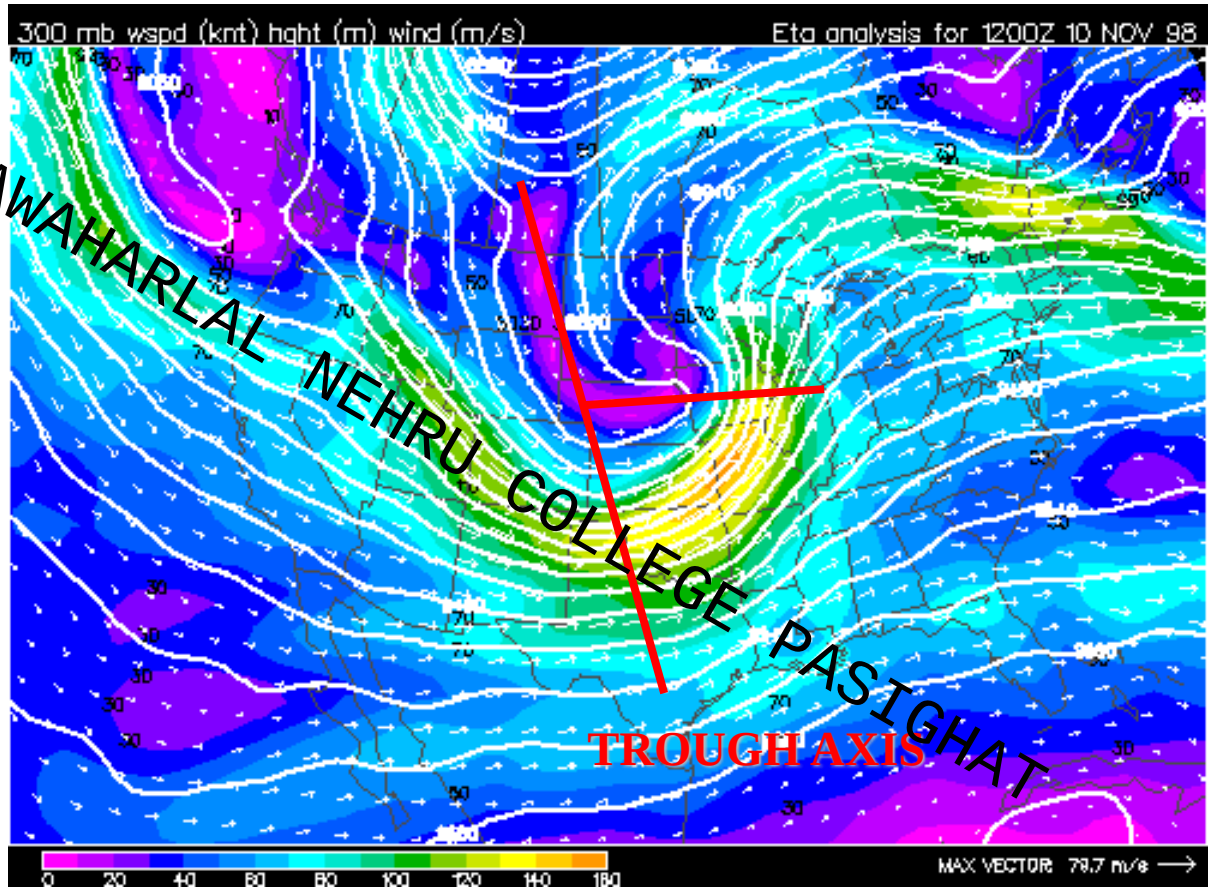
Same time as the previous image.



Example of Cyclone Development Forced by Upper Flow

12 hours later, the jet speed maximum has shifted downstream with the trough, and there appear to be two trough axes.

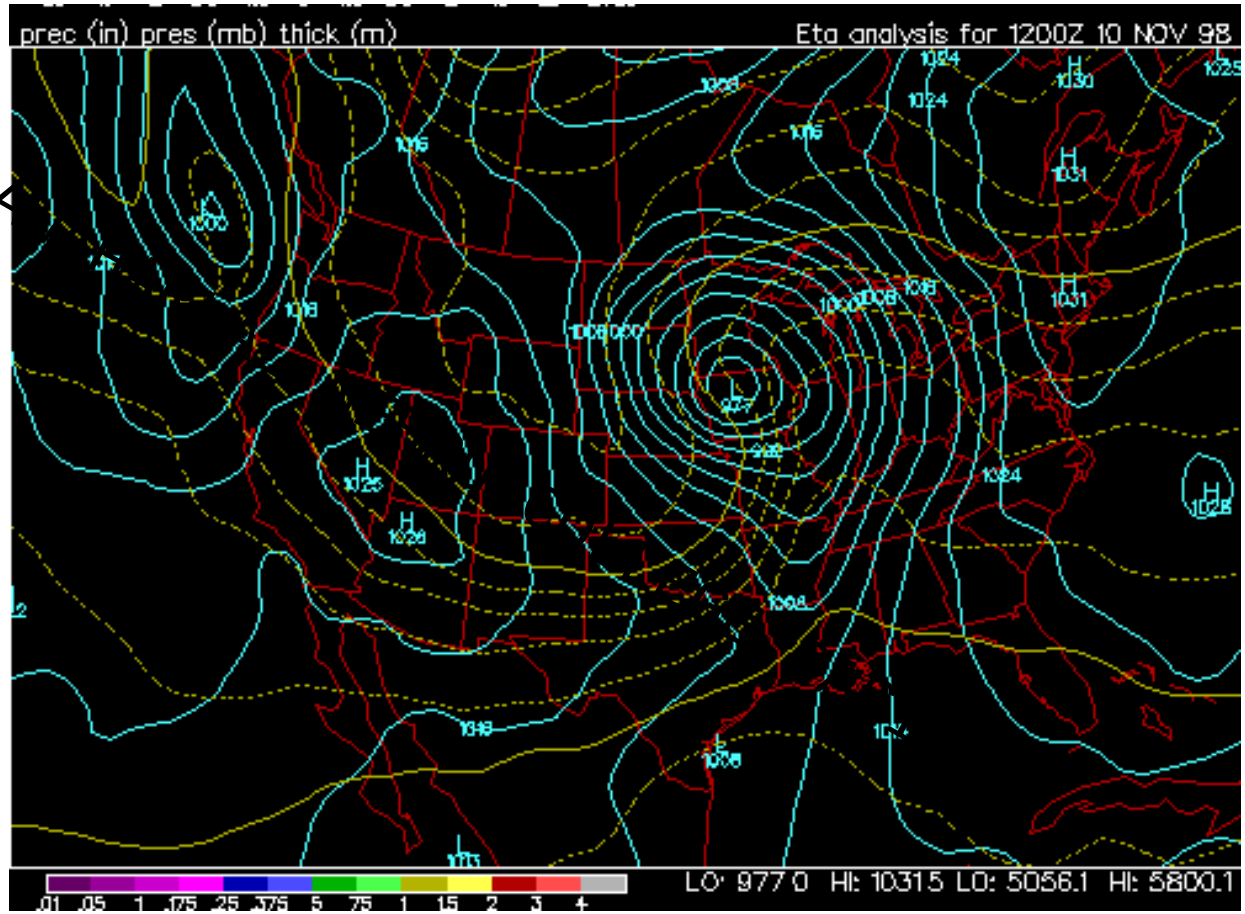
The trough is "**negatively tilted**," (NW-SE in orientation) often a sign of very strong PVA and forced ascent.



Example of Cyclone Development Forced by Upper Flow

Now, the surface cyclone has deepened to a very low 977 mb.

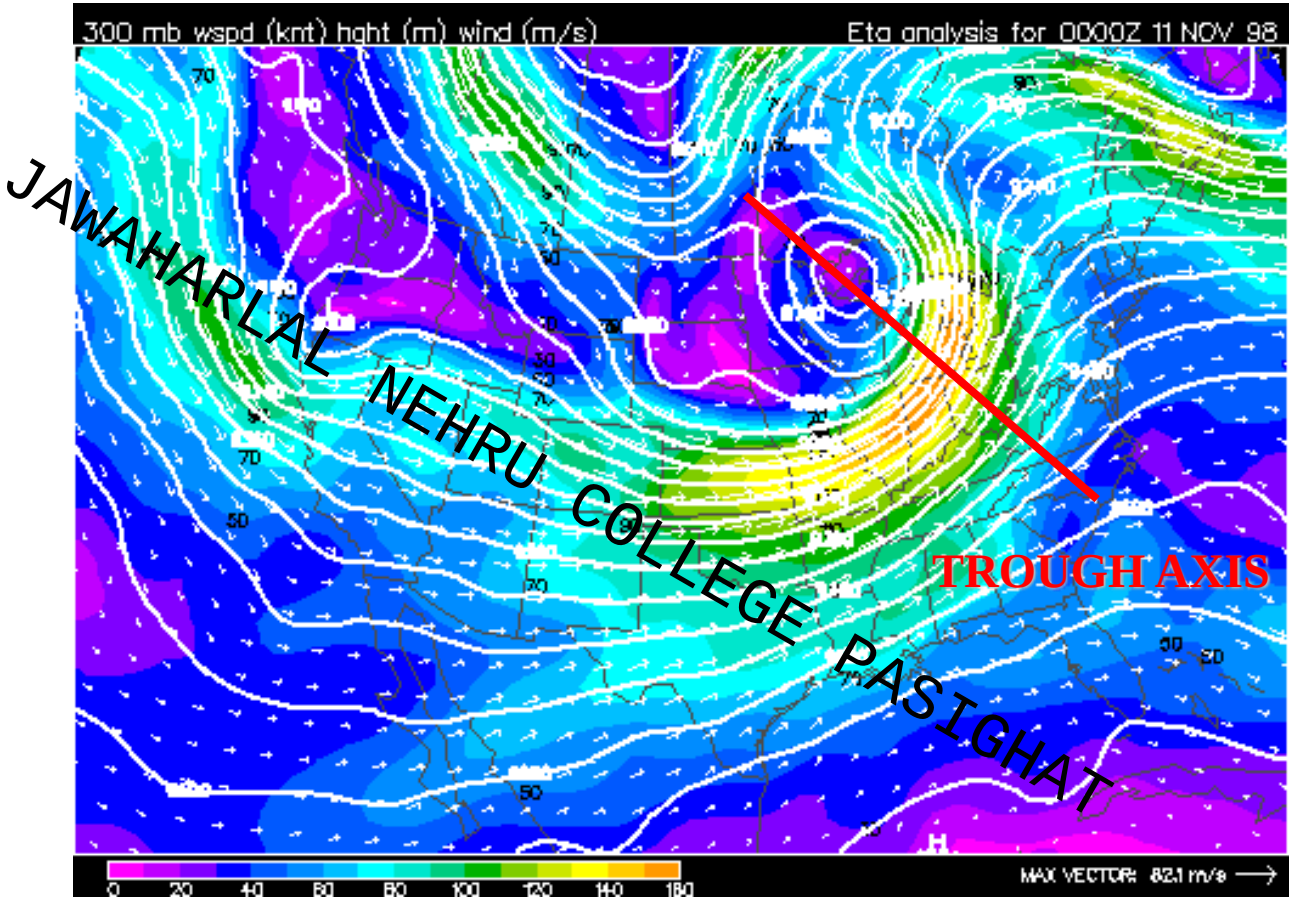
In general, it is still located downstream of the trough axis, but the trough axis appears to be catching up to the surface cyclone.



Example of Cyclone Development Forced by Upper Flow

12 hours later:

- 300 mb upper tropospheric low hasn't moved too much
- Upper low is situated over eastern Lake Superior.



Example of Cyclone Development Forced by Upper Flow

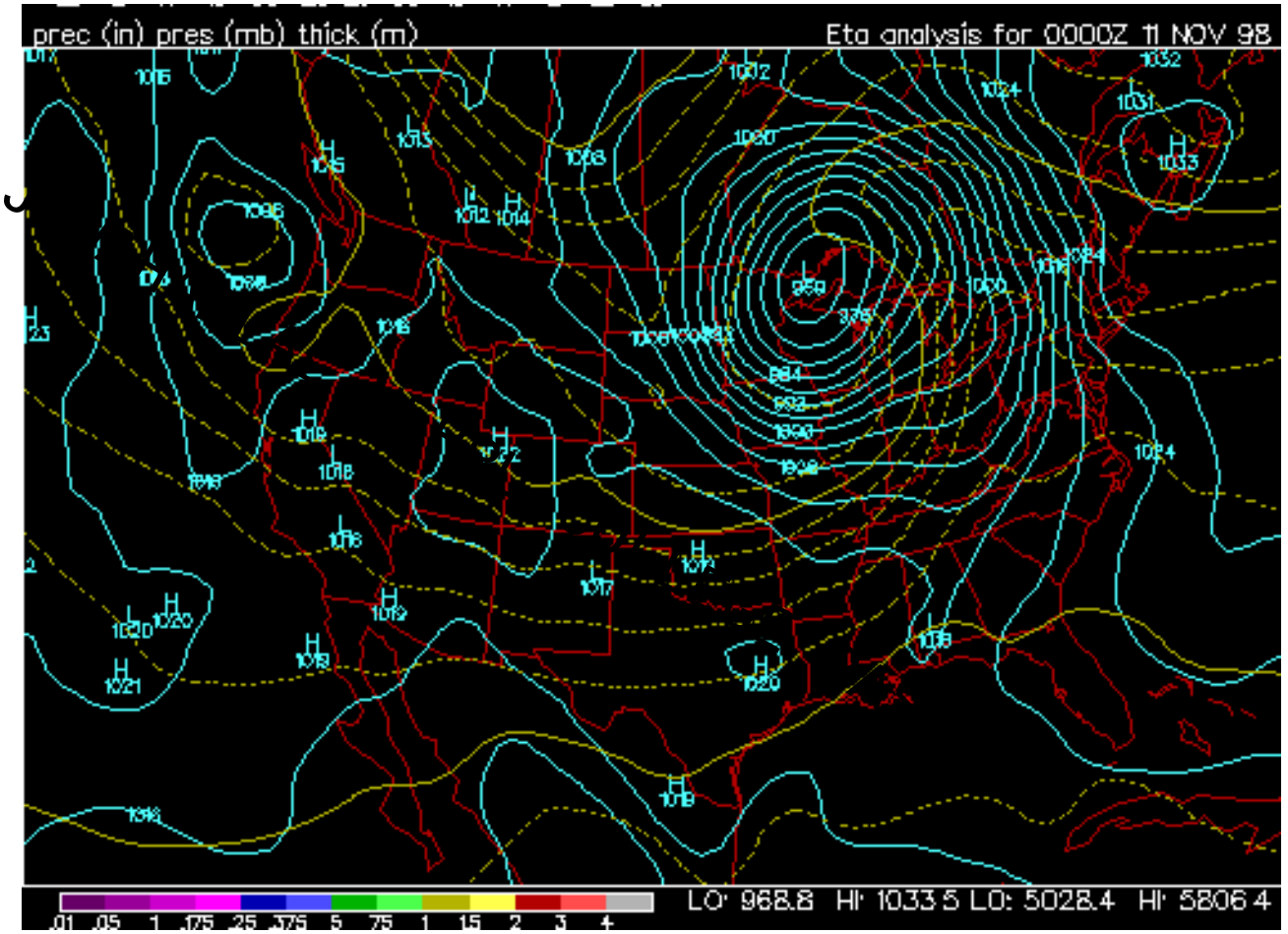
SFC at same time:

•Surface cyclone is also over eastern Lake Superior!

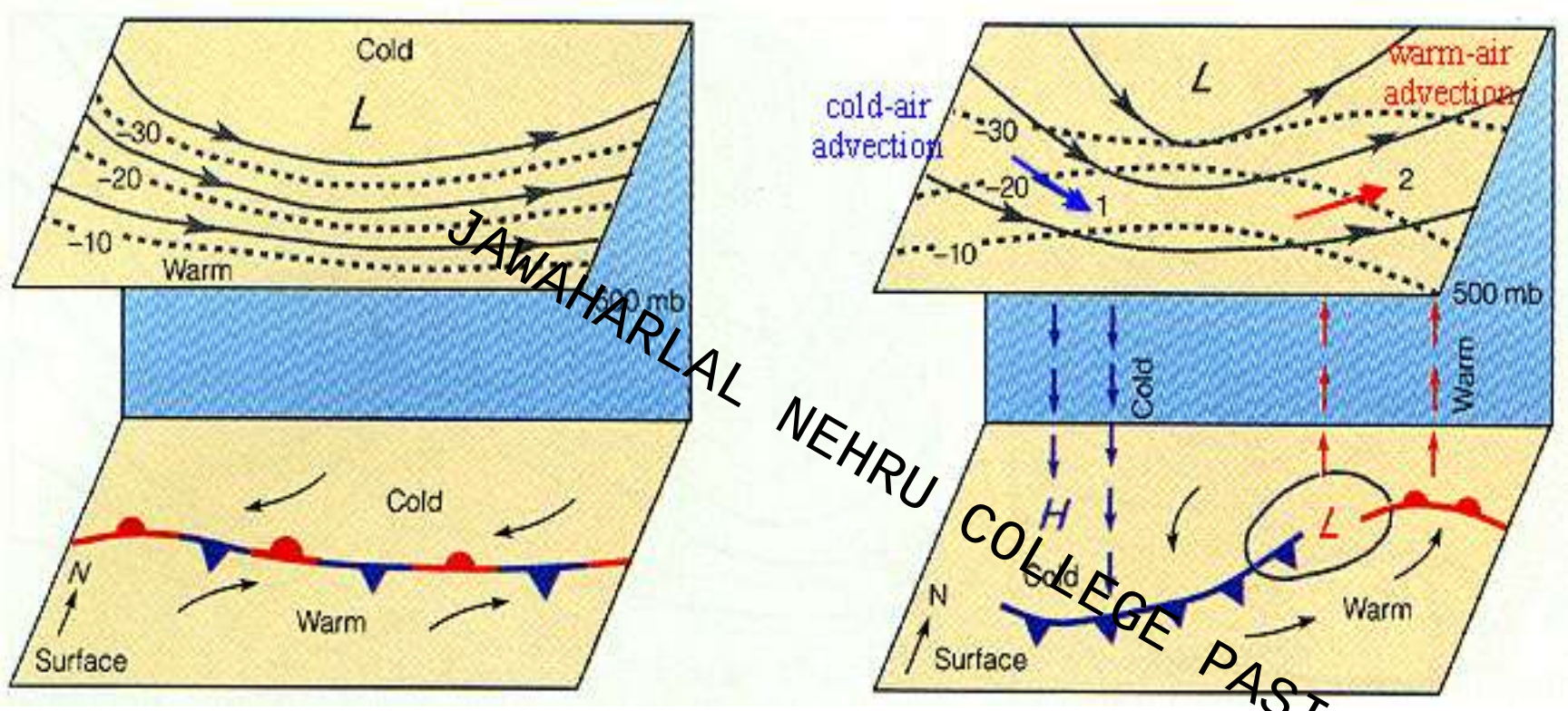
•This means that the surface cyclone is no longer in a favorable position for PVA (or upper divergence and ascent)

•At this point, the surface cyclone will weaken!

•Cyclone is "**vertically stacked**."



Temperature Advection



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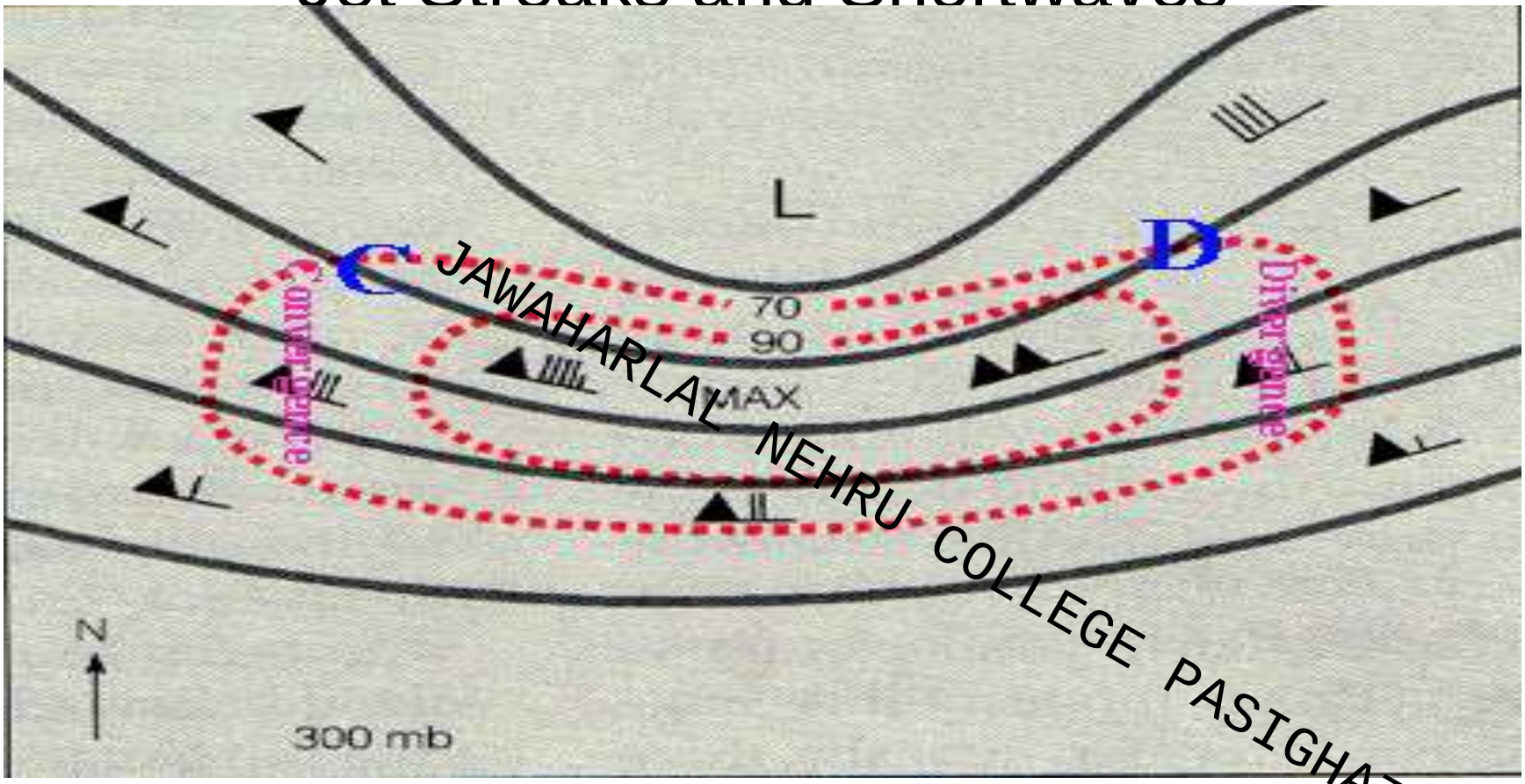
Consider a longwave over a stationary front, seen in (a). The height lines and the isotherms are parallel to each other, we can say the atmosphere is ***barotropic***.

At time (b) a shortwave moves into the longwave trough and intensifies. The shortwave caused the isotherms to cross the height lines, thus the atmosphere is ***baroclinic***
West of the height trough, a region of (CAA). Here, the cold air is more dense and will cause sinking motions.
East of the trough, a region of (WAA). Here, the warm air will produce rising motions.

Jet Streaks and Shortwaves



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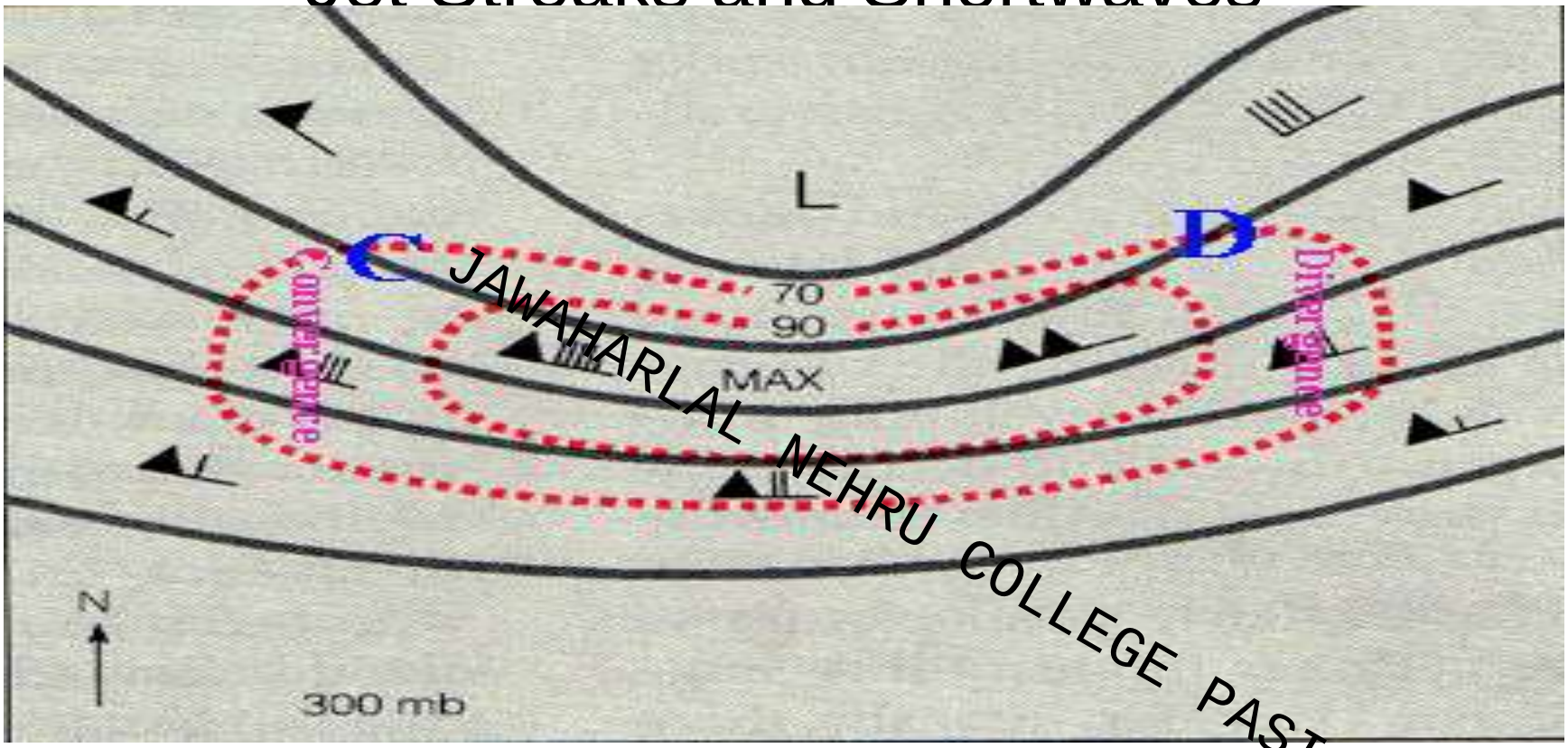
If a shortwave trough is intensified in a longwave trough, height lines are forced together:

- **large PGF** in the base of a shortwave trough
- We have seen before that large PGF corresponds to large wind speeds.

Jet Streaks and Shortwaves



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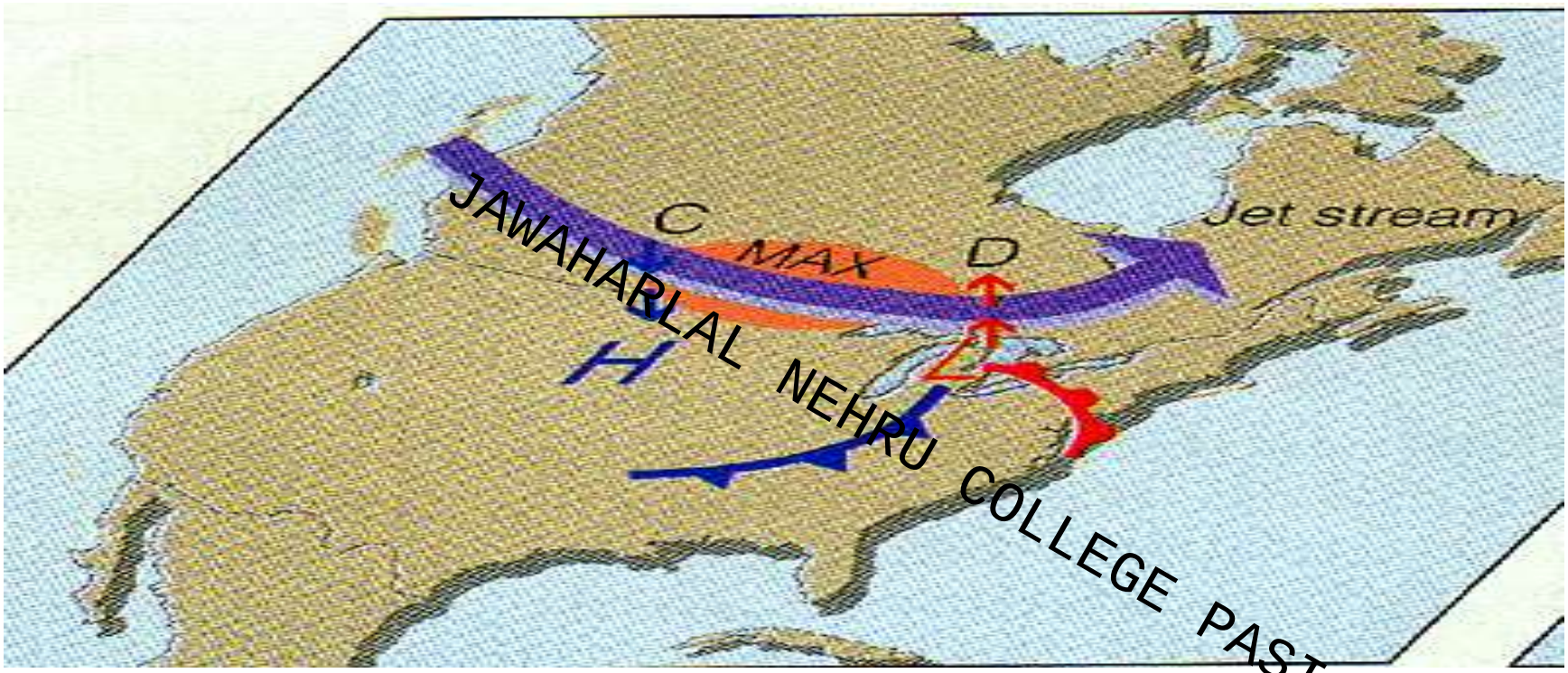
- Largest wind speeds where height lines are the closest together on an upper level map.
- Wind speed decreases outward from this point.
- Therefore we have a convergence of wind to the left/west of a trough and the divergence of wind to the east/right of a trough.

Jet Streaks and Shortwaves



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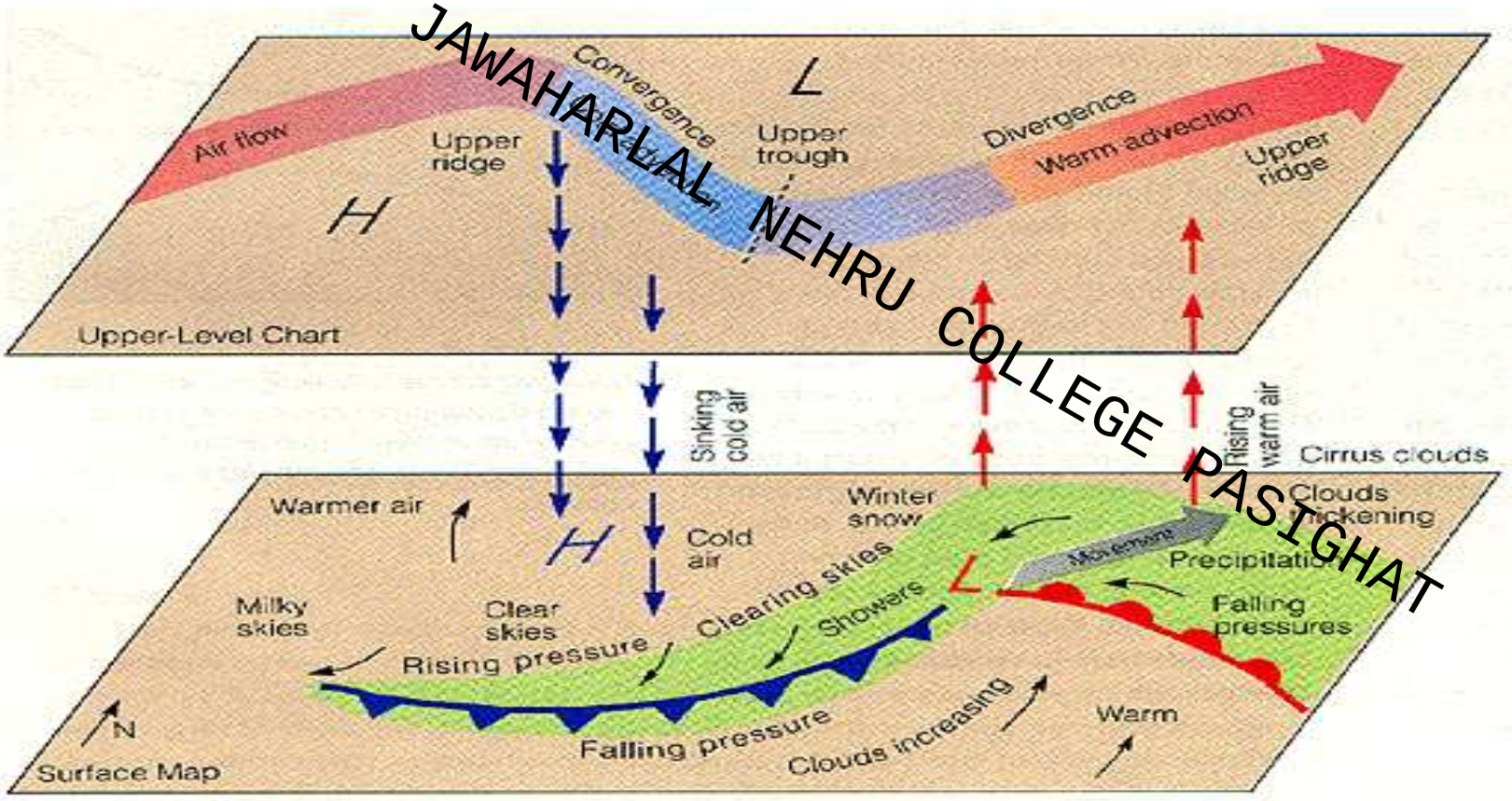
If we look at the full vertical structure we will see that the divergence and convergence associated with a jet streak are directly above the low and high pressures at the surface.

The full picture



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Creating a Cyclone

If an upper level shortwave intensifies in a longwave :

- Jet streak creates upper level convergence and divergence
- Surface convergence occurs directly below upper level divergence
- Cyclone begins to develop

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Cyclone Intensifies and Fades

- Cyclone goes through its life cycle, intensifies, its low pressure decreases, warm front and cold front move
- Upper level low to west of surface low (westward tilt with height)
- Upper level trough begins to catch up to surface low (tilt decreases)
- When cyclone is vertically stacked (no tilt), cyclone begins to die

(no divergence above the surface convergence)

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Economic Geography

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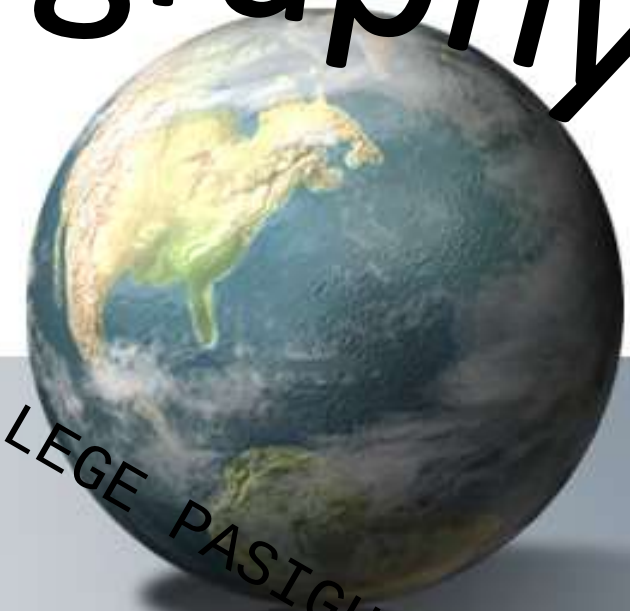

Dr. K.K.Mishra

Economic systems are an important part of any culture

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- Every society (culture) must answer the **basic economic questions**:
  - What to produce
  - How to produce it
  - Who will get what is produced
- Cultural influences on the economic system
  - World view of the culture
  - Technological level of the culture
  - Political structure of the culture

Economic system cont.

- Non-cultural influences
  - Relative location & accessibility
  - Topography & Climate
  - Resources available from the environment
- Factors of production in all economic systems
  - **Land** – real estate and natural resources – raw materials
  - **Labor** – mental and physical efforts applied to “land” and “capital” to facilitate production
    - **Management** or entrepreneurship – that segment of labor which organizes land, capital, and the other segment of labor to produce goods and services
  - **Capital** – the tools and facilities needed for production

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It begins with physical place

- What does nature provide that is useful?
- Elements of physical place with economic significance:
  - Climate and flora and fauna
  - Topography: landforms
  - Soil
  - Rivers (nature and flow) OR lack of rivers
  - Mineral deposits
- **World View may influence both what and how elements are used in the society**

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It continues with relative location

- Peripheral or central location?
- Accessibility?

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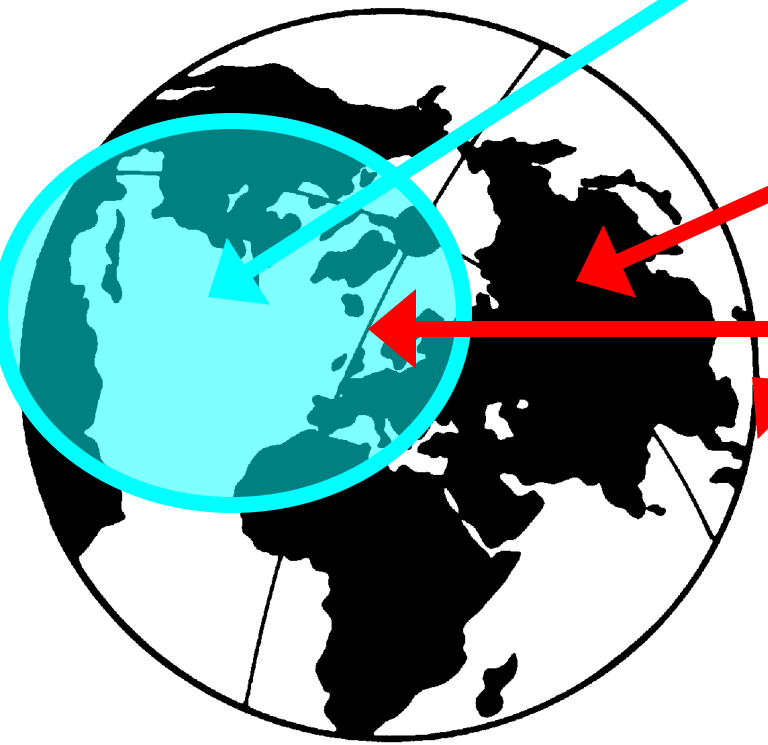
Major world trade lanes

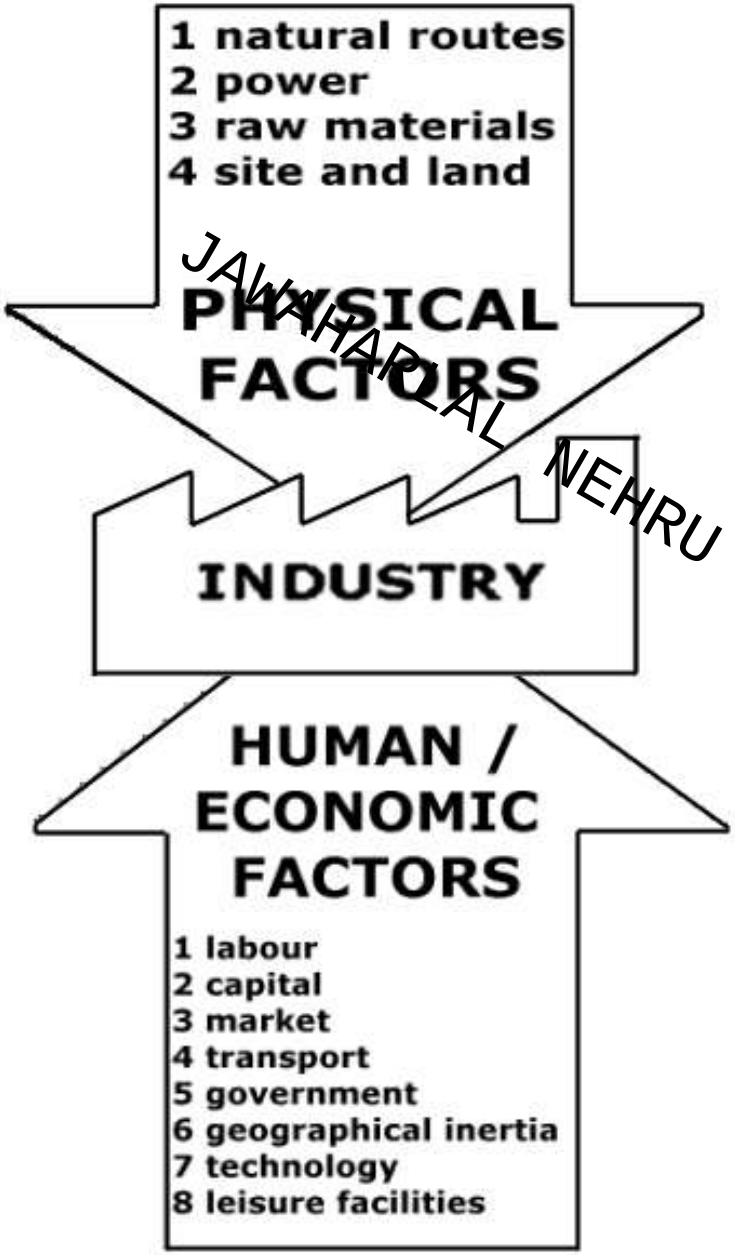


Mongolia – rather inaccessible

Western Europe -- centrality

Australia (not seen) – peripheral

Location Factors for Firms &. . .



- Many factors influence locational decisions of firms, individuals, governments, etc.

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Technology & the Economy

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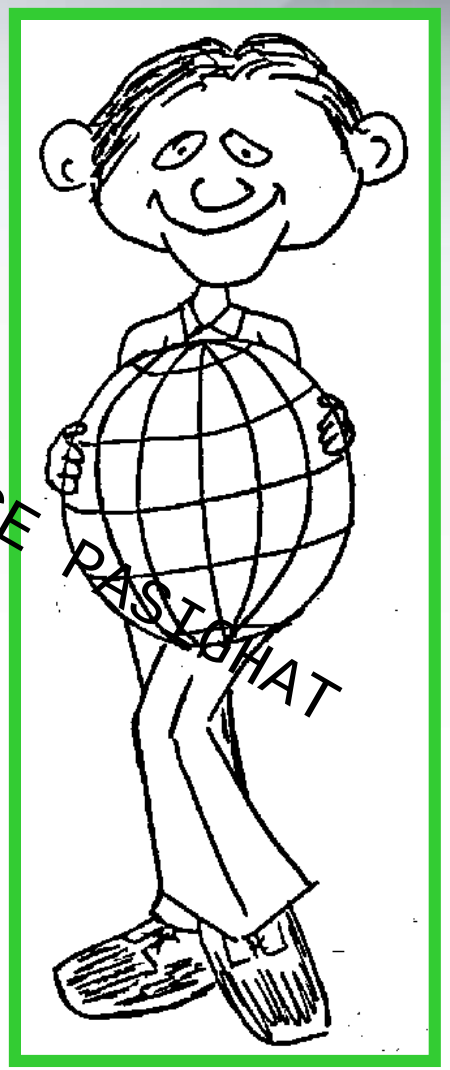
- Technology will influence the range of possible uses of economic elements
- **"Nature, despite the limitations with which it hedges human initiative and enterprise, is not only very diverse but also remarkably malleable."** W. Gordon East *The Geography Behind History*
- In the interplay between humans and environmental conditions, humans are the "choosers." Therefore, human choices become extremely meaningful.

Balanced Economic Approach

- Governments & firms often consider only what can be quantified in dollars and discount other, difficult to quantify, factors.
- The significance of the 4 laws of ecology must be factored in
  - Some “costs” are difficult to quantify, but must not be discounted because of that.
  - Human & social costs are important



Early Cradles of Civilization: Economic Factors

- Productive soil to support agriculture
- Adequate access to water: rainfall and/or rivers
- Transportation – domesticated animals & rivers
- Reasonable temperature range for human activity
- Plants and animals that could be domesticated or already had been domesticated
- Some metal ores that could be refined to make tools and/or weapons
- Location where ideas could mix
- Some degree of natural defensibility

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Cultural developments with economic implications

- Control of fire
- Stone tools
- Domestication of plants and animals
- Metal tools
- Boats
- Agriculture
- Urbanization
- Rise of the nation-state
- Renaissance

- Age of Reason
- Scientific Revolution
- Agricultural Revolution
- Democratic Revolution
- Industrial Revolution
- Internal combustion engine
- Communication Revolution
- Microelectronics and the computer age

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Classification Continuum

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Pure Capitalism

Pure Socialism

Classification

- **Market Economy** [capitalism; free-enterprise]
  - Private ownership of capital & “land”
  - Minimal government ownership or regulation [laissez-faire capitalism – the impossible extreme of not government involvement in the economy]
  - Profit-motive is the driving force – the engine that drives the economy – encourages risk-taking.
  - Competition results in efficiency and the lowest possible consumer prices
  - Price regulating mechanism is supply and demand

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Supply, Demand, Market Curves

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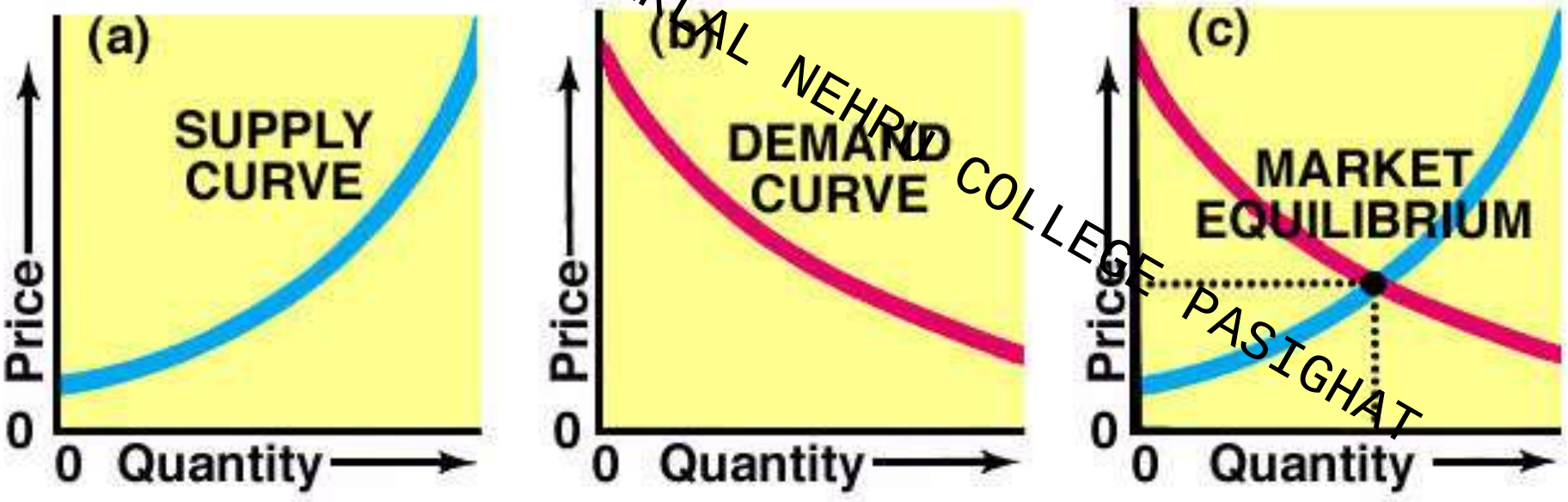
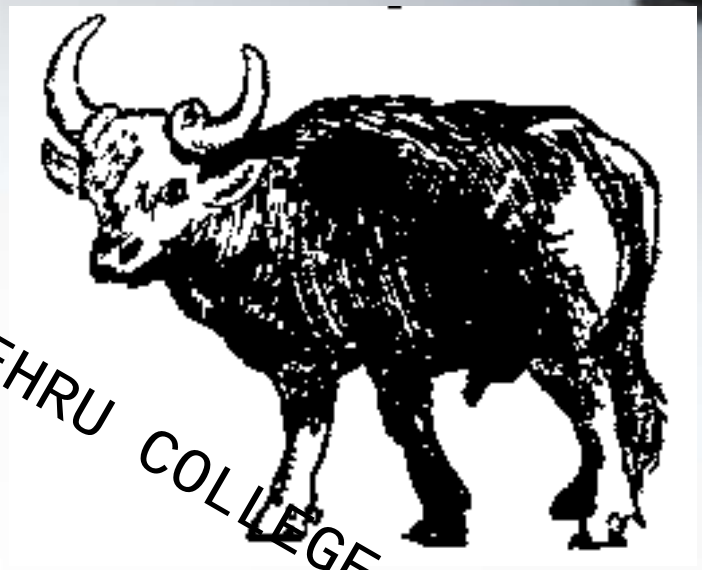


In theory, an ideal, automatic regulating mechanism

Stock Market – supply & demand



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Many Americans have much of their financial future tied up in the stock market – insurance policies, 401K plans, pension funds, mutual funds, etc.

Classification cont.

- **Command economy disappearing?**
  - Capital and land can't be privately owned
  - Production & pricing planned by agency of govt.
    - Influenced by political/social agenda of the government
  - General absence of competition
  - Consumer interests may have a low priority
  - Efforts to have a totally command economy have never succeeded: Soviet Union, China, etc.
    - Tend to be inefficient, producing poor-quality goods
    - Needed elements of "capitalism" to be sort of successful
    - Really were "socialist" – much government control.

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Destitute couple in Russia

Russian disinfection center

Economic Variations in Russia

Homeless in Russia

- Source of political instability – this condition didn't exist under communism.

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Traditional Economy

- Non-industrial
- Basic economic questions answered by doing what is “customary”
- Generally opposed to risk-taking behaviors
- Private ownership of capital
- Land may be privately owned, but often is considered the property of the group – the tribe.
- **No country today has this economy**, but there may be areas within developing countries where this is the type of economic system

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Mixed economy – what all countries really have.

- Mostly combination of market & command economies
- **U.S.** – Mixed Market Economy – leans toward the market system, but there is government involvement in the economy
- **China** – Mixed [socialist economy] – overall planning by the government, but some "privatization" has been allowed – joint ventures with capitalist firms from outside China – SEZ's & unique status of Hong Kong
- **Brazil** – Mixed Market Economy with pockets of traditional economy in the interior

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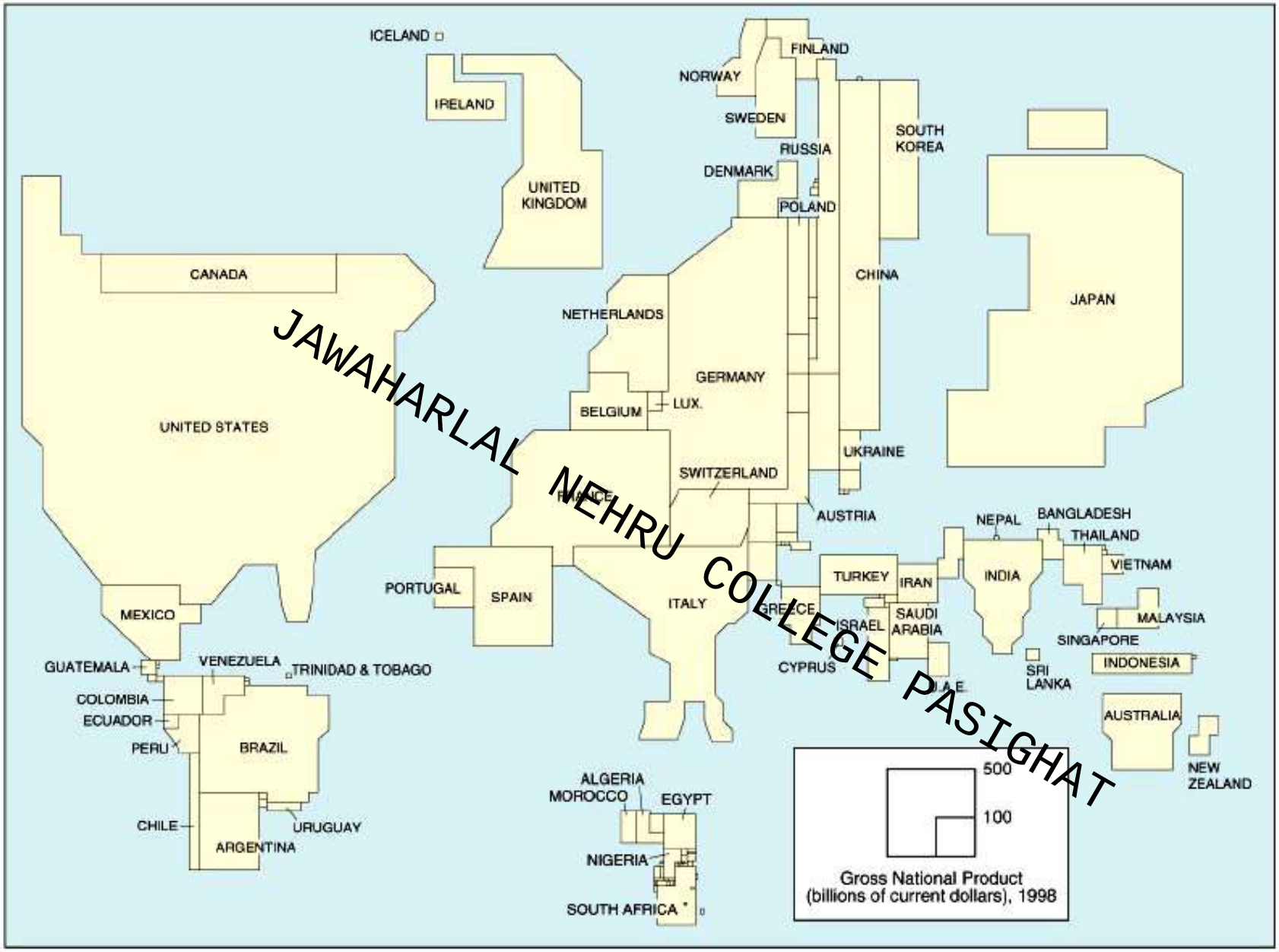
Sizes of Economies



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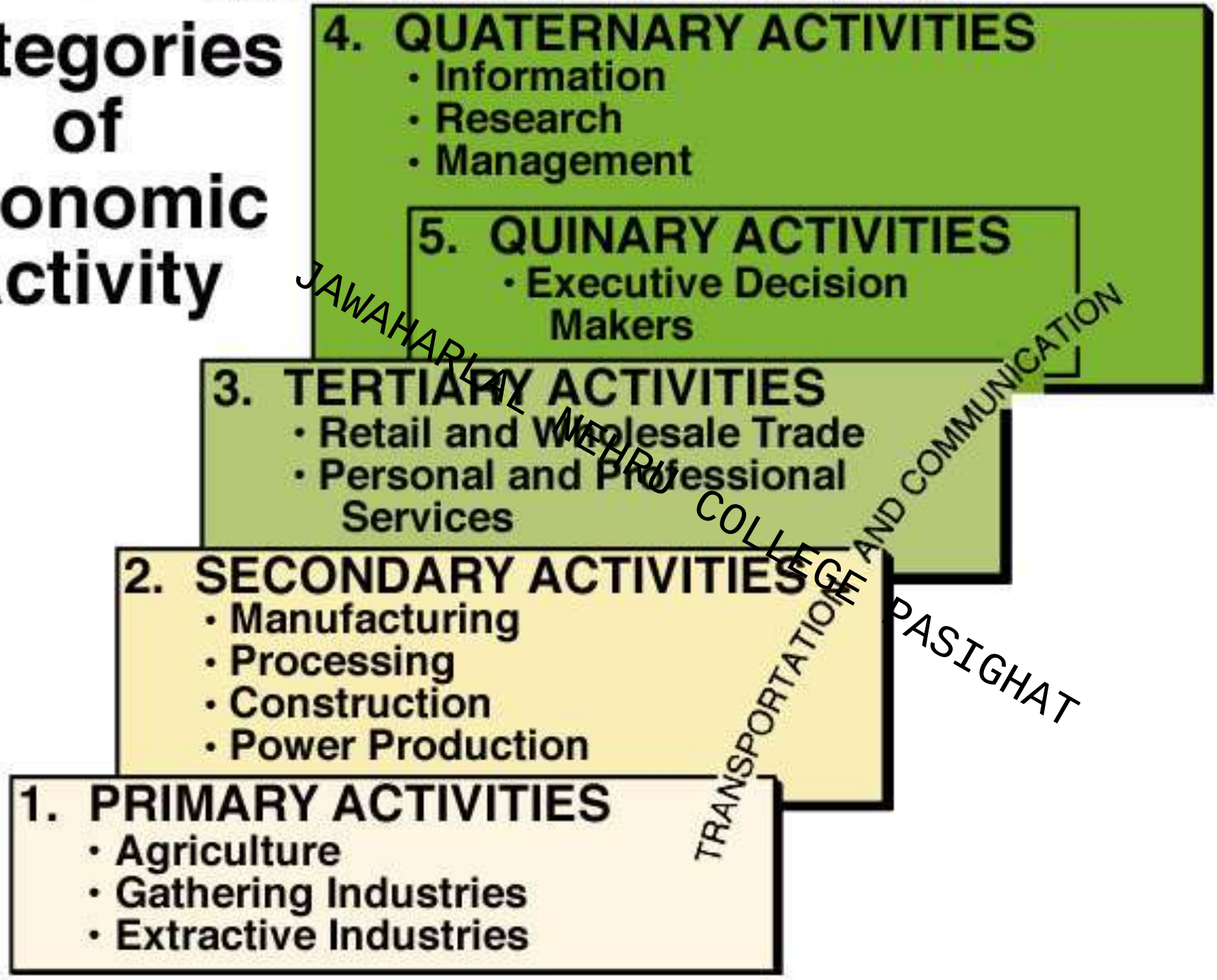
Categories of Economic Activity



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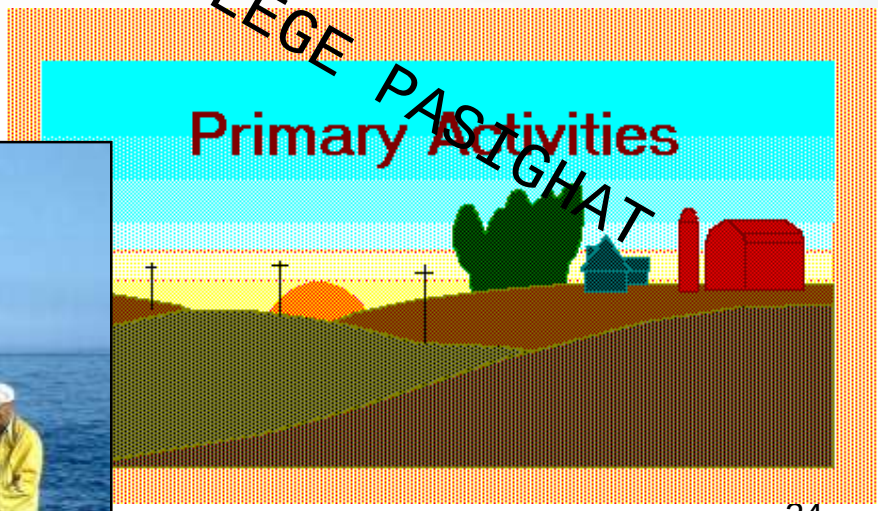
Primary Economic Activities

- The simplest, closest to nature, use of earth products
  - Hunting & gathering
  - Agriculture and animal husbandry – growing plants and harvesting the fruit and raising animals for sale
  - Extracting minerals from the earth – various ores, crude oil, natural gas, etc.
  - Fishing
  - Lumbering



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Primary: Subsistence Agriculture

- Extensive Subsistence Agriculture – involves large areas of land and minimal labor input per unit of land.
  - Nomadic herding
  - Shifting cultivation (milpa; slash-and-burn; swidden); less than 5% of world's people engaged today
- Intensive Subsistence Agriculture – involves small land holdings and great amounts of labor per unit of land. – Nearly half of the world's people are engaged in it.
  - Traditional Chinese agriculture
  - Production of foodstuffs for sale in rapidly growing urban markets

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extensive subsistence agriculture

- Slash-and-burn agriculture – a form of crop rotation. Probably the most efficient use of the tropical lands in the long-term. Does not support a large population

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Intensive subsistence agriculture

- Labor Intensive

Green Revolution

- Seed and management improvements– grains.
- Increased production–1969-1999–4% increase in grain per capita world-wide
  - Chinese rice up 2/3 & India's wheat 100%
- Benefits not uniform – not much in Sub-Saharan Africa
  - Purchase of seeds [hybrids] & fertilizers and insecticides -- may be beyond the most needy's abilities
  - Consumer resistance to "engineered" crops
- Women benefited less – 1/3 to ½ of farm laborers – work longer hours & have lower incomes then men farmers – in some cultures women prohibited from land ownership.

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Green Revolution

- Emphasis on crops not generally grown in Africa south of the Sahara

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Early beneficiaries of the Green Revolution.

- Greatest need exists in Africa due the large population growth rate

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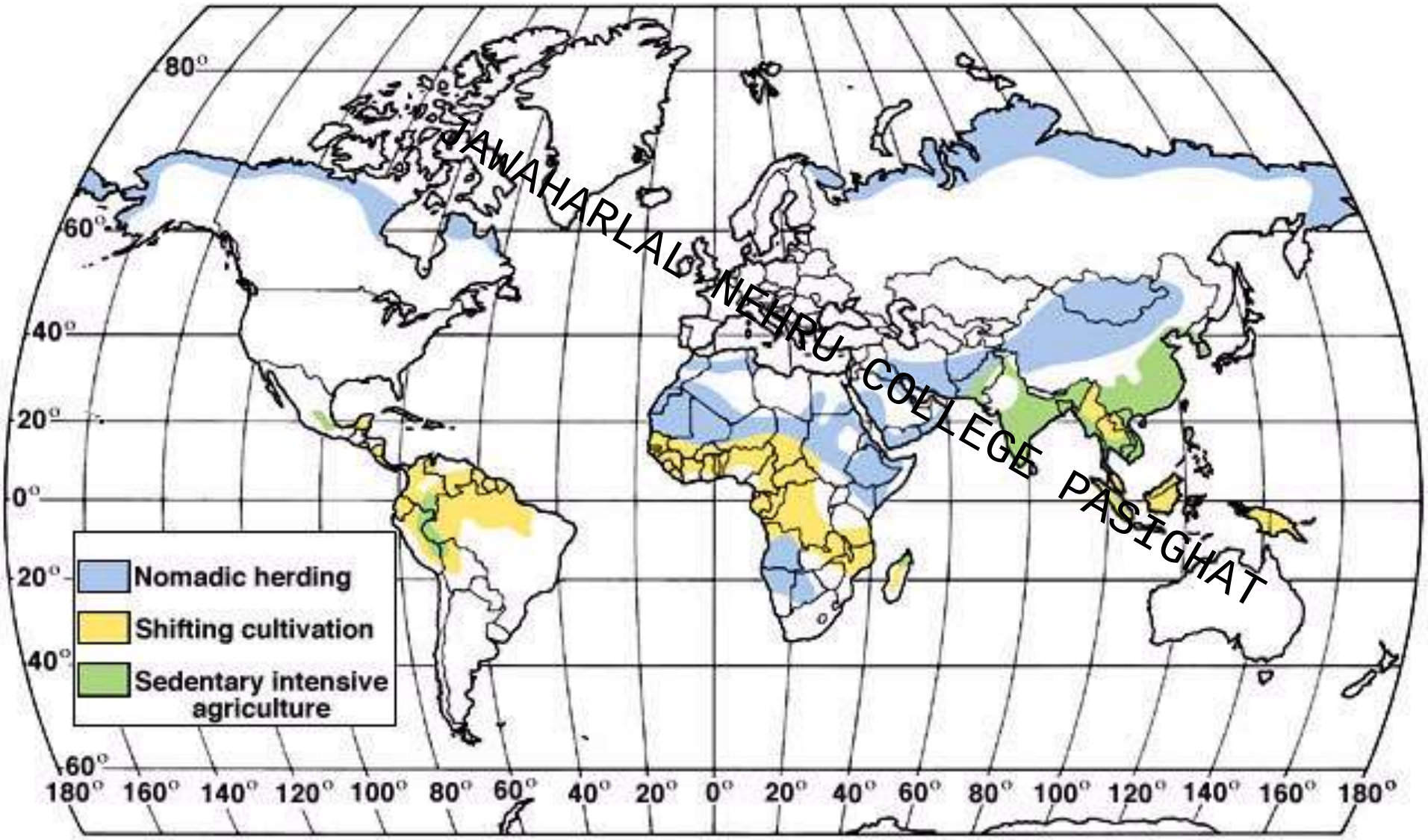
Subsistence Agriculture Areas



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Commercial Agriculture

- Often at the expense of domestic food needs
- Production Controls
  - Market forces – supply & demand
  - Profit motive – i.e. fewer pigs in Jersey County, IL
  - Competition
  - Government farm policies – price subsidies, etc.
- A Model of Agricultural Location – Von Thünen rings
  - Value of land varies inversely with distance
  - Highest value agriculture (intensive commercial agriculture) located near urban markets – truck farms
  - At greater distances, extensive commercial agriculture – wheat fields

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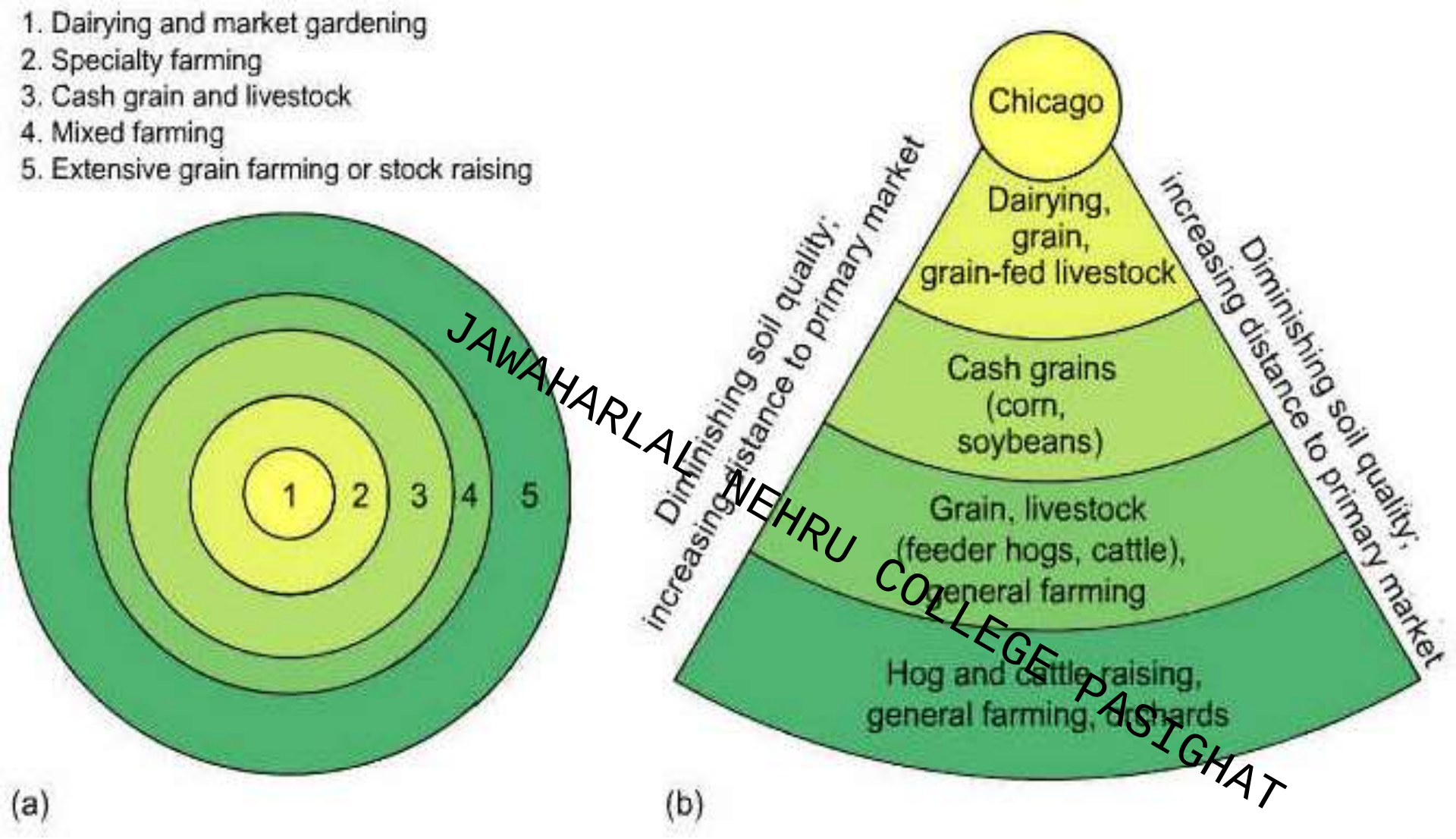

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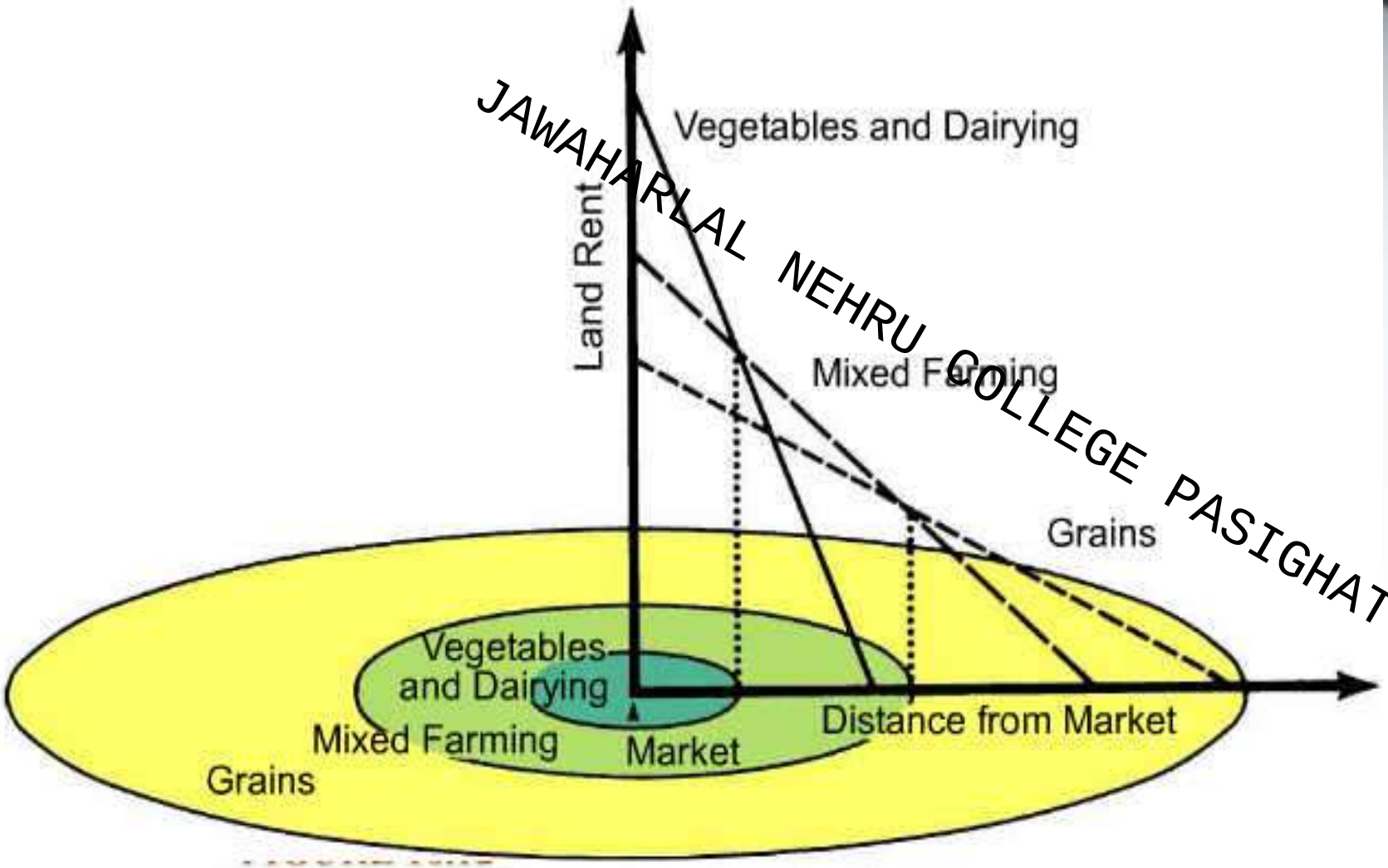
von Thünen rings

- Distance in transportation miles & mode not point-to-point miles – Calhoun County, IL

Land use affected by “rent” and distance from markets



Transport gradients and agricultural zones.

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Commercial Agriculture

- Intensive Commercial Agriculture
  - Higher value land & closer to markets
  - Use of much machinery, fertilizers, labor, etc.
  - Dairy farms, truck farms – perishables (refrigerated trucks & railroad cars extended the economic distance from markets)
  - Livestock-grain farming – farther from markets in U.S.
- Extensive Commercial Agriculture
  - Less expensive land & farther from markets
  - Wheat farms use expensive capital – combines are expensive so cooperatives may purchase some
  - Large land areas (low capital output per unit area)
  - Typified by large wheat farms and livestock ranching

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Agriculture: Special Crops

- Special circumstances, uaually climatic, make places far from markets intensively developed areas.
- Mediterranean agriculture
  - Year-round warmth and dry summers – irrigation may be needed
  - Grapes (wine), olives, oranges, figs, some vegetables – these desirable crops grow best in limited climate areas
- Plantations – tropical or warm subtropical climates
  - Usually foreign investment & may divert land from domestic subsistence farming resulting in need to import food
  - Often labor intensive -- employed alien labor forces
  - Produced 1 or 2 specialty crops: coffee, tobacco, rubber, bananas, pineapples, sugar cane, tea, jute, cacao

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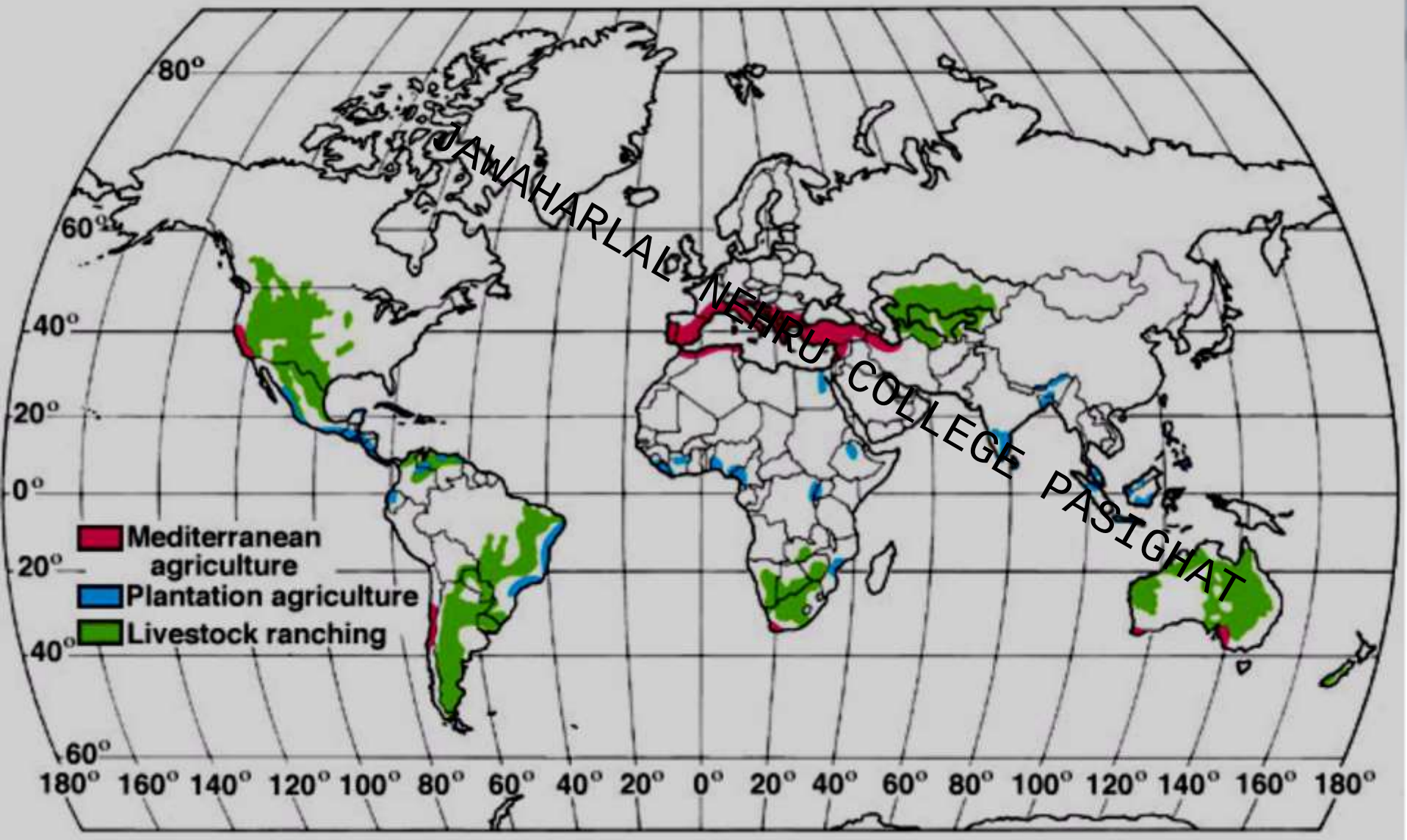
Ranching and Special Crops



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Agriculture: Planned Economies

- Subject to government planning and political goals
- Collective and state farms – tended to be inefficient
  - Lack of individual incentive
  - Emphasis on heavy industry and the military
  - “Private plots” introduced to improve productivity
- Toward privatization – decline of “communism”
  - 2000, only 5% of Russian of farmland privately operated
  - China: from collectives to communes to private – 180 mil. new family farms under rent-free leases
- Transition from command economies to market economies – difficult in agriculture and industry in countries that had called themselves communist

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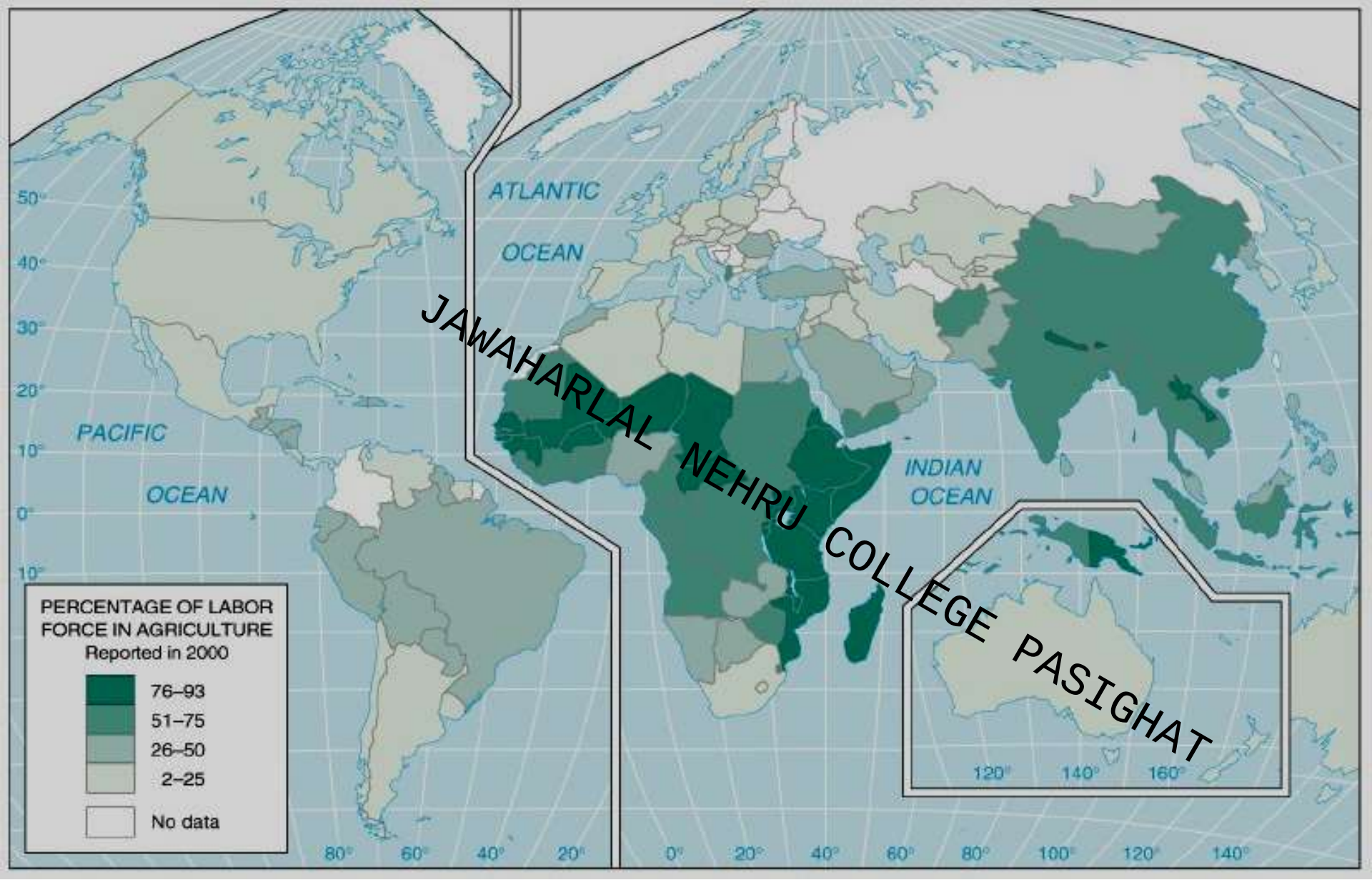

Percent labor force in agriculture

Other Primary Activities

- Fishing and Forestry – **renewable resources**
  - Goal should be **maximum sustainable yield**
- Mining and Quarrying – extracting
  - Exploiting an accident of nature – no correlation between area of country and quantity of resources
  - Transportation costs very important for low-value minerals (gravel, limestone, cement, and aggregate)
  - Nonrenewable resources – oil, coal, natural gas
  - Reusable resources – like metals (copper, lead, & iron)

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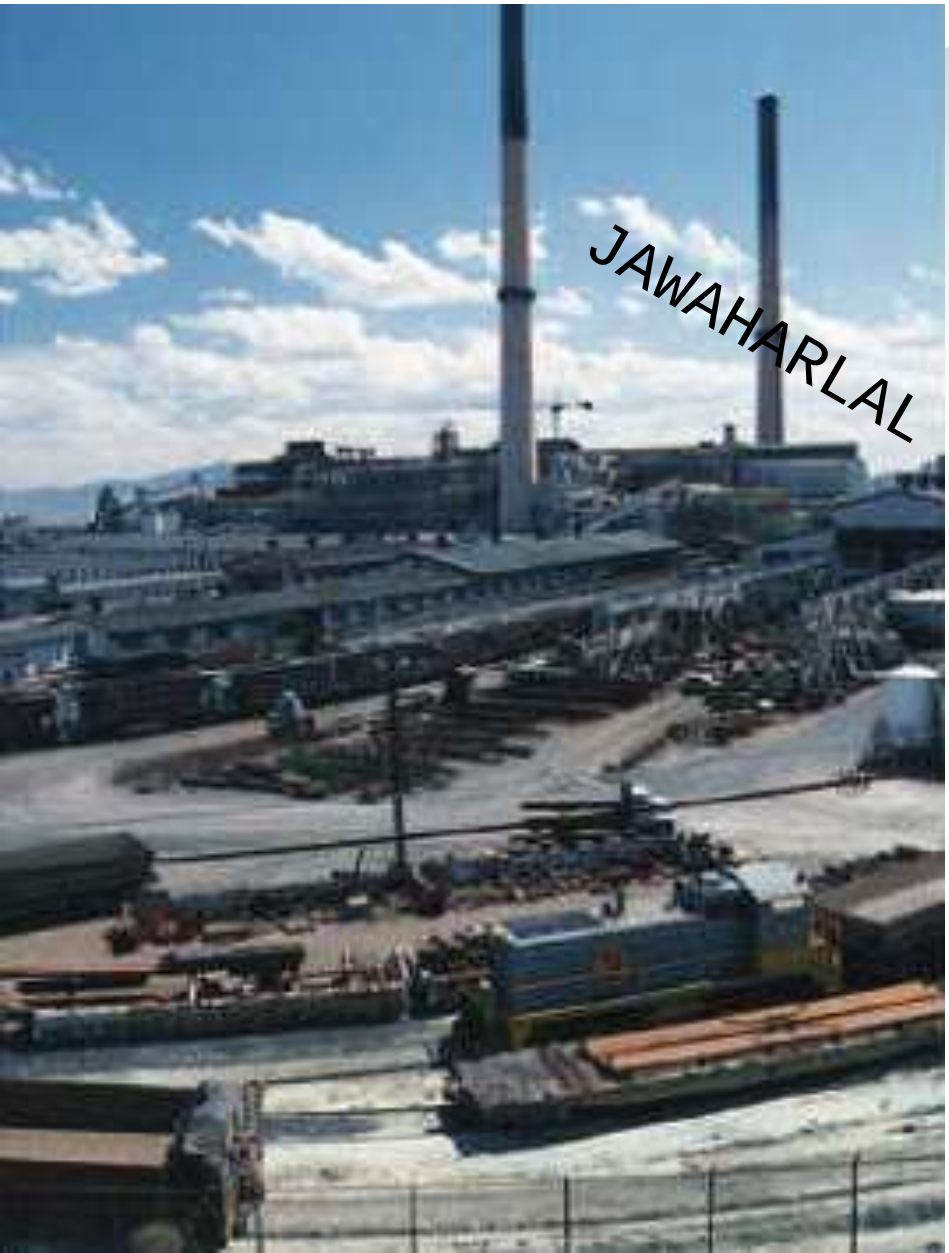
Lumbering – primary activity

Mining, etc.



- Affected by balance of three factors: quantity available, richness of ore, and distance to markets
- Land acquisition and royalty costs may equal the other three
- Competition may also be a deciding factor

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Trade in Primary Products

- Share (%) of world trade is declining
- Importance to Developing Economies
  - Depend on trade for foreign exchange revenue
    - Pay for needed imports
    - Source of capital investment
- Danger of Commodity Trade Dependence – could be at mercy of fluctuating world markets
  - Banana & coffee republics of Central America
  - Exception may be something like oil – OPEC changed the focus of power in that market

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Secondary Activities: Manufacturing

- Industrial Locational Models
  - Variable costs have important role in location decisions: transportation charges, labor rates, power costs, plant construction or operation expenses, interest rates of money, raw materials
  - Seeking to reach a large enough market cheaply enough to produce profits
  - Alfred Weber – placed much weight on transportation costs

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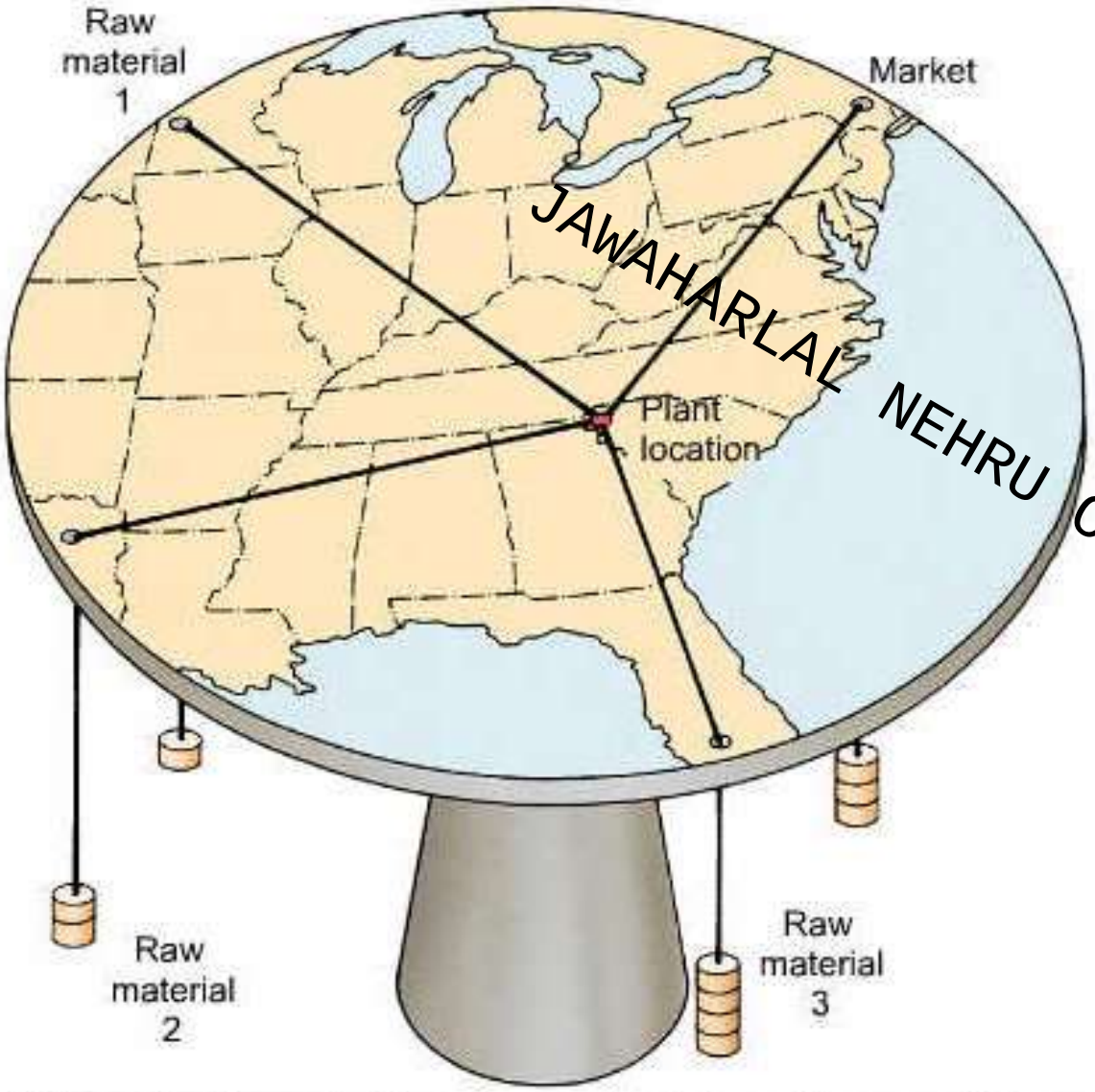
Weber's model visualized



Plane table solution to a plant location problem.

Rather rigid formula that may not give sufficient weight to factors other than location.

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Other Locational Considerations

- Transport Characteristics – declining cost factor
  - Cheapest is by water (rivers don't go everywhere)
  - Air is the most expensive per pound
- Agglomeration Economies
  - Industrial development tends to attract more
    - Parts suppliers – former Carter Carburetor
    - Complementary industries – tire manufacture near auto – FEDEX, UPS, car rentals, & hotels near major airports
  - Just-in-time approach dispenses with large parts inventories
  - Flexible production systems not rigid assembly lines

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Agglomerating tendencies

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Location: Comparative Advantage

- Areas tend to specialize in products for which they have the greatest relative advantage
- When other countries' comparative advantages reflect lower labor, land, raw material and capital costs, manufacturing activities may voluntarily relocate from higher-cost market locations – outsourcing by American firms – i.e. components may be made in Mexico and assembled in the U.S.A.
- NAFTA – attempt to keep outsourcing from going elsewhere & enlarge the whole market

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More on location

- Imposed Considerations or other considerations
  - Land use, zoning & environmental quality restrictions
  - Government area-development incentives
  - Local tax abatements & Sale of development bonds
  - Stability of government & its economic policies
  - Presence or lack of necessary infrastructure
- Multinational corporations play one location against another to get “best” deal for firm (usually reducing country’s benefit). Compete for auto assembly plant

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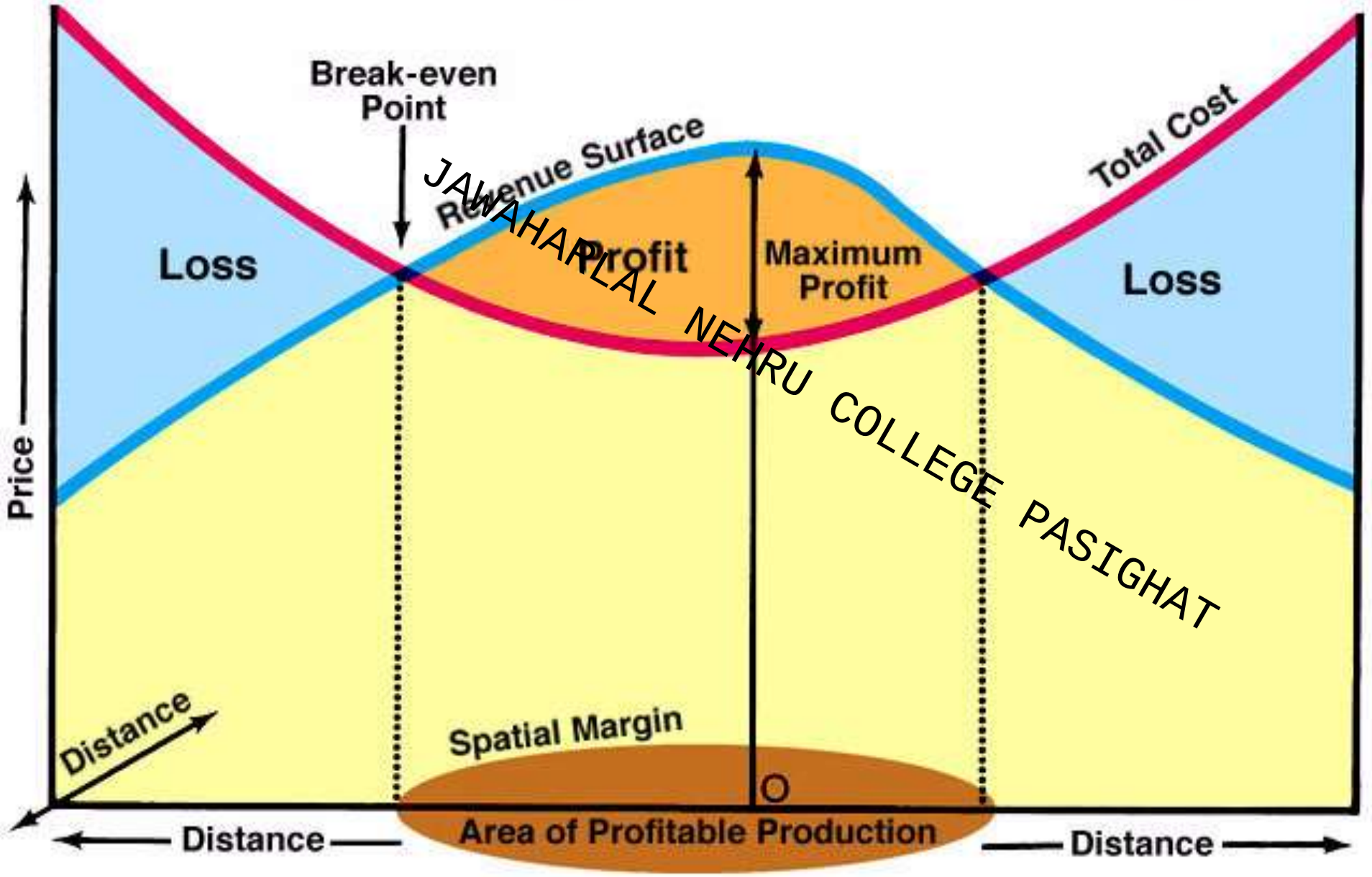
Spatial Margin of Profitability



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Transnational Corporations (TNCs)

- Growing international structure of modern manufacturing
- 90% of the largest 100 have headquarters in USA, Japan, or European Union.
- Benefits of foreign direct investment doesn't reach all countries – i.e. little reaches Africa
- Most capital flows go to advanced countries
- Take advantage of comparative advantage
- Often lose their original national identify & have budgets larger than many countries
- Very difficult to regulate

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Table 12-6 Triad Foreign -Investment Clusters

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United States	European Union	Japan
Argentina	Brazil	Hong Kong
Bolivia	CIS states	South Korea
Chile	Croatia	Thailand
Colombia	Czechoslovakia	
Mexico	Hungary	
Panama	Poland	
Philippines	Slovenia	
Saudi Arabia	Yugoslavia	
Venezuela		

Secondary Activities Continued

- World Manufacturing Patterns and Trends
  - Four major industrial clusters: Eastern Anglo-America, Western and Central Europe, Eastern Europe, and Eastern Asia
  - Post-industrial economies developing in Anglo-America and Europe (iron belt to rust belt)
  - Significant industrial clusters are developing in other places such as Mexico – pockets of development in the “third world”
- High Tech Patterns – emergence of “sun belt”
  - Electronics, robotics, less dependent on location of raw materials

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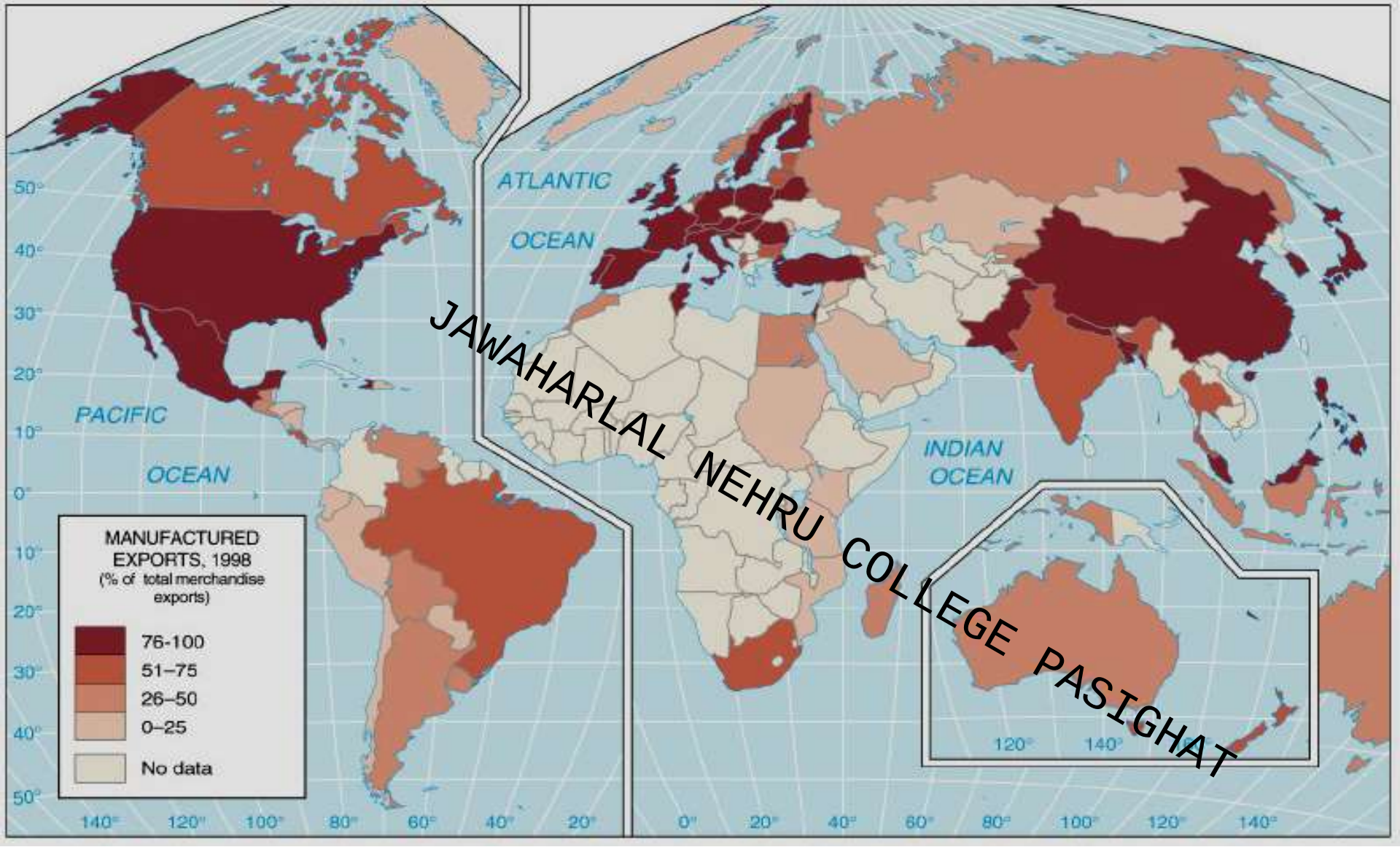

Manufactured Exports

Developing countries seek a bigger and better "piece of the pie"

- Banana plantations are declining in importance in Costa Rica, whereas there are growing numbers of workers in high-tech fields and tertiary and quaternary activities

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Factors promoting development

- Stable government
- Democratic government
- Arable (farmable) land
- Adequate resource base – quantity & variety
- Educated population
- Good relative location for commerce
- Well-developed infrastructure
- Positive attitudes toward:
  - Private ownership & Risk-taking
  - Work & responsibility (good work ethic)
- Human factors may be more important than physical

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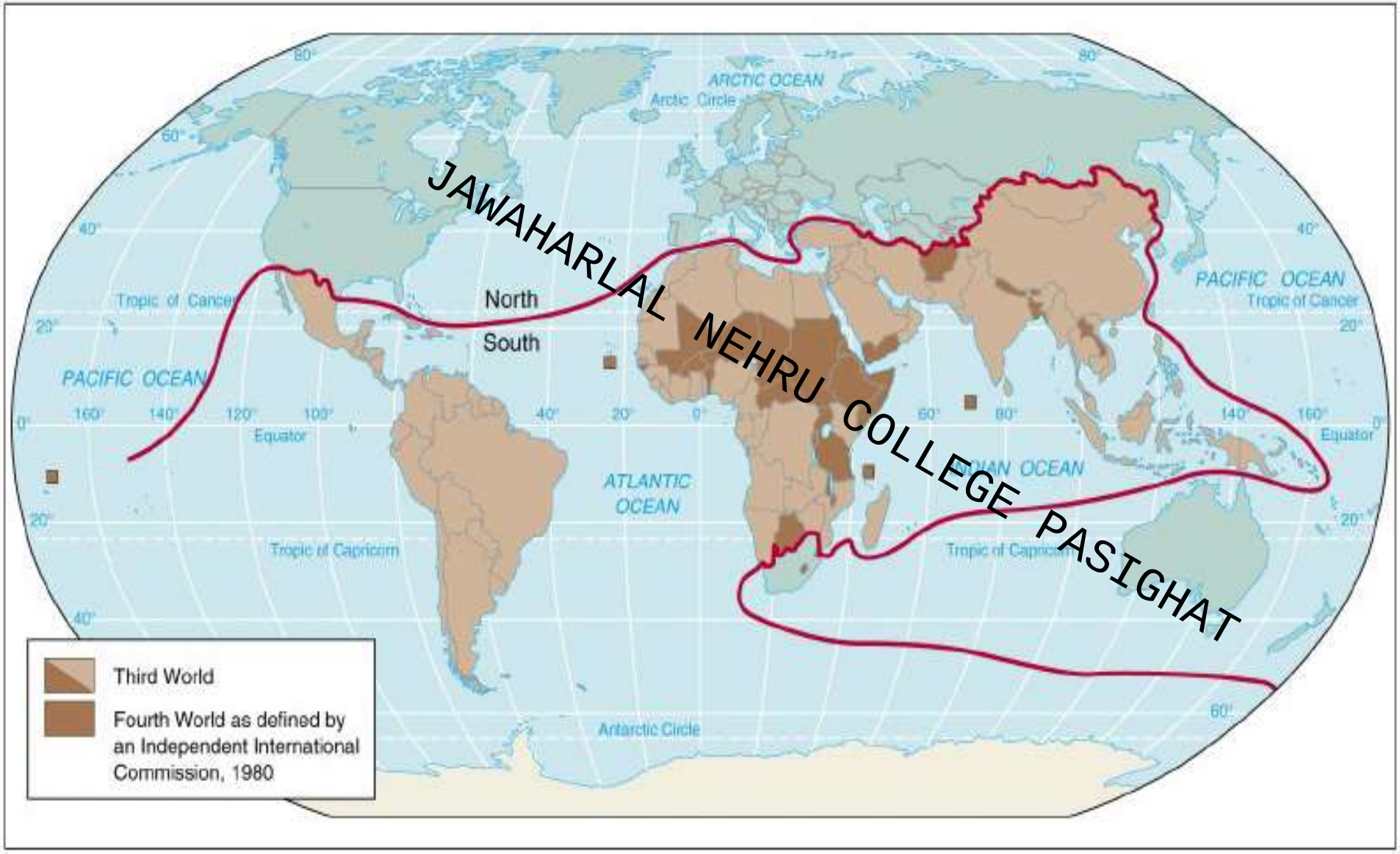
Developing Countries



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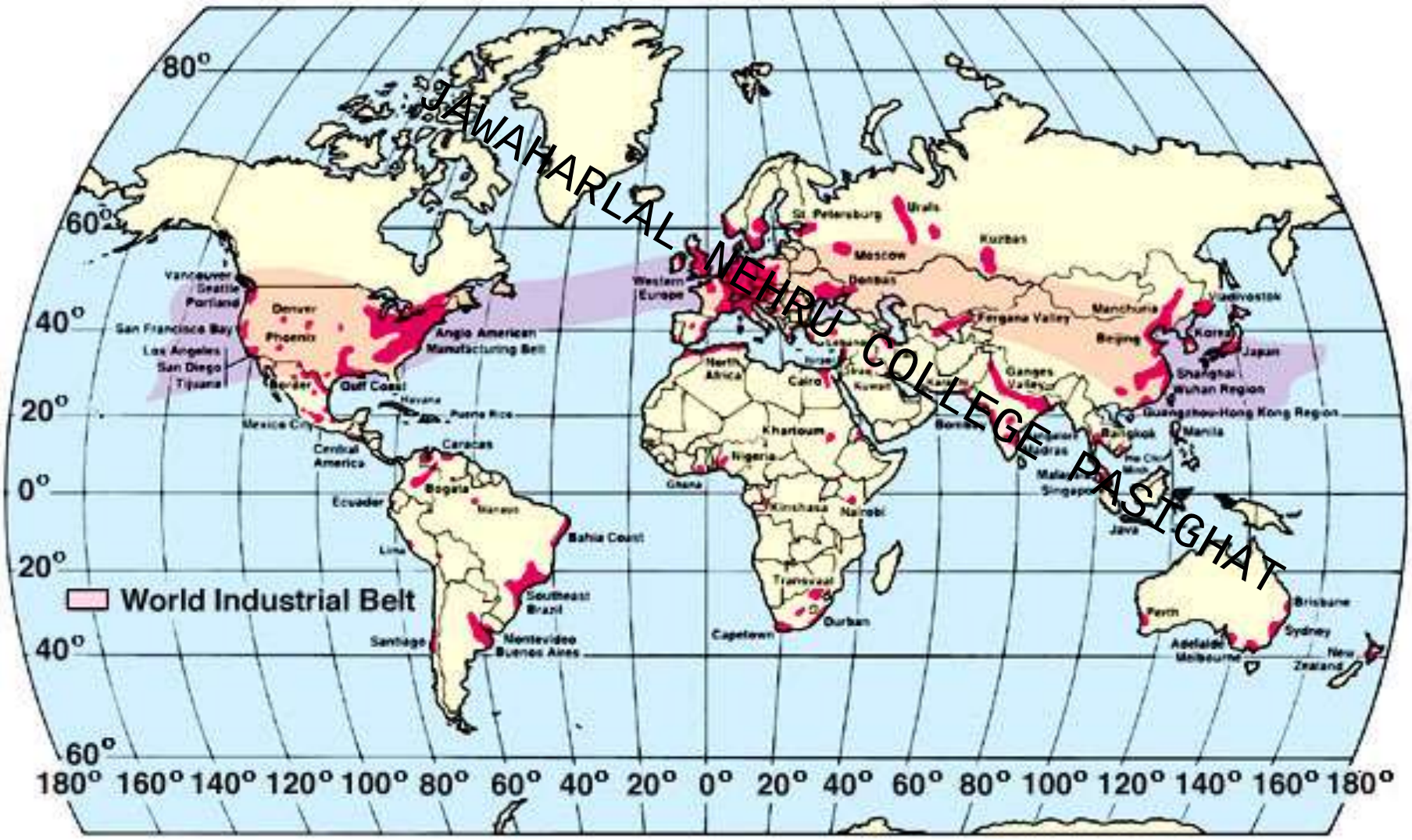
World Industrial Regions



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Industrial Revolution: Why England?

- Resources: had limestone, coal, and iron ore
- Government that encouraged business
- Large available workforce (Enclosure Acts)
- Sufficient number of capitalists – risk-takers
- Large market – domestic & colonial
- Good relative location – center of land hemisphere
- Large commercial fleet of ships
- Good water supply (water power & for steam)
- Good number of inventors (favorable environment)
- Available raw materials: wool – domestically & cotton from colonies – Egypt, India, America

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Post-Industrial Transition

- Shift from major emphasis on secondary activities
- Shift to dominance of tertiary activities
  - Quarternary
  - Quinary

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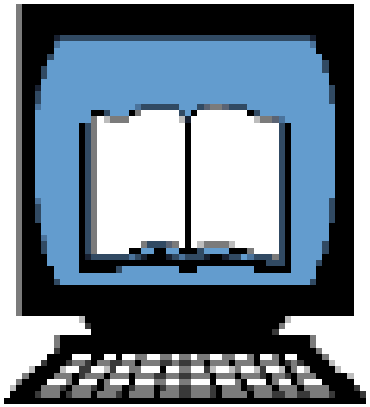

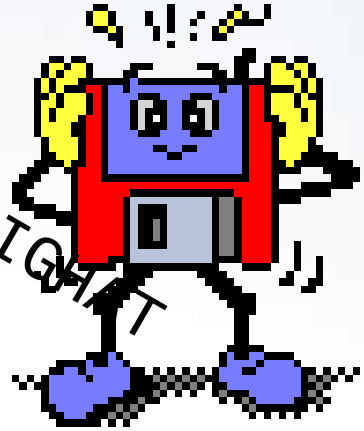

Tertiary and Beyond

- Tertiary Services – service sector
  - Growing sector in older, industrialized economies
  - Has replaced secondary activities as the largest sector in the U.S. economy
- Beyond Tertiary –
  - Quarternary – Advanced services
    - Information handling, management, research – particularly in the computer areas
    - Specialized knowledge, high-tech skills, i.e. national accounting firms (serving a nation-wide market)
  - Quinary – Executive decision-making
    - Special, highly-paid skills, top executives, etc.
    - Locate in places with the finest amenities

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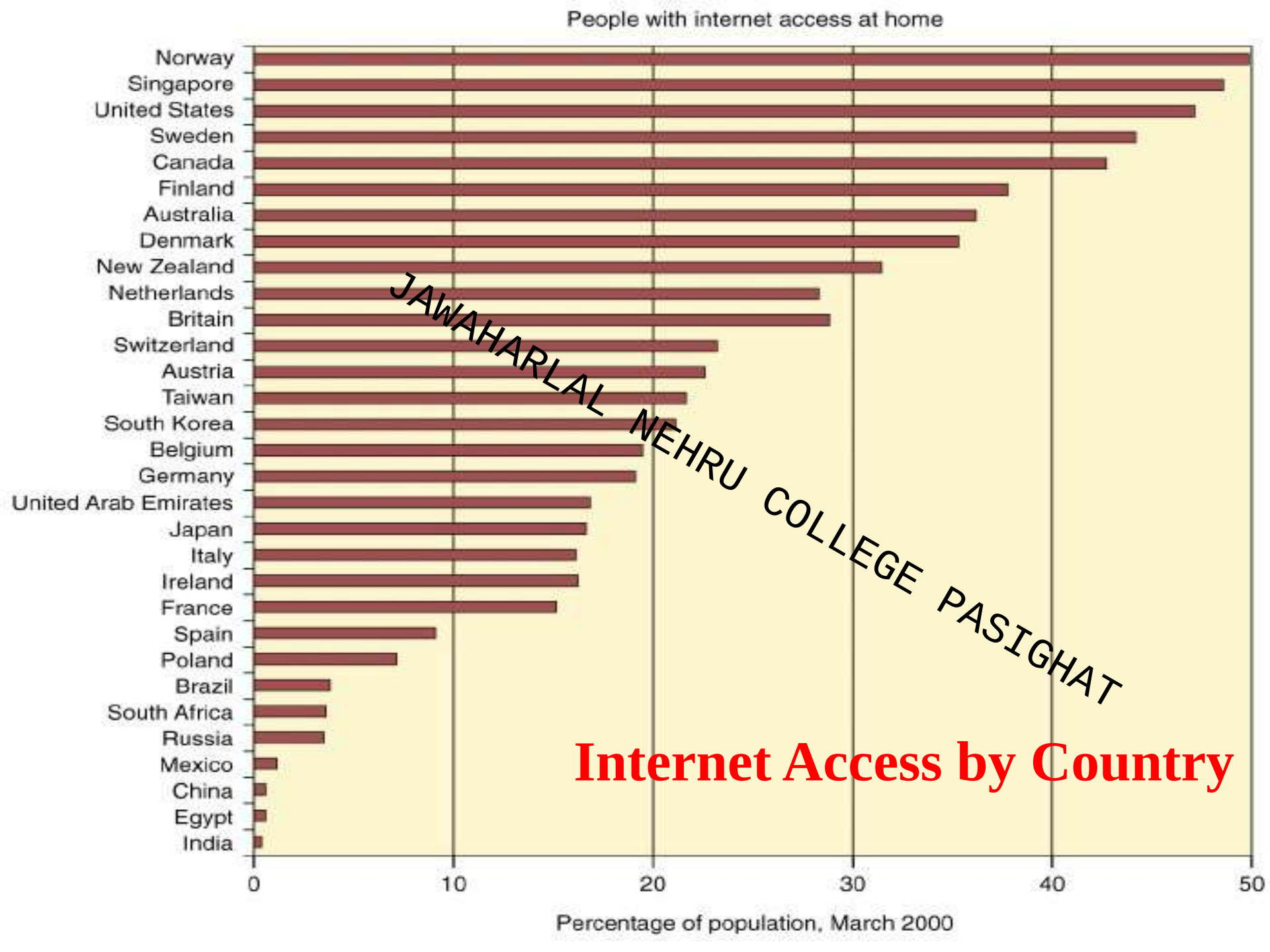
People with internet access at home
Norway
Singapore
United States
Sweden
Canada
Finland
Australia
Denmark
New Zealand
Netherlands
Britain
Switzerland
Austria
Taiwan
South Korea
Belgium
Germany
United Arab Emirates
Japan
Italy
Ireland
France
Spain
Poland
Brazil
South Africa
Russia
Mexico
China
Egypt
India
0
10
20
30
40
50
Percentage of population, March 2000
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Internet Access by Country

Services in World Trade

- Increasing Tradability of Services
  - Total of world trade in services
    - 1980 – 15%
    - 2000 – 25%
- Increased Access to Efficient, State-of-the-Art Equipment and Techniques
  - Facilitates the post-industrial shift
  - Adds credence to the old saying, “Knowledge is power.” Substitute for “knowledge” the ability to manipulate, regulate, even control information

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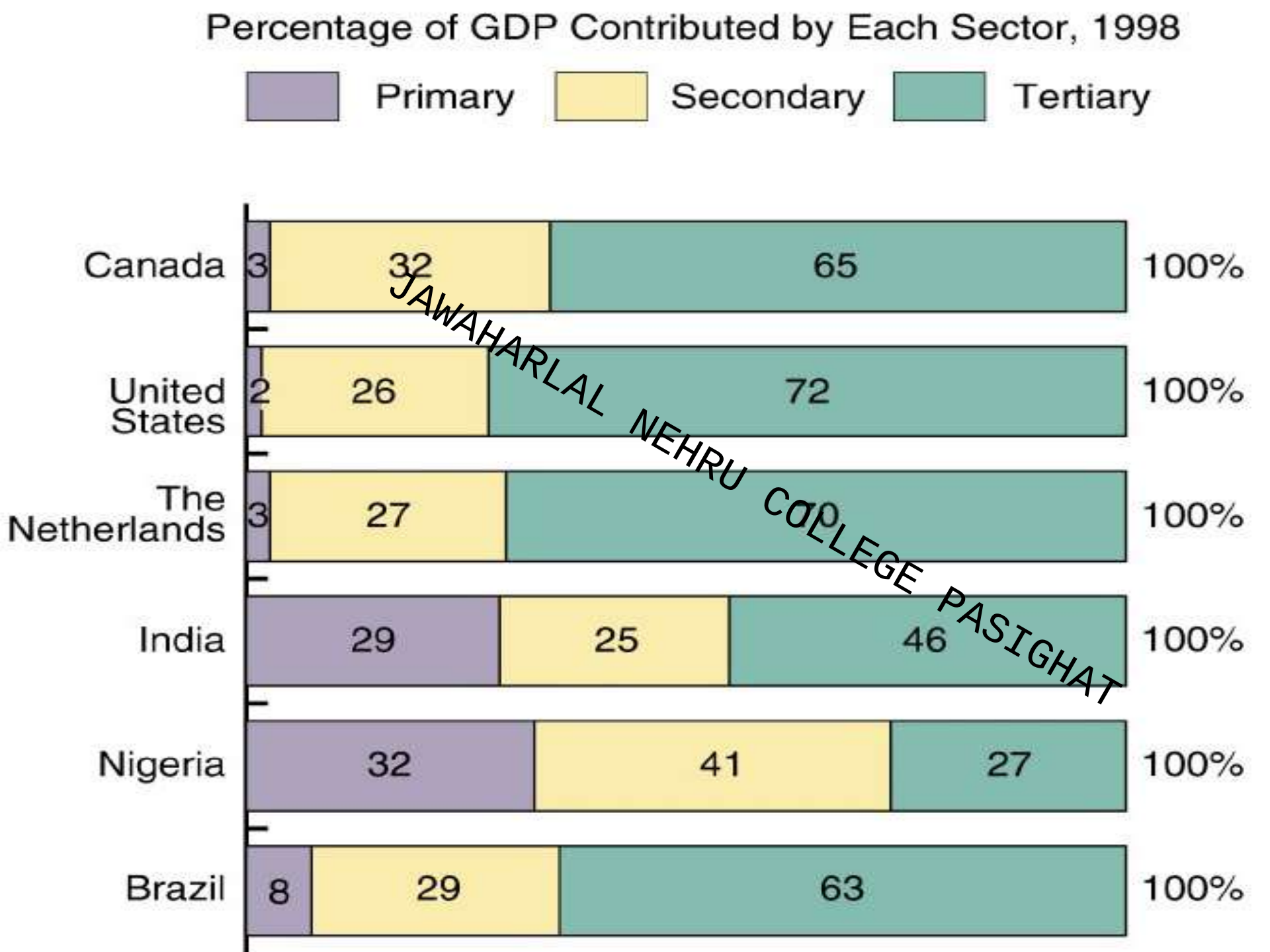

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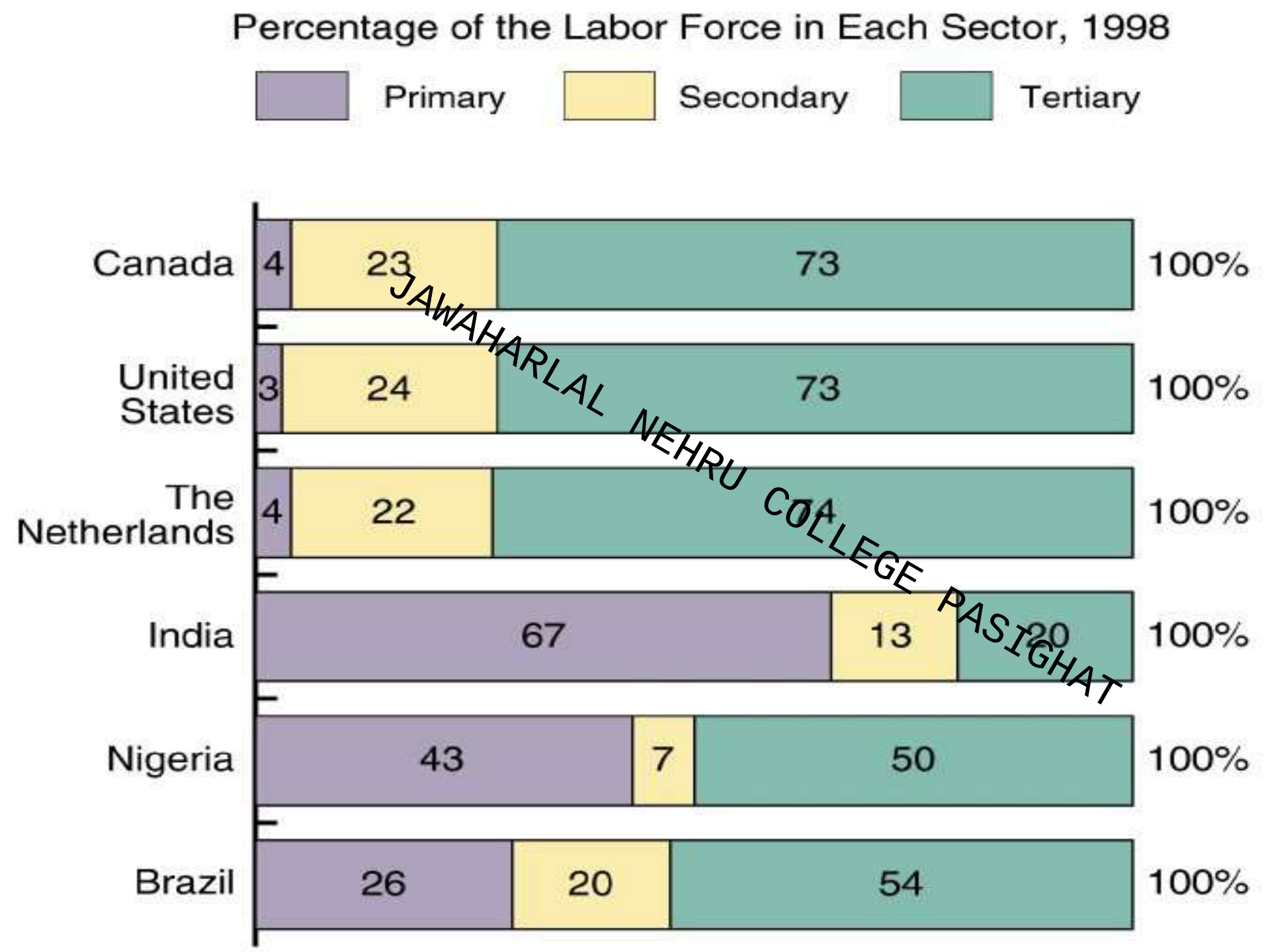

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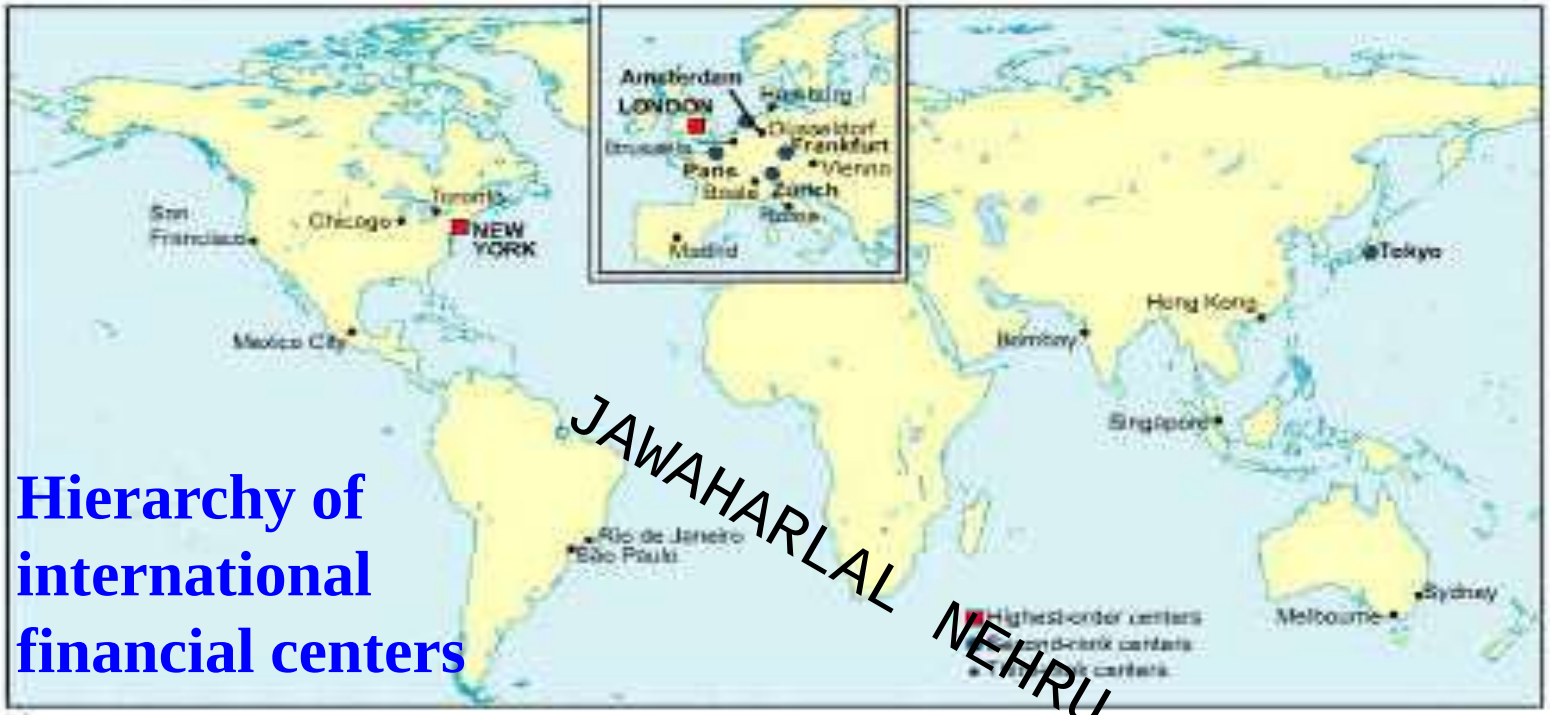

(a)

Hierarchy of international financial centers

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FINANCIAL SERVICES

(b)

Off-shore locations and "furtive money"

The hierarchy of international financial centers

Process of Developing is Difficult

- Factors facilitating development
  - Resources
  - Political stability
  - **Physical infrastructure**
  - Accessibility
  - **Social infrastructure**
  - Government policies favorable to direct foreign investment
  - Good relative location

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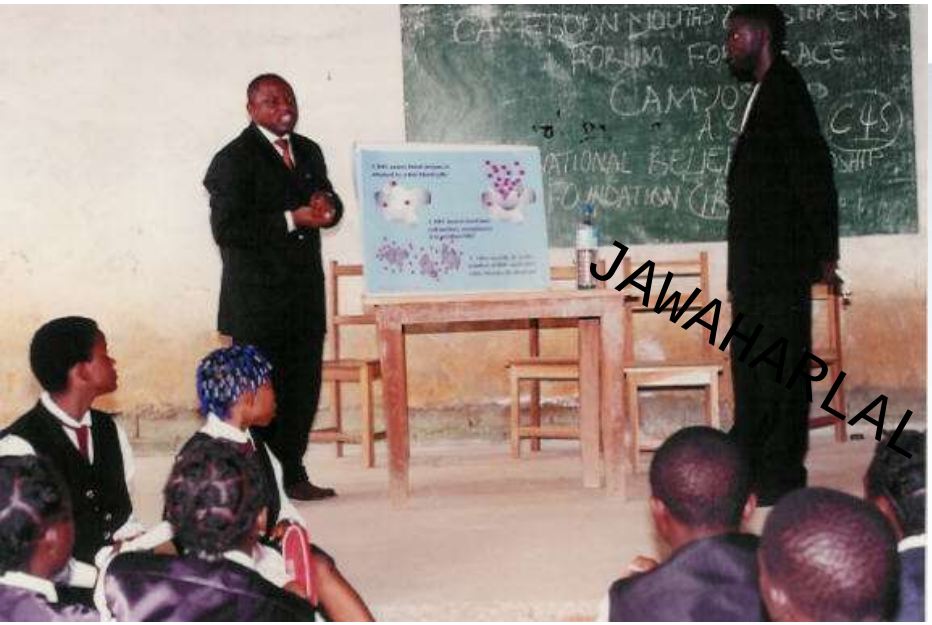
Infrastructure



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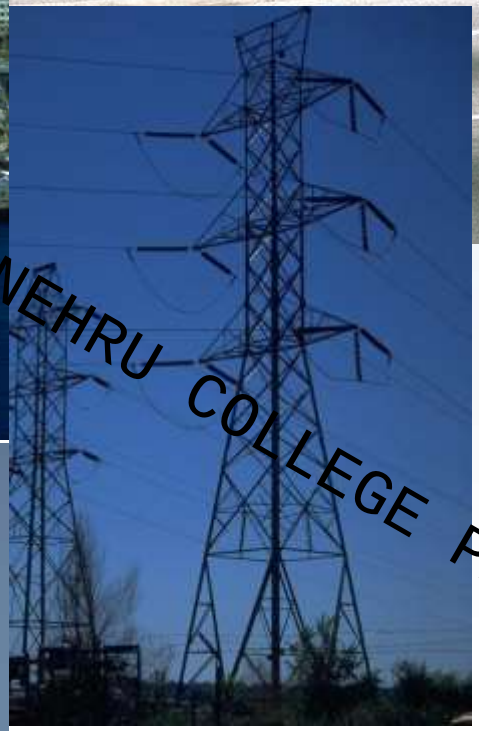
Infrastructure



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Infrastructure & accessibility

- Colonial railroads – “tap root”
- Poor rivers for transportation
- Poor relative location

FOREIGN DIRECT INVESTMENT, 1999
(billions of U.S. dollars)

- Over $5 billion
- $1 to $5 billion
- $0.5 to $1 billion
- Under $0.5 billion

China

Development

- Change in economic ideology – favorable government policies.
- On the Pacific Rim
- Near Japan
- Huge domestic market

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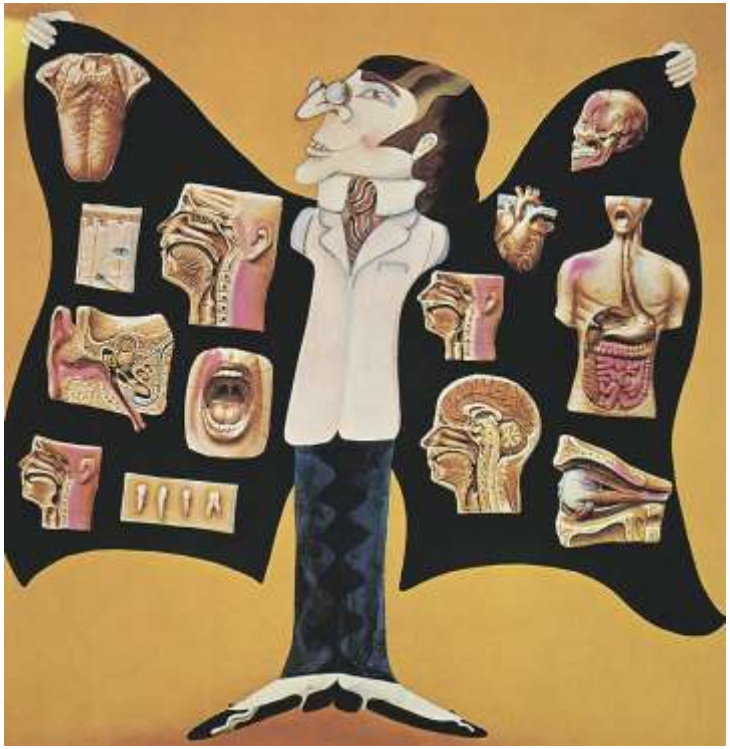
China: Strange Economic Mix

Illegal trade
in body parts

Click on the picture
to see the video



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Questionable
practices by Chinese
police and military

Click on the picture to
see the video

Some Key Points:

1. Physical environment varies over the earth
   - Pineapples aren't grown in Missouri but wheat is (soil & climate not suited to pineapples)
   - No megalopolis is forming in Rocky Mts. (remote area difficult to build roads etc.)
2. Unequal distribution of useful mineral deposits
   - Some countries blessed – US & Britain
   - Some countries not blessed – Japan
   - Some have mixed blessing – Russia

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Some Key Points:

3. Cultural considerations affect choices
   - Pigs not raised in Muslim areas -- religion
   - Starvation in India – most cows in world
   - Masai would not consider becoming farmers
   - Masai prefer 25 sick cows to 10 healthy ones (numbers considered more important)
4. Technological Development
   - Native Americans didn't mine coal or iron ore (tools & manufacturing technology)
   - Bushmen displaced by Bantu migration
   - Native Americans couldn't stop European advances (military technology)

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Some Key Points:

5. Exposure to ideas (relative location)
   - Aborigines were almost completely isolated – no trade & stimulus of ideas
   - Spread of Industrial Revolution in Europe & North America

6. Political decisions
   - British taxing policies encouraged growth of business that led to Industrial Revolution
   - Spanish taxing policies did not encourage business growth and development

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Some Key Points:

7. Economic Factors for development
   - Type of market structure
   - Local demand for products
   - Existence of export markets
   - Level of infrastructure

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Outdated Classification

- First World Countries
- Second World Countries
- Third World Countries

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First: Non-Communist, Developed

- **Industrialized, advanced countries – developed**
- **Mixed-market economy**
- **Well-developed infrastructure**
  - **Transportation**
  - **Communication**
  - **Education**
- **Relatively low population growth rate**
- **The average diet is more than sufficient**
- **Good health care is available**
- **Democratic government (usually)**
- **Examples: USA, Britain, France, Canada, Japan**

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Second: Communist Countries

- Countries that **call themselves COMMUNIST**
- Some are somewhat industrialized
- Socialist economies (mixed, but heavy on the command economy elements)
- Infrastructure development varies
- Population growth rate may vary greatly
- Average diet usually nearly adequate to adequate
- Health care available to all but quality may vary
- Totalitarian government
- Examples (few): China, Vietnam, N. Korea, Cuba

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Third: Non-communist, developing

- Limited secondary activity – mostly primary
- Mixed market economy (often highly socialized)
- Poorly developed infrastructure – not uniformly developed
- High population growth rate in most countries
- Average diet probably insufficient
- Poor health care, particularly outside the cities
- Government sometimes democratic, but often civilian or military dictatorships – trend toward democracy has been growing
- Levels of development varies among and within states

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Environmental quality

- In the drive to industrialize and achieve high mass consumption, countries often allow firms to pollute
- Costs of pollution are often difficult to quantify
  - Costs of cleaning-up/preventing are fairly easy for firms to estimate–costs passed to consumers
  - Linking pollution & problems not easy to do
  - How does one quantify reduced quality of living?
    - Medical costs for respiratory problems & cancer
    - Damage to & loss of plants, animals, & material objects
    - Heat and noise pollution

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Environment cont.

- Industrial revolution seems to have introduced, at least at a larger scale, a new trade-off:
  - More material possessions for reduced quality of life
- KEY POINT: technology is not evil – it is neutral – it is merely a tool:
  - Humans choose how to use technology
  - Humans can choose to use more costly, but environmentally friendly technology
  - If all firms use environmentally friendly technology, competition will really not be affected

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The Age of Exploration

DR K K MISHRA

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Great Voyages of Discovery

The Big Idea

European explorers made discoveries that brought knowledge, wealth, and influence to their countries.

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Main Ideas

- Europeans had a desire and opportunity to explore.
- Portuguese and Spanish explorations led to discoveries of new trade routes, lands, and people.
- English and French explorers found land in North America.
- A new European worldview developed because of the discoveries.

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Main Idea 1:
Europeans had a desire and opportunity to explore.

An interest in discovery and exploration grew in Europe in the 1400s. Improvements in navigational tools, cartography, and shipbuilding allowed European sailors to go farther than ever before.

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Reasons to Explore

- People in Europe wanted goods from Asia. Italy and Egypt controlled the trade routes and charged high prices. Europeans wanted to find their own trade routes so they wouldn't have to pay the fees.
- Christians wanted to spread their ideas about religion to other parts of the world.
- Some explorers were simply curious about what lay on the other side of the ocean.

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Advances in Technology

- Sailors now had instruments such as the astrolabe and the compass to find new routes.
- More accurate maps allowed sailors to travel from one port to the next using the open sea and not having to follow the coast.
- Shipbuilding, especially by the Portuguese, made new ships with better sails and better steering.

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Main Idea 2:
Portuguese and Spanish explorations led to discoveries of new trade routes, lands and people.

A man who never went on any sea voyages was responsible for most of Portugal's success on the seas. Known as **Prince Henry the Navigator**, he built an observatory and a navigation school, and paid people to sail on explorations.

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Exploration

- Even with new technology, travel on the open seas was still very dangerous.
- In spite of the dangers, Portuguese explorers sailed south looking for a water route to Asia.
- As they traveled south, they set up ports along the way.
- In 1488 Bartolomeu Dias sailed around the southern tip of Africa but had to turn back due to the raging sea.
- In 1498 Vasco de Gama sailed around Africa and landed on the west coast of India.
- This established the sea route to Asia.

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A "New World"

- One Italian sailor, Christopher Columbus, believed that he could reach Asia by sailing west across the Atlantic.
- The king and queen of Spain gave Columbus the money to make his journey.
- In October 1492, Columbus landed on a small island in the Bahamas. He believed that he had reached Asia.
- Ferdinand Magellan was the first explorer to sail around the tip of South America and go around the globe.
- The lands that were discovered on these explorations were known as the "New World." Before these journeys, the continent of the Americas was not known to have existed.
- Spanish explorers in the New World found gold and silver as they conquered the empires there, but passed along diseases to the native peoples that killed possibly more than three-quarters of them.

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Main Idea 3:
English and French explorers found land in North America.

- Like Spain and Portugal, England and France wanted to find a route to Asia to bring back spices and other goods.
- They also hoped to find riches in the New World.

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Exploring New Lands

- Since the Spanish and Portuguese already held the southern routes through the Americas, the English and French explored northern routes.
- John Cabot, sailing for England, sailed west to the coast of Canada.
- Jacques Cartier, a Frenchman, sailed up the Saint Lawrence River into Canada.
- Although a northern route to Asia was not established, these explorers claimed northern lands for England and for France.

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The Spanish Armada

- The Spanish controlled the gold and silver from the former Aztec and Inca empires.
- An English sailor named Francis Drake began stealing gold and silver from the Spanish ships.
- The Spanish were angry with the English for these raids and sent 130 ships, known as the **Spanish Armada**, to attack England.
- However, the English ships were faster and had better weapons. They were able to defeat the Spanish and destroy over half their fleet.
- This weakened the Spanish Empire and allowed England to gain power.

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Main Idea 4:
A new European worldview developed because of the discoveries.

These voyages of discovery changed the way the Europeans thought of the world and their place in it.

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A New European Worldview

- The explorations brought new knowledge and geography and proved that some old beliefs were wrong.
- Improved mapmaking, or **cartography**, showed new lands and new possible trade routes.
- New trade routes gave new opportunities for wealth and resources.
- Europeans could now spread their influence around the world.

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The Columbian Exchange

The Big Idea

The exchange of plants, animals, ideas, and technology between the Old World and the New World brought many changes all over the world.

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Main Ideas

- Plants and animals were exchanged among Europe, Asia, Africa, and the Americas.
- Culture and technology changed as ideas were exchanged between Europe and the Americas.
- Society and the economy changed in Europe and the Americas.

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Main Idea 1:
Plants and animals were exchanged among Europe, Asia, Africa, and the Americas.

European explorers set out to find routes to Asia, but their discovery of new lands and new people had an effect they never imagined.

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The Columbian Exchange

- The exchange of plants, animals, and ideas between the New World (the Americas) and the Old World (Europe) is known as the **Columbian Exchange**.
- Exchanges occurred when Europeans took seeds to plant crops in the New World.
- Europeans also took animals such as cows, goats, sheep, horses, and chickens to the New World.
- Accidental exchanges took place when Europeans brought over diseases or animals such as rats that hid in ships.

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New World Plants and Animals

- While Europeans introduced plants and animals to the New World, they also found things they had not known about.
- They took samples back to their home countries as well as to Africa and Asia.
- Vegetables such as tomatoes, potatoes, and squash, as well as plants such as tobacco, had never been seen before.
- These products went around the world. Many of them grew well in other countries, so they are now a part of those cultures.

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Main Idea 2:
Culture and technology changed as ideas were exchanged between Europe and the Americas.

Along with plants and animals, ideas were also exchanged. Technology and culture were taken to the new lands that were explored.

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Exchanges of Culture

- Two of the biggest cultural changes that the Europeans brought to the New World were religion and language.
- Christians set out to convert people in the new lands to their religion.
- Missionaries went all over the world. In some places their religion blended with the local religion to create new kinds of religion.
- Missionaries also built schools and taught the natives European languages such as Spanish, Portuguese, and Dutch.

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Exchanges of Technology

- Europeans took guns and steel to parts of Africa and to the Americas. They also introduced ways to use the wheel in the Americas.
- Horses were introduced for riding, as well as for carrying heavy loads. Oxen were introduced for plowing fields.
- Animals were used to carry the silver from mines. Sheep created a new industry when people began making textiles.
- People began to grow sugarcane on **plantations**, or large farms.

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Main Idea 3:
Society and the economy changed in Europe and the Americas.

As industries changed in some places, Europeans increased trade with Asia and the Americas. Their change had huge social and economic effects, especially in Africa and in the Americas.

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Treatment of American Indians

- Plantations and mines made money for Portugal, Spain, and some colonists in the Americas.
- However, the plantation life and mining made for bad treatment of American Indians.
- The Spanish colonists forced American Indians to work on the plantations. Hard work and disease killed many.
- Some clergy in the Americas called on the Spanish government to help the Indians. Laws were passed to protect them, but not all colonists followed the new laws.

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Slavery

- So many American Indians died that colonists looked elsewhere for laborers.
- Since African slaves had already developed immunity to European diseases, the colonists began to ship thousands of slaves from Africa to the Americas.
- Social order in the Americas consisted of Europeans as the upper class, and Africans, American Indians, and others of mixed race as the lower class.
- This social order was based on conquest and racism. **Racism** is the belief that some people are better than others because of racial traits, such as skin color.
- Slave labor continued in the Americas until the 1800s.

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Origins of Capitalism

The Big Idea

Changes in international trading and marketing patterns influenced the development of a new economic system called capitalism.

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Main Ideas

- A new economic system called mercantilism emerged.
- New trading patterns developed in the 1600s and 1700s.
- Power in Europe shifted as a result of new trade routes, banking, and increased manufacturing.
- Market economies changed business in Europe.

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Main Idea 1:
A new economic system called mercantilism emerged.

The exchange of products between European countries and their colonies changed economic relations around the world.

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Mercantilism

- **Mercantilism** is a system in which a government controls all economic activity in a country and its colonies to make the government stronger and richer.
- Mercantilism was the main economic policy in Europe between 1500 and 1800.
- European colonies were allowed to trade only with their home country. The colonies acquired raw materials such as wood, fur, cotton, and dye and sent them back to Europe.
- The home country would take the raw materials and turn them into manufactured goods, which they would then sell back to the colonies.
- This allowed the countries to build up their wealth, and the trade created markets for their manufactured goods.

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Main Idea 2:
New trading patterns developed in the 1600s and 1700s.

Mercantilism created new trading patterns around the world.

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New Trading Patterns

- One major trading pattern involved the exchange of raw materials, manufactured products, and slaves among Europe, Africa, and the Americas. This type of trade was called triangular trade.
- The Atlantic slave trade was a major part of the trade network. The Portuguese, Dutch, and English were all active in the slave trade.
- Between the 1500s and 1600s, millions of slaves were shipped to the colonies in the New World. Enslaved Africans were crammed onto ships and sent mainly to South America and the Caribbean.

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Main Idea 3:
Power in Europe shifted as a result of new trade routes, banking, and increased manufacturing.

New trade routes, banking, and increased manufacturing brought more wealth to England and the Netherlands. They also shifted the economic power in Europe.

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The Shift of Power

- England benefited greatly from increased trade with China and India, as well as with North America.
- The Netherlands became a great trading power when Dutch merchants formed a company that traded directly with Asia.
- The Netherlands also became a center for banking. Jews who had migrated to the Netherlands to avoid religious persecution played a role in the banking industry. The Christian Church did not want its members to lend money, so the Jews entered the banking business.
- The Jews were so successful in the banking business that the English invited them to come to England to improve business there as well.

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Main Idea 4:
Market economies changed business in Europe.

Economic growth and new wealth changed business in Europe. Because more people had wealth, they were buying more manufactured goods. The demand for goods increased.

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Economic Growth

- The growth of manufacturing economies was caused by increased demand.
- Demand was increased by a growing population, lower expenses for food, and more colonies.
- As demand grew, businesspeople tried to find new and better ways to produce their goods. They wanted to increase their supply to meet the demand.

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Capitalism and Market Economies

- **Capitalism** is an economic system in which individuals and private businesses run most industries. Competition among these businesses affects the cost of goods.
- Competition works best in a **market economy**, in which individuals decide what goods and services they will buy.
- In the 1800s, capitalism would become the economic system of most countries in the world.

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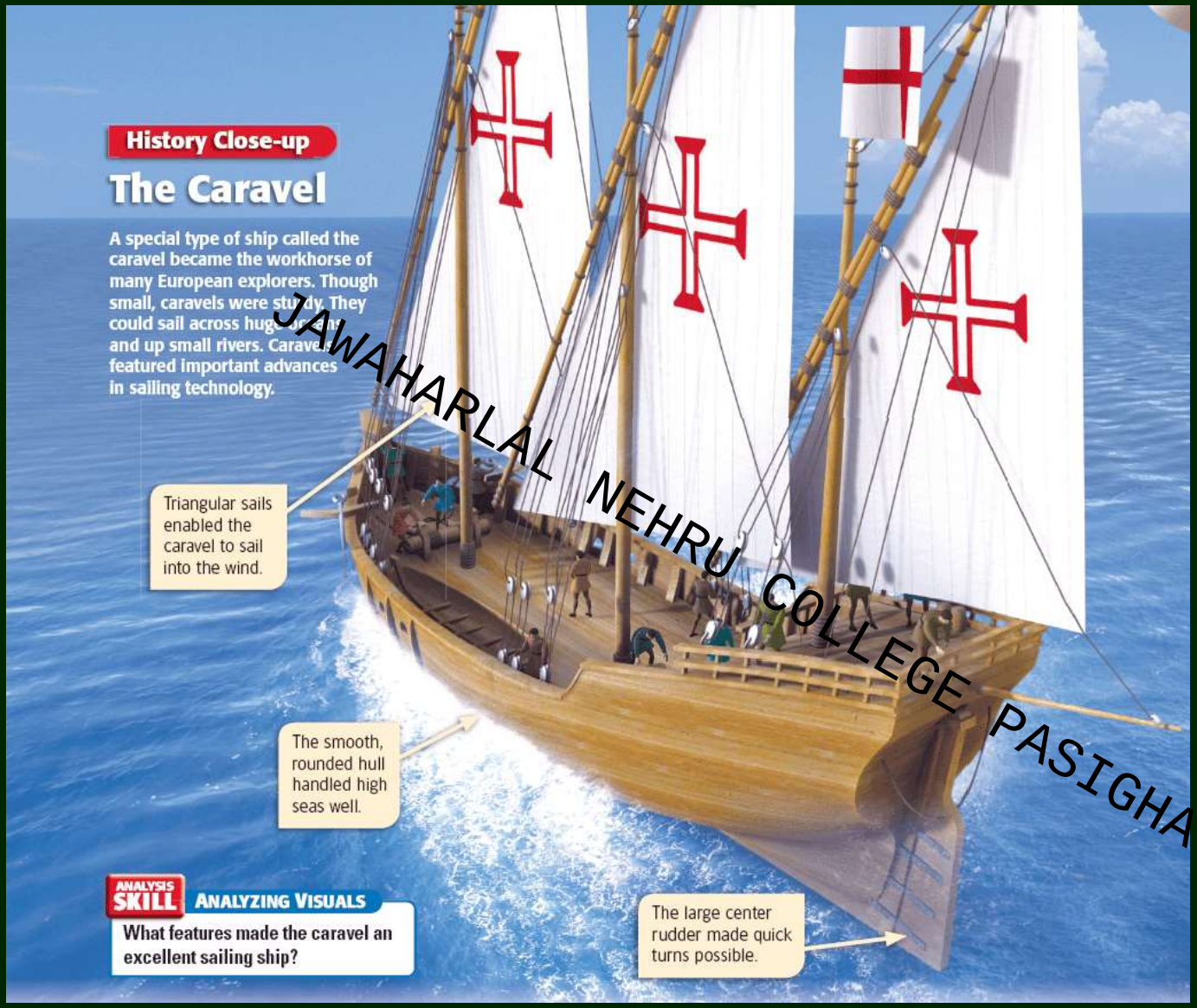

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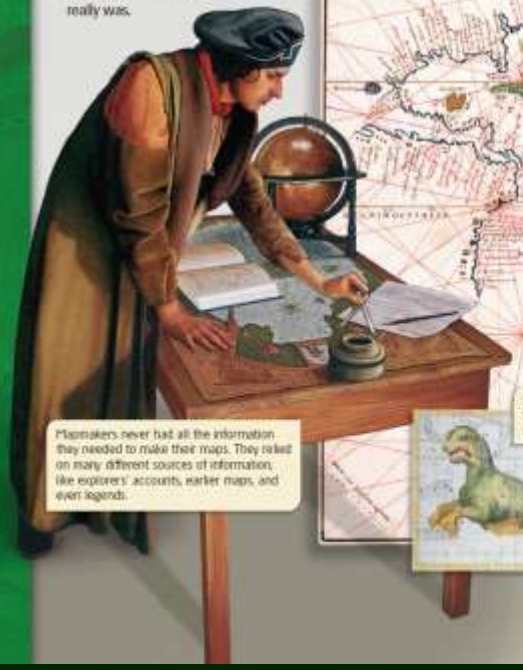
Mapping New Worlds

During the Age of Exploration, Europeans began to learn more about the size and shape of the world. Sailors and explorers traveled to new lands and brought back new information about places. Then professional mapmakers used this knowledge to create maps. As explorers traveled farther, what had been blank areas on earlier maps disappeared, and people began to see how the world really was.



Mapmakers never had all the information they needed to make their maps. They relied on many different sources of information, like explorers' accounts, earlier maps, and even legends.

1536 This map from 1536 shows that the mapmaker was familiar with the coasts of Europe and Africa, but knew less about the Americas. In North America, for example, the coastline is not very accurate, and the interior is completely blank.

Many early mapmakers illustrated their maps with legendary monsters like this one.

1650 This 1650 map is more complete than the 1536 map. Much of the interior of North America is shown, but there are still errors. For example, California is shown as an island.

1820 This 1820 map [illegible] more complete than the first two. It is also more accurate. Still, some areas are blank.

GEOGRAPHY SKILLS INTERPRETING MAPS

1. **Location** What continents can you identify on the 1536 map?
2. **Place** Why did the shape of North America on these three maps change over time?

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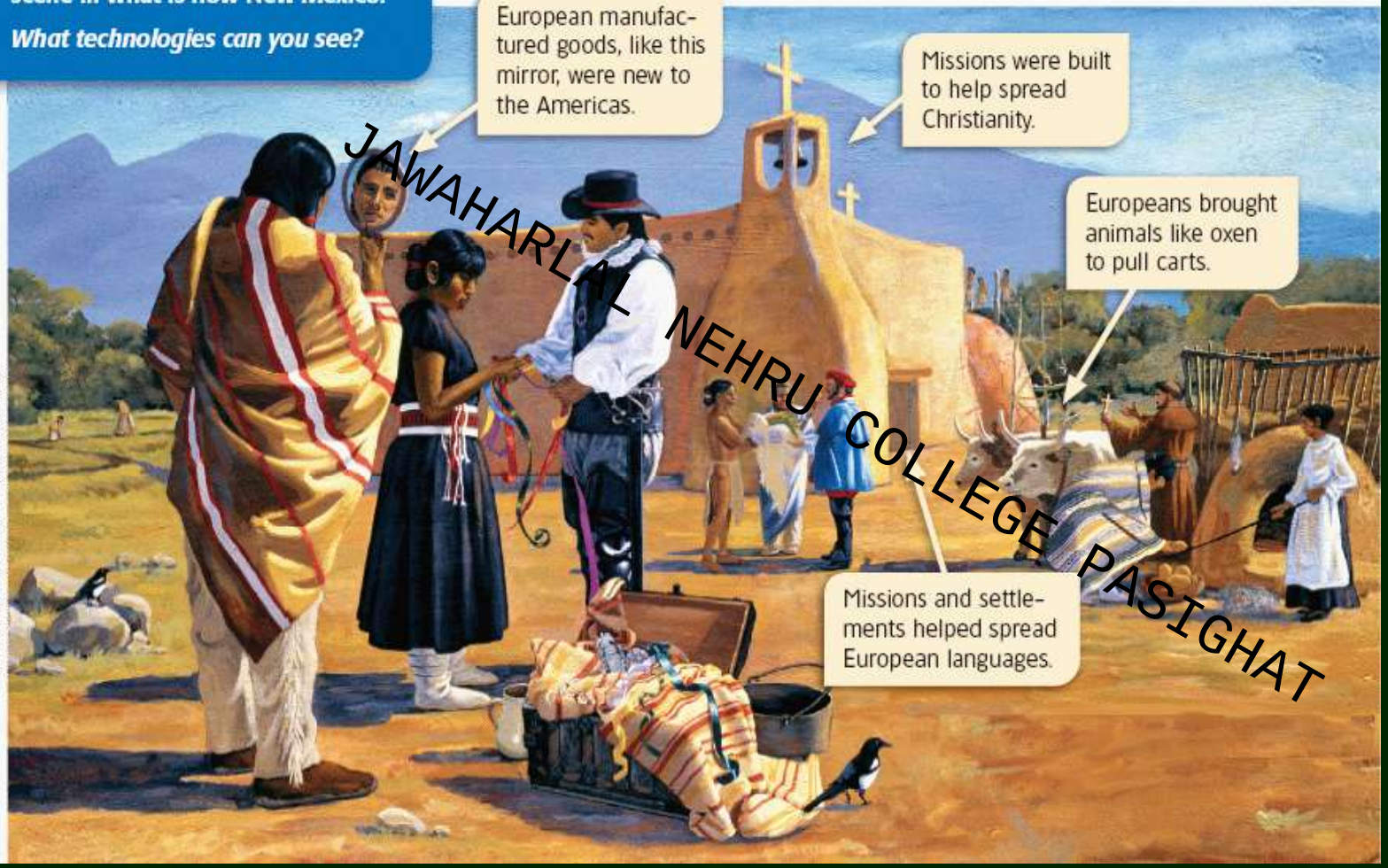
Europeans brought new ideas and technologies when they settled new lands. This illustration shows a scene in what is now New Mexico.

What technologies can you see?



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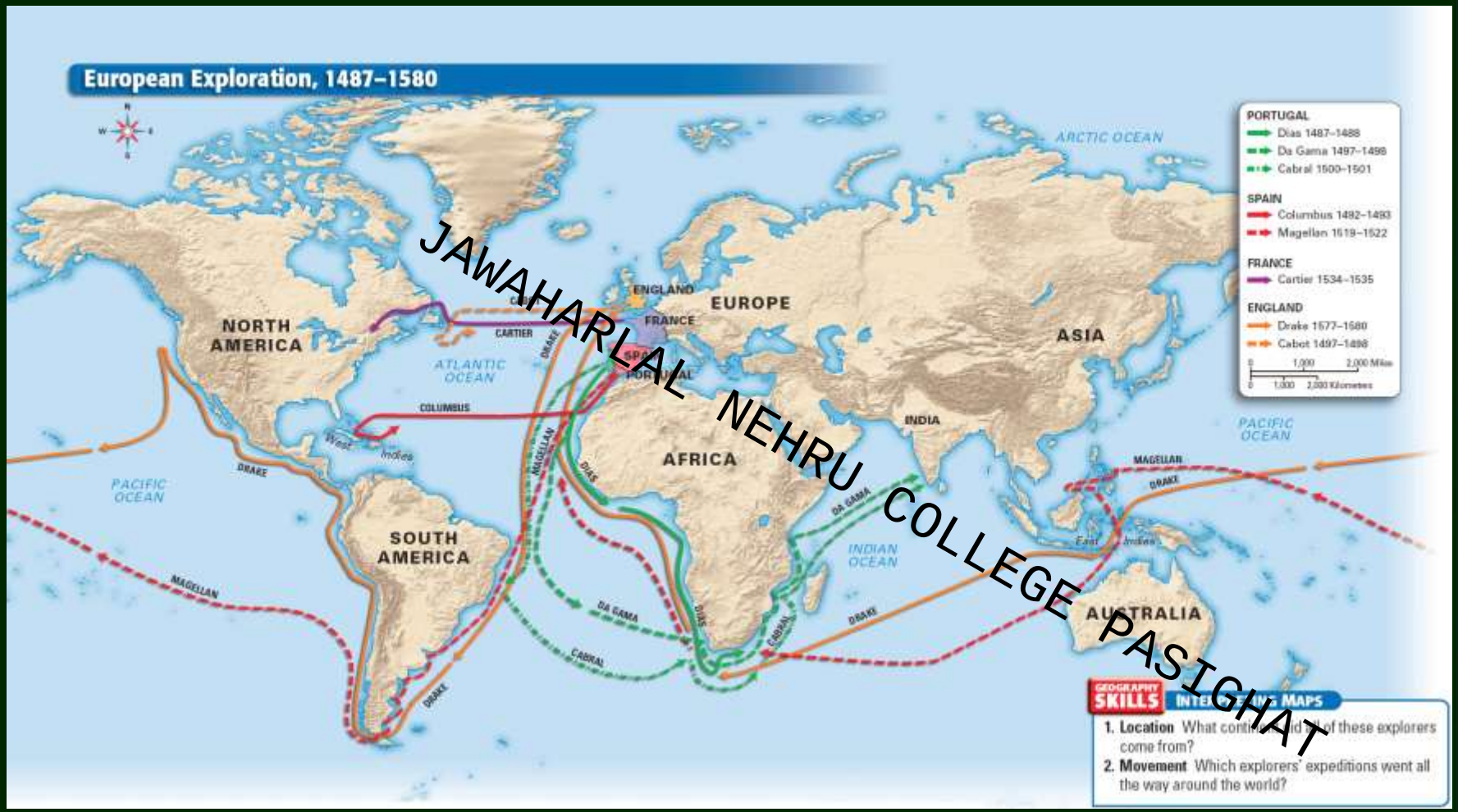

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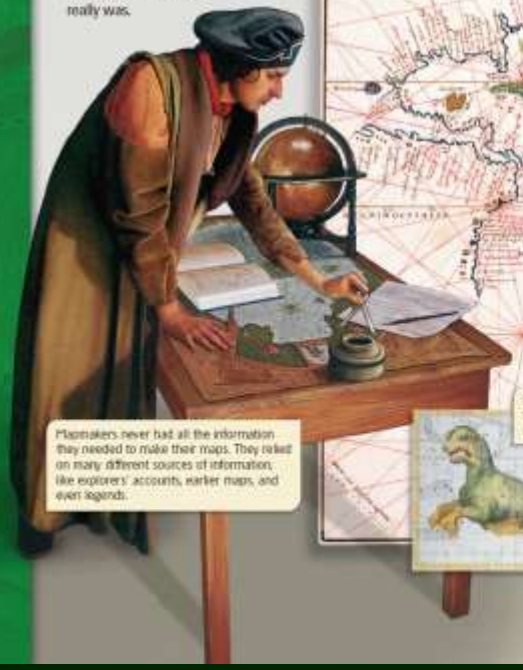

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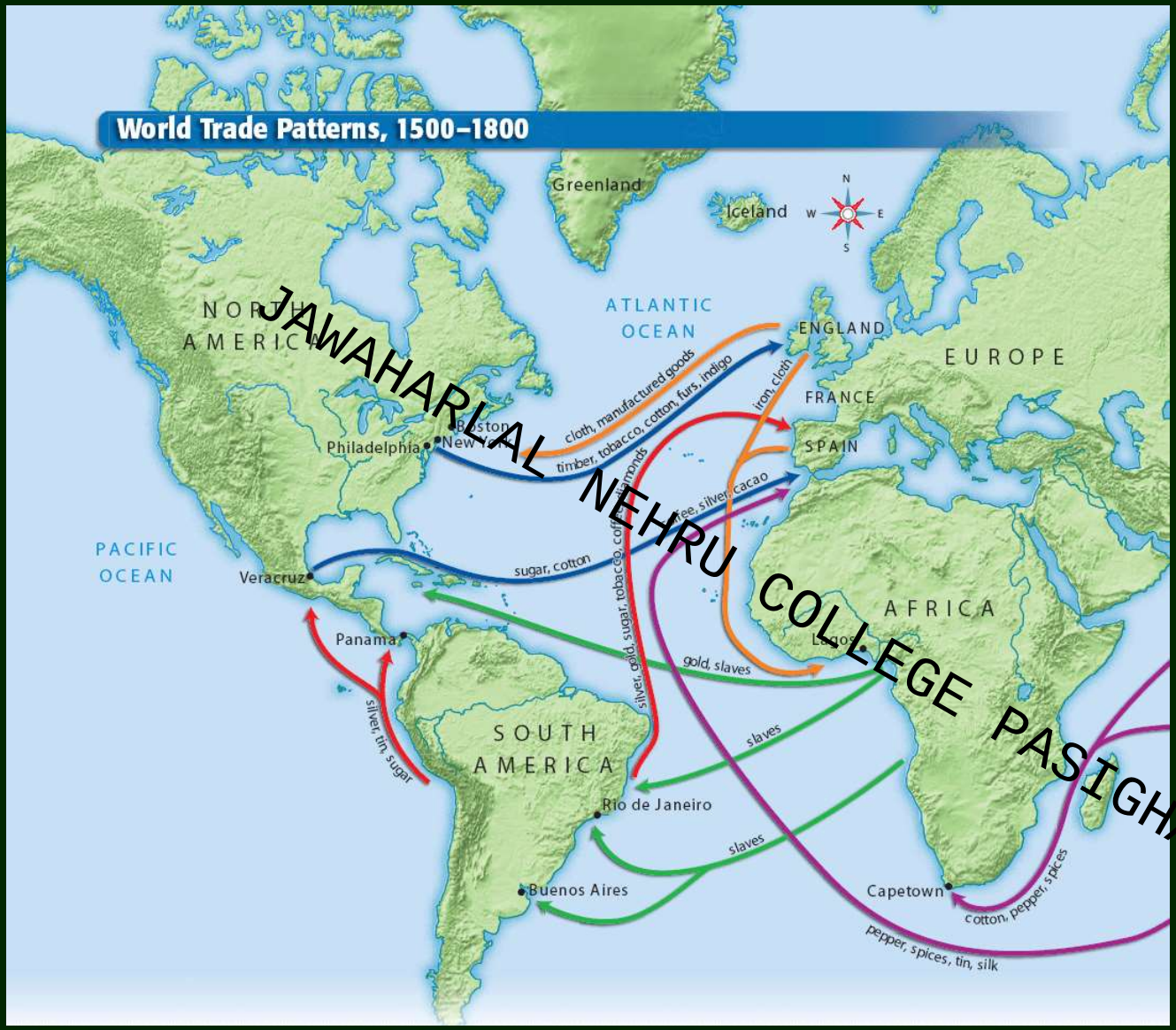

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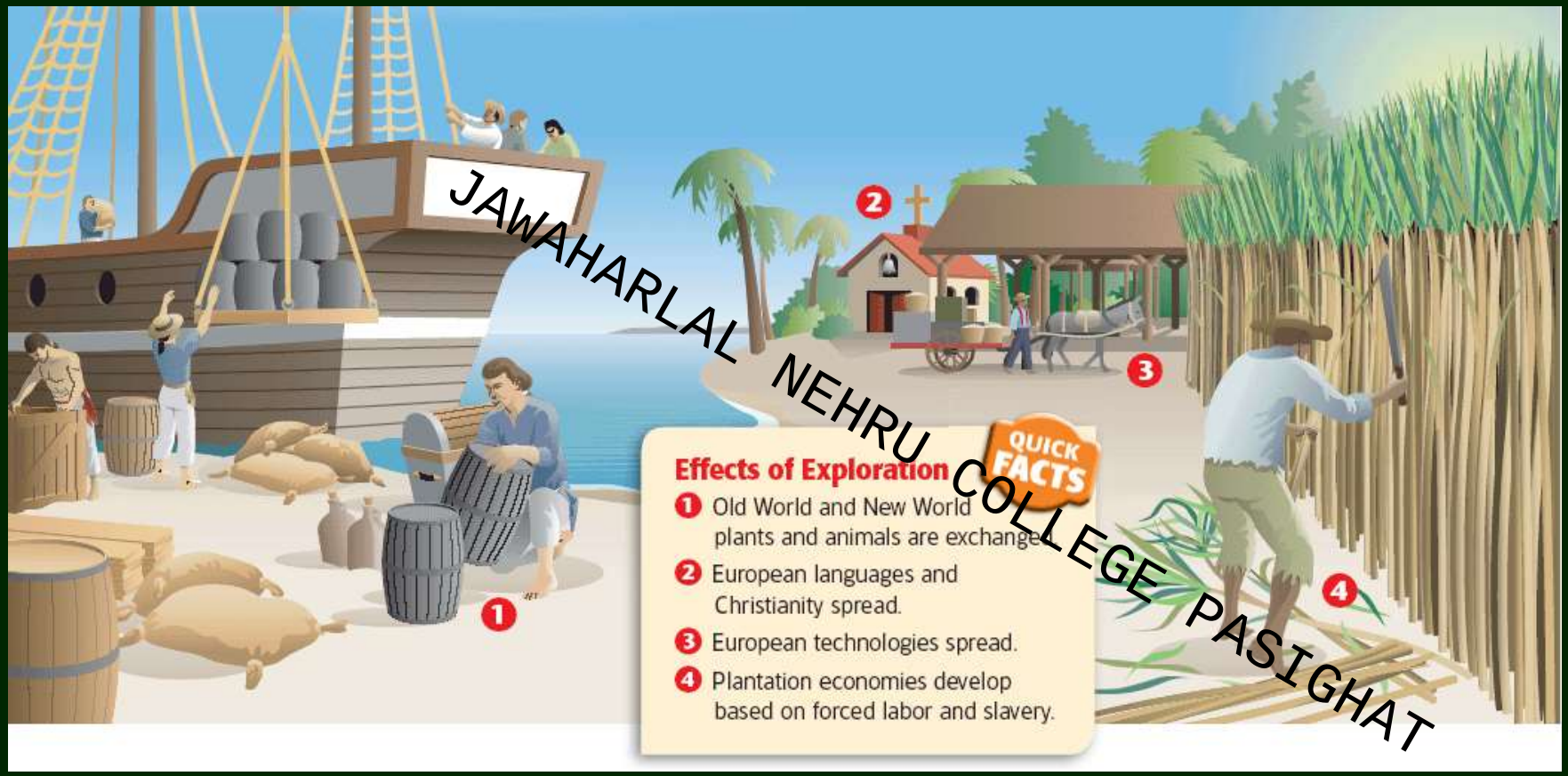

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Supply and Demand

QUICK FACTS

Market economies are based on the idea of supply and demand. This idea states that people will produce goods that other people want. In Europe, market economies developed as populations grew and the world economy developed.

1 Population grew in Europe. With more people, there was a greater demand for goods.

2 Since people wanted more goods, companies worked to make, or supply, more goods.

3 Finally, the supply of goods met the demand for goods.

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Visual Summary

Use the visual summary below to help you review the main ideas of the chapter.

QUICK FACTS

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Click window above to start playing.

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THE ATMOSPHERE

LIEUTANANT DR K K MISHRA

ATMOSPHERIC CIRCULATION

The Three Cell Model
Global Winds
The ITCZ

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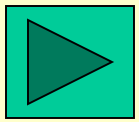
The purpose of this presentation is to introduce the topic of atmospheric circulation.

Main concepts:

- **atmospheric circulation is a response to differences in insolation between low and high latitudes.**
- **there is a transfer of energy from low to high latitudes**
- **a global pattern of surface winds and pressure belts results from this circulation**
- **there is a seasonal shift of the surface wind and pressure belts**
- **this shift has a pronounced effect on the climate of areas such as sub-saharan Africa**



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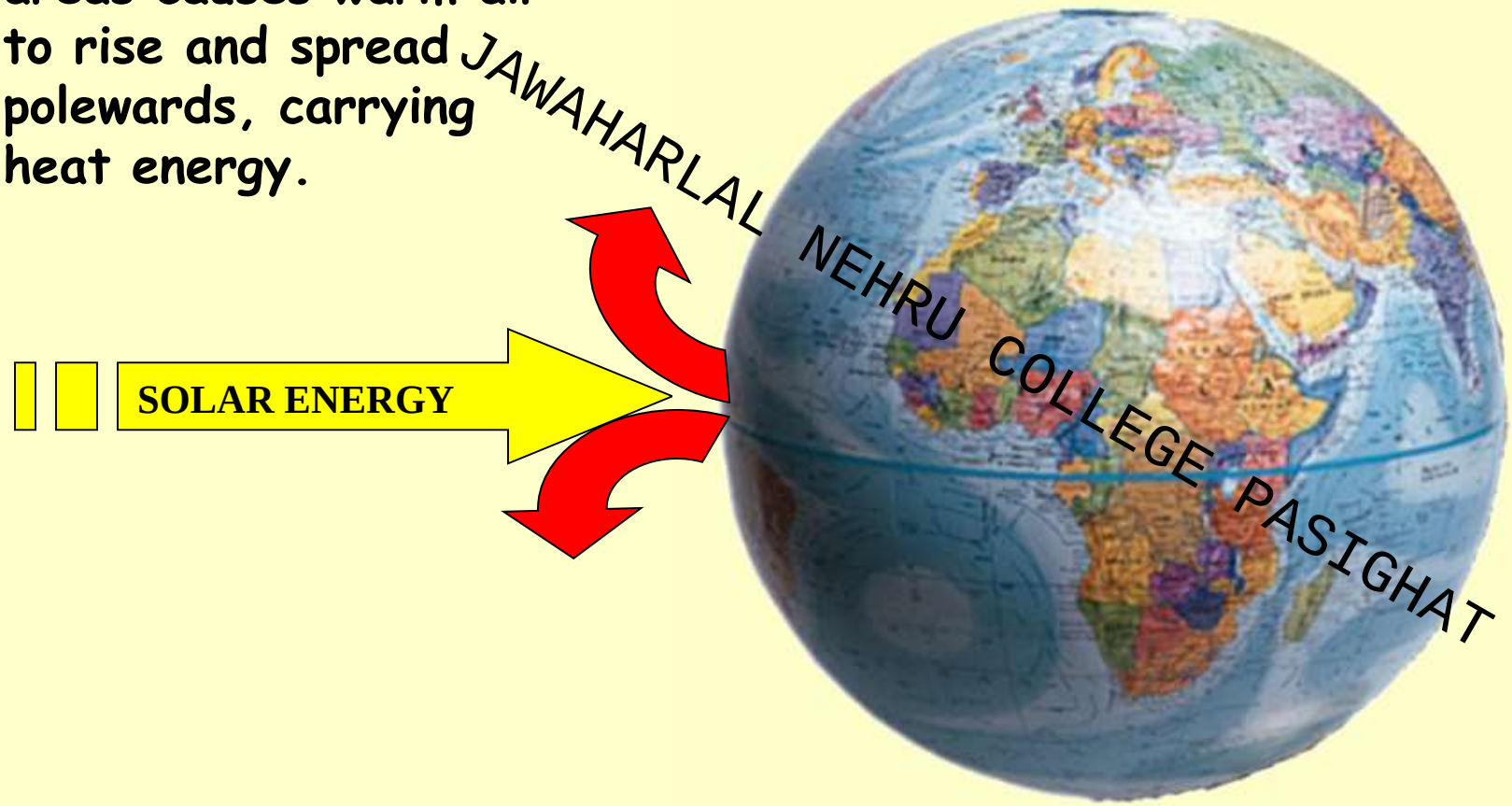
THE THREE CELL MODEL

FORMATION OF THE HADLEY CELL (1)

Insolation in tropical areas causes warm air to rise and spread polewards, carrying heat energy.



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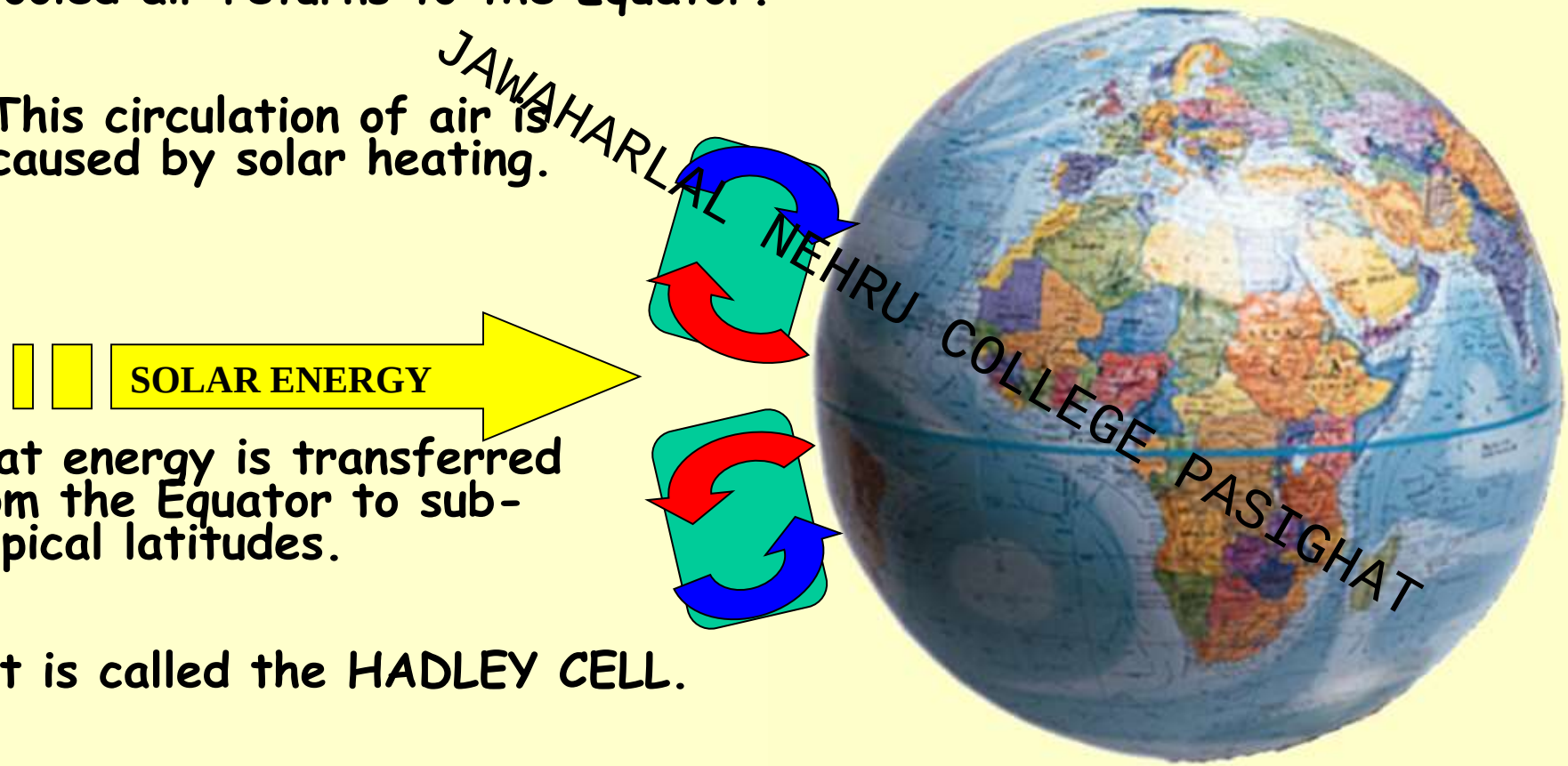
THE THREE CELL MODEL

FORMATION OF THE HADLEY CELL (2)

Air cools and begins to fall at about 30°N and 30°S of Equator. Cooled air returns to the Equator.

This circulation of air is caused by solar heating.



Heat energy is transferred from the Equator to sub-tropical latitudes.

It is called the HADLEY CELL.

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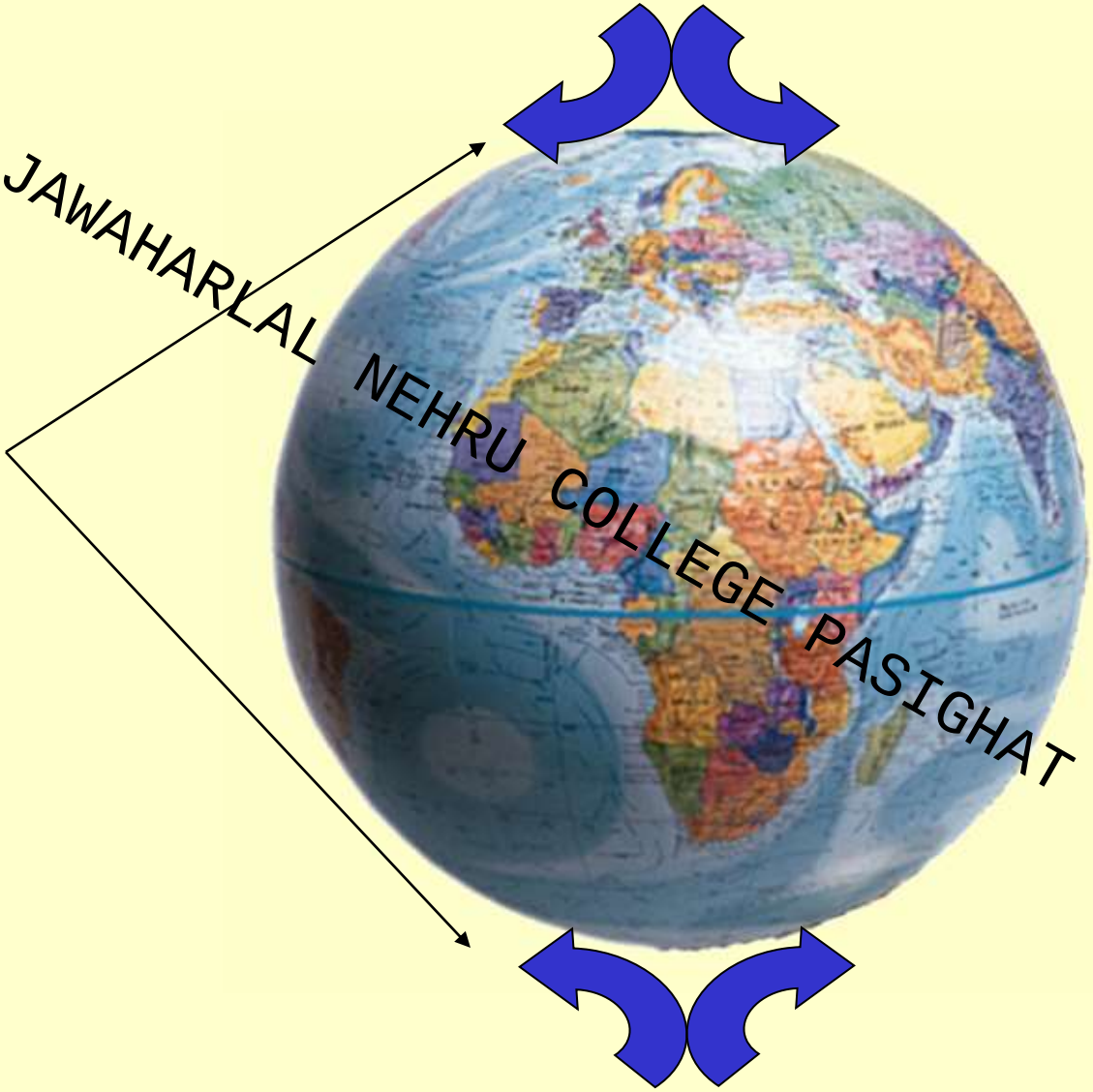
Q

THE THREE CELL MODEL

FORMATION OF THE POLAR CELL (1)

Intensely cold, dense air sinks at the poles, then blows as surface winds towards the Equator.



THE THREE CELL MODEL

FORMATION OF THE POLAR CELL (2)

At about 60°N and 60 °S, the cold polar air is warmed in contact with the earth's surface.

This warmed air rises and returns polewards, carrying heat energy.

This circular motion is called the POLAR CELL.

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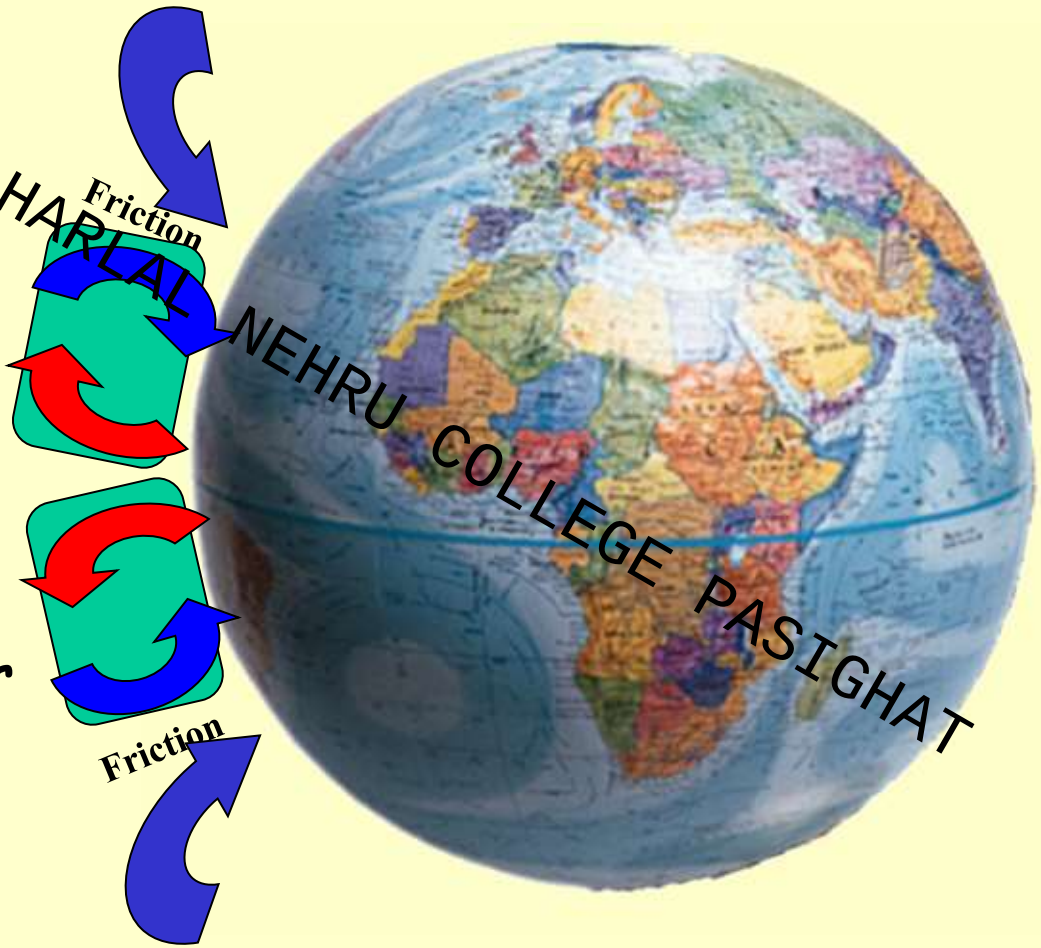
THE THREE CELL MODEL

FORMATION OF THE FERREL CELL (1)

The Hadley Cell is driven by differences in heat energy at the Equator.

As the air in the Hadley Cell falls at about 30°N and 30°S, it pulls the air beside it down as well, due to friction



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THE THREE CELL MODEL

FORMATION OF THE FERREL CELL (2)

The Polar Cell is driven by differences in heat energy. Cold polar air falls and spreads towards the Equator.

As the air in the Polar Cell rises at about 60°N and 60°S, it pulls the air beside it up as well, due to friction.

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THE THREE CELL MODEL

FORMATION OF THE FERREL CELL (3)

Unlike the Hadley and Polar Cells, the Ferrel Cell is not driven by differences in heat energy.

The Ferrel Cell is caused by friction where air is in contact with the other two cells.

The Hadley Cell drags air down at about 30°N and S.

The Polar Cell causes an uplift at about 60°N and S.

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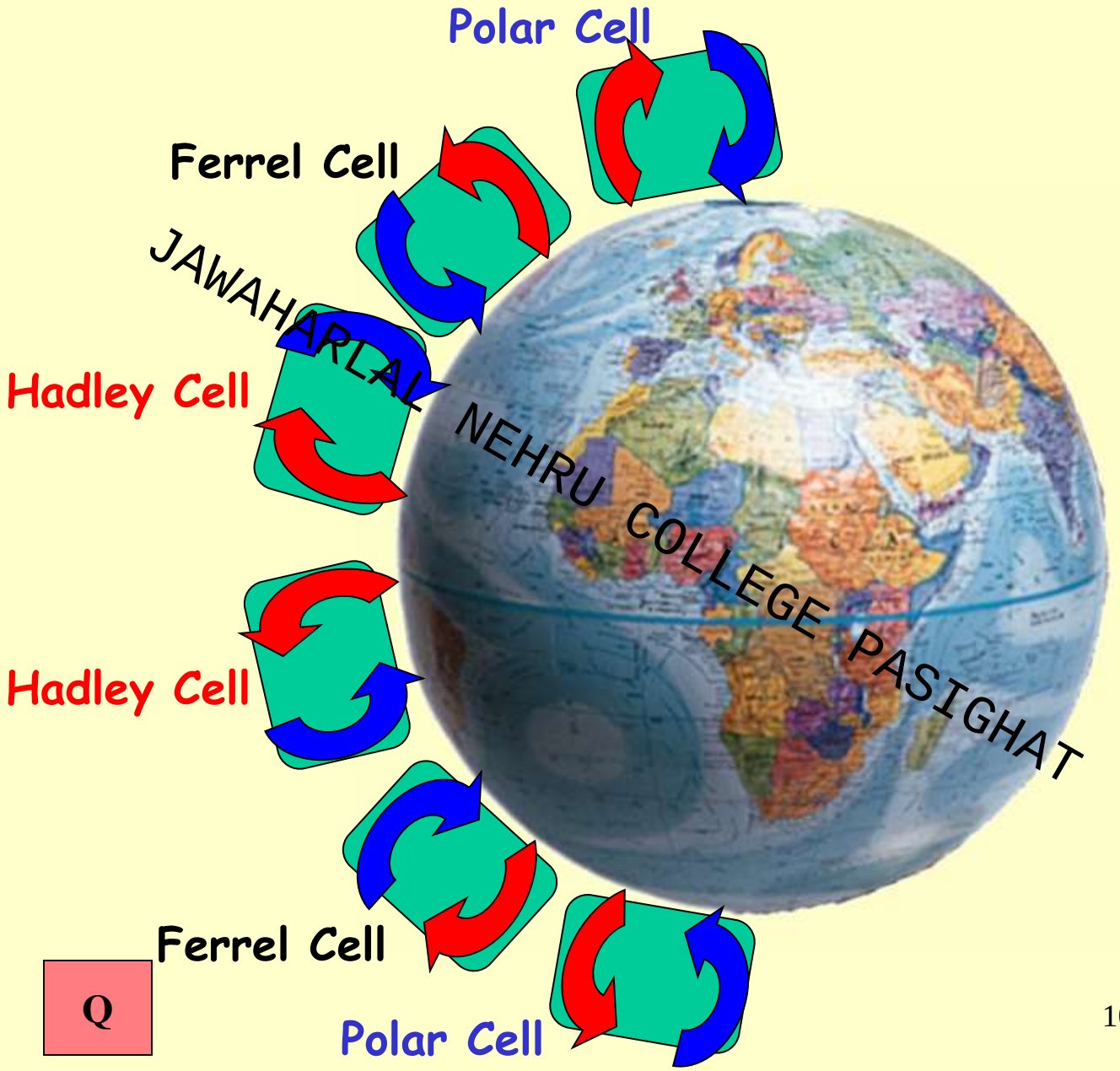
THE THREE CELLS TOGETHER

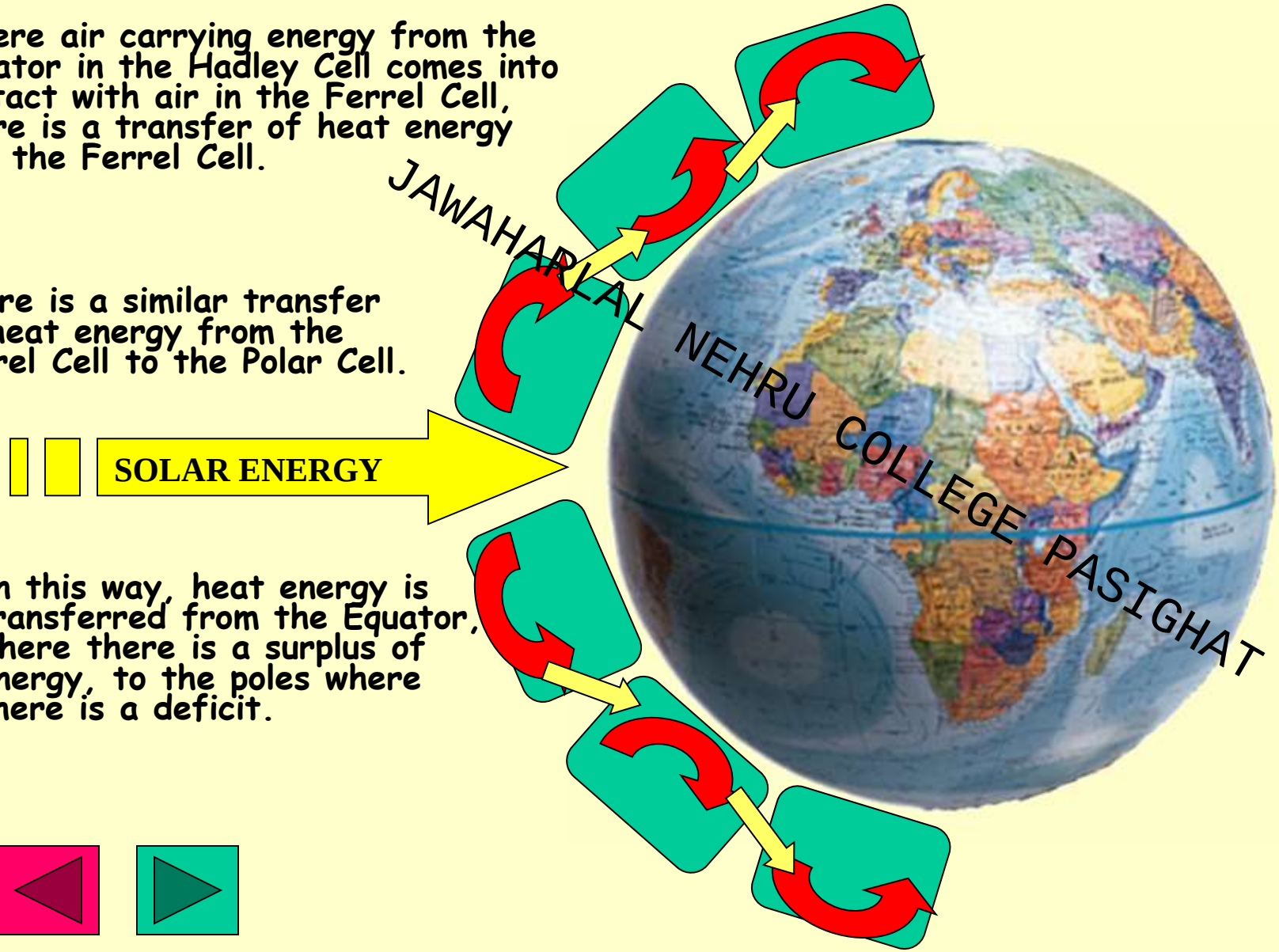


Q

THE TRANSFER OF HEAT ENERGY FROM EQUATORIAL TO POLAR AREAS

Where air carrying energy from the Equator in the Hadley Cell comes into contact with air in the Ferrel Cell, there is a transfer of heat energy into the Ferrel Cell.

There is a similar transfer of heat energy from the Ferrel Cell to the Polar Cell.



In this way, heat energy is transferred from the Equator, where there is a surplus of energy, to the poles where there is a deficit.

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THE CORRESPONDING MOVEMENT OF COLDER AIR

In the Polar cell cold air from polar regions flows to mid-latitudes as polar easterly winds

In the Ferrel Cell there is a movement of cold air at high altitude.

In the Hadley Cell, cooler air moves from the sub-tropics to the Equator.

Q

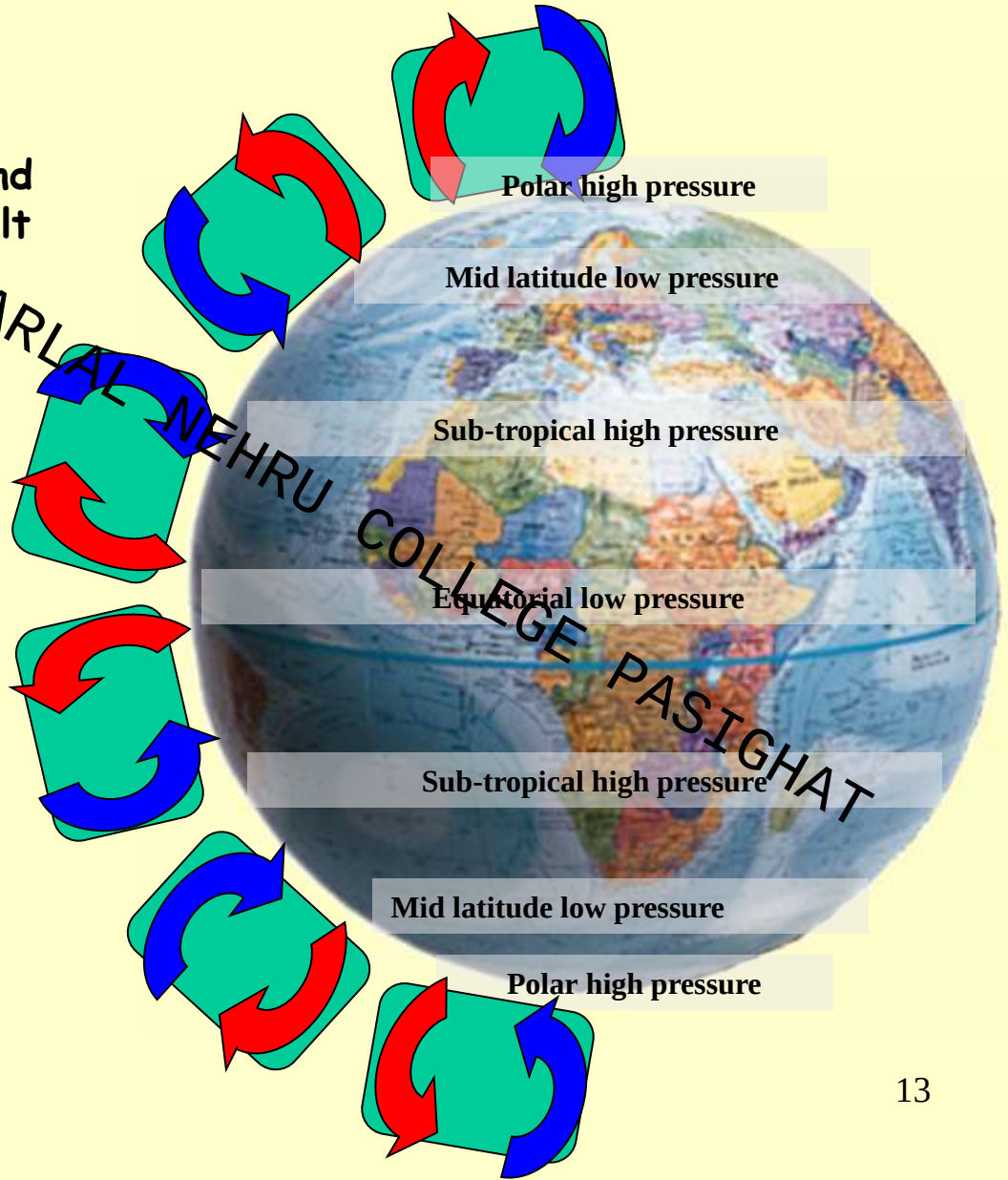
ASSOCIATED PRESSURE BELTS

Rising air at the equator causes the equatorial belt of low pressure

Descending air at about 30°N and 30°S causes the sub-tropical belt of high pressure

Rising air at about 60°N and 60°S causes a mid-latitude belt of low pressure

Descending air at the poles causes the polar high pressure areas



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Q

ASSOCIATED SURFACE WIND PATTERNS

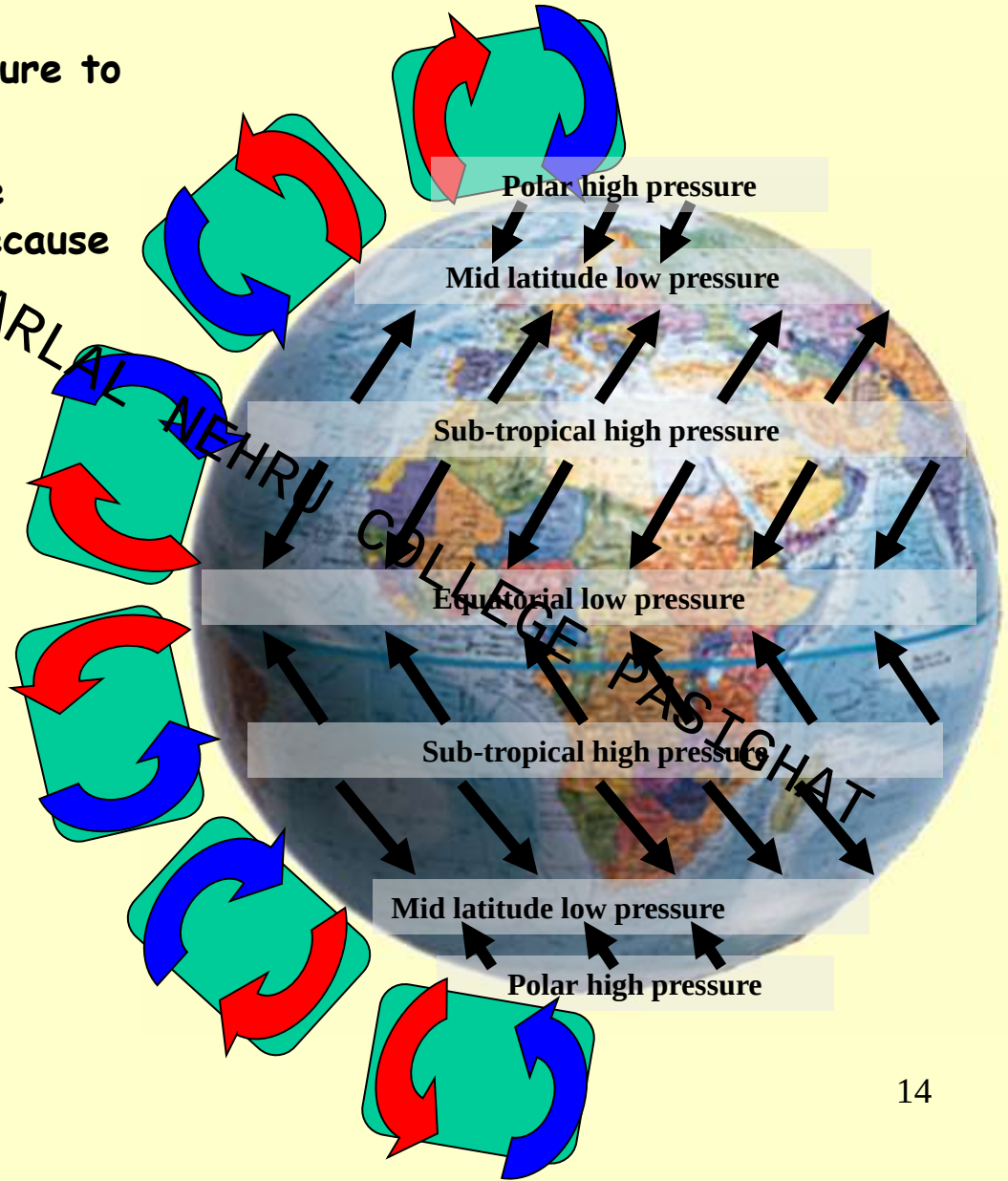
Winds always blow from high pressure to low pressure.

They are deflected because of the Coriolis Force which come about because of the rotation of the earth.

Winds in Northern Hemisphere are deflected to the right.

Winds in the southern hemisphere are deflected to the left.

These wind belts shift seasonally. (See next section)



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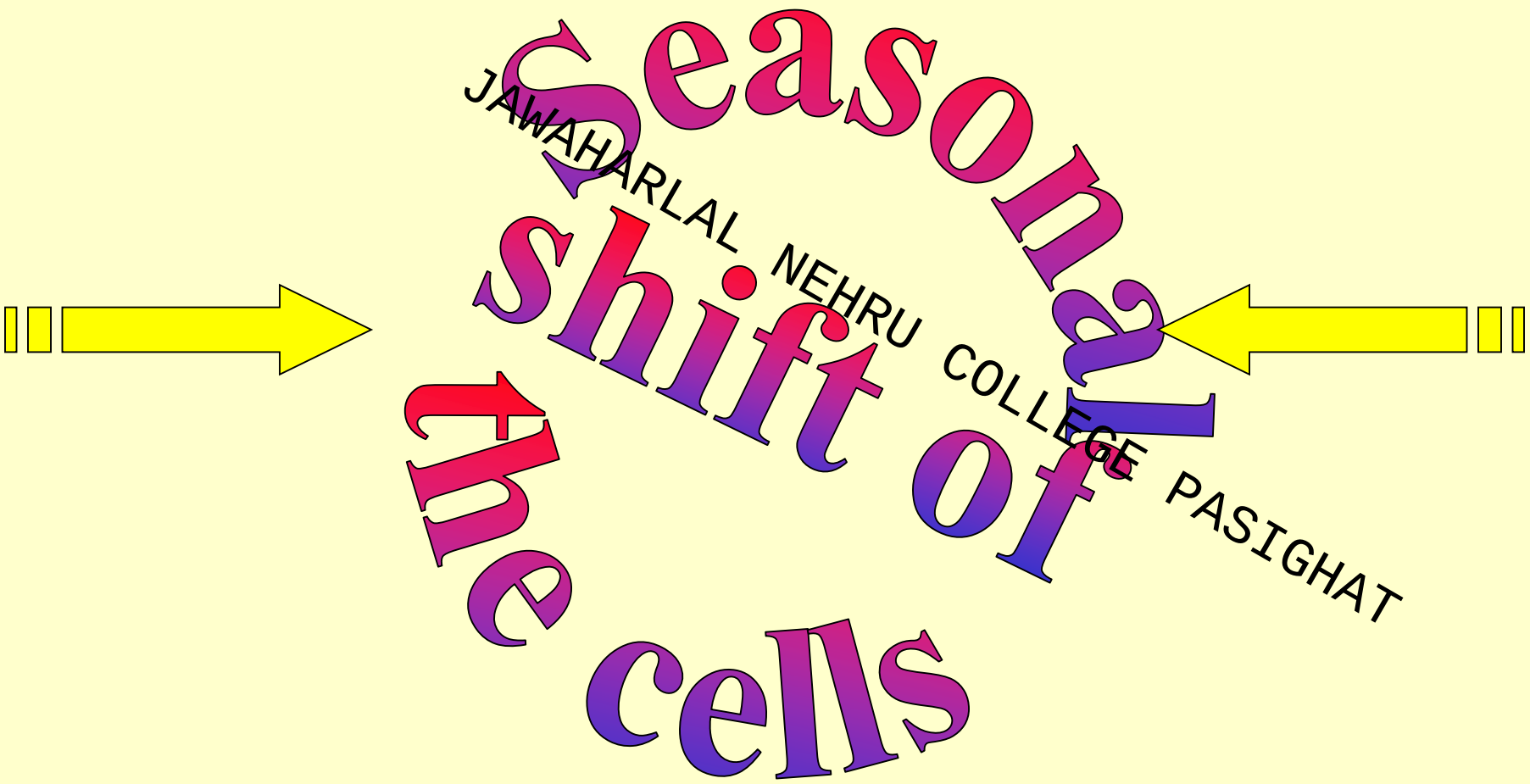
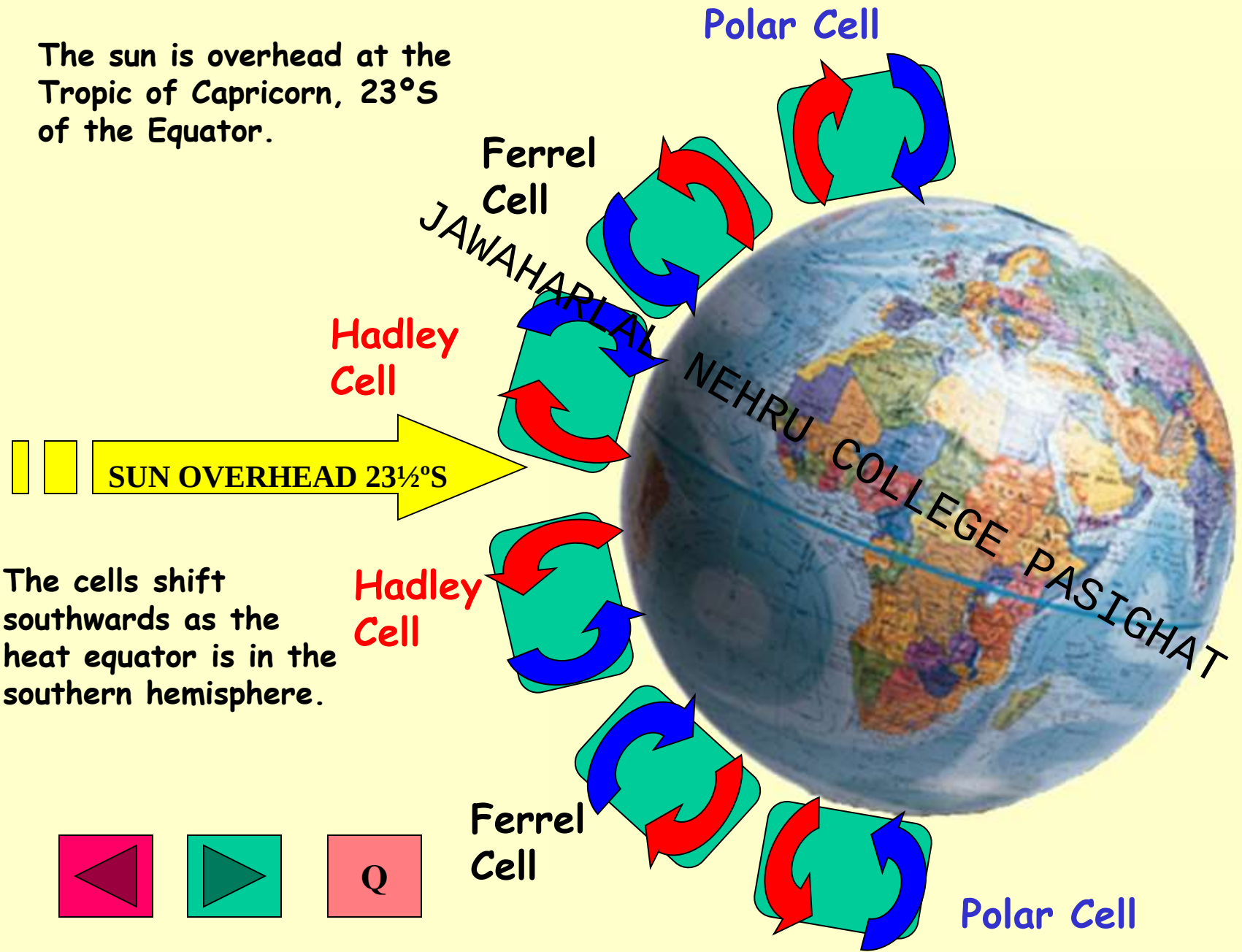
THE ATMOSPHERE



Q

POSITION OF THE THREE CELLS IN DECEMBER

The sun is overhead at the Tropic of Capricorn, 23°S of the Equator.

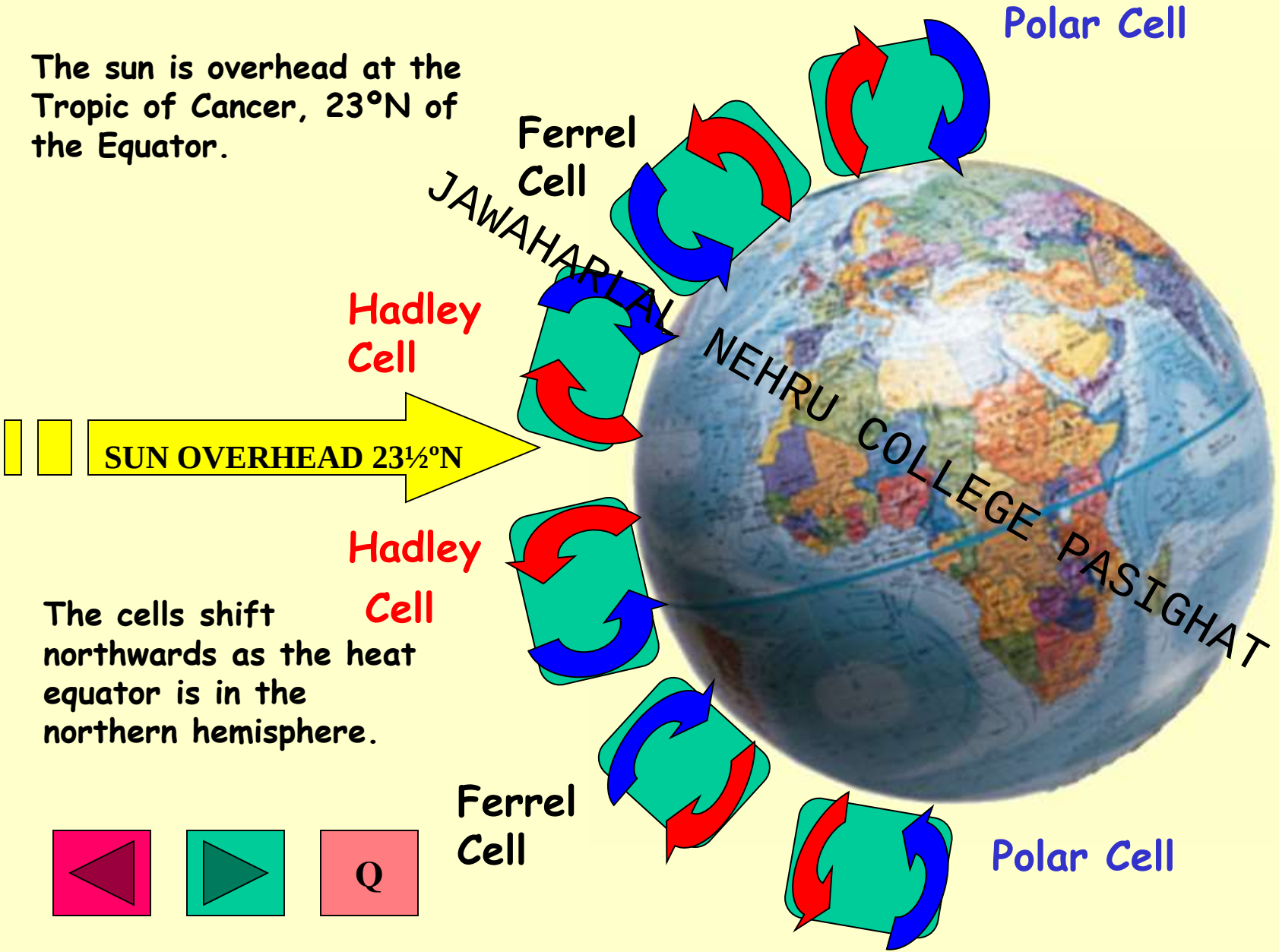


The cells shift southwards as the heat equator is in the southern hemisphere.

Q

POSITION OF THE THREE CELLS IN JUNE

The sun is overhead at the Tropic of Cancer, 23°N of the Equator.



The cells shift northwards as the heat equator is in the northern hemisphere.

Q

THE INTER-TROPICAL CONVERGENCE ZONE

IN THE NORTHERN HEMISPHERE:

The winds that blow to the equatorial low pressure belt are called the North East Trade Winds

IN THE SOUTHERN HEMISPHERE:

The winds that blow to the equatorial low pressure belt are called the South East Trade Winds

The line along which they converge (meet) is called the INTER-TROPICAL CONVERGENCE ZONE.

This is often abbreviated to ITCZ

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THE INTER-TROPICAL CONVERGENCE ZONE

IN THE NORTHERN HEMISPHERE

OVER WEST AFRICA

The sub-tropical high pressure belt develops over the Sahara so is hot and dry.

This is known as continental Tropical (cT) air.

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IN THE SOUTHERN HEMISPHERE

OVER WEST AFRICA

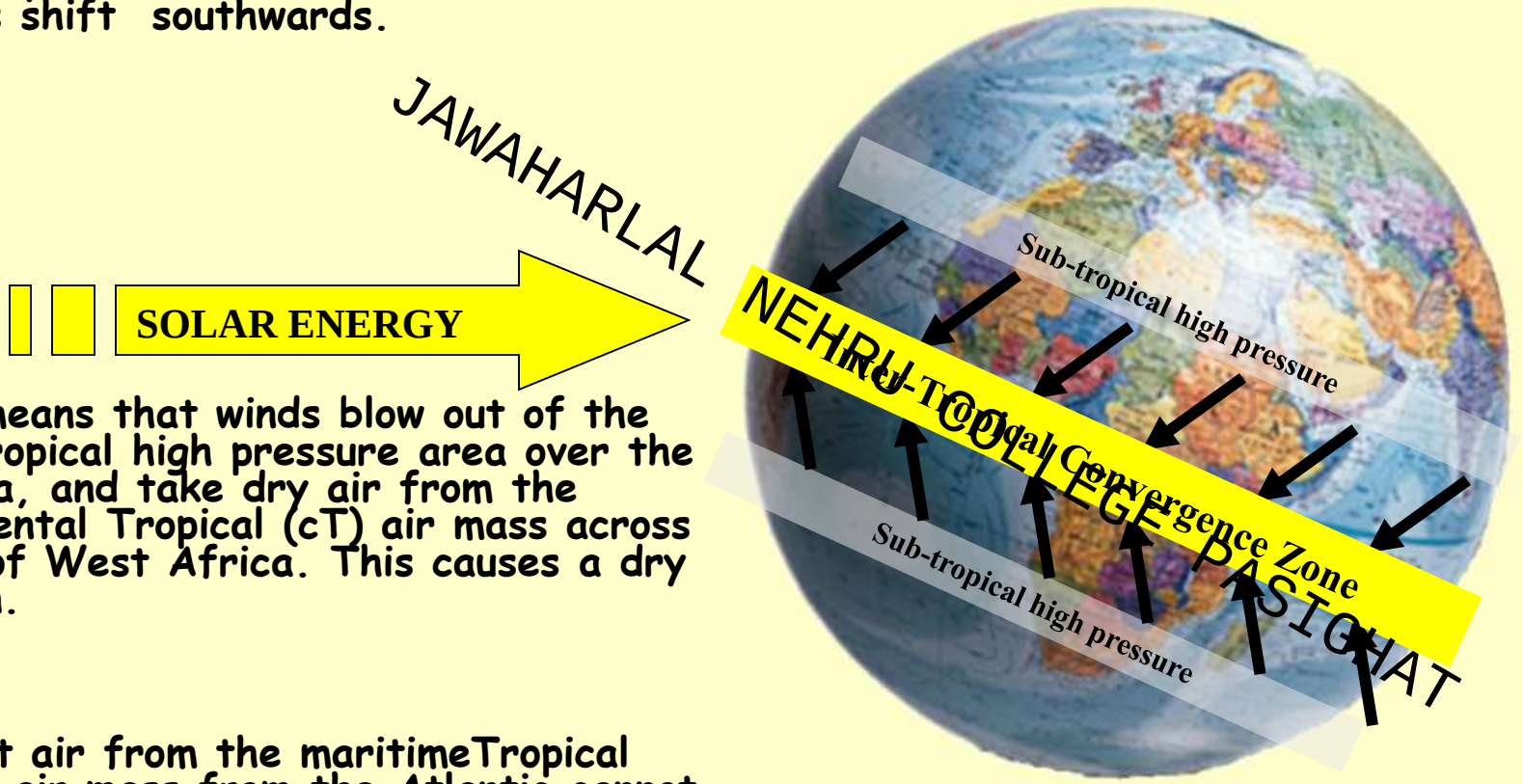
The sub-tropical high pressure belt develops over the Atlantic so is warm and moist.

This is known at maritime Tropical (mT) air.

Q

THE ITCZ IN DECEMBER

In December, the zone of maximum insolation (solar energy) is south of the Equator. This means that the wind belts shift southwards.



This means that winds blow out of the sub-tropical high pressure area over the Sahara, and take dry air from the continental Tropical (cT) air mass across most of West Africa. This causes a dry season.

Moist air from the maritimeTropical (mT) air mass from the Atlantic cannot reach far inland, where there is a dry season.

Q

THE ITCZ IN JUNE

By contrast, in June, the zone of maximum insolation is well to the north of the Equator. This means that the wind belts shift northwards.

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Moist maritime Tropical air from the Atlantic now reaches far inland, where there is a rainy season. These winds flow northwards to the ITCZ to replace air that has become unstable and risen.

The winds blow out of the sub-tropical high pressure area over the Sahara, now only affect the northern part of sub-Saharan Africa.

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The ITCZ in West Africa
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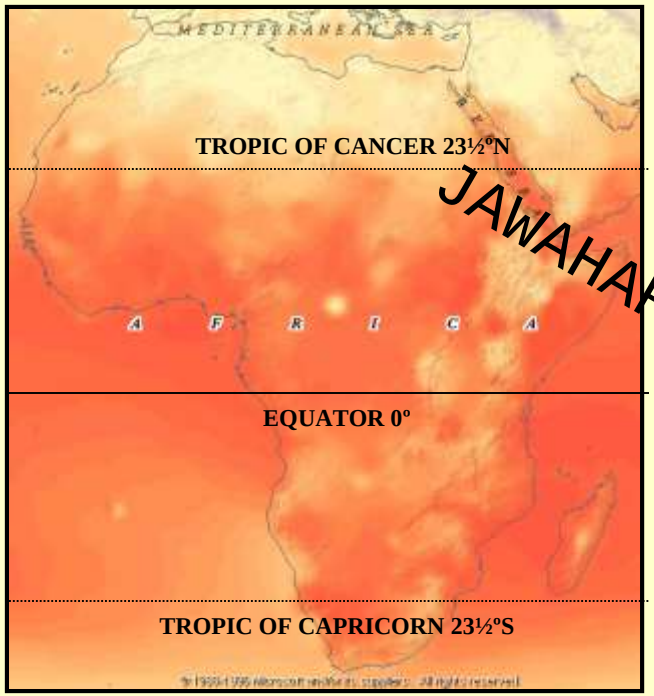
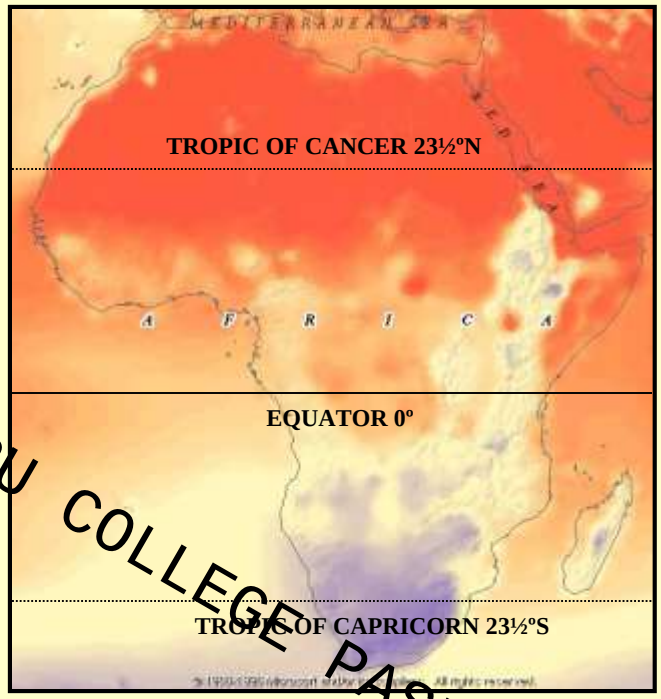
THE EFFECT OF THE SUN'S MIGRATION ON SEASONAL TEMPERATURES AFRICA





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AFRICA – TEMPERATURES IN JANUARY

Because the sun is overhead in the southern hemisphere, it is the south that is hottest, (shown by the red areas). The Sahara stands out as a cooler, (lighter coloured), area.

AFRICA – TEMPERATURES IN JULY

In July, with the sun overhead north of the Equator, the Sahara is clearly much hotter than the rest of the continent.

POSITION OF THE ITCZ IN DECEMBER

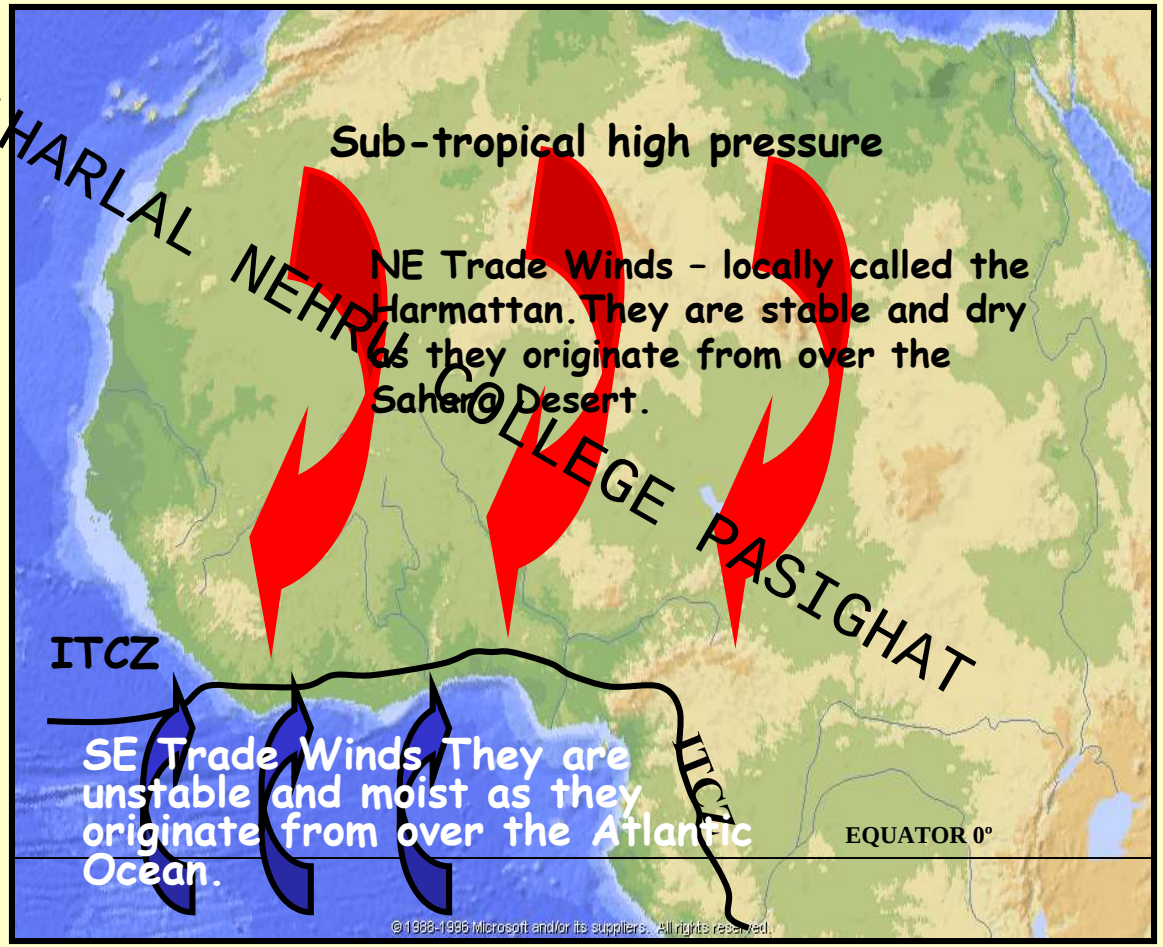
In December the sun is overhead in the southern hemisphere.

The ITCZ is found to the south, where there is maximum insolation.

The sea stays a fairly constant temperature, so the ITCZ runs just along the coast in WAfrica.

Only the coastal fringe receives rain from the unstable mT air at this time of year

Further north, the area is under the influence of the Harmattan, (stable, dry cT air blowing out of the Saharan high pressure area).



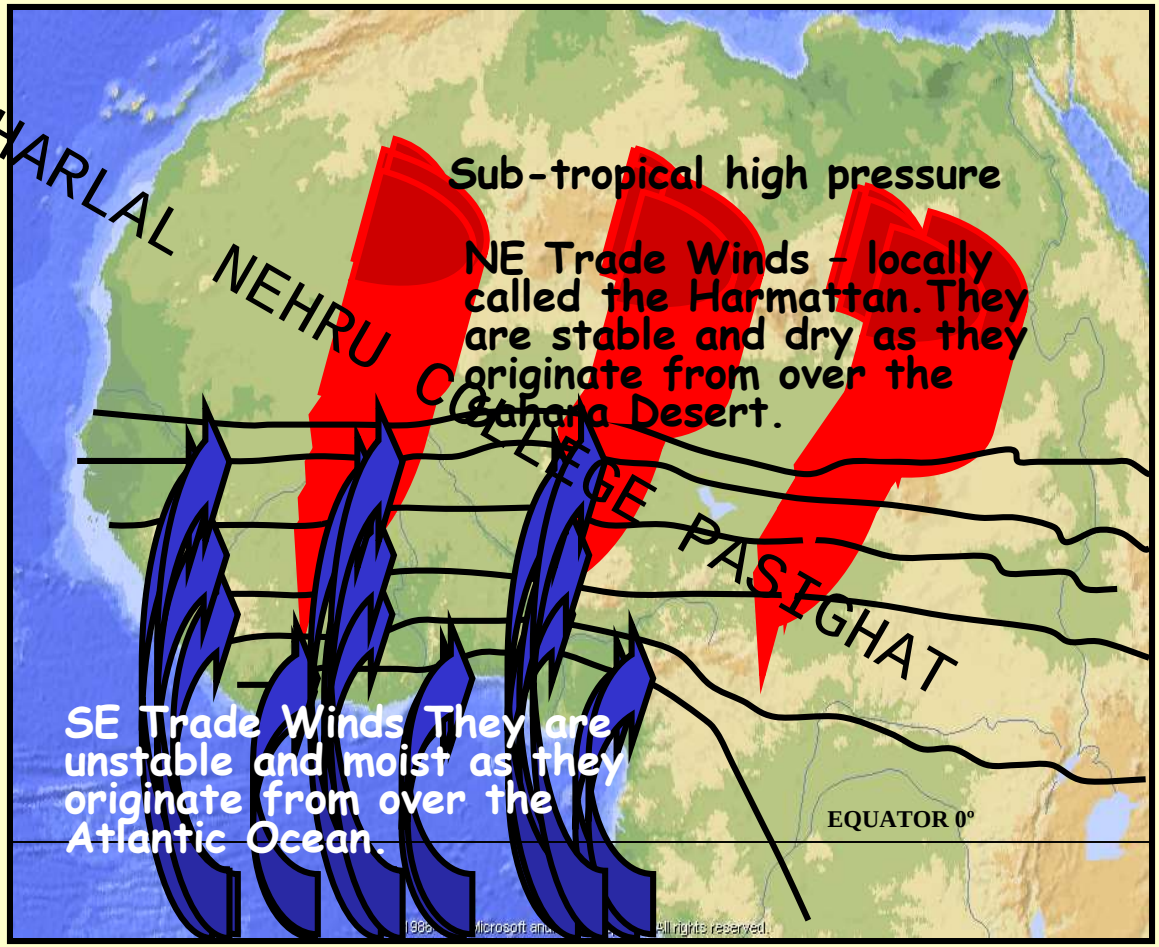
Click here to find out about stable air

Click here to find out about unstable air

MIGRATION OF THE ITCZ FROM DECEMBER TO JUNE

Between December and June, progress through the Earth's orbit causes the sun to migrate northwards.

As it does so, the ITCZ also moves further north, allowing moist mT air to reach progressively further inland, brining the rainy season to West Africa.



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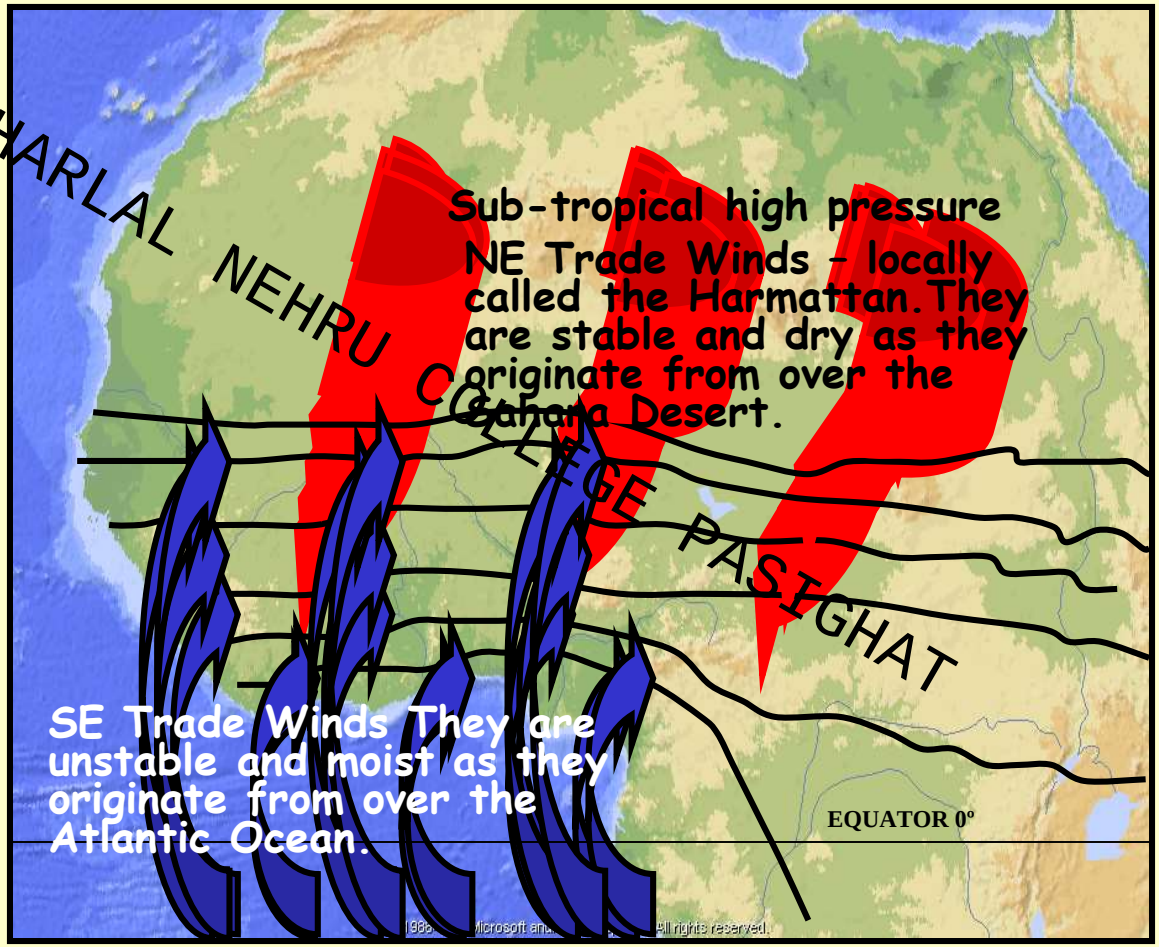
MIGRATION OF THE ITCZ FROM JUNE TO DECEMBER

By late June, the sun begins to migrate southwards, and so does the ITCZ, following the zone of maximum insolation.

As the ITCZ moves further south, the Harmattan carries dry, stable cT air further south, bringing the dry season across more and more of West Africa.



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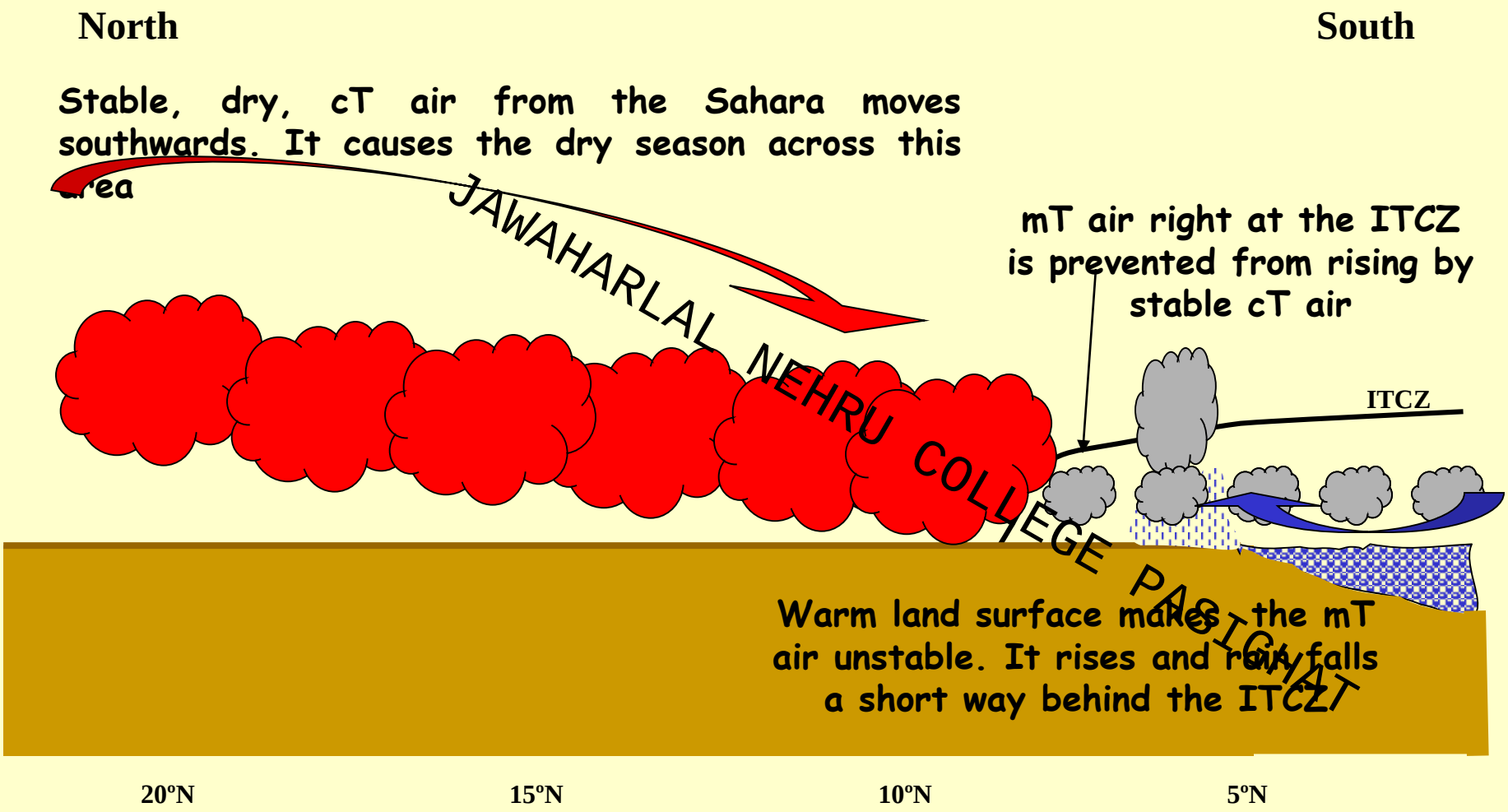
THE ITCZ AND PRECIPITATION IN WINTER



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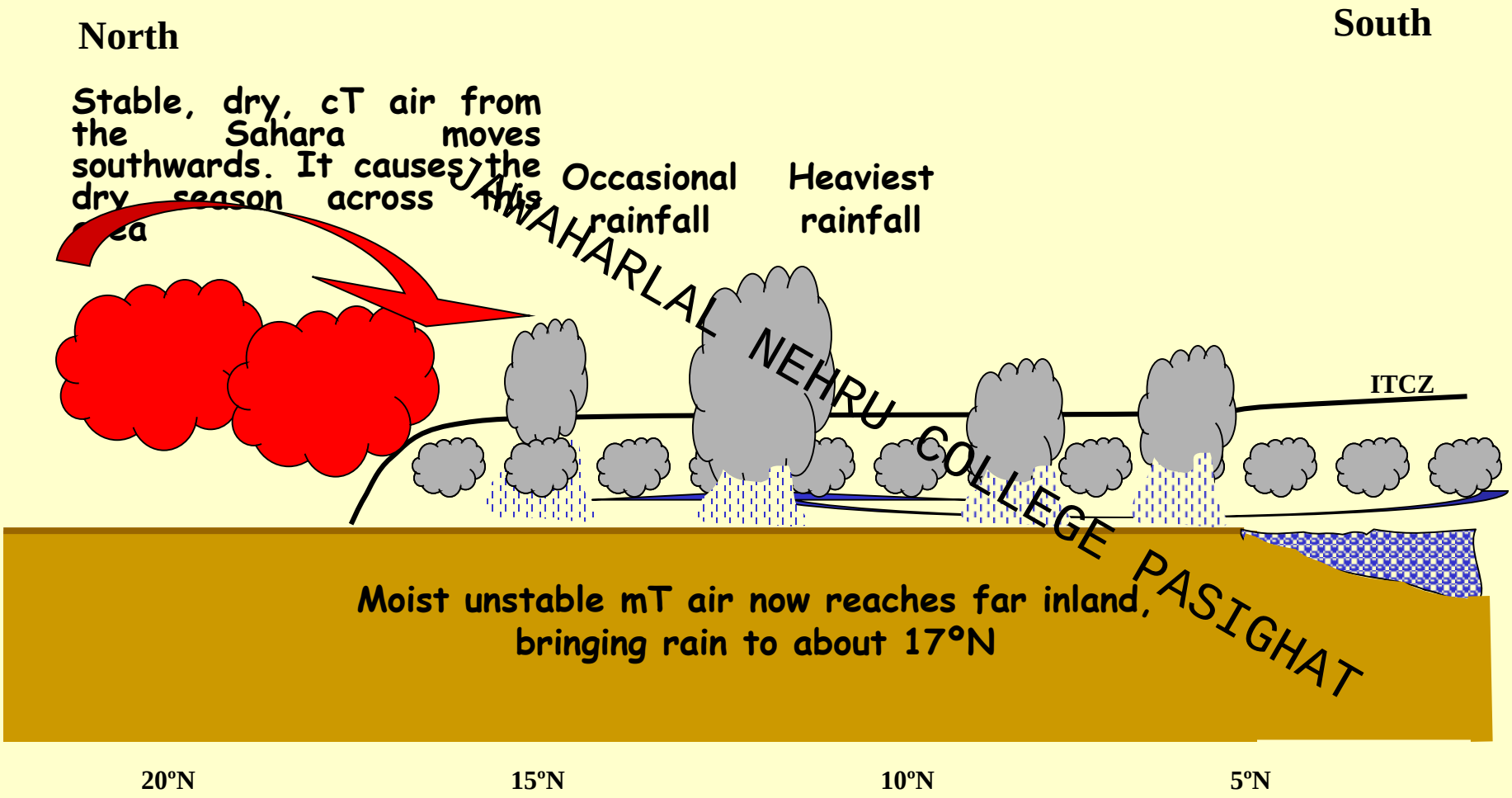
Based on a diagram from "Core Themes in Geography", by Broadley & Cunningham

THE ITCZ AND PRECIPITATION IN SUMMER



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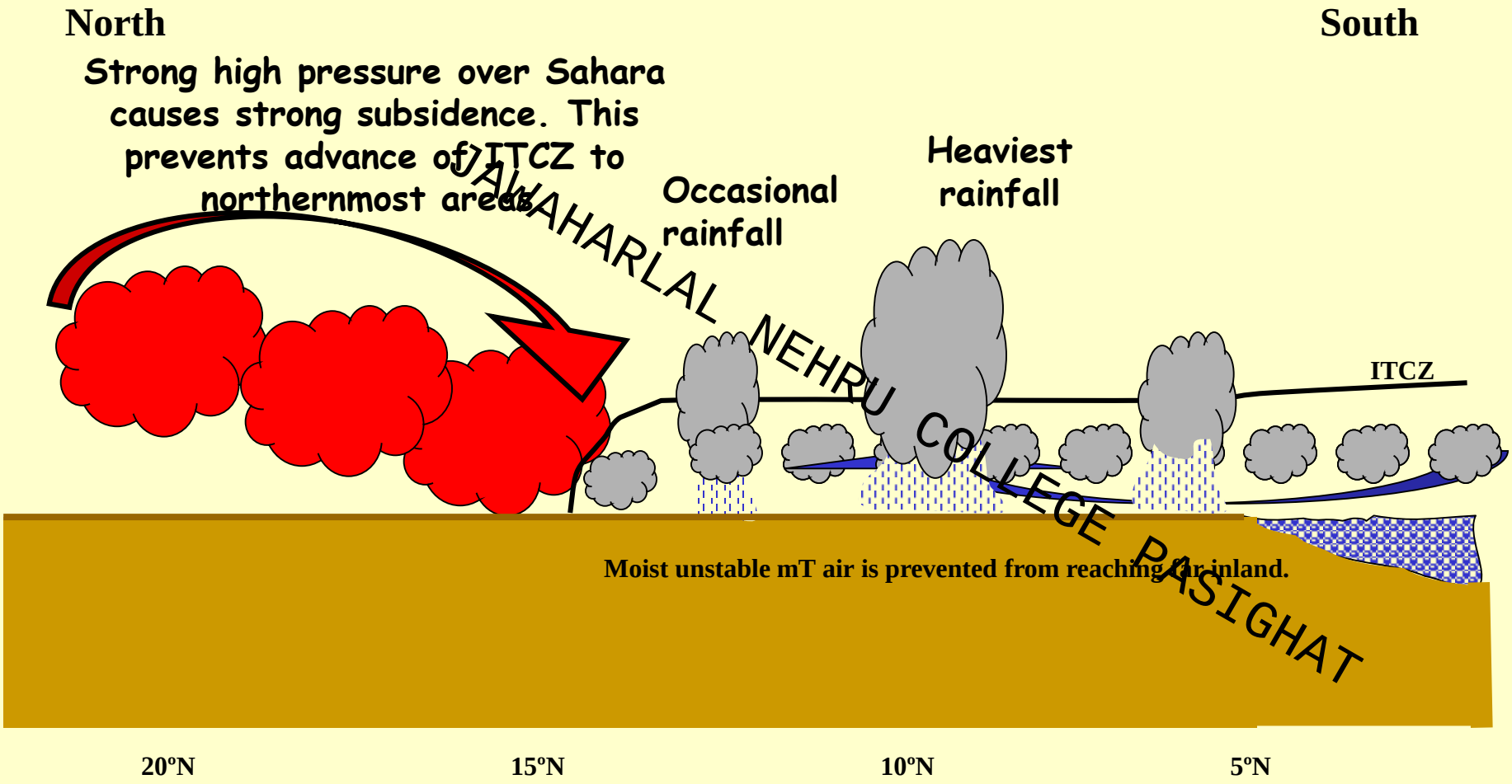
Based on a diagram from "Core Themes in Geography", by Broadley & Cunningham

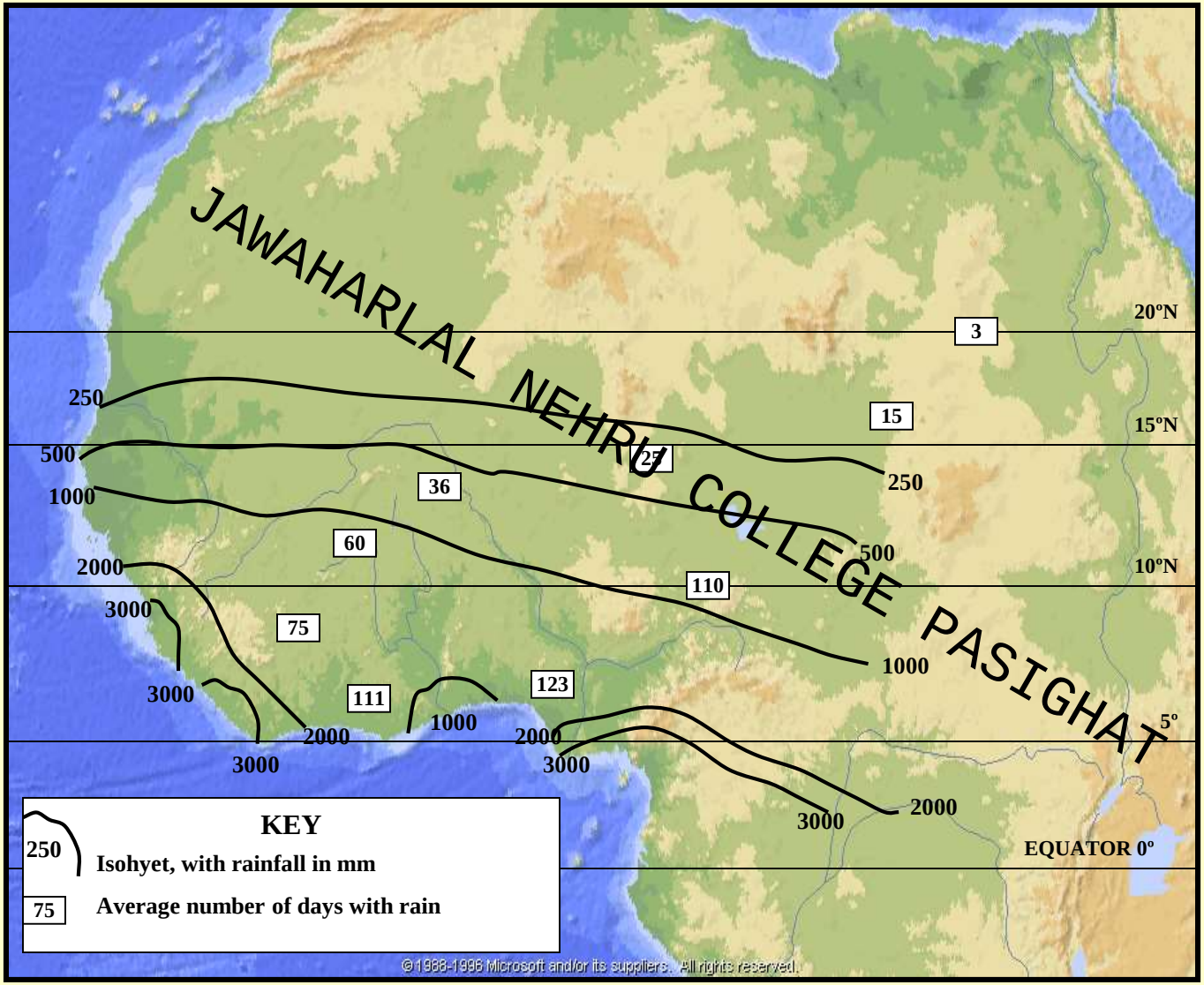
THE ITCZ AND PRECIPITATION IN A SUMMER DROUGHT



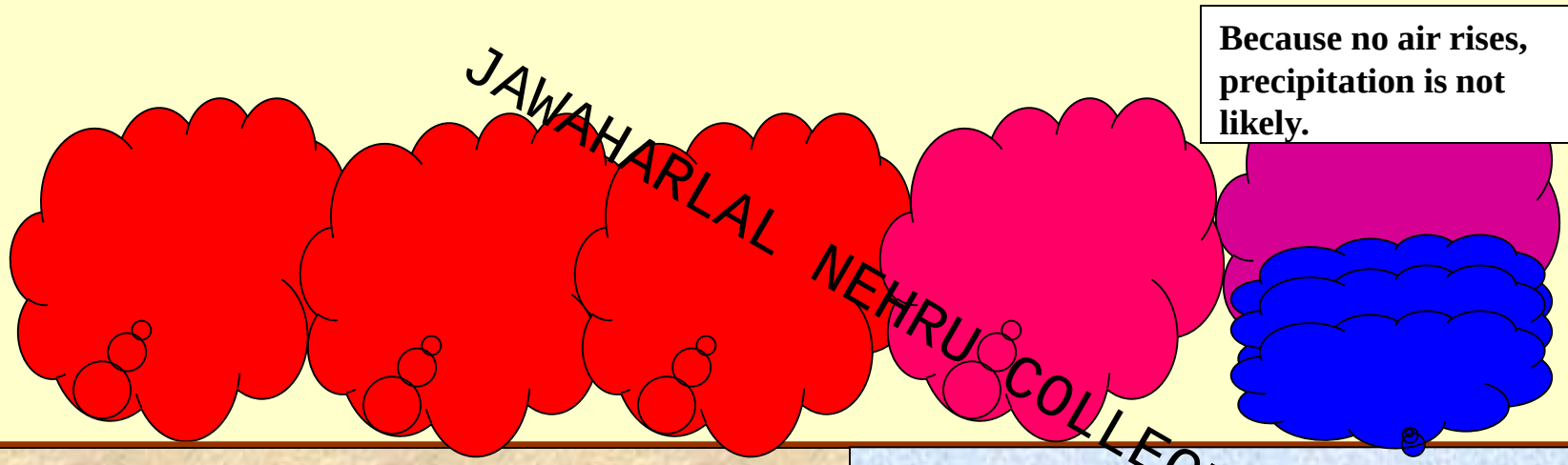
JAWAHARLAL NEHRU COLLEGE PASIGHAT

Based on a diagram from "Core Themes in Geography", by Broadley & Cunningham

RAINFALL IN WEST AFRICA



THE FORMATION OF A STABLE AIRMASS



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WARM SURFACE

A large volume of air develops uniform characteristics of high temperature and humidity.

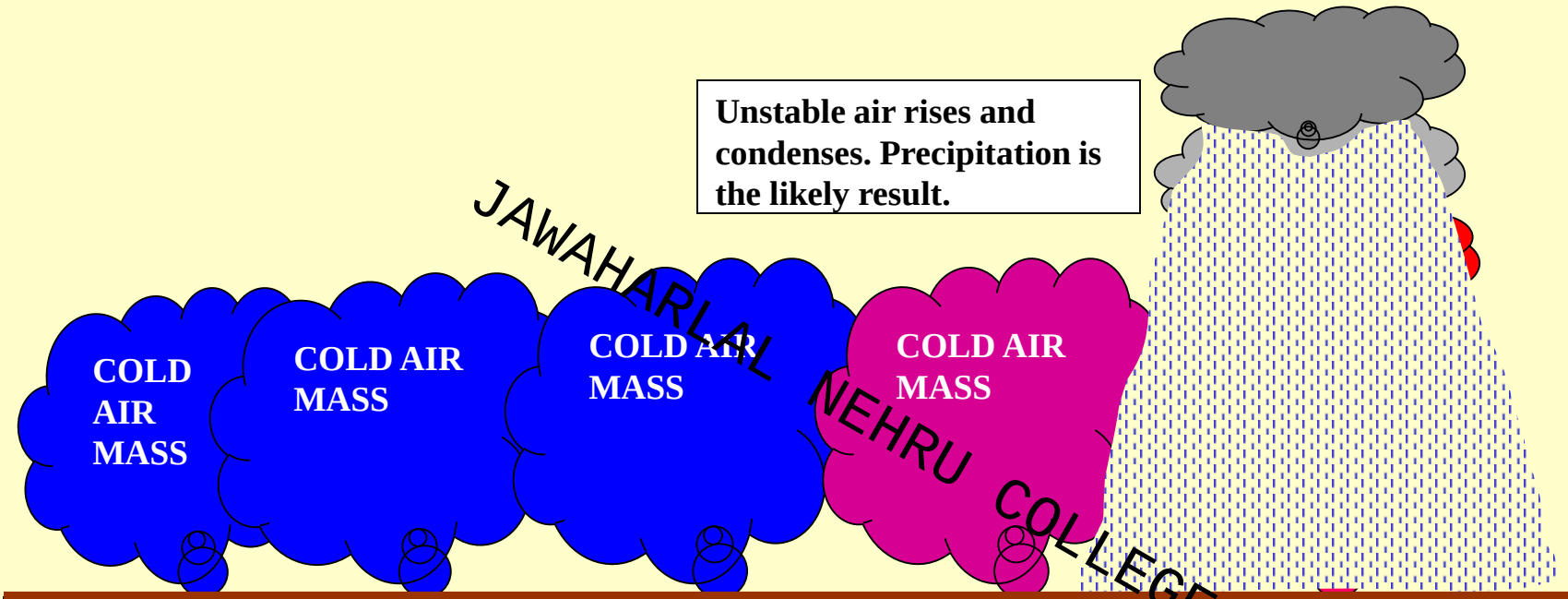
This creates a warm air mass

COLD SURFACE

The lower layers of the air mass are chilled. They are dense and are not likely to rise.

This air is *stable.*

THE FORMATION OF AN UNSTABLE AIRMASS



COLD SURFACE	WARM SURFACE
A large volume of air develops uniform characteristics of low temperature and humidity over a cold surface.	The lower layers of the air mass are heated and begin to rise. As the air rises, it cools, and any water vapour condenses, giving the potential for precipitation.
This creates a cold air mass.	This air is *unstable.*

THE THREE CELL MODEL

Describe, in detail, what happens as a result of insolation at the Equator.

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SOLAR ENERGY

What energy is being transferred from where to where?

What is the name of this cell?

A

THE THREE CELL MODEL

Describe, in detail, what happens at the poles

What is being transferred from where to where?

What is the name of this cell?

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A

THE THREE CELL MODEL

Explain how energy is transferred between 30°N or S and 60°N or S.

What is the name of this cell?

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A

THE TRANSFER OF HEAT ENERGY

Explain how heat energy is transferred from the zones of surplus to zones of deficit.

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A

ASSOCIATED PRESSURE BELTS

Describe and explain the pressure belts associated with these cells.

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A

ASSOCIATED SURFACE WIND PATTERNS

From what pressure (high or low) to what pressure does wind blow ?

How and why are winds deflected in the northern hemisphere?

How are winds deflected in the southern hemisphere?

Make a quick sketch of the surface winds

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A

POSITION OF THE THREE CELLS IN DECEMBER

Where is the sun overhead in December?

What effect does this have on the cells and pressure belts?

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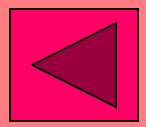
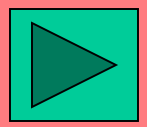

A

POSITION OF THE THREE CELLS IN JUNE

Where is the sun is overhead in June?

What effect does this have on the cells and pressure belts?

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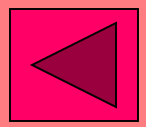
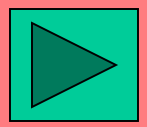

A

IN THE NORTHERN HEMISPHERE:

What is the name of the winds which blow to the Equator?

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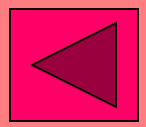
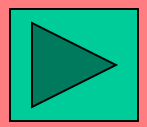
IN THE SOUTHERN HEMISPHERE:

What is the name of the winds which blow to the Equator?

What is the full name of where these winds meet?

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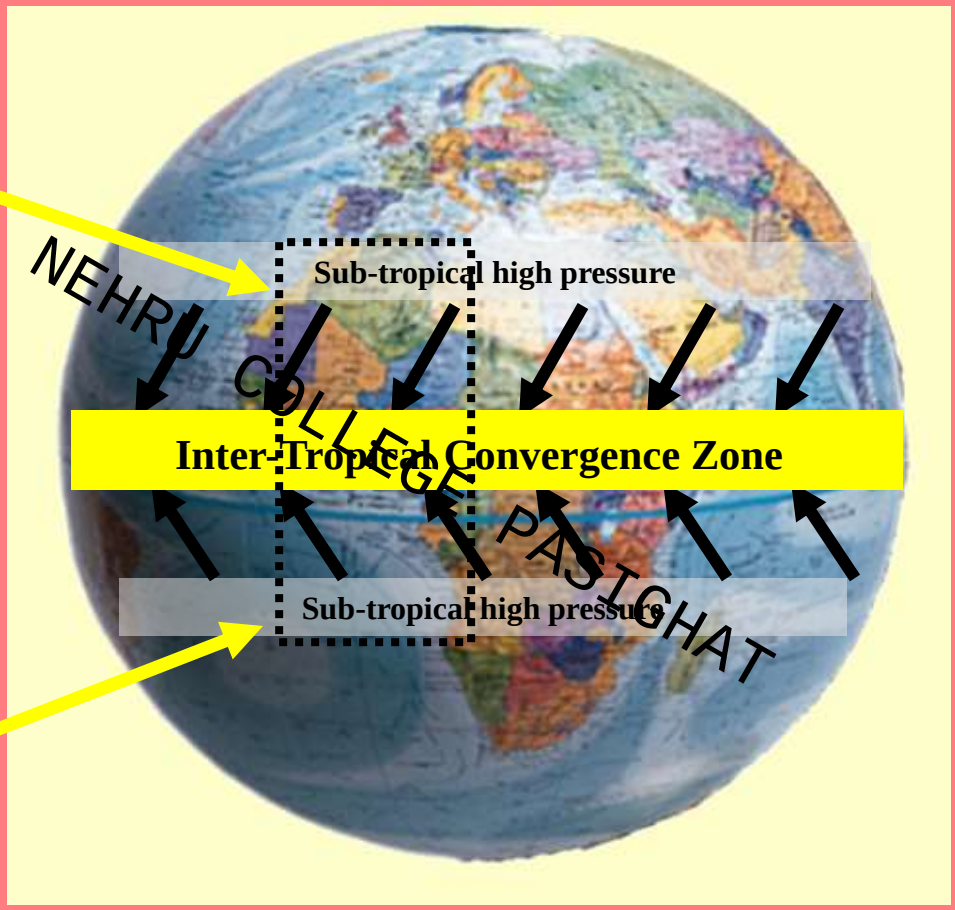
THE INTER-TROPICAL CONVERGENCE ZONE

What are the characteristics and name of the air mass that develops over the Sahara?

What are the characteristics and name of the air mass that develops over the S. Atlantic?



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A

THE ITCZ IN DECEMBER

Which air mass influences most of W.Africa in December?

What conditions does this bring?

What influence does the other air mass have over West Africa?

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A

THE ITCZ IN JUNE

Where is the zone of maximum insolation in June ?

Which air mass has an influence over West Africa ?
What conditions does this cause ?

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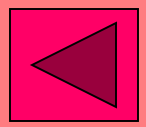
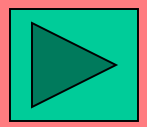

A

The History and Politics of Cartography

Capt Dr K K Mishra

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Presentation Outline

- Introduction to Maps
- Ancient mapping
- Regional maps
- Medieval maps
- The age of exploration and cartography
- The Renaissance and mapping
- World atlases, the enlightenment, and colonialism
- Mapping the United States

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What are maps?

- A form of human communication that represent geography and culture
- “Map” comes from the Latin *mappa*, meaning “cloth”
- “Maps are pictures of the world that embody changes in artistic depiction, scientific inquiry, and the way we view and understand the land around us. They are material objects, social documents, and historical artefacts. The history of cartography is a complex story of changes in artistic representation, technical progress, and social construction, all of which bear the mark of economic and political power” (11, Short).

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Properties of maps: Scale and Projection

- Scale is the measure of the compression of a map.
- Projection is the representation of the round world on a flat surface. All projections are distortions.
  - Mercator projection- most famous, used in navigation
  - Other projections: Robinson, Hammer, Goode, and Sinusoidal

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Properties of maps: Orientation

- The directionality of a map is its orientation.
- Modern orientation places north at the top of the map and south at the bottom.
- This is only a recent convention—orientation is subjective in a spherical world.
- Using north as the principal orientation point if problematic because of the distinction between “magnetic” north and “true” north.
- Orientation reflects people’s judgments and perspectives.

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Properties of maps: Symbols, pictures and plans; the grid system

- Maps can be represented by symbols, pictures or plans.
- A system of vertical and horizontal lines help us structure and represent space in maps.
- The most common grid is latitude (north-south) and longitude (east-west).

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Maps and GPS

- GPS relies on many locating techniques and devices used in maps (ex. longitude and latitude).
- GPS would have been impossible without the development of a system of cartography.

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Maps carved on rocks

- The earliest maps were carved on rocks and they illustrated beliefs and rituals connected with wider cosmologies.
- The earliest rock maps were probably made around 40,000 years ago during the upper Paleolithic period.

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Kwazulu-Natal rock engraving, southern Africa

This rock engraving depicts a hunter with a bow and arrow and his prey.

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Image from http://www.hp.uab.edu/image_archive/ta/tab.html

The Maps of Hunter-Gatherers

- These maps had a practical purpose: to locate fertile areas and good hunting regions.
- These maps also had a spiritual purpose: the depictions of animals and places were acts of supplication to the gods.
- The maps were drawn on: wood, bark, skins, paddles, canoe seats, clothes, wooden plates, trees, and on the body.

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The Agricultural Revolution

- The shift from hunting-gathering to agriculture marked a shift in cartography.
- Maps focused on field systems and property relations, not on hunting trails and animal habits.
- Urban centers developed: "The organized power associated with these hierarchical societies enabled the development of systems of technical knowledge and information recording. The collection of data became an essential part of maintaining social control and political power" (41, Short)

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Ancient map of the Mesopotamian world from Sippar, Iraq c 700-500 BC

- This map is on a stone tablet.

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Image from:
http://www.thebritishmuseum.ac.uk/compass/ixbin/goto?id=enc383%20

Maps and the Development of Urban Civilization

- Urban landscapes became important political and spiritual centers, and were thus rigorously mapped.

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Map of Tenochtitlan, Codex Mendoza, c. 1541

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Image from http://www.latinamericanstudies.org/aztecs/aztecs24.gif

Maps of South Asia

- Few South Asian maps date from more than 800 years ago.
- Most pre-European maps from South Asia are cosmological maps that depict the universe.
- A hot, humid climate makes it difficult to preserve old maps.
- A preoccupation with cosmology contributed to the scarcity of map making.

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Ancient Greece

- 600 BC: Much intellectual curiosity in Greece.
- Pythagoras, Aristarchus, and Eratosthenes concluded that we lived in a heliocentric universe with a spherical earth. Eratosthenes found that the circumference of the earth was 25,000 miles (it is actually 24,899 miles).

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Ancient Rome

- Julius Caesar initiated a survey of the world to provide geopolitical information about the empire. The “Agrippa Map” resulted.
- Ancient Roman maps were used to record landholdings, and were probably used for tax purposes or to assist in the allocation of the water supply.

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The Peutinger map, c. 400 AD

- This portion of the Peutinger map shows parts of the eastern Mediterranean

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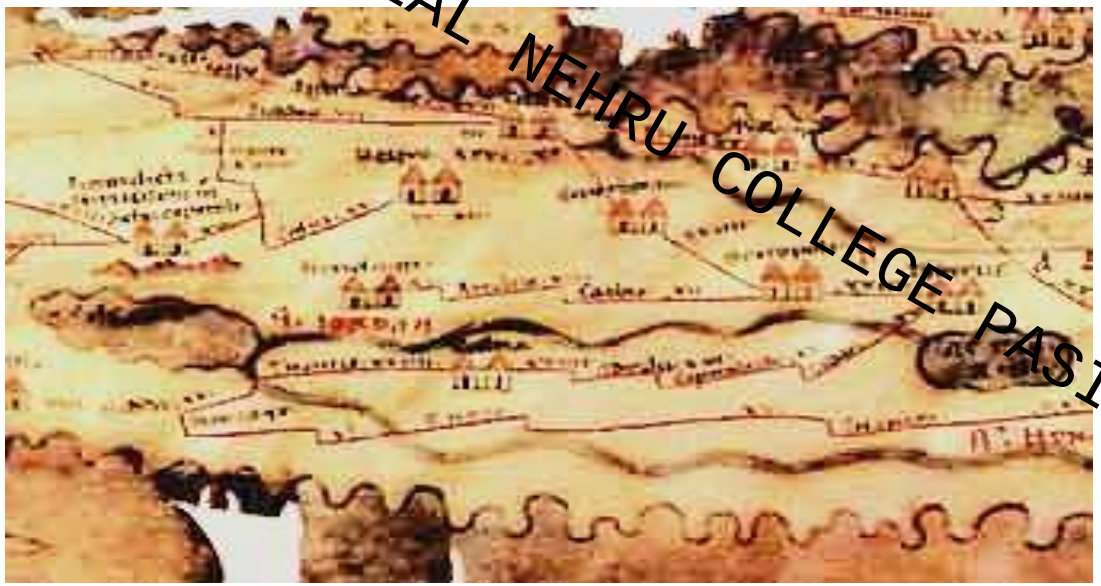

Image from http://www.livius.org/a/1/judaea/peutinger_jud.jpg

Claudius Ptolemy

- Ptolemy's *Guide to Geography* described longitude and latitude and proposed this grid system with degrees and minutes. He also outlined a conic and pseudoconic projection.

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Image from http://www.aces.uiuc.edu/Students/images/C.Ptolemy.jpg

Mappaemundi: 13th-14 c Europe

- Maps of the world: *Mundus* means world
- Three types: tripartite, zonal, transitional
- Tripartite: most common. These depict Asia at the top, Africa at the east, and Europe at the West. The world is centered at Jerusalem and there is a division of the world by God to the three sons of Noah.
- Zonal: divided into 5 or 7 climate zones
- Transitional: more accurate, 14th century

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The psalter map, c. 1260

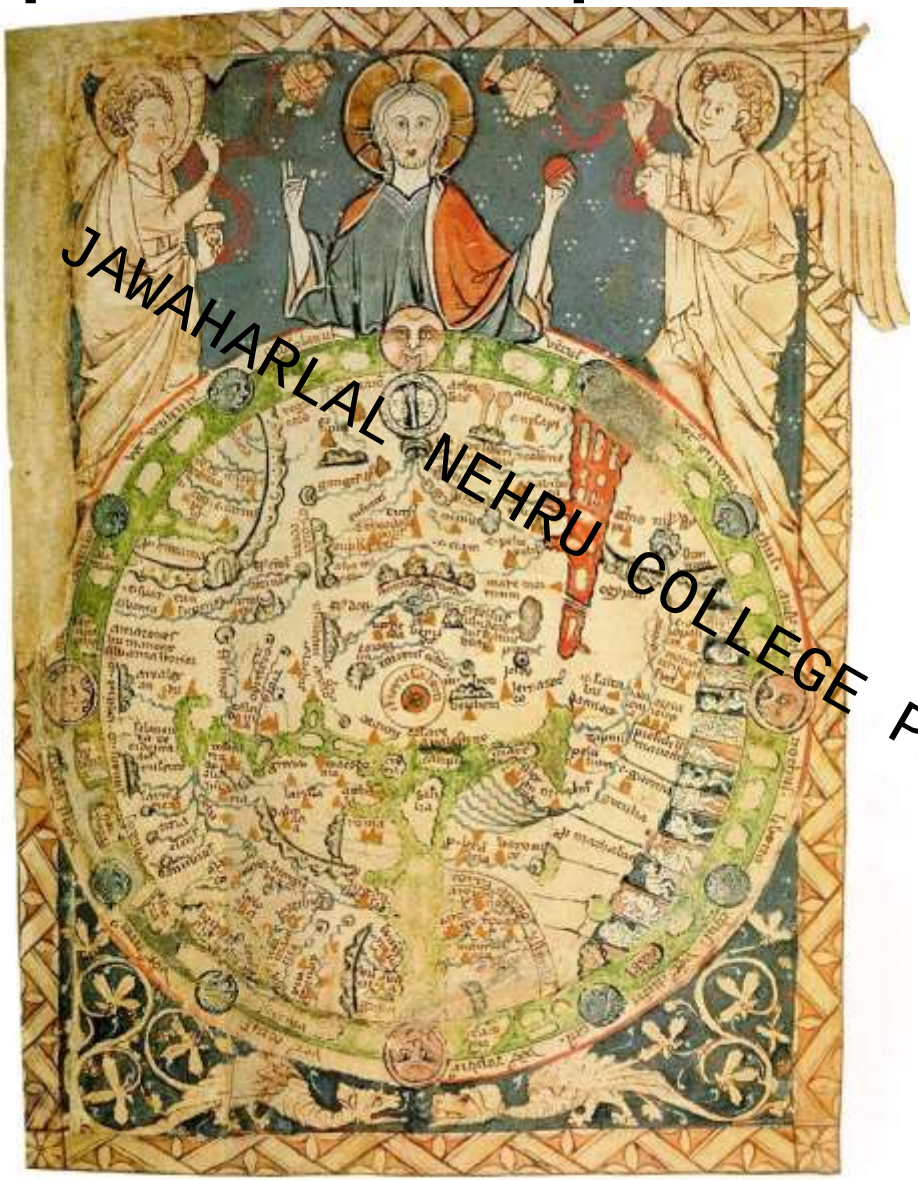

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Image from http://puffin.creighton.edu/bucko/lectures/images/world.jpg

Portolan Charts and Atlases

- These are sea charts from the late 12th century, which developed once mariners started using the compass.
- These developed the convention of orientation towards the north.
- These have a network of lines that correspond to points of the compass and seafaring routes.
- These were error prone because they did not take into account the curvature of the earth.

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Portolan chart from the Vallard Atlas, 1547

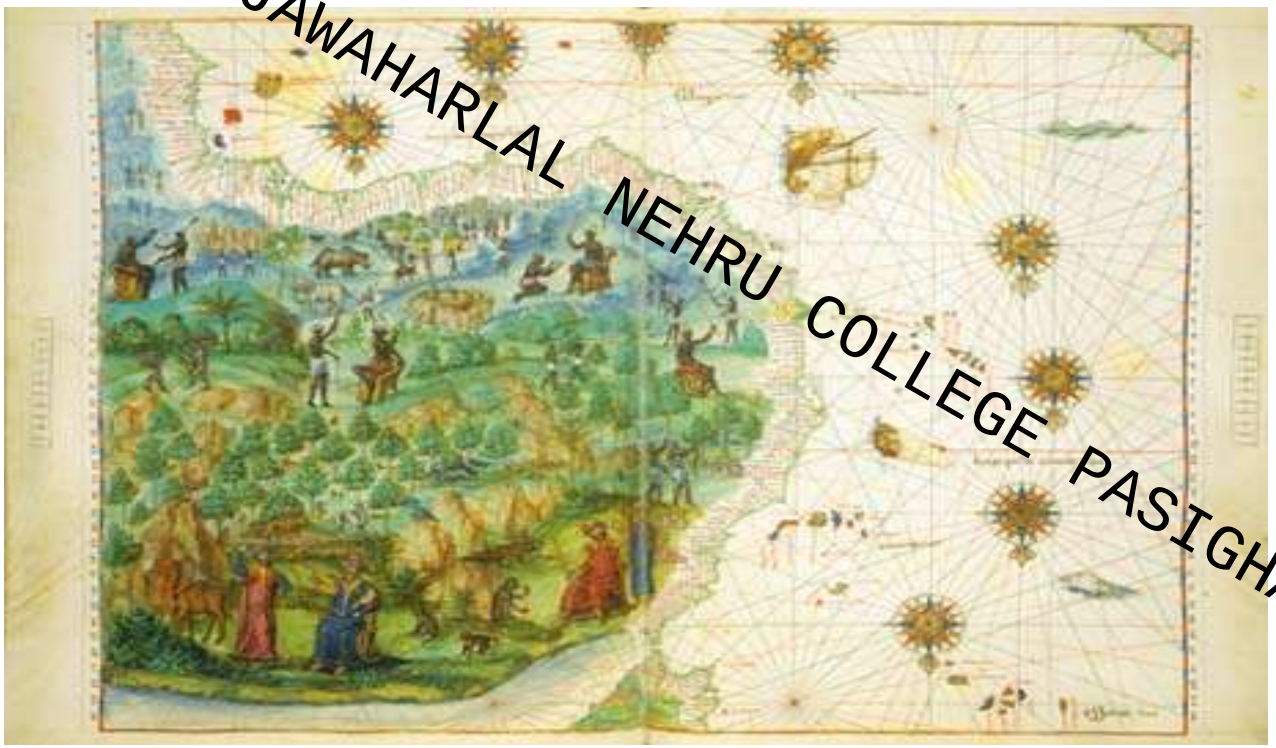

Image from http://www.mariner.org/captivepassage/photos/lg_inln2001-90_nwafrica.jpg

Islamic Cartography

- 800-1400 AD: Arabs conquered much of the Middle East, North Africa, Spain, India and Armenia. The empire was a breeding ground for intellectual activity.
- Cosmological maps were created from the Islamic scientific tradition, not religious discourse.
- World maps were very general and placed the Middle East at the center

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World map, 1456, by Al-Idrisi

- This is a very geometric representation of the world. It draws on the Ptolemic understanding, thus combining traditions of the East and the West.

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Image from http://www.oldmaps.mu/Maps/Images/Al-IdrisiCircular.jpg

Maps of China

- Have been dated as early as 200 BC.
- During the Tang and Song dynasties, maps were submitted to the central authorities on a 3 to 5 year basis.
- In Medieval China, maps were produced by central authorities for military, political, or administrative purposes.

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Maps of the Far East

- Japan: “Gyoki maps” commissioned by the government.
- The Japanese made grid-like maps of rice fields as important records of ownership.
- Korea: Ch’onhado maps with Korea at the center of the world.
- Korea adopted a more systematic approach to large mapping in the late 15the century in order to aid with defense.

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Ch'onhado, Korea, mid 18th century

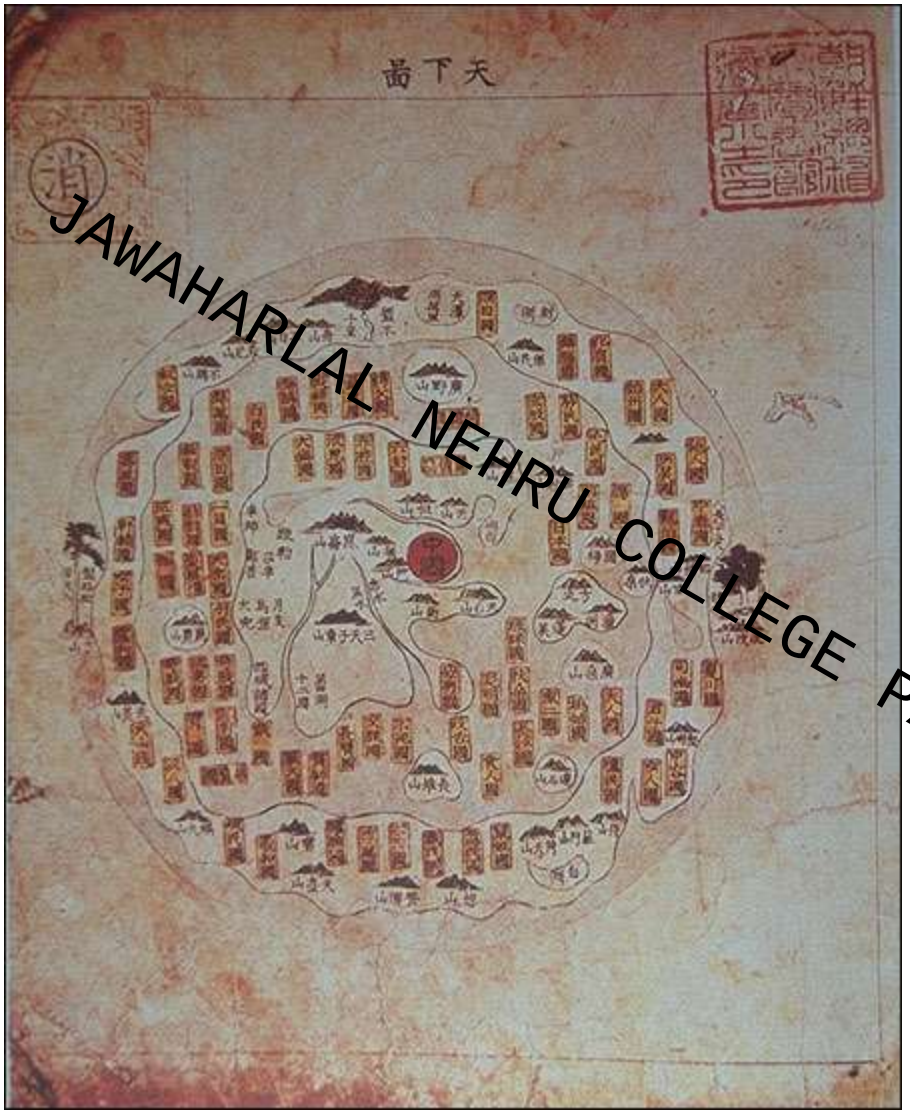

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Image from http://www.henry-davis.com/MAPS/Ren/Ren1/750.jpg

Maps of Mesoamerica

- Olmecs, Mixtecs, Toltecs, and Zapotecs
- Four types of maps: terrestrial with and without a historical narrative, cosmological, and celestial.
- Many maps were lost or destroyed during the Spanish conquest.

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Maps of South America

- 3 types of indigenous mapping: celestial maps, maps made at the behest of Europeans by indigenous people, and maps made by Europeans but influenced by local conceptions of space.
- Many maps were quick sketches in the sand or hand gestures in the air.

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Alcama, William Hack, 1685

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Image from http://www.nmm.ac.uk/collections/images/70/F1904.jpg

Mapping South America

- The Spanish and Portuguese did much of the mapping of South America
- 1506: the earliest printed map of the New World by Giovanni Matteo Contarini
- 1507: Martin Waldseemullewr represented North America as a separate continent
- There was not much mapping of the interior of the continent until later

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Giovanni Contarini's world map, 1506

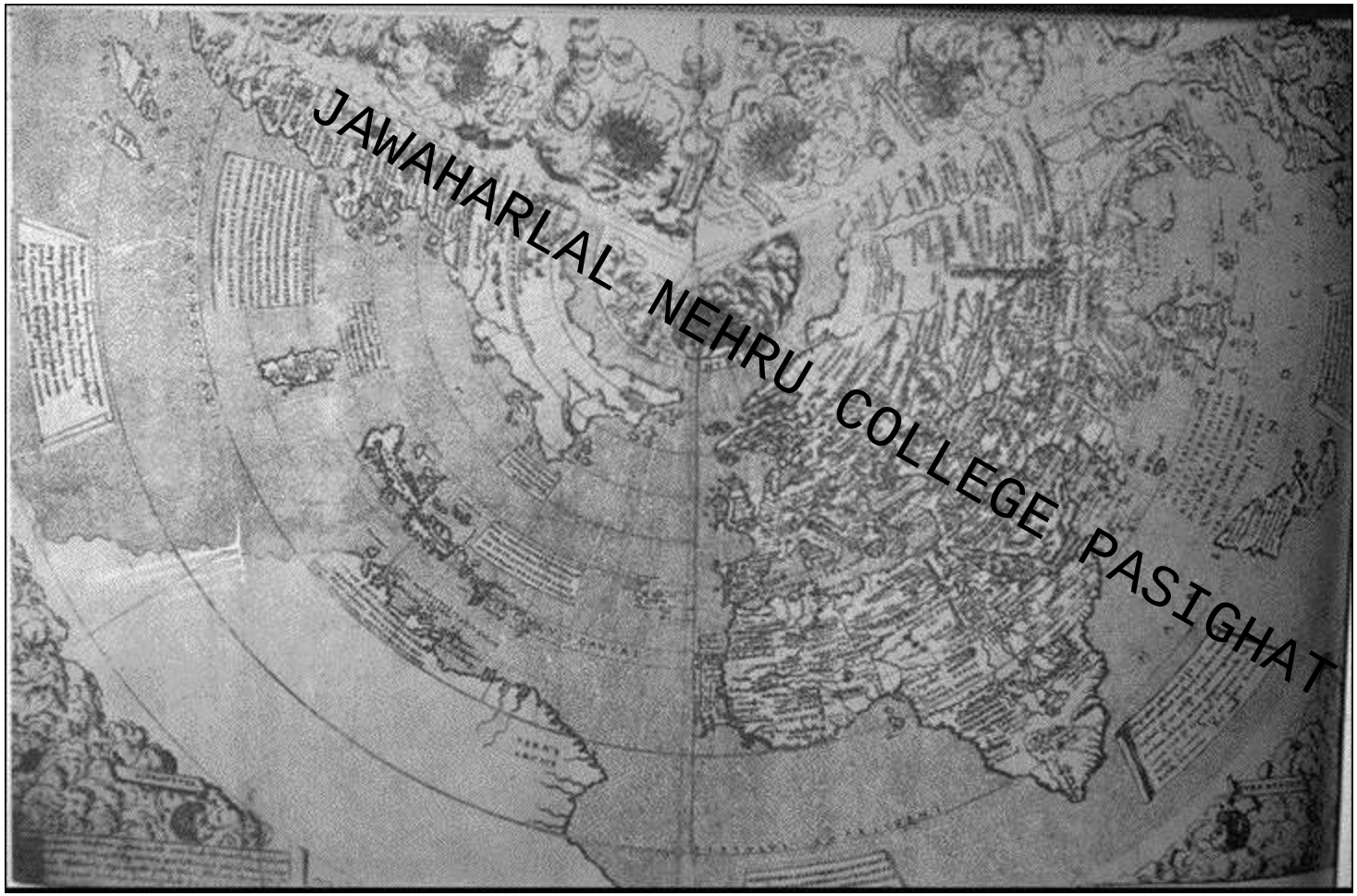

Image from http://www.henry-davis.com/MAPS/Ren/Ren1/308.html

Maps of North America

- Few maps pre-European maps of North America exist.
- Canadian Inuit maps were engraved onto the ivory tusks of walrus.
- Native American made maps on the inside of birch bark. These assisted in navigation along the waterways.

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Mapping North America

- North America was mapped by the Italians, Dutch, French, and English.
- 1612: Map by Samuel de Champlain of France that promoted the idea of colonization.

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Map of Virginia, John White, c. 1585

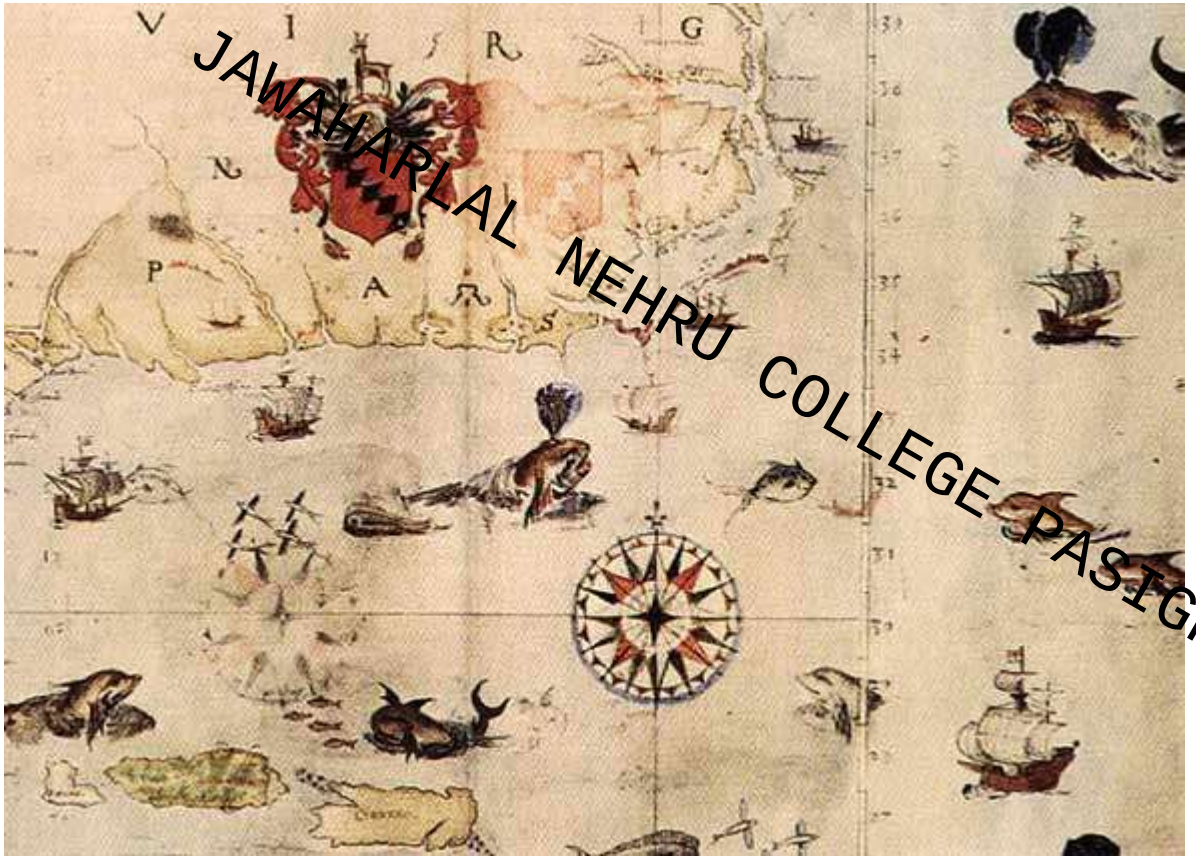

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Image from http://www.wilsonsalmanac.com/images1/map_virginia_cr.jpg

Mapping the Pacific

- Exploration missions began with Magellan, Francis Drake, and Abel Tasman
- The British and the French were competitive over mapping the Pacific in the 18th and 19th centuries.

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World map showing Magellan's voyage, 1544, Battista Agnese

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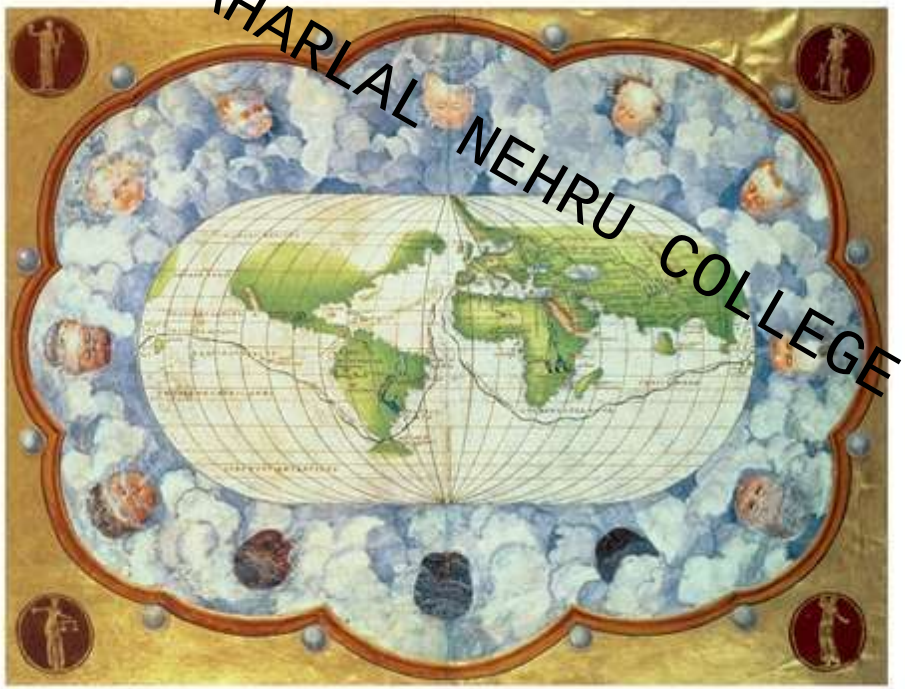

Image from http://www.art.com/asp/display_artist-asp/_/crid--33047/Battista_Agnese.htm

The Development of the Sea Atlas

- Late 16th century: moderately priced sea atlases were made available.
- 1620: *Mariner's Mirror* by Lucas Jason Waghenaer was published. This was the first atlas to show sea charts and coastal profiles on the same map.

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Ptolemy and the Renaissance

- Ptolemy's *Guide to Geography* was revised and reprinted all over Europe between 1475 and 1730
- 1524: *Cosmographia* by Peter Apian first made the distinction between cosmography, geography, and cosmology

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Prima Europa Tabula, 1482, from Ptolemy's *Guide to Geography*

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Image from http://images.rgs.org/search_.aspx?keyword=metal

Ptolmey's world map

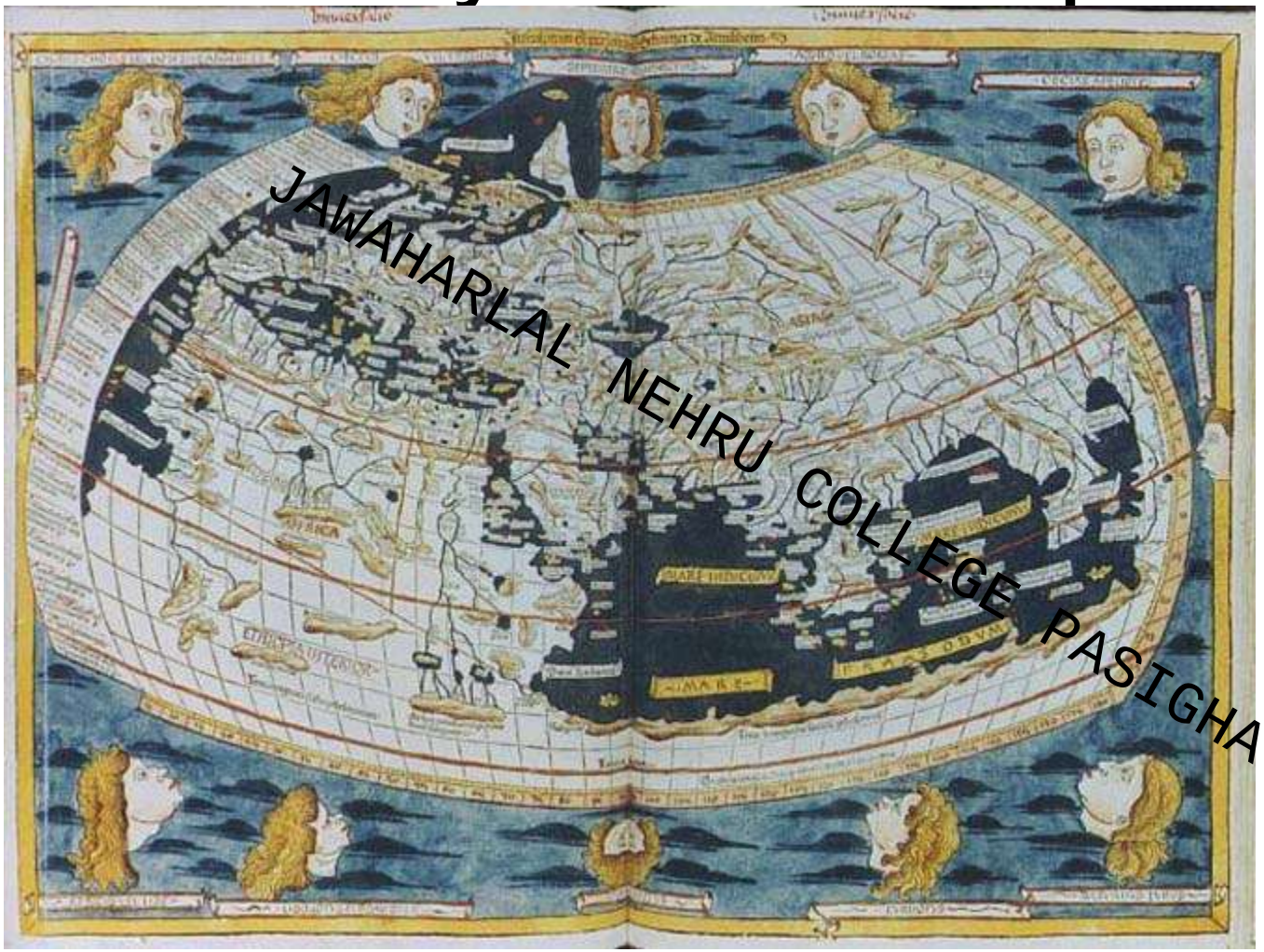

Image from http://www.sailtexas.com/columbusships.html

Mapping National territories

- 1579: The first national atlas of Europe was produced by Christopher Saxton. Saxton also mapped many British regions.
- 1611-1612: The first national atlas of Britain was completed by John Speed

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Christopher Saxton's Map of Dorset, c. 1579

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Image from http://special.lib.gla.ac.uk/exhibns/month/june2002.html

World Atlases

- 1570: Abraham Ortelius's *Theatrum*, the first world atlas, was published.
- 1595: Mercator's *Atlas* was published. This used a map of the world with a Mercator projection.

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Map of Russia from Ortelius's *Theatrum*

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Image from http://www.vnbc.dircon.co.uk/OrtelMoscovy.jpg

Mercator's Arctic, 1595

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Image from
http://www.helmink.com/Antique_Map_Mercator_Arctic/Scans/Mercator%20Actic%202.jpg

Colonial Mapping: Maps as Imperial Claims

- French and British competition for lands in North America is illustrated by their respective cartographies.
- 1718: Guillaume Deslisle published a map that compressed the English colonies.
- 1755: The British response. Map by John Mitchell extended the boundaries of Virginia, the Carolinas, and Georgia.

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Deslisle's map

Image from http://www.plancius.nl/maps/Amerika/images/am4.JPG

Cartography and the Enlightenment

- More accurate maps emerged as did an emphasis on latitude and longitude
- Urban growth in 18th century Europe prompted large urban mapping projects. Many of these maps were bird's-eye views of cities.

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Turgot/Bretez map of Paris, 1739

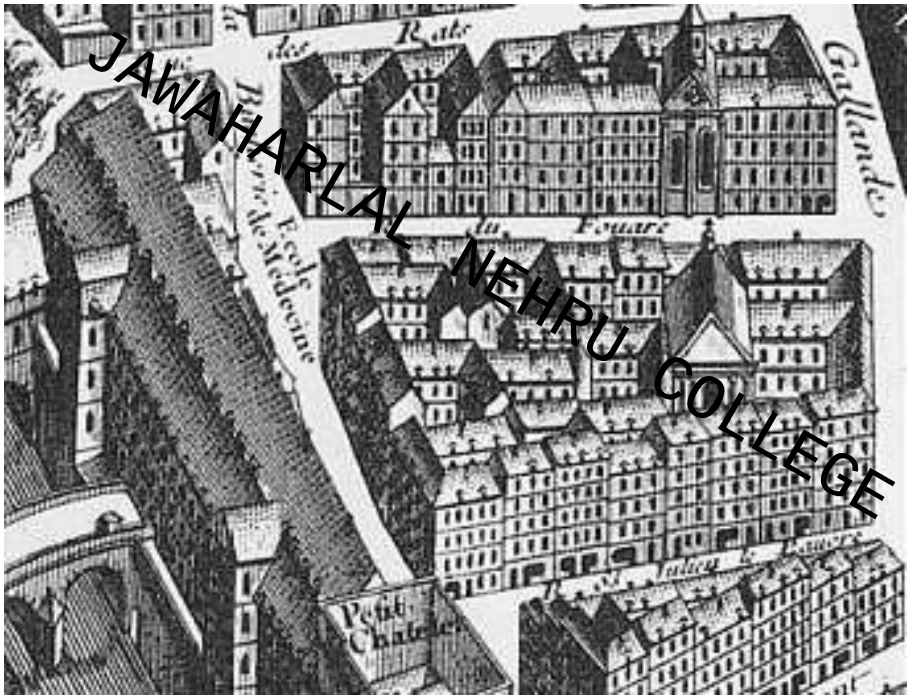

Image from http://www.people.ku.edu/~asnow/maps.html

Mapping the Early United States

- 1820: John Melish published a detailed map of the entire country with room out West ready to be populated
- 1874: Francis Walker publishes the *Statistical Atlas of the United States* which presents data on health, immigration, religion, ethnicity, economic trends, and population distribution and density.

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Works Cited

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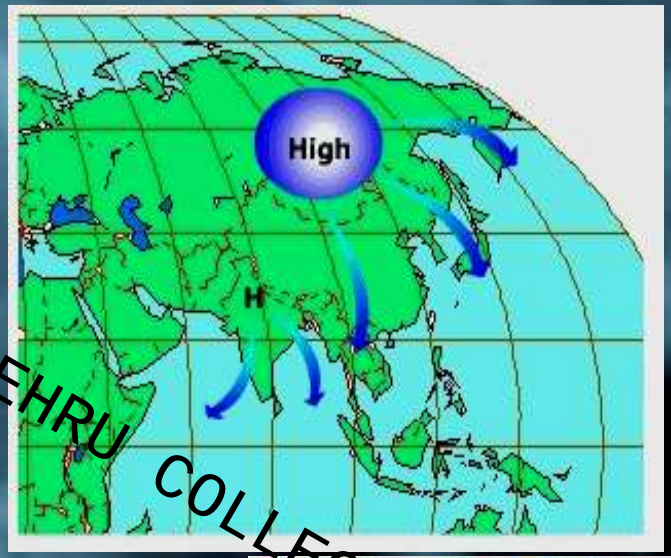
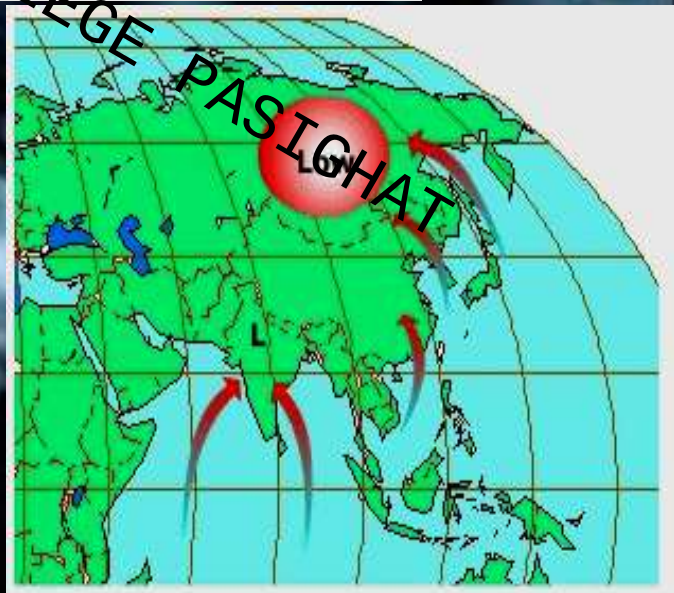
DR.K.K.MISHRA

- **India's climate is dominated by monsoons.**
- **Monsoons are strong, often violent winds that change direction with the season.**
- **The term "monsoon" technically describes seasonal reversals of wind direction caused by temperature differences between the land and sea breeze, creating zones of high and low pressure over land in different seasons.**





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Monsoons occur due to changes in atmospheric pressure which are caused by different rates of heating and cooling of continents and oceans.

Monsoons occur every year in many countries around the world other than South Asia - northern Australia, Africa, South America and the US are also affected.

The geographical extent of the global surface monsoons (the figure below) can be outlined by the normalized seasonality

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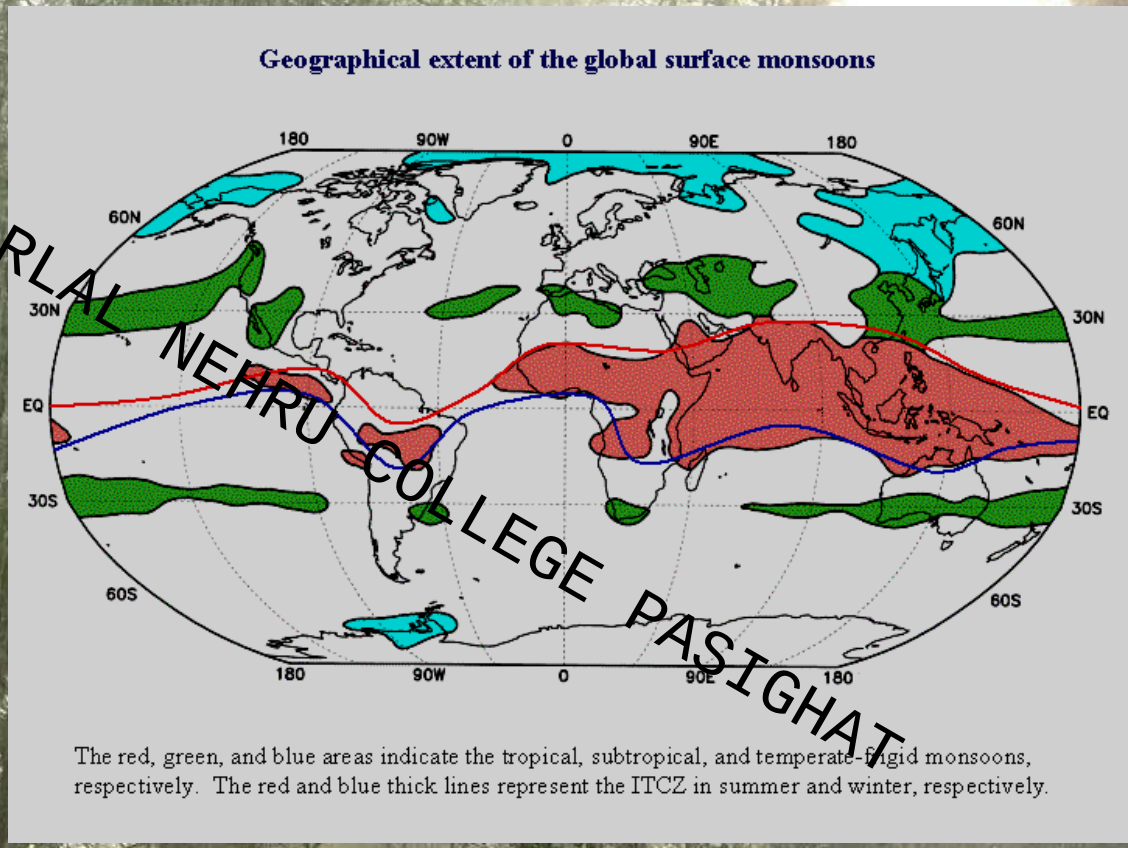

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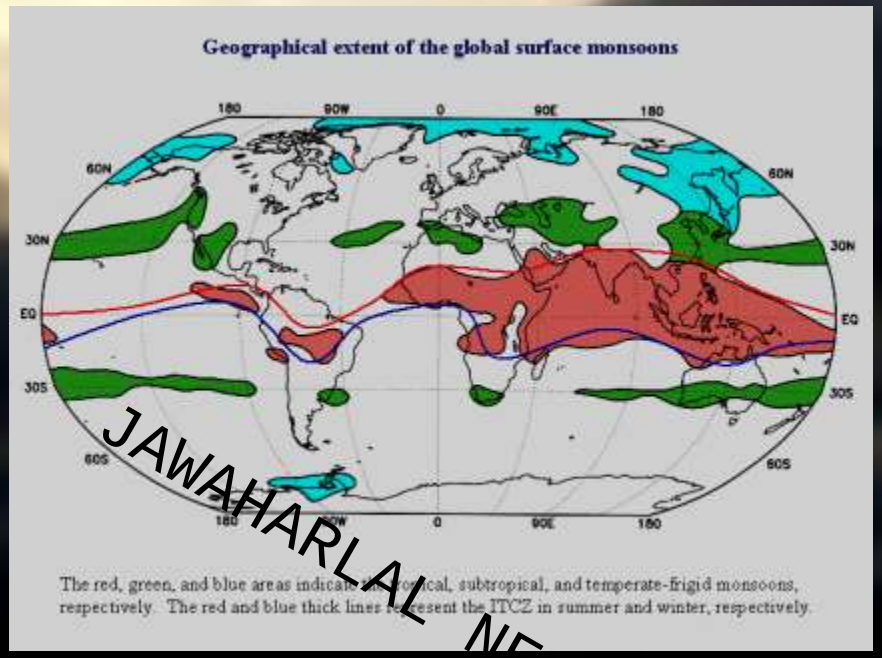

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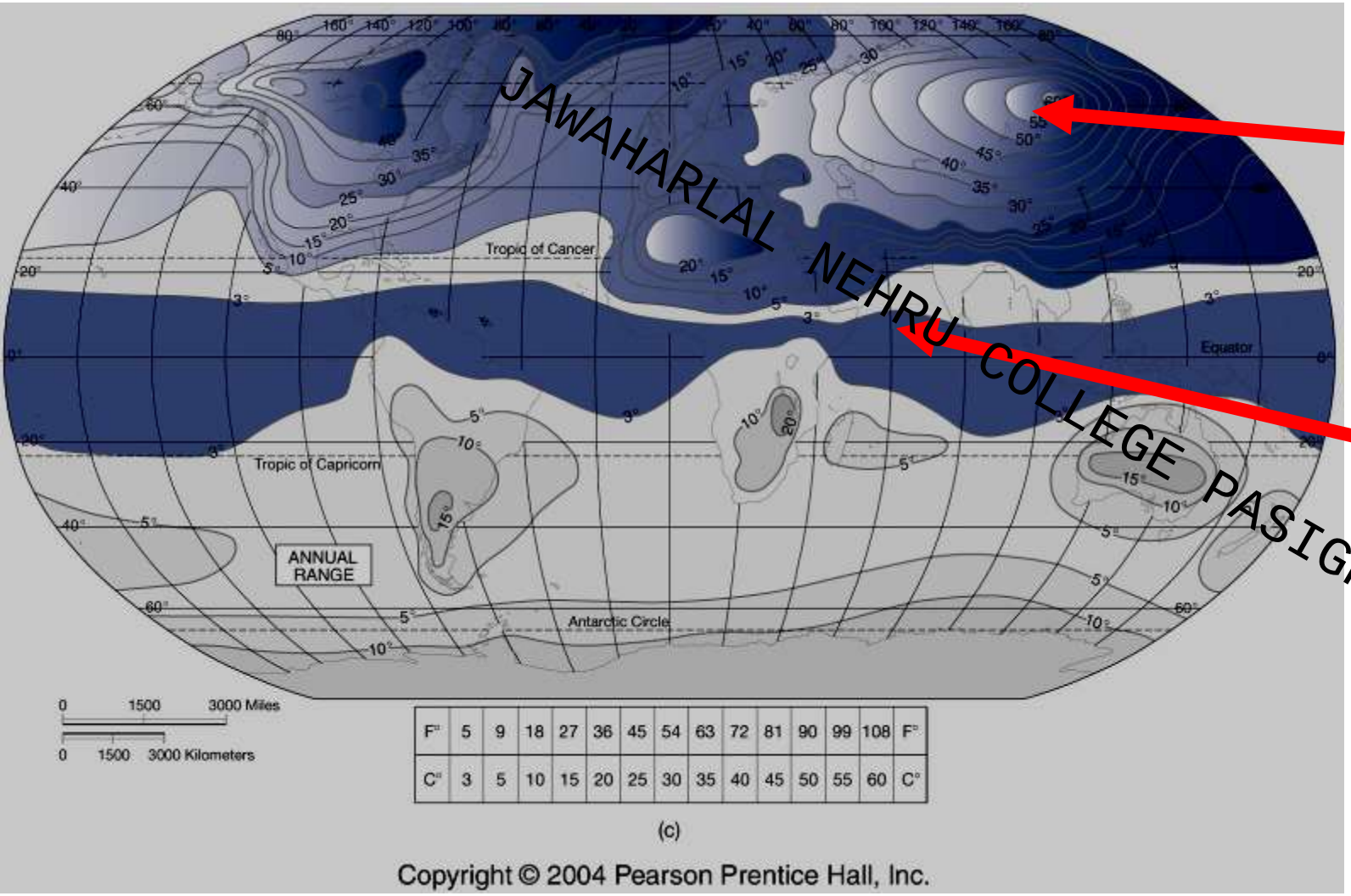
The global surface monsoons contains three kinds of monsoons: the tropical, subtropical, and temperate-frigid monsoons, respectively.

The extent of the classical tropical monsoons is surrounded by the positions of the Inter Tropical Convergence Zone (ITCZ) in summer and winter, which is the result of the two driving forcings of the tropical monsoon, the seasonal variation of the planetary thermal convection and the seasonal variation of the semi-permanent planetary waves due to the thermal contrast between ocean and continent. (Li and Zeng, 2000, 2003, 2005).

Surface temperature range that results in the monsoon

Sea surface temperature variations are much smaller than land surface temperature variations. (Mainly the seasonal cycle)



Tibetan plateau

Ocean: range of 3 to 5°C

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Monsoon is a term derived form the Arabic word "*Mausim*", meaning season. It was first used by Arabic navigators to describe the seasonal winds of the Arabian Sea.

These winds blow from the north-east for one half of the year and from the south-west for the other half.

Monsoon winds blow from cold to warm regions because cold air takes up more space than warm air

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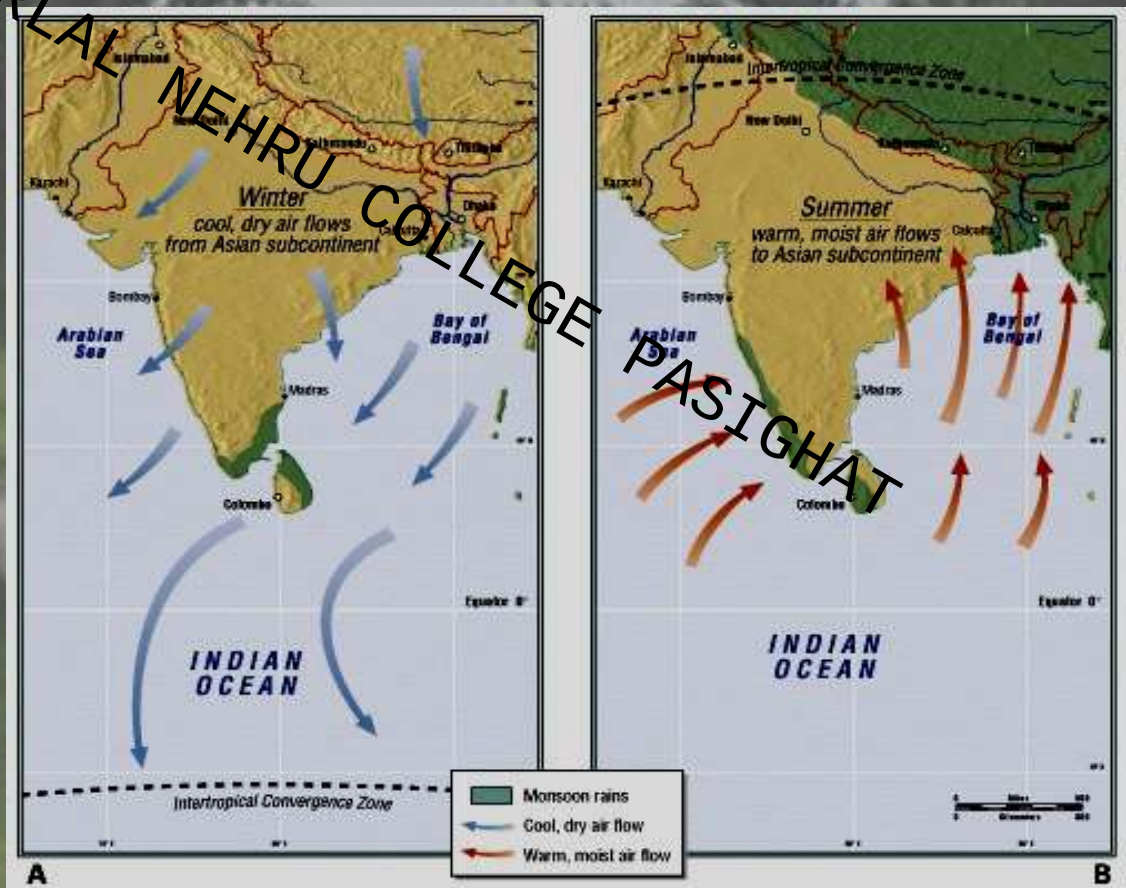
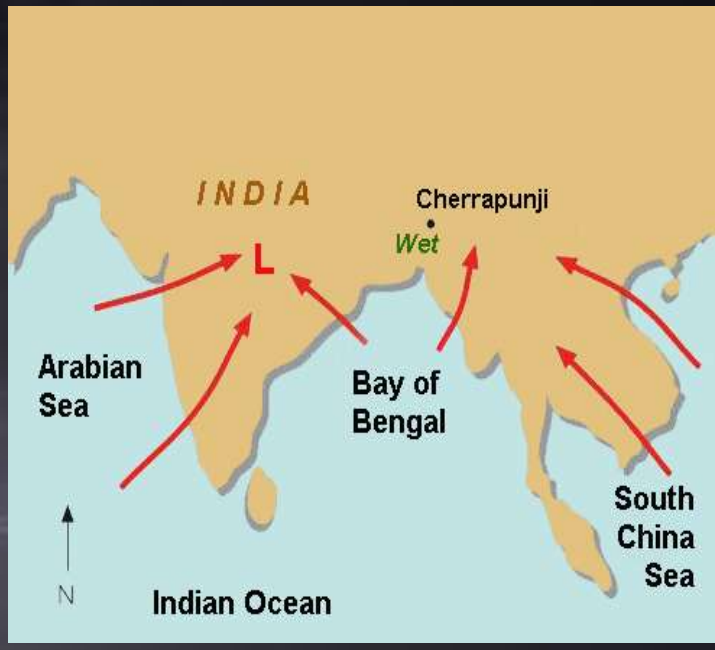
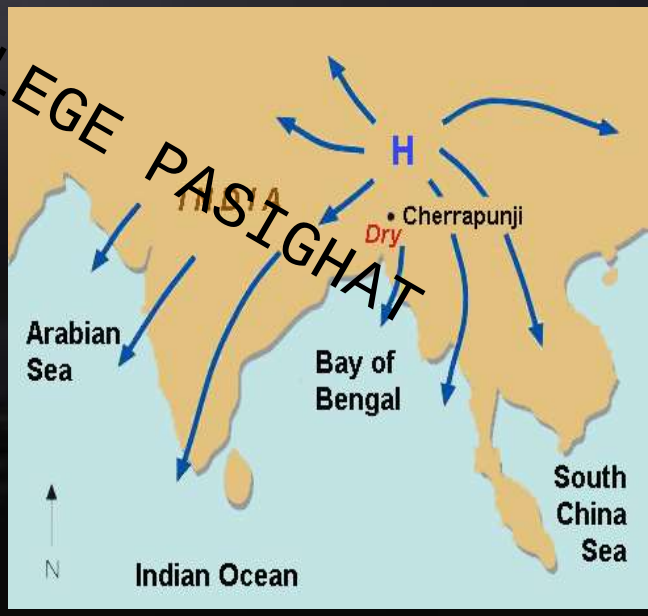


- Being a tropical monsoon country there are two monsoon seasons.
- The South –West (summer) monsoon has warm winds blowing from Indian Ocean. Its span is June to September, with 75 % of the annual rainfall in India. It varies from 10 cm in western Rajasthan to over 900 cm in Meghalaya.



Summer monsoon

- North- East (winter) monsoon is characterized by a dry continental air mass blowing from the vast Siberian high pressure area from December to March. The rainfall includes snowfall during winter monsoon which is of the order of 1000 km2 in India. This is also known as Retreating monsoon.



Winter monsoon

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- **The mountains of southern India split the summer winds. The western arm of the monsoon is deflected northwards, by the western Ghats, to Mumbai and then on to Pakistan.**

- **The eastern arm travels up through the Bay of Bengal to Kolkata and Assam, and is deflected north-westwards by the Himalayas.**

- **On average, the winds arrive in southern India about six weeks before they arrive in north-west India.**

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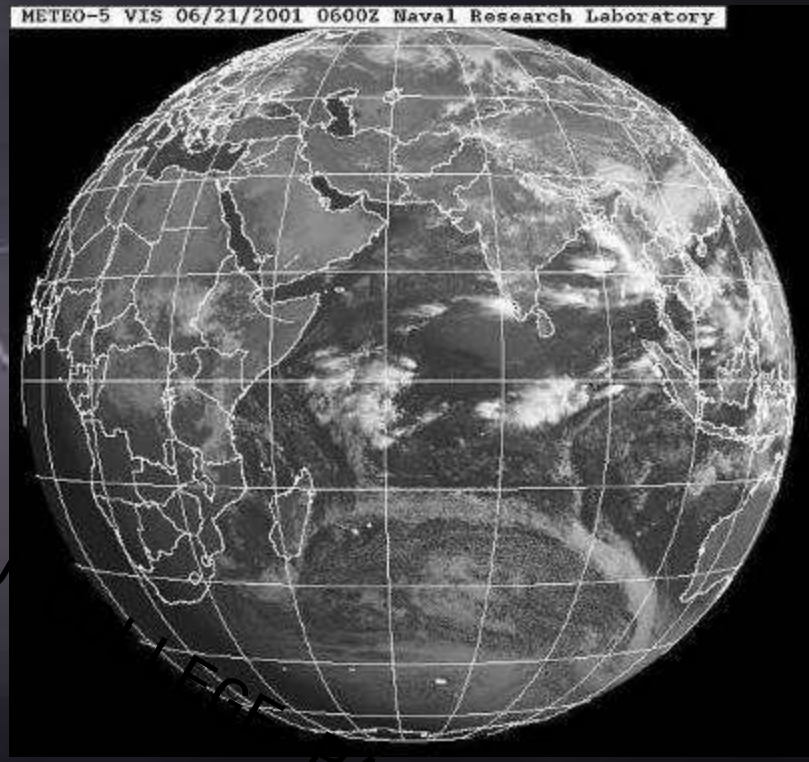
- Thar desert and adjoining areas of the northern and central Indian Subcontinent heats up too much during summer. This causes a low pressure area over the northern and central Indian subcontinent. To fill up this void, the moisture-laden winds from the Indian Ocean rush in to the subcontinent.

- These winds, rich in moisture, are drawn towards the Himalayas, creating winds blowing storm clouds towards the subcontinent. The southwest monsoon is generally expected to begin around the middle of June and dies down by September.



a fully illuminated view of the Indian Ocea
region shortly after the onset of the SW
Monsoon.

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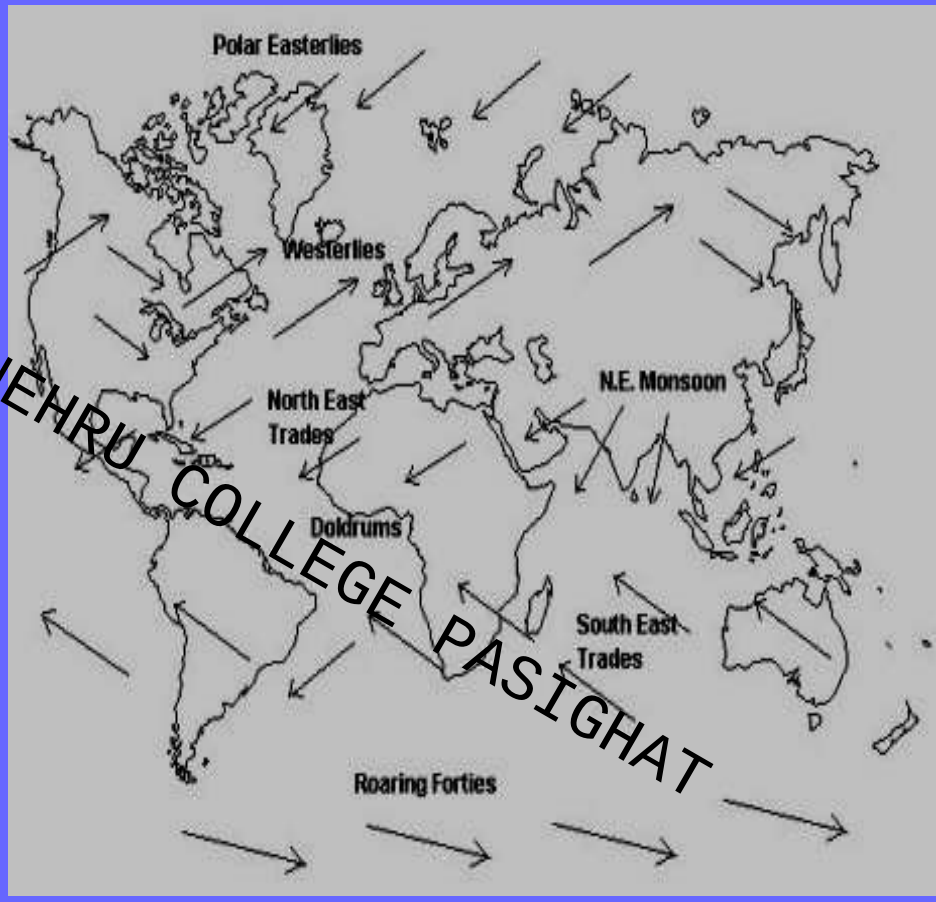
I I E C T - P A S T C H A

Indian ocean winds - monsoon



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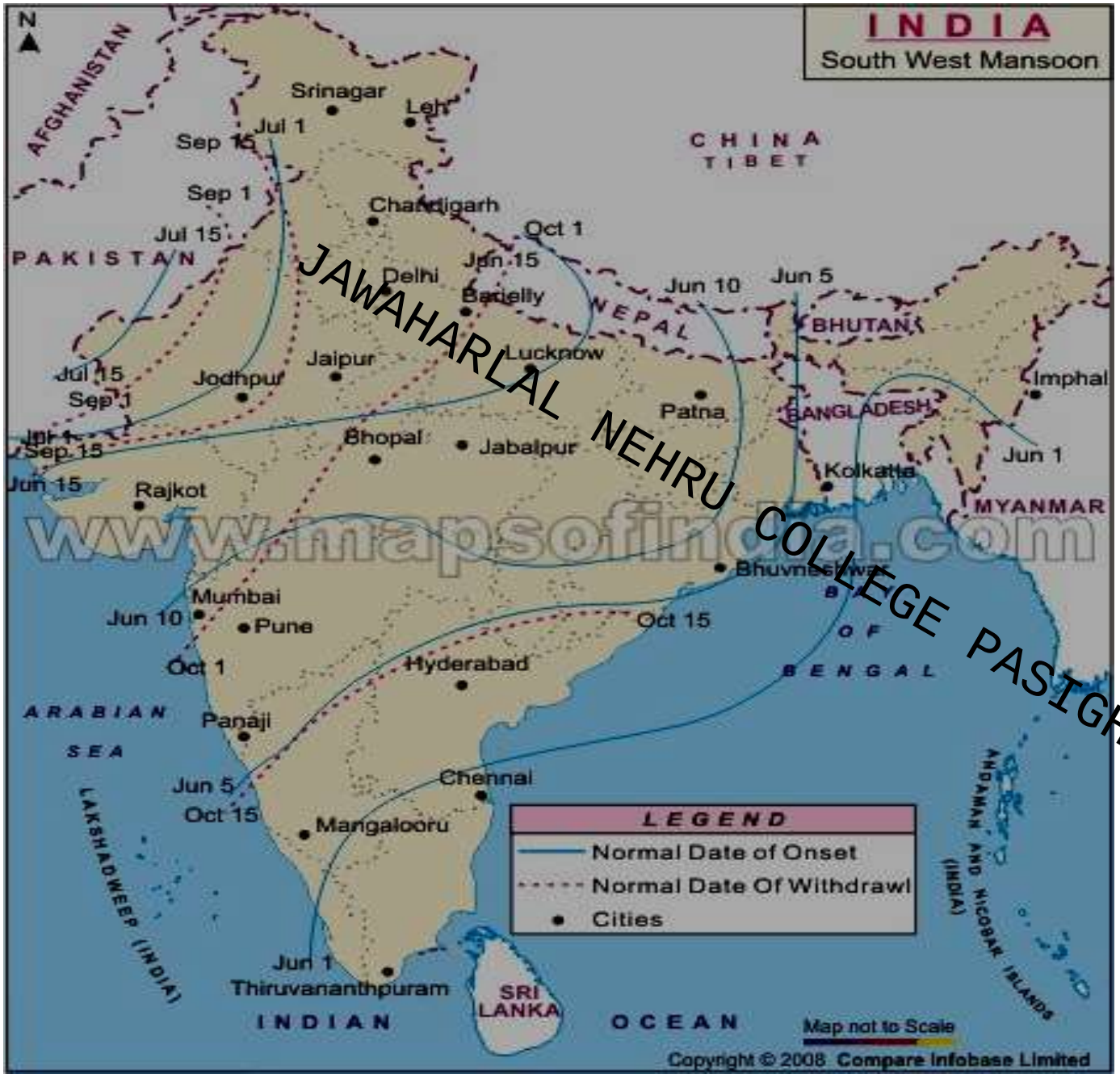
June-August (SW monsoon)

December-March (NE monsoon)

Onset of South West Monsoon



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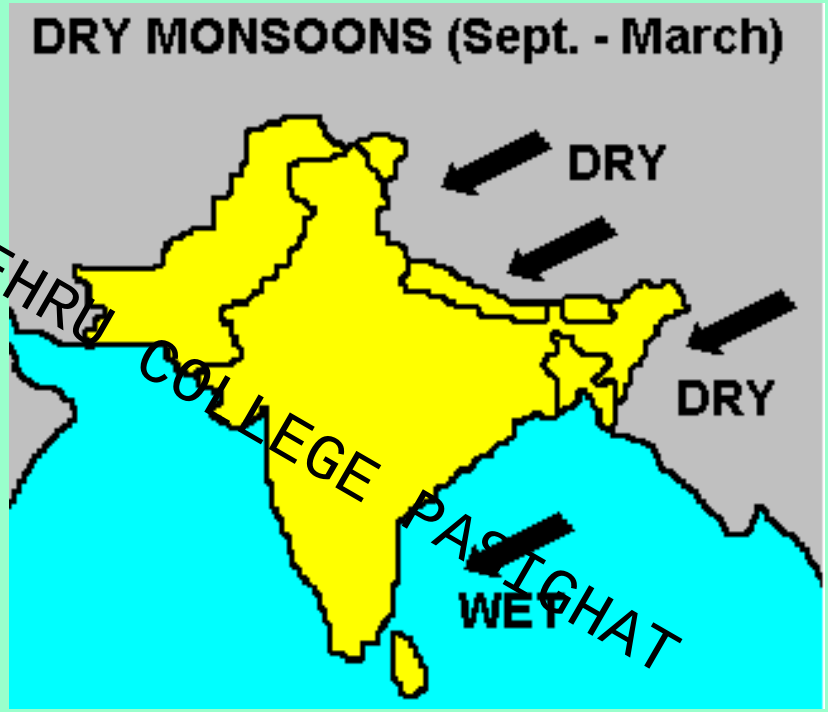
www.mapsofindia.com

Retreating Monsoons
(North East Monsoon)

- Much of India experiences infrequent and relatively feeble precipitation during the retreating monsoon.
- An exception to this rule occurs along the southeastern coast of India and for some distance inland.
- When the retreating monsoon blows from the northeast across the Bay of Bengal, it picks up a significant amount of moisture, which is subsequently released after moving back onto the peninsula.
- .



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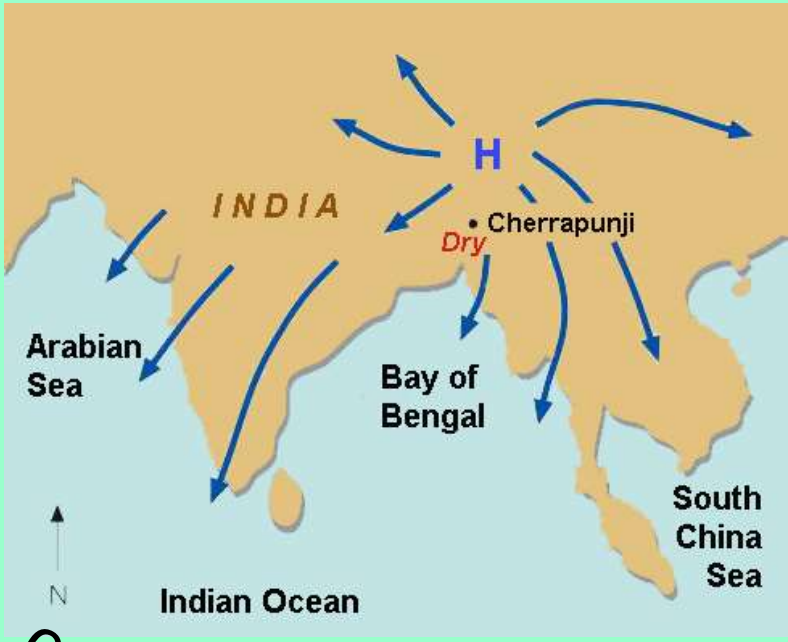
- Thus, from October to December the coast of Tamil Nadu state receives at least half of it's roughly 1,000 mm of annual precipitation

- This rainy extension of the generally dry retreating monsoon is called the northeast, or winter, monsoon.

- Another type of winter precipitation occurs in northern India, which receives weak cyclonic storms originating in the Mediterranean basin.

- In the Himalayas these storms bring weeks of drizzling rain and cloudiness and are followed by waves of cold temperatures and snowfall. The state of Jammu and Kashmir in particular receives much of its precipitation from these storms.



Retreating Monsoon

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- The heaviest monsoon rainfalls occur where the winds blow side-on to the hills. The higher the hills and more moist the air, then the greater the amount of rainfall.

- These factors give Cherrapunji, in Assam, one of the highest rainfalls in the world. On average, Cherrapunji has an annual rainfall total of nearly 11 metres, the maximum monthly amount occurring in June.

- Mumbai receives about 1.8 metres with the maximum monthly total in July.

- In comparison, Delhi registers only 64 cm of rainfall each year with the maximum monthly total occurring in both July and August.

- At Chennai the pattern of rainfall is different because the monsoon winds blow along the coast. Here, the rainfall increases gradually through the summer months with larger amounts falling in October and November, owing to tropical cyclones traveling westwards across the Bay of Bengal.

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- The torrential rainstorms often cause violent landslides and widespread floods. Entire villages have been swept away during monsoon rains. Despite the potential for destruction, the summer monsoons are welcomed in India.

- Farmers depend on the rains to irrigate their land.

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- Additionally, a great deal of India's electricity is generated by water power provided by the monsoon rains.

- The monsoon delivers most of India's rainfall and has a key impact on the economy. Only a third of India's crops grow on irrigated land and a weak monsoon can wipe out many incomes and shrink demand for farm equipment and consumer goods.
- Monsoon rainfalls are unreliable in that the amount varies considerably from year to year. Low rainfalls cause great problems for agriculture and water supplies in general.
- In the Indus river the flood problem is often made worse because the monsoon rainfalls can coincide with high river levels in its tributaries, caused by water from the melting mountain snows of the Himalayas

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Interannual variations of Indian summer monsoon

- The rainfall during the Indian summer monsoon season (June, July ,August and September) show considerable inter-annual and interseasonal variability.

- Over any part of India, Some years a lot of rainfall occurs causing flood, while some other years rainfall amount received is much less causing drought like situations. This year to year variation of rainfall over a region during monsoon seasons is termed as Interannual variability of monsoon rainfall.

- This inter-annual variability in the summer monsoon rainfall has a profound effect on the socioeconomic well being of India. Hence, the ability to forecast such events became the focus of various meteorological studies.

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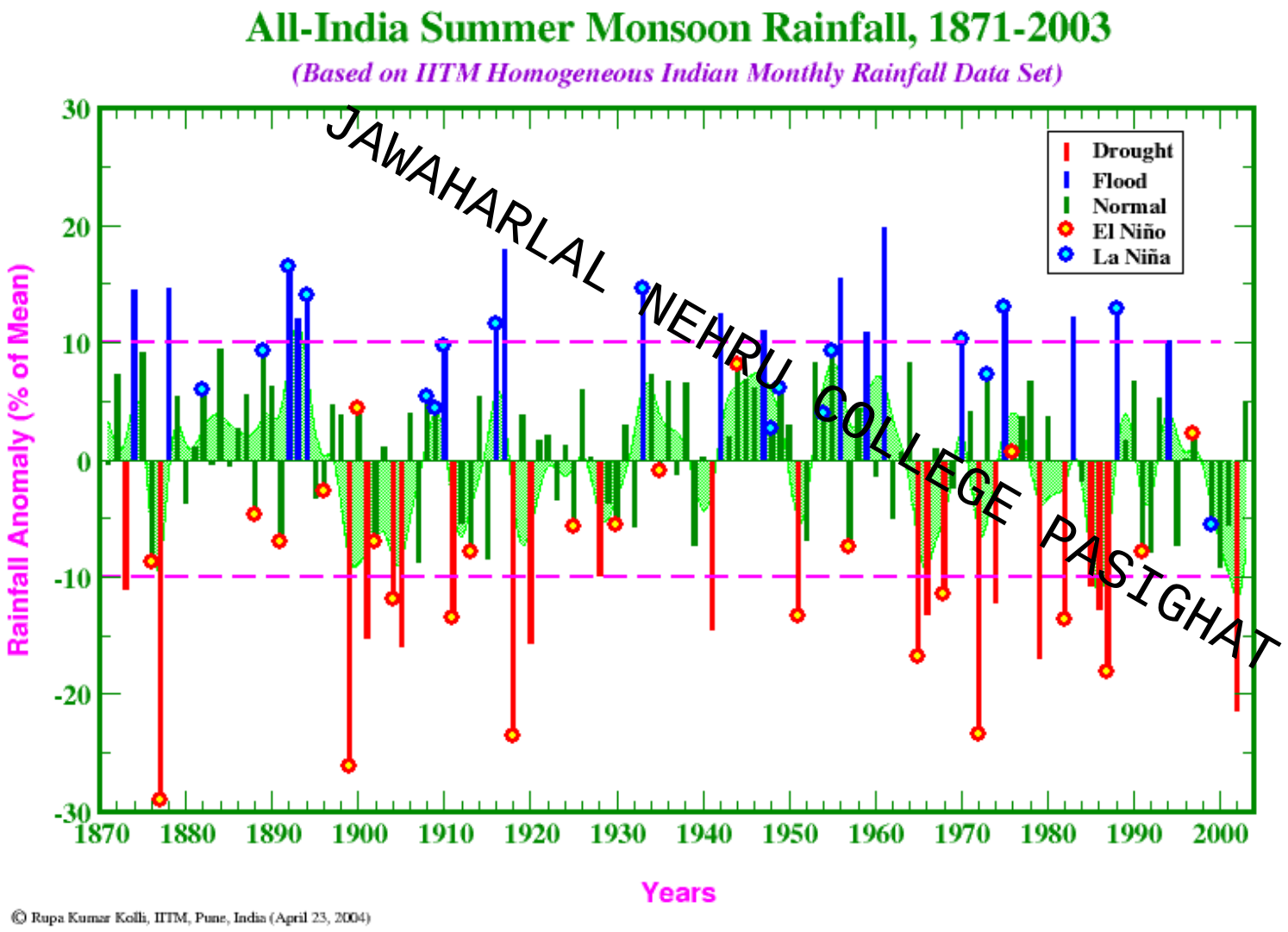
Monsoon Rainfall Variability
All-India mean Rainfall



Predictability of the Indian Monsoon Rainfall

- Short range (1-2 days in advance) and medium (3-10 days in advance) predictions of rainfall over any region including that over the Indian region during the monsoon season depend on how well the initial state of the atmosphere has been defined with large number of very good quality observed data and the quality dynamic model used for predictions. The better the initial data, better is the forecast.

- In the tropical region, it is believed that the predictability of day-to-day weather patterns is restricted to 3-4 days.

- Observational studies show that the Indian Monsoon's seasonal rainfall is linked with several surface boundary conditions like sea surface temperature (SST) of the east Pacific, Indian ocean ,land surface temperature, Eurasian and Himalayan snow cover etc.

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Prediction of Indian summer monsoon

Since 1988, the Indian Meteorological Department **has been issuing forecast based on 16-parameter power regression and parametric models.**

List of 16 parameters

El Nino (same year) (Nino 1 + 2)
El Nino (previous year) (Nino 1 + 2)
South Indian Ocean SST (Feb. + March)
East Coast India temperature (March)
Arabian Sea SST (Nov. + Dec. + Jan.)
Central India temperature (May)
N H Temperature (Jan. + Feb.)
Darwin pressure tendency (April–Jan)
N H Pressure (Jan. to April)
Southern Oscillation Index (Mar to May)
Indian Ocean Equatorial Pressure (Jan to May)
Europe Pressure Gradient (January)
Argentina pressure (April)
50 hPa East–West Ridge Extension (Jan. + Feb.)
Himalayan Snow Cover (Jan. to Mar.)
Eurasian Snow Cover (Dec.)

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Methods of Predicting Indian Monsoon Rainfall

- IMD utilizes statistical method for making seasonal predication of the Indian monsoon rainfall.
- Studies of historical data sets, over the years, have brought out several predictors for the monsoon rainfall forecasting.
- The most commonly used statistical technique for seasonal predication is the linear regression analysis.
- IMD has also started using dynamic model forecasts for proving southwest monsoon rainfall.

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The Hadley Circulation

- The Hadley circulation spans half of the surface area of the globe, and variability within this system affects the lives of billions of people.

- Our understanding of this variability is limited to the last century of instrumental measurements, to the even shorter record of satellite-derived observations, or to associated modeling studies aimed at simulating variability in the tropics associated with the Hadley circulation.

- Only by bringing together climatologists and paleoclimatologists on the current understanding of the Hadley circulation, by examining paleoclimatic records that provide evidence of past variability in this system, and model simulations of expected future changes, a proper prediction on monsoons can be made.

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Monsoon Circulation

Hadley cell

The Hadley cell is a circulation pattern that dominates the tropical atmosphere, with rising motion near the equator, pole ward flow 10-15 kilometers above the surface, descending motion in the subtropics, and equator ward flow near the surface. This circulation is intimately related to the trade winds, tropical rain belts, subtropical deserts and the jet streams.

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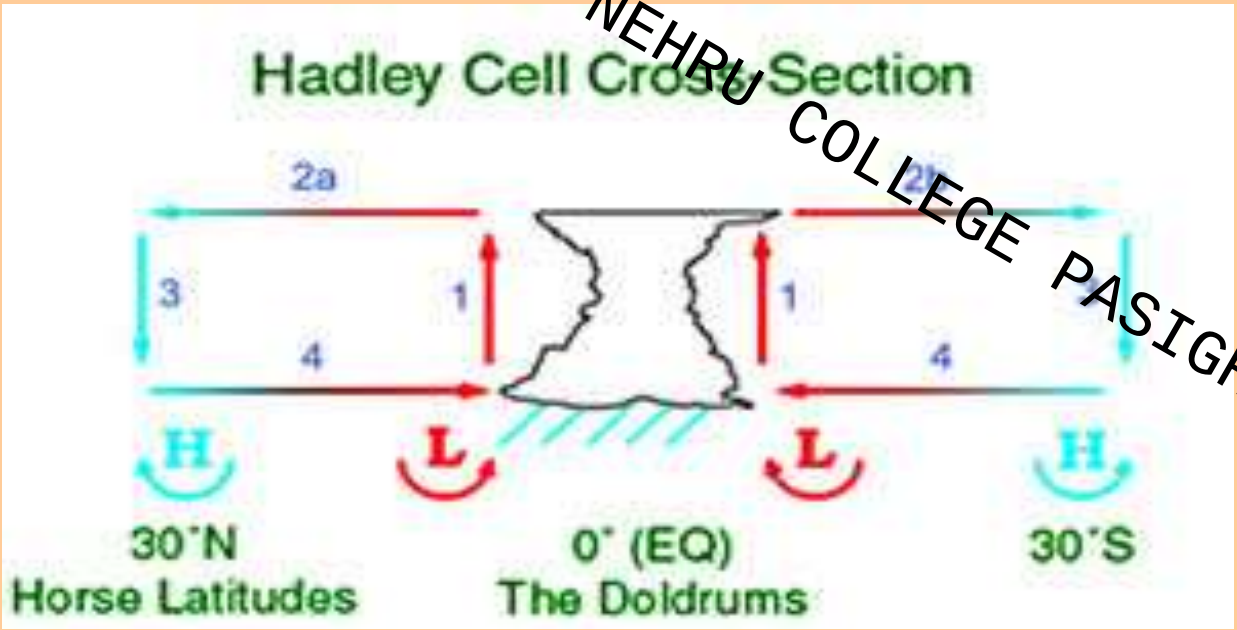
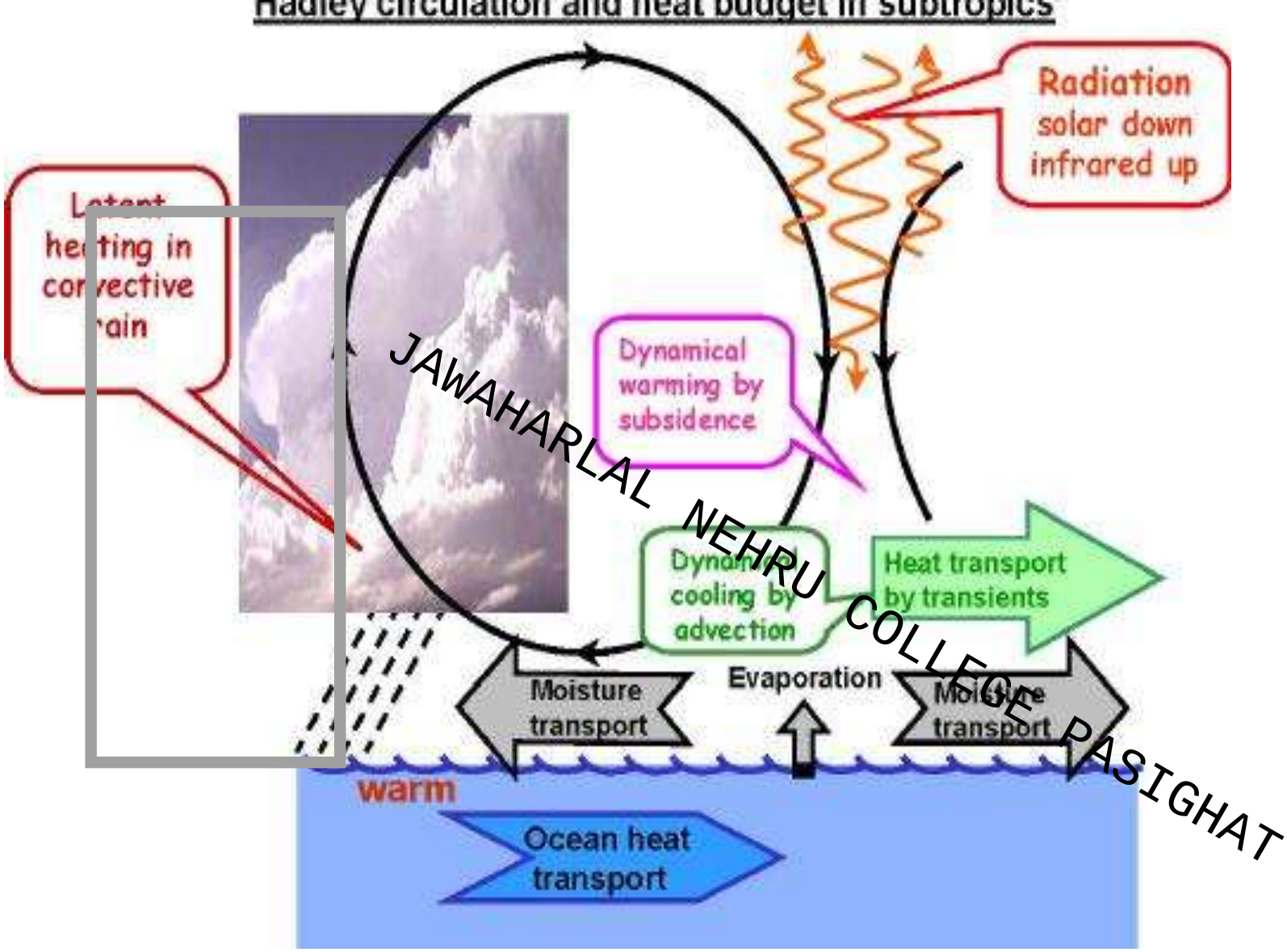


The Hadley cell carries heat and moisture from the tropics to the northern and southern mid-latitudes



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During Monsoon season, rising limb of Hadley cell is over the Indian continent and the sinking limb is over the equatorial Indian ocean.

Therefore the monsoons circulation is opposite to conventional Hadley circulation.

Walker circulation

- The **Walker circulation** is an atmospheric circulation of air at the equatorial Pacific Ocean, responsible for creating ocean upwelling off the coasts of Peru and Ecuador.
- This brings nutrient-rich cold water to the surface, increasing fishing stocks. It was discovered by Jacob Bjerknes in 1969 and was named after the English physicist Sir Gilbert Walker who discovered the Southern Oscillation .
- The Walker circulation is caused by the pressure gradient force that results from a high pressure system over the eastern pacific ocean, and a low pressure system over Indonesia.

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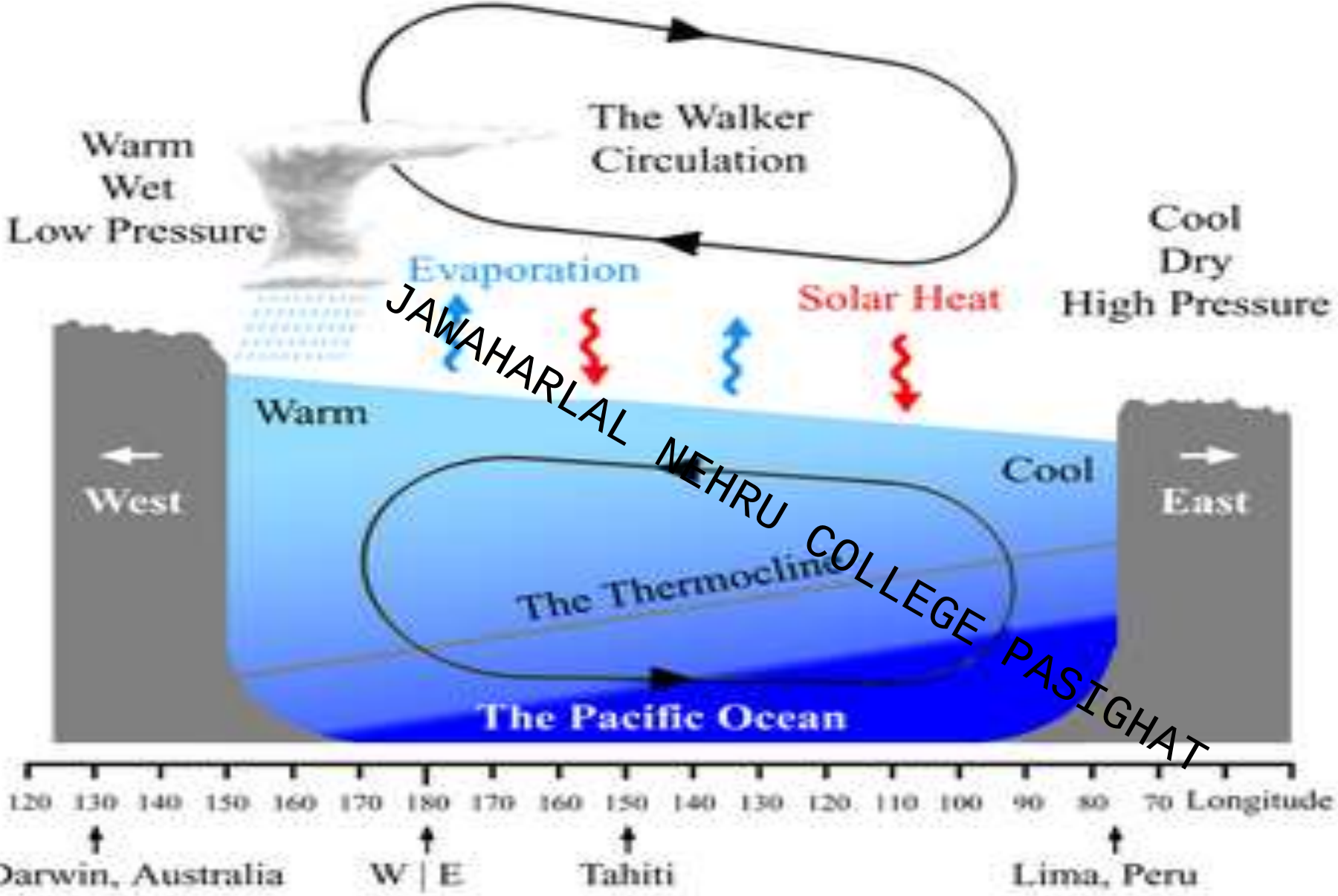

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It is seen at the surface as easterly trade winds which move water and air warmed by the sun towards the west.

HADLEY circulation is intimately related to the trade winds, tropical rain belts, subtropical deserts and the jet streams.

- The **trade winds** are a pattern of wind that are found in bands around the Earth's equatorial region. The trade winds are the prevailing winds in the tropics, blowing from the high-pressure area in the horse latitudes towards the low-pressure area around the equator. The trade winds blow predominantly from the northeast in the northern hemisphere and from the southeast in the southern hemisphere.

- **Jet streams** are fast flowing, relatively narrow air currents found in the atmosphere at around 11 kilometres (36,000 ft) above the surface of the Earth, just under the tropopause. They form at the boundaries of adjacent air masses with significant differences in temperature, such as of the polar region and the warmer air to the south. The jet stream is mainly found in the Stratosphere.

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El Niño and La Niña relation to Indian Monsoons

El Niño and La Niña are defined as sustained sea surface temperature anomalies of magnitude greater than 0.5°C across the central tropical Pacific Ocean.

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When the condition is met for a period of less than five months, it is classified as El Niño or La Niña conditions; if the anomaly persists for five months or longer, it is classified as an El Niño or La Niña episode. Historically, it has occurred at irregular intervals of 2-7 years and has usually lasted one or two years.

The first signs of an El Niño are:

- ✓ Rise in air pressure over the Indian Ocean, Indonesia, and Australia
- ✓ Fall in air pressure over Tahiti and the rest of the central and eastern Pacific Ocean
- ✓ Trade winds in the south Pacific weaken or head east

- ✓ Warm air rises near Peru, causing rain in the deserts there
- ✓ Warm water spreads from the west Pacific and the Indian Ocean to the east Pacific. It takes the rain with it, causing rainfall in normally dry areas and extensive drought in eastern areas.

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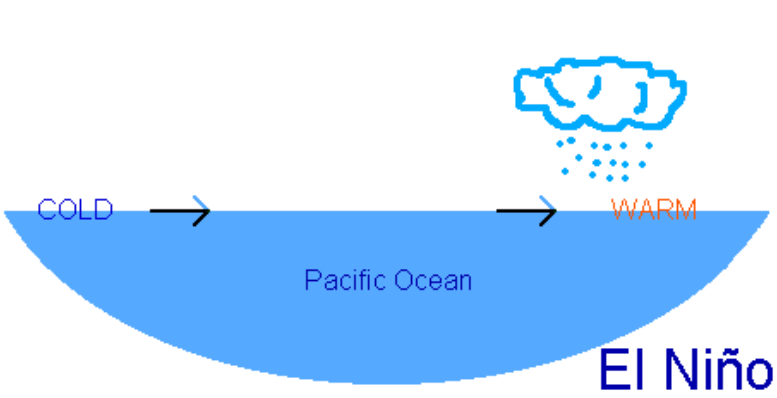

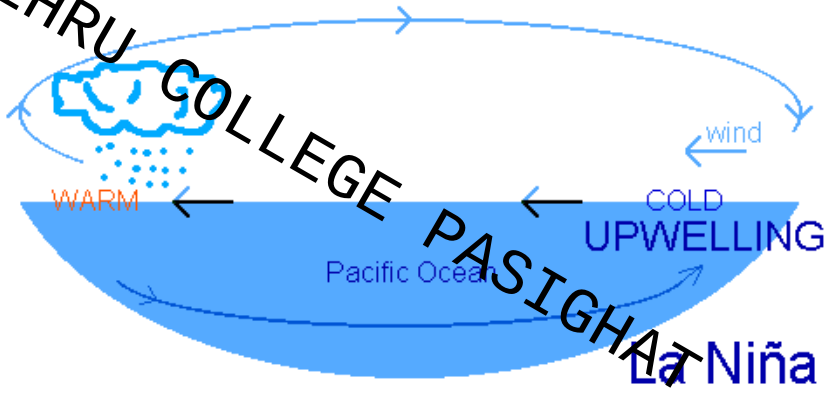

- ✓ For India a continuous and homogeneous record is available since 1871.
- ✓ Monsoon rainfall is increasing (+10 to +12 % per century) along the west coast, north Andhra Pradesh and in northwest India. It is decreasing (-6 to –8% per century) over east Madhya Pradesh and adjoining areas, northeast India and parts of Gujarat and Kerala.
- ✓ A weak monsoon, is a result of a large negative Southern Oscillation Index (SOI) and El Nino event.
- ✓ A strong monsoon, is a result of a large positive SOI and the absence of El Nino event.
- ✓ During the period 1871—1999, 11 of 21 drought years were El Nino years.
- ✓ The periods 1895-1932 and 1965-1987 were characterized by frequent droughts.
- ✓ The periods 1872-1894 and 1933-1964 were practically drought free

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Relationship of EQUINO and ENSO over Indian Monsoon

- Comparison of the evolution of the normal summer monsoon of 2003 with the unanticipated drought of 2002 led to this investigation of the role of the deep convection in the atmosphere (deep cloud systems) over the equatorial Indian Ocean.

- The link of the Indian monsoon to events over the equatorial Indian Ocean is as important as the well-known link to the dramatic events over the Pacific (El Niño Southern Oscillation; ENSO).

- Over the equatorial Indian Ocean, enhancement of deep convection in the atmosphere over the western part is generally associated with suppression over the eastern part and vice versa. This oscillation between these two states, which is reflected in the pressure gradients and the wind along the equator, the Equatorial Indian Ocean Oscillation (EQUINOO).

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Monsoon depression

A depression that forms within the monsoon trough. The term is most frequently used to describe weak cyclonic disturbances that form over the Bay of Bengal and generally track northwestward over the Indian subcontinent. These occasionally intensify into tropical cyclones if they remain over warm ocean water long enough.

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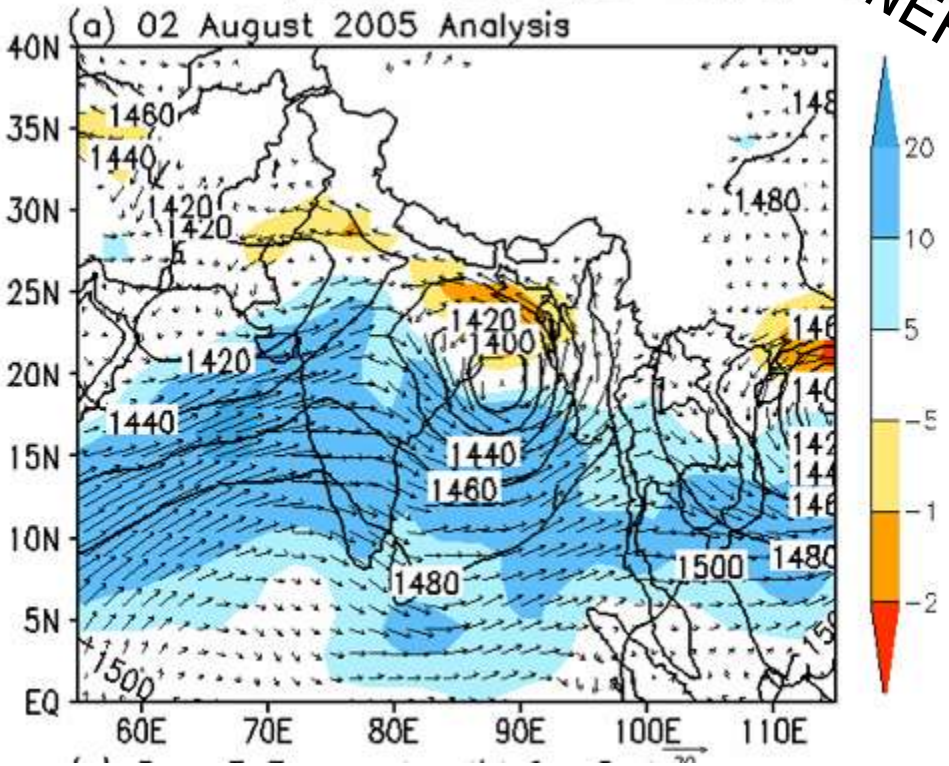

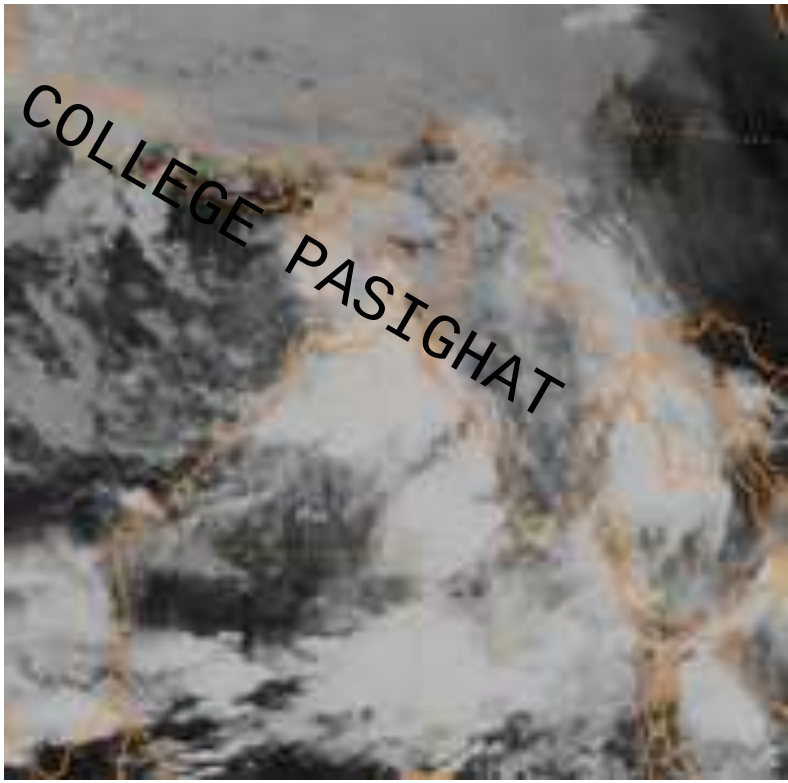

The criteria followed by the Meteorological Department of India to classify the low pressure systems in the Bay of Bengal and in the Arabian Sea as adopted by the World Meteorological Organisation (W.M.O.) are:

Types of Disturbances	**Associated wind speed in the Circulation**
1. Low Pressure Area	Less than 17 knots (< 31 kmph)
2. Depression	17 to 27 knots (31 to 49 kmph)
3. Deep Depression	28 to 33 knots (50 to 61 kmph)
4. Cyclonic Storm	34 to 47 knots (62 to 88 kmph)
5. Severe Cyclonic Storm	48 to 63 knots (89 to 118 kmph)
6. Very Severe Cyclonic Storm	64 to 119 knots (119 to 221 kmph)
7. Super Cyclonic Storm	120 knots and above (222 kmph and above)

1 knot - 1.85 km per hour

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Indian Monsoon can be affected by pollution over Indian Ocean

- A dense brownish haze of microscopic pollutant particles suspended in air (aerosols) in the Indian Ocean, discovered by an international team of researchers, could ``affect monsoon parameters in the long run,'' referred as Atmospheric Brown cloud.

- Widespread pollution observed recently over an area as large as the United States in the Indian Ocean including the Bay of Bengal and the Arabian Sea could affect monsoon in the Indian subcontinent.

- The extent of the effect, which depends on other factors like how aerosols react with clouds, is being studied.

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Monsoons and Climate Change

- There is a competition between zonal circulation and monsoon winds. We have to find which will be favoured by global warming.
- Overall, global warming will change conditions in the sea more slowly than conditions on land, because of the difference in the rate of response to heating, a concept familiar from the sea breeze.
- Thus, we would expect the summer monsoons to be amplified by stronger warming in summer. In addition, with more moisture in the air, extracted from a warming ocean, rainfall (and flooding) might be expected to increase.
- Conversely, in winter, we should expect less of a difference, as the land refuses to get quite as cold as previously. So, the winter monsoons should weaken, as should any of the nutrient-supplying coastal upwelling associated with winter monsoons.

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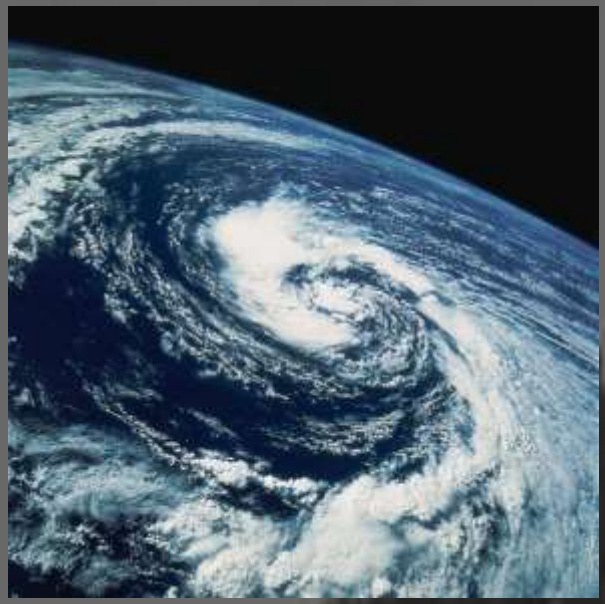
Will Climate Change Affect India's Monsoon Season?

- Changes to India's annual monsoon are expected to result in severe droughts and intense flooding in parts of India.
- Scientists predict that by the end of the century the country will experience a 3 to 5 degree C temperature increase and a 20% rise in all summer monsoon rainfall.
- Climate change studies undertaken so far reveal that action is essential in order to prevent long term damage to India's water cycle.
- The livelihood of a vast population in India depends on agriculture, forestry, wetlands and fisheries and land use in these areas is strongly influenced by water-based ecosystems that depend on monsoon rains.



Warmer temperature appear to bring heavier rainfall

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Future changes in monsoon variability

- India is already vulnerable to variations in the monsoon, both from year-to-year and within the season.
- One of the key questions in climate change is whether the remarkable stability of the monsoon rains will continue, or whether the monsoon will become more volatile.
- Most models predict a modest increase in interannual variability but to differing degrees. At the heart of this are the projections of what will happen to El Nino - whether it will become stronger and/or more frequent - since El Nino has dominant influence on monsoon variability.
- Monsoon is important and scientists are engaged in understanding the variability of monsoon using observed data and numerical models.
- Hope that in future we will have more accurate prediction of Indian monsoon rainfall.

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End of Slide Show

Back to Index Page

Back to Home Page

SECTORS OF INDUSTRY

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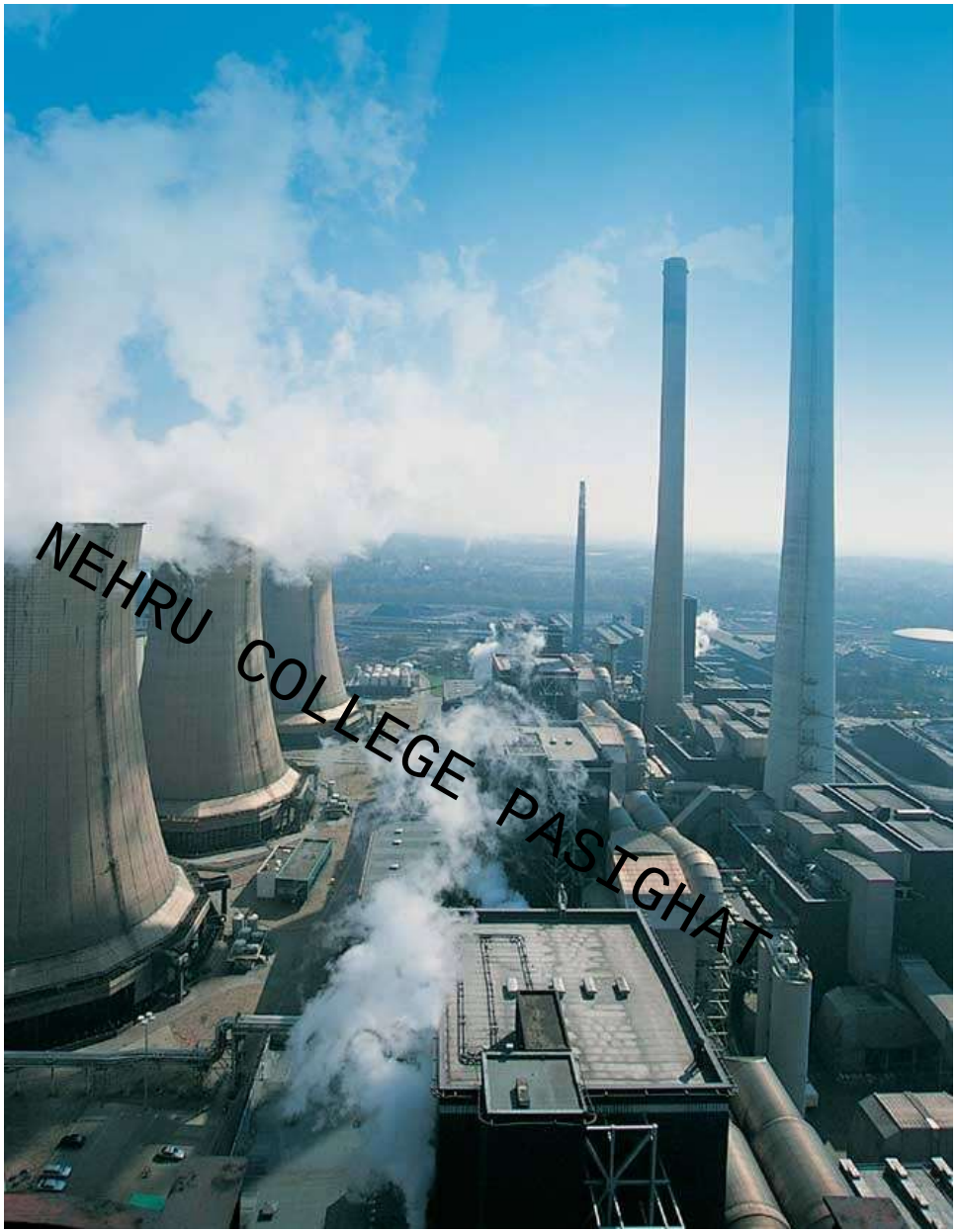
DR K K MISHRA

Industry is the sector of the economy concerned with the production of goods and services.



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Industry has 4 sectors…

Primary

Secondary

Tertiary

Quaternary

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Major businesses in this sector include agriculture, fishing, forestry and all mining and quarrying industries

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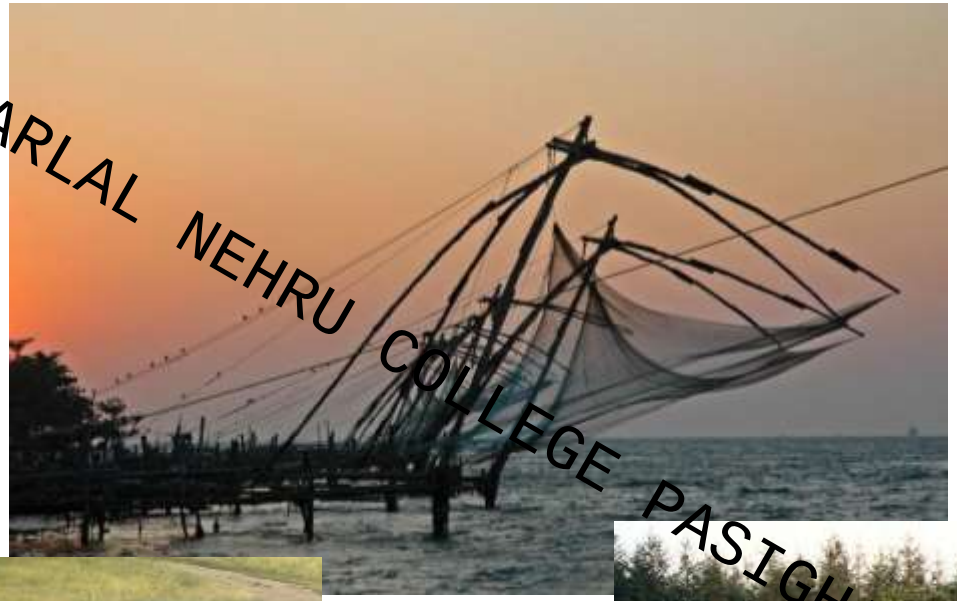

The primary sector of industry is also called extraction. It generally involves changing natural resources into primary products. Most products from this sector are considered raw materials for other industries.

Primary industry is a larger sector in developing countries; for instance, animal husbandry is more common in Africa than in Japan.

The secondary sector (manufacturing) produces finished, usable products. This sector of industry generally takes the output of the primary sector and manufactures finished goods or where they are suitable for use by other businesses, for export, or sale to domestic consumers.

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* Aerospace manufacturing
* Automobile manufacturing
* Brewing industry
* Chemical industry
* Clothing industry
* Electronics
* Engineering
* Energy industries
* Metalworking
* Steel production
* Software engineering
* Telecommunications Industry
* Tobacco industry

This sector is often divided into light industry and heavy industry.

The tertiary sector of industry is also known as the service sector or the service industry.

It involves the provision of services to businesses as well as final consumers. Services may involve the transport, distribution and sale of goods from producer to a consumer, or may involve the provision of a service, such as in pest control or entertainment.

- News media
- Leisure industry/hotels
- Consulting
- Healthcare/hospitals
- Waste disposal
- Estate agents
- Business services
- Restaurants
- Local government services
- Central government services
- Education
- Law and order

Goods may be transformed in the process of providing a service, as happens in the restaurant industry or in equipment repair. However, the focus is on people interacting with people and serving the customer rather than transforming physical goods

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The quaternary sector is the research industry.

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Industrial research looks for new ways to cut costs, find new markets, produce new ideas, new production methods and methods of manufacture.

The 4 Sectors of Industry are interrelated. An individual industry will often use more than one sector in order to produce products.

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On the next slide we will see an example of how the four sectors relate together in the production of cotton clothes, part of the fashion industry.

COTTON IN THE FASHION INDUSTRY...

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PRIMARY

Cotton is grown and picked on a cotton farm

COTTON IN THE FASHION INDUSTRY...

PRIMARY

Cotton is grown and picked on a cotton farm

SECONDARY

Cotton is processed to cloth, which is, in turn, sewn in to clothing.

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COTTON IN THE FASHION INDUSTRY...

PRIMARY

Cotton is grown and picked on a cotton farm

SECONDARY

Cotton is processed to cloth, which is, in turn, sewn in to clothing.

TERTIARY

Cotton clothes (eg jeans, shirts etc) are sold in high street shops.

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COTTON IN THE FASHION INDUSTRY...

PRIMARY

Cotton is grown and picked on a cotton farm

SECONDARY

Cotton is processed to cloth, which is, in turn, sewn in to clothing.

TERTIARY

Cotton clothes (eg jeans, shirts etc) are sold in high street shops.

QUATERNARY: Research is carried out in to new ways of processing or growing cotton. e.g. organic cotton.

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Models and fashion shows: tertiary.

The entire fashion industry involves a great number of different products and services, all of which can be classified according to industrial sector...

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Models and fashion shows: tertiary.

Leather manufacture in a tannery: secondary

The entire fashion industry involves a great number of different products and services, all of which can be classified according to industrial sector...

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Models and fashion shows: tertiary.

Leather manufacture in a tannery: secondary

A shoe factory in hanoi: secondary

The entire fashion industry involves a great number of different products and services, all of which can be classified according to industrial sector...

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Models and fashion shows: tertiary.

Leather manufacture in a tannery: secondary

A shoe factory in hanoi: secondary

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The entire fashion industry involves a great number of different products and services, all of which can be classified according to industrial sector...

Sheep farming and sheering for wool production: primary

Models and fashion shows: tertiary.

Leather manufacture in a tannery: secondary

A shoe factory in hanoi: secondary

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The entire fashion industry involves a great number of different products and services, all of which can be classified according to industrial sector...

Sheep farming and sheering for wool production: primary

Cosmetics research: quaternary

So which are these do you think?

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Diagrammatic representations

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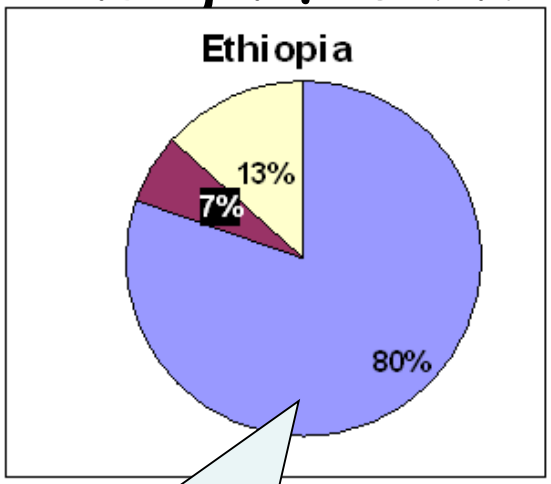
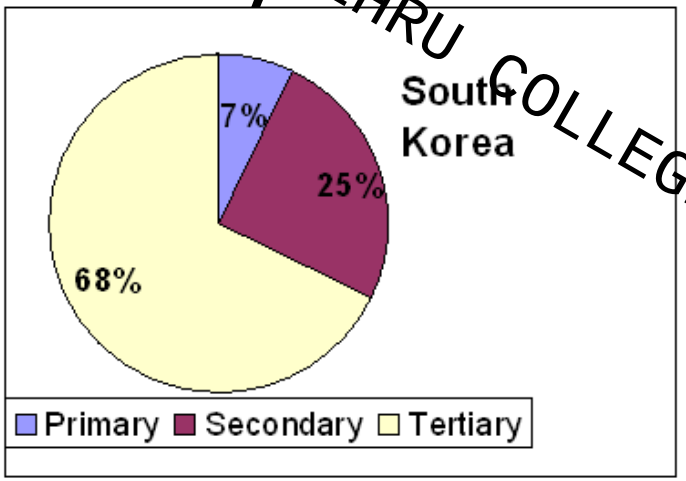
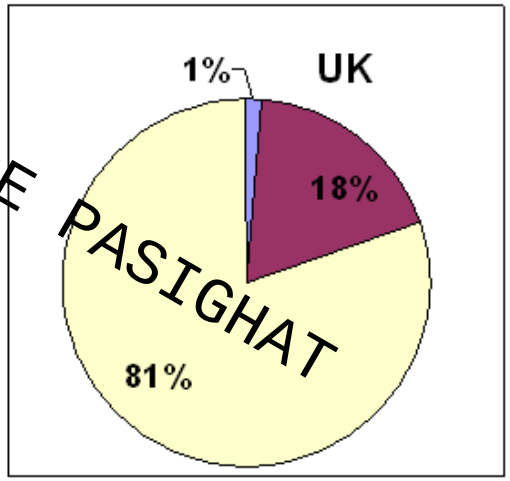
Different ways!

What is happening in a country now?

- One of the common ways to show this is by a pie chart.
- We only graph the primary, secondary and tertiary sectors because quaternary are insignificant in many countries.







Do you see any patterns?

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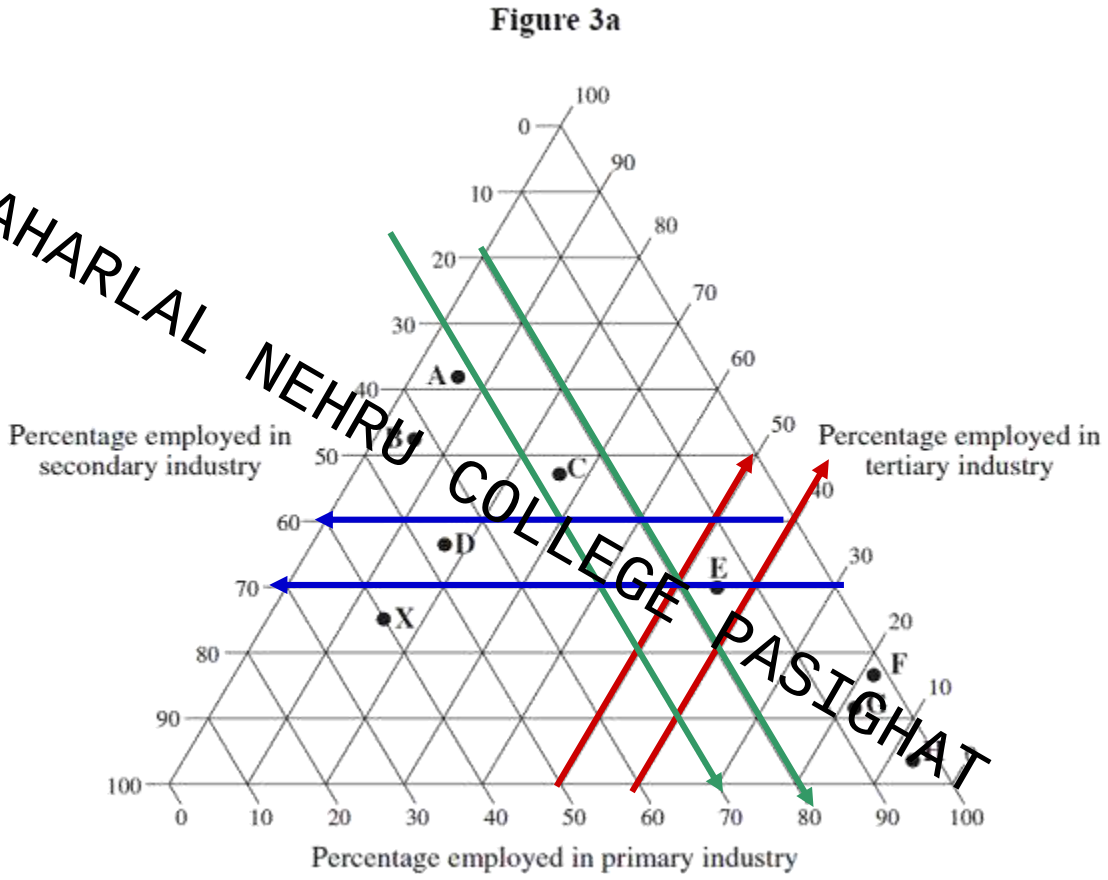
Besides pie charts …

- Employment is can demonstrated on triangular graphs
- Primary: E is between 50% & 60%. What?
- Secondary: C is between 20% & 30%. What?
- Tertiary: D is between 30% & 40%. What?



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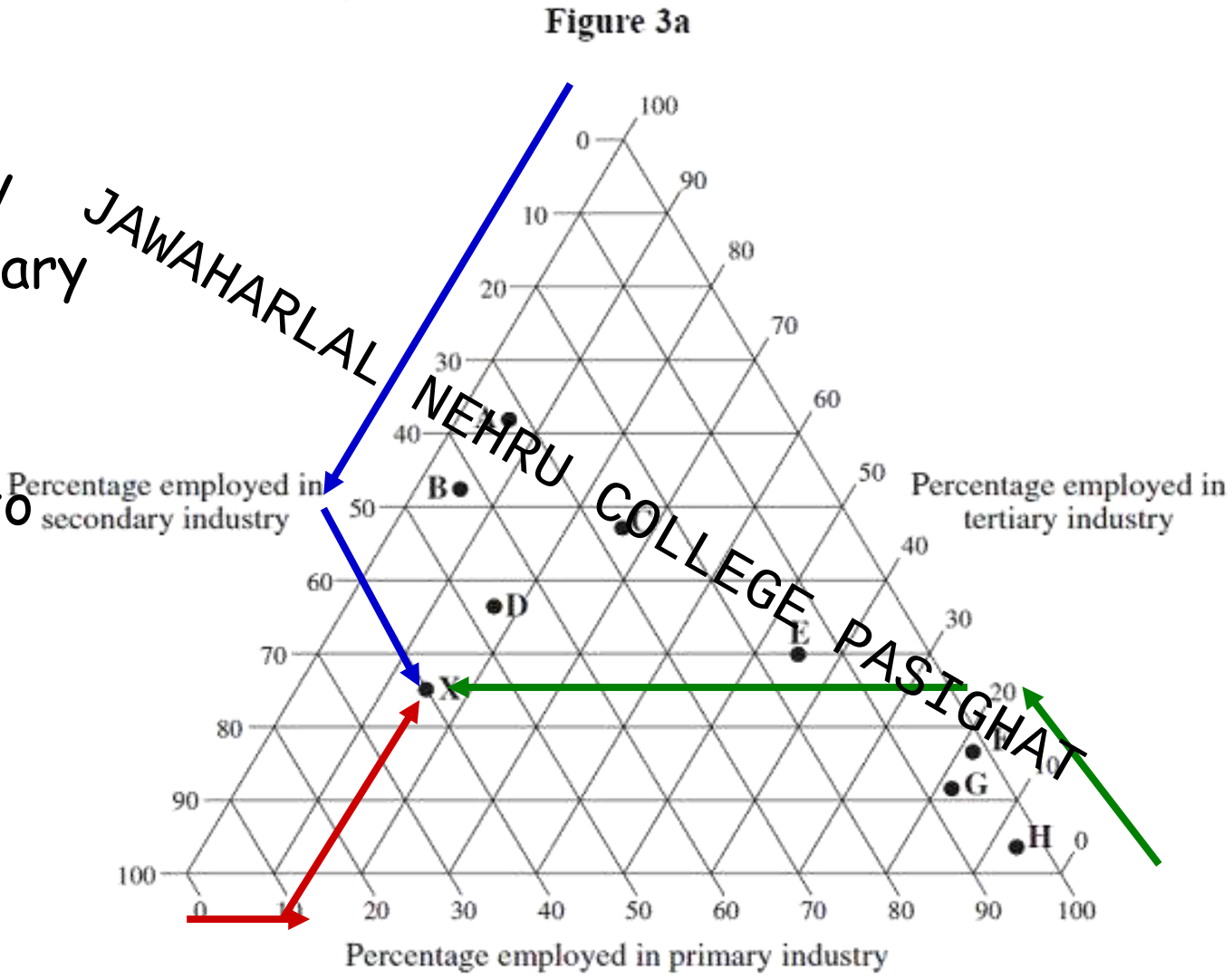
Besides pie charts …

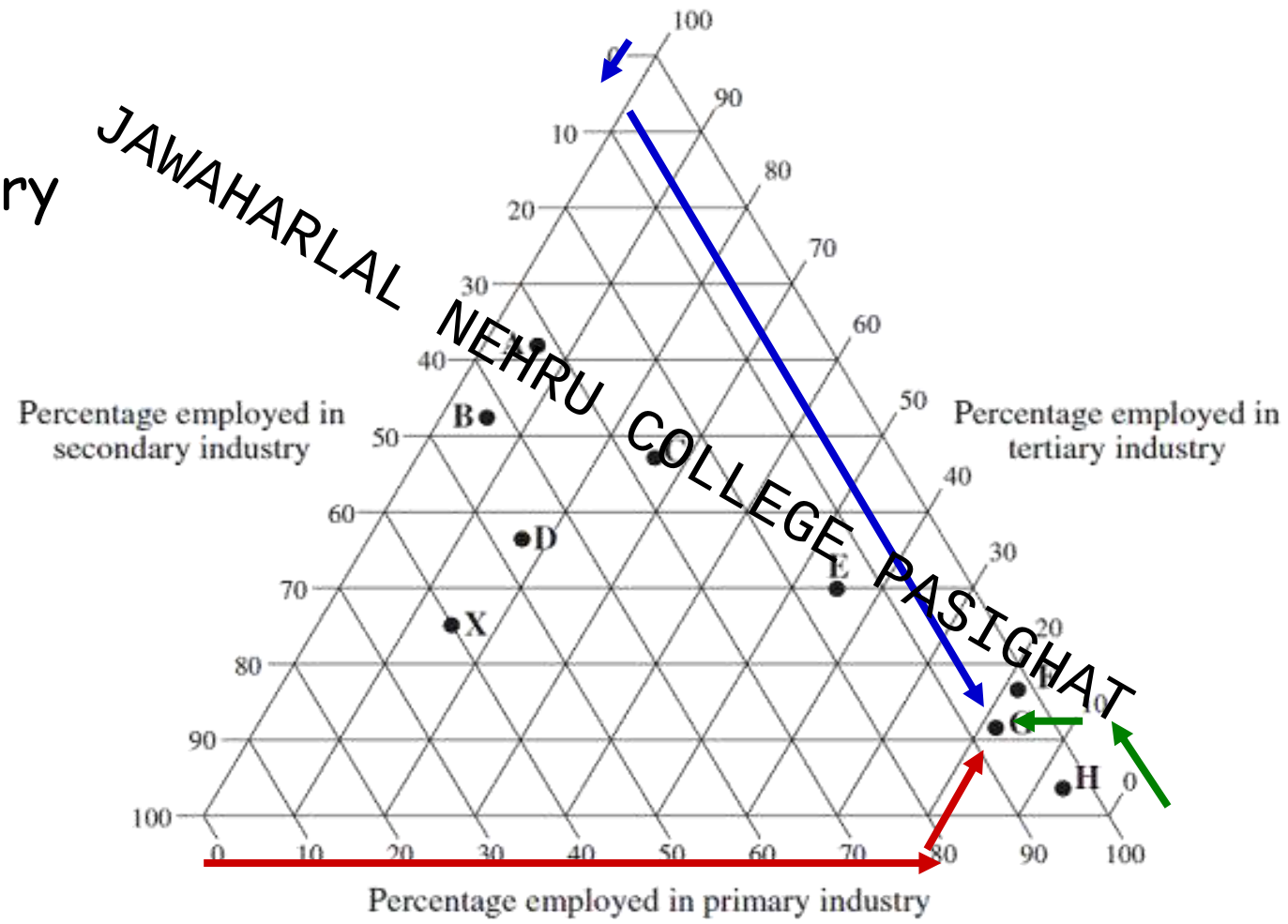
- X
- 15% primary
- 60% secondary
- So what % tertiary?
- Hint: adds to 100%



Besides pie charts …

- G
- ?% primary
- ?% secondary
- And ? % tertiary

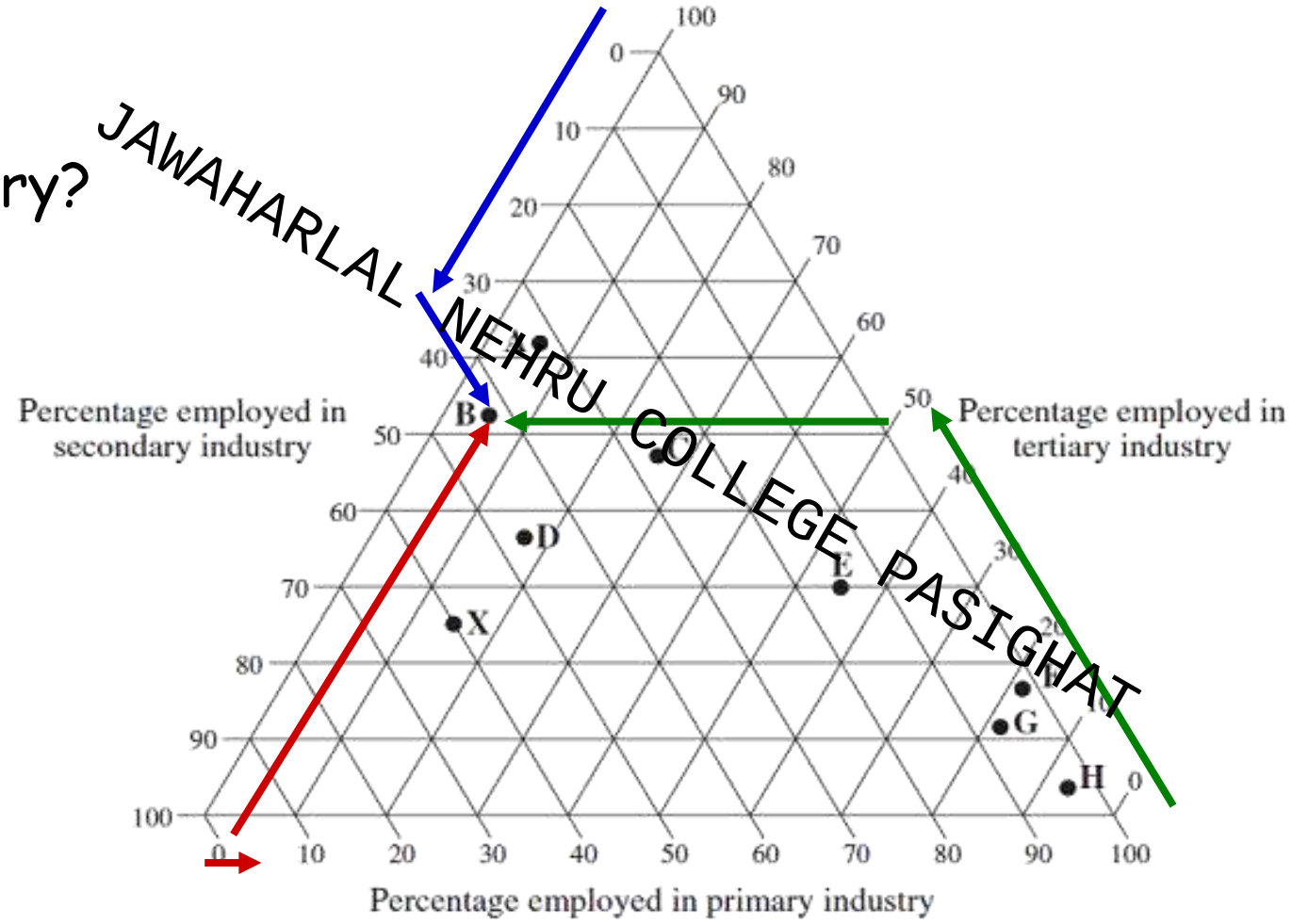
Figure 3a



Besides pie charts …

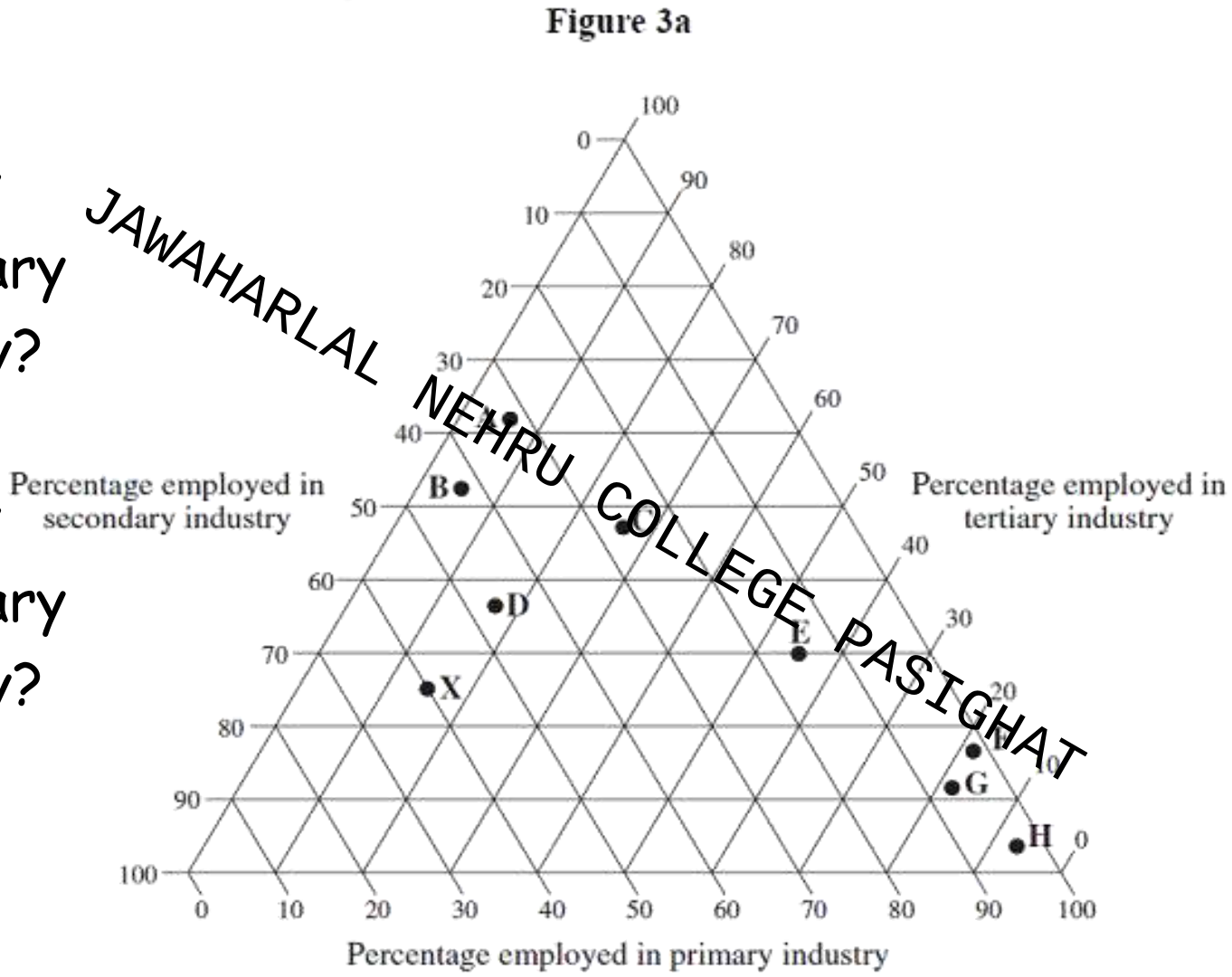
- B
- 5% primary
- ?% secondary?
- And ? % tertiary

Figure 3a



Besides pie charts …

- C?
- ? % primary
- ? % secondary
- ? % tertiary?
- E?
- ? % primary
- ? % secondary
- ? % tertiary?



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POLITICAL GEOGRAPHY

Capt Dr K K Mishra

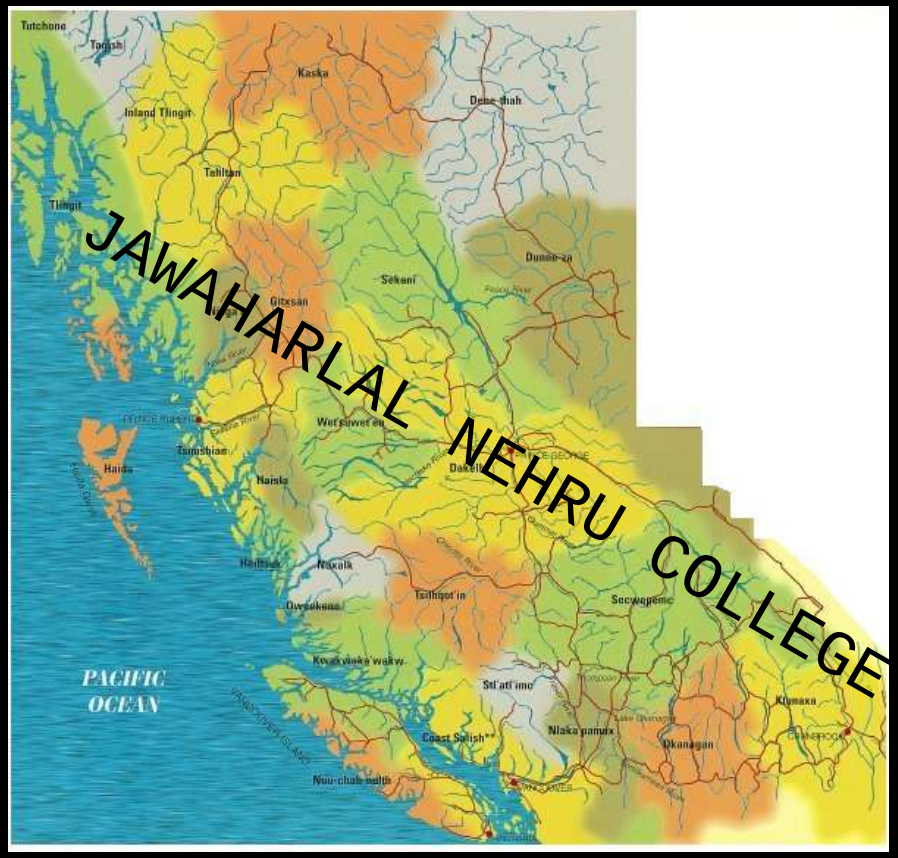
Outline

- Basic definitions
- The role of colonialism
- Definitional complexities
  - Multinational states
  - Stateless nations
- The role of absolute and relative location
- Strategic location
- Capital cities
- Alliances of states

State

- An independent political unit holding sovereignty over a territory (Canada)
- Casually referred to as "country"
- United States of America: 50 theoretically independent units that chose to join together in 1 'State'

Nation

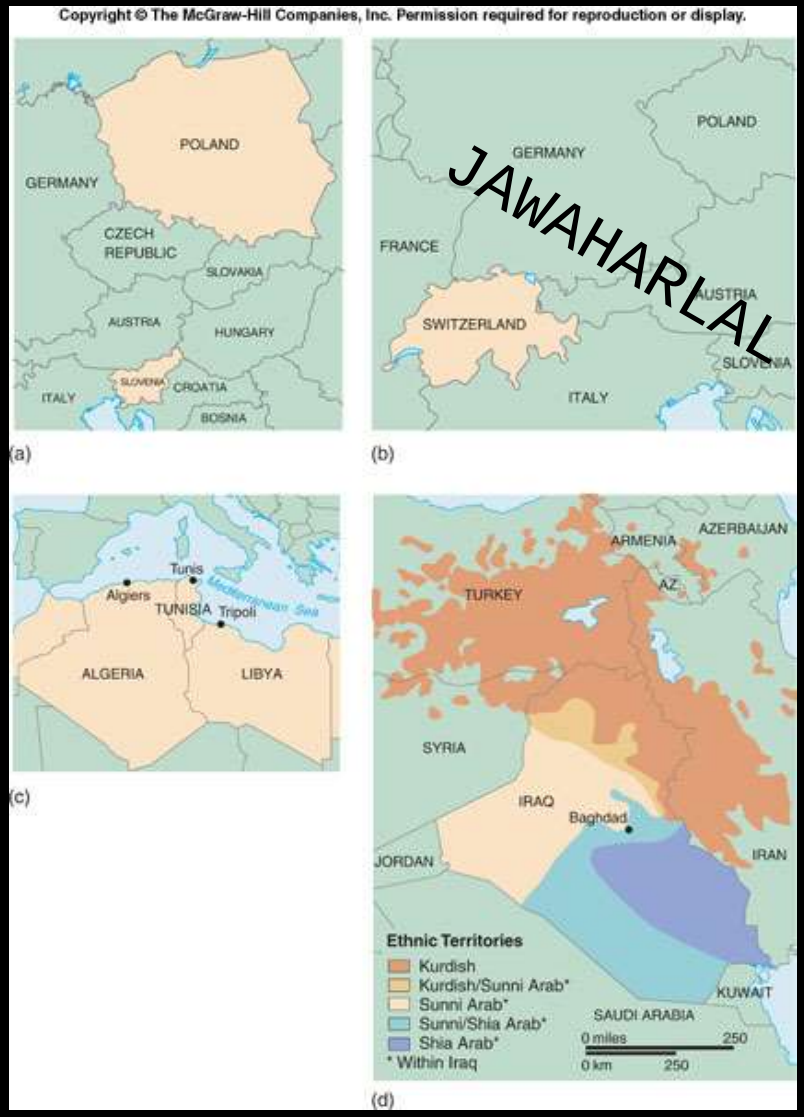


- Geographers' definition: community of people with common ancestry, culture and territory
- Does not imply an independent political unit
- e.g. Quebec; Acadians in Eastern Canada; "First Nations" throughout Canada

Nation-States

- State whose territory coincides with the area occupied by a single nation
- E.g. Iceland – all residents of the state are members of a single Icelandic nation
- vs. Canada – several different nations within the boundaries of the Canadian state

Definitional complexities

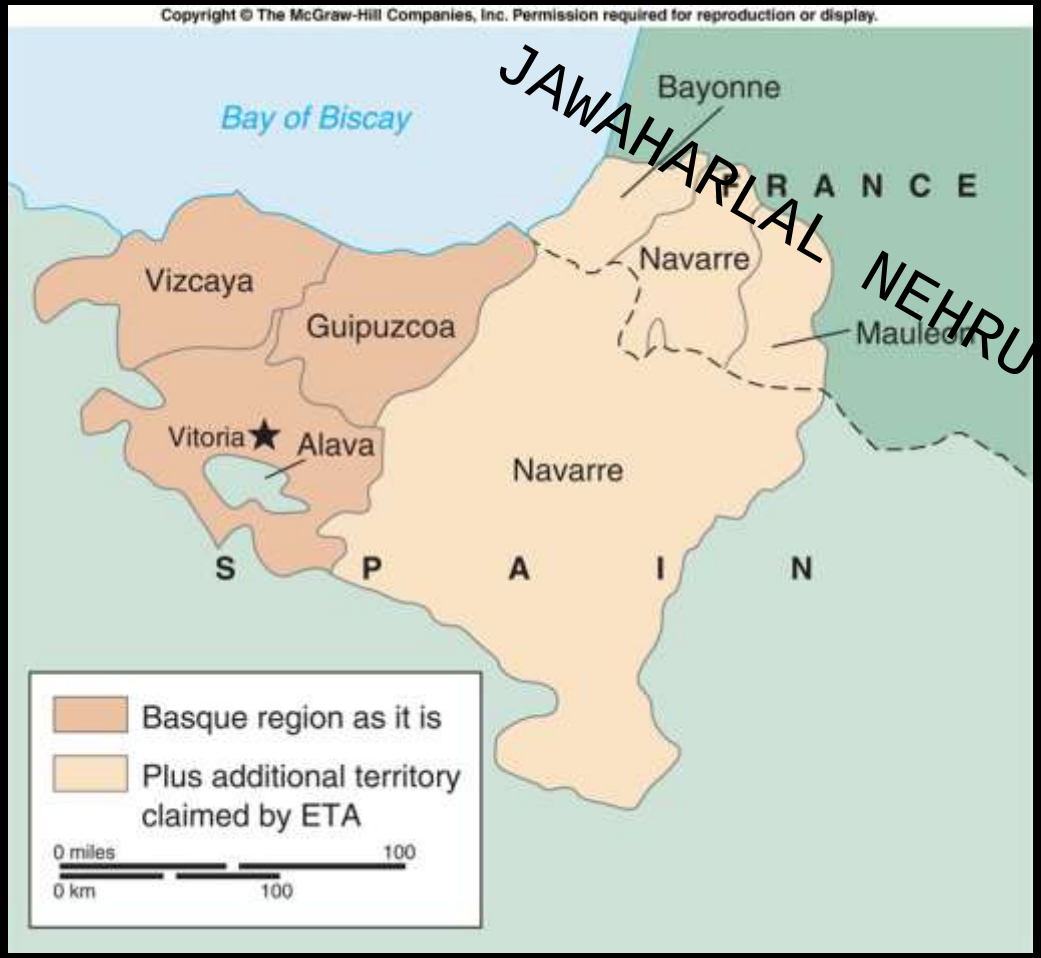


- Poland is essentially a nation-state
- Switzerland is a multi-national state
- The territory of the 'Arab nation' extends over several Arab states
- The Kurds are a stateless nation. Some Kurds are fighting for their own state, Kurdistan.

Multi-national States

- e.g. Canada – several nations within borders of Canadian state
- United Kingdom -- Scots, English, Irish, Welsh are separate nations
- Former Yugoslavia (will discuss later in 1050)
- All Western Hemisphere states
- All African states

Stateless Nations



- ethnic groups (nations) occupying territory, but not belonging to a single state
- Basques in Spain and France – there is no Basque state
- Basque nationalist organizations want autonomy or independence for a Basque state

The Kurdish Nation

25-40 million people, depending on how it is defined

Area ≥ 190,000 km^2

- Opposition to Ottoman Empire in WW 1
- promised independence by UK & France (1920); but Turkey established control, internat. acknowledged 1923
- Boundaries for political, not ethnographic reasons
- Kurds not recognized as a nation by Turkey, Iraq, Iran
- Kurds supported USA invasion of Iraq 2003

Area claimed by Kurdish nationalist groups; Kurdistan nationalist flag

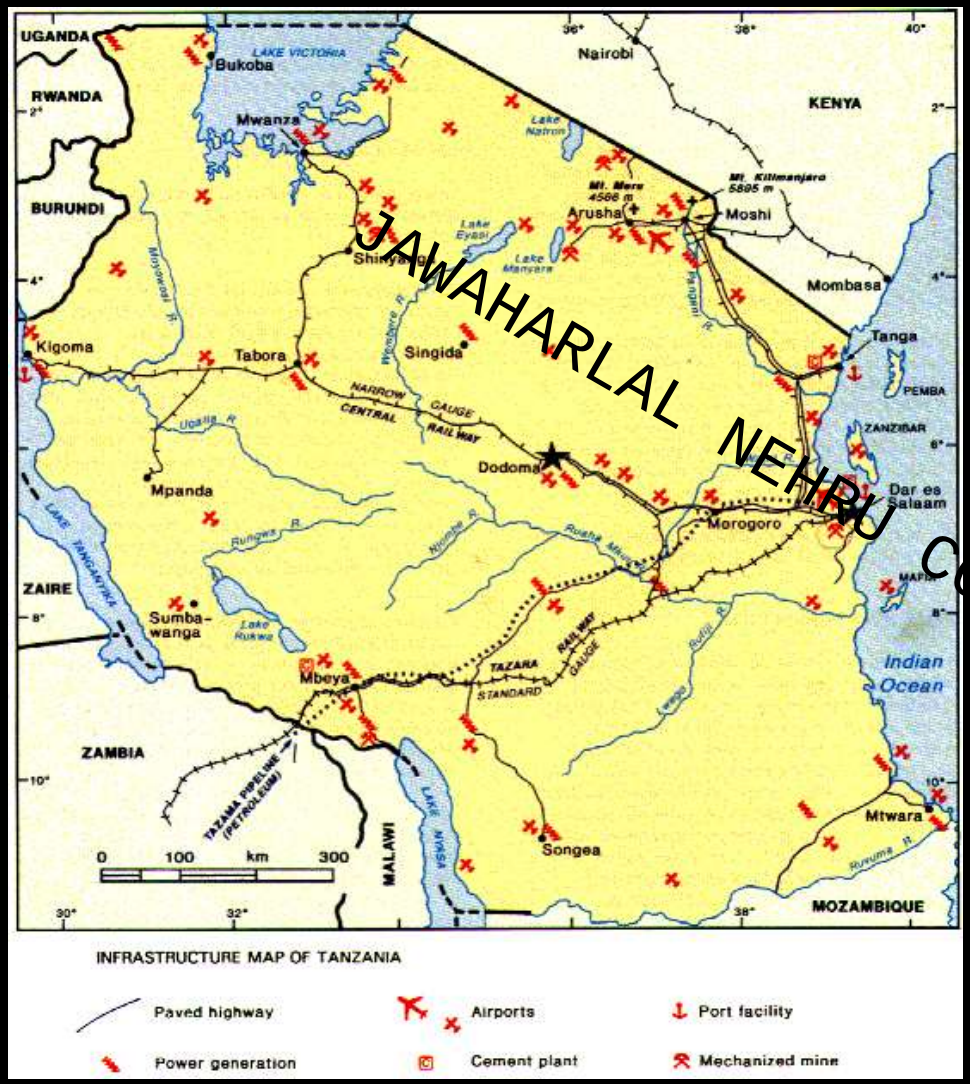
Geographic Characteristics of States

- Size - important for resources, power, governance, communication
  - Russian Federation- 17,075,000 km^2 Nauru - 20 km^2
- Shape - for governance/transport
- Location - Absolute & Relative

Location

- Absolute Location
  - Position with respect to grid (lat/long) Gibraltar's absolute location is 36°09N 5°21W
- Relative Location
  - Position with respect to other states and regions. Gibraltar's relative location is crucial as a British colony at the entrance to the Mediterranean Sea.

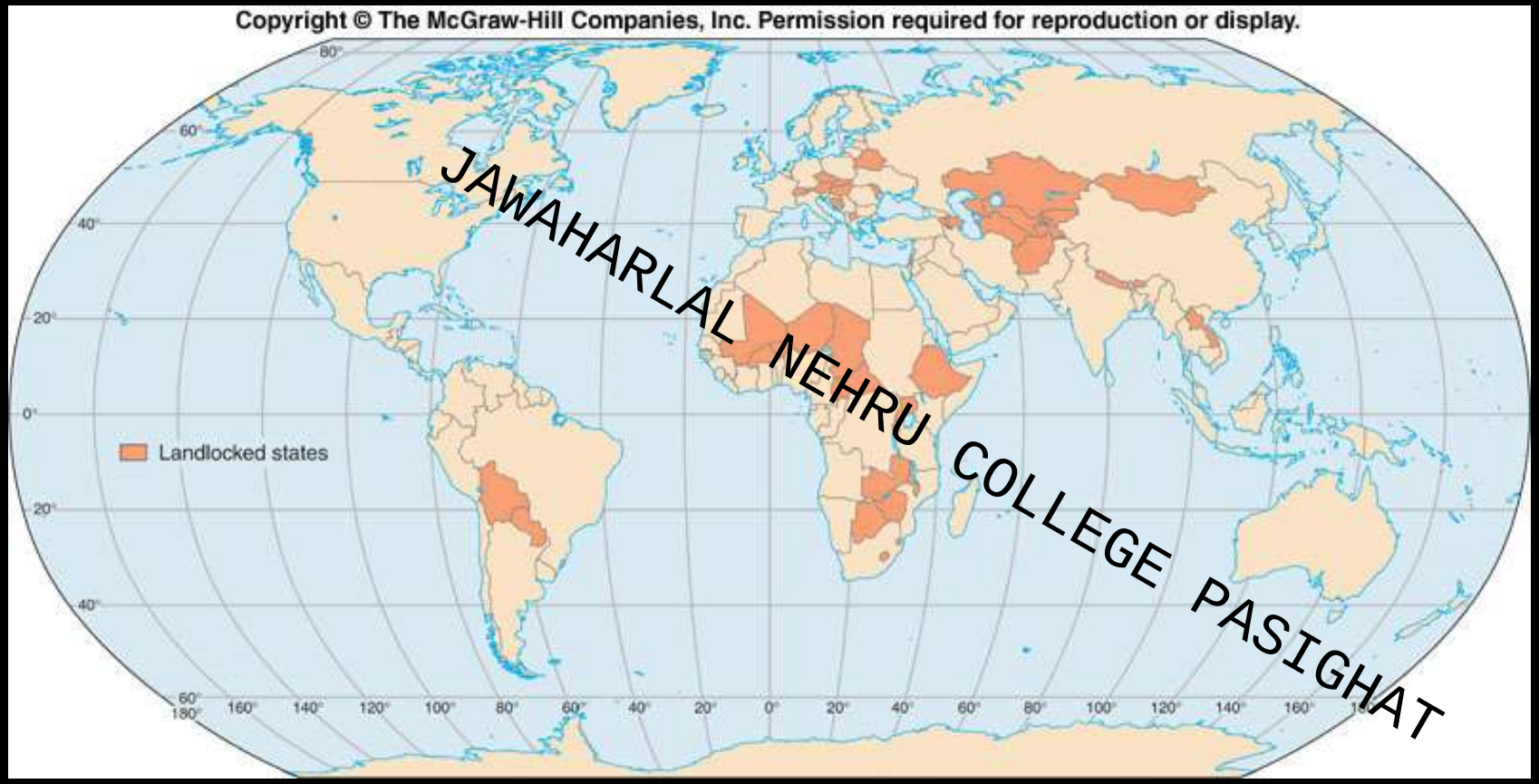
Absolute & relative location: Tanzania



- Colonial legacies today

tanzania.gu.se/COUNTRY.HTM

Relative Location

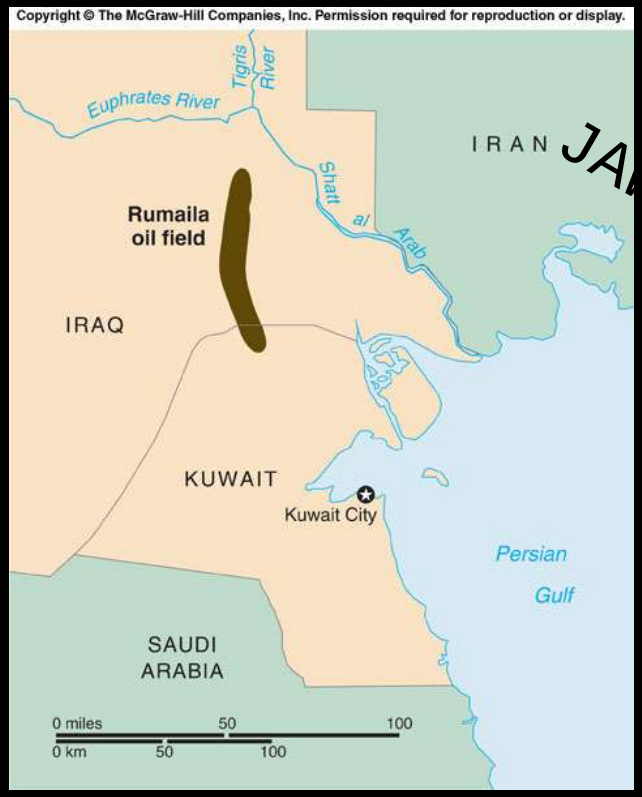


- Landlocked States are disadvantaged for access to ocean and resources
- Some have land corridors to ocean (e.g. Democratic Rep of Congo)

Landlocked Bolivia

- 1879-1883, Bolivia & Peru allied against Chile: War of The Pacific
- Chile won and took Antofagasta, Tarapaca, Arica coastal areas – rich in nitrates
- Bolivia lost access to Pacific and became landlocked
- Bolivian Navy still practices on Lake Titicaca

Strategic Locations



Strategic Location of oil resources in Iraq/Kuwait.

- Relative locations of importance to two or more states
- Military or economic significance
- differs over time – e.g. results of change from wind to coal to petroleum as fuel for shipping
- many Straits are good examples -- Malacca, Bosphorus, Bering Strait, Strait of Hormuz, Strait of Gibraltar
- Canals – Suez, Panama

Where the Oil Is

Despite the Bush administrations desire to reduce the nations dependence on oil from the politically unstable Middle East and the increased efforts by American energy companies to find oil and natural gas closer to home, the region remains at the heart of the business because of its vast reserves.

KNOWN OIL RESERVES BY REGION, IN 2000

In billions of barrels

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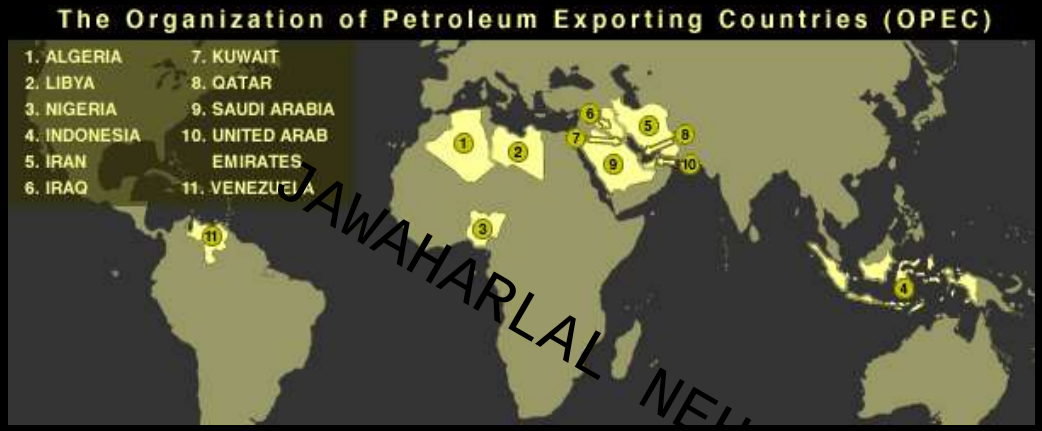
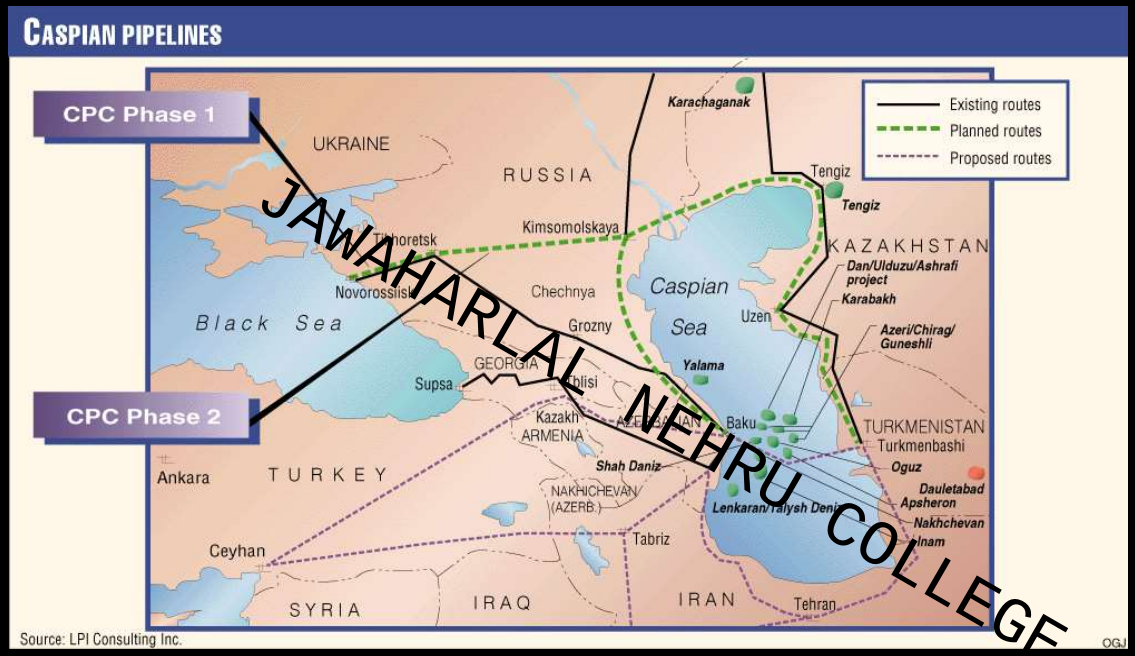
Source: Energy Information Administration

Strategic location: oil geopolitics & formation of OPEC



- 1960 - OPEC founded in Baghdad by Iraq, Iran, Kuwait, Saudi Arabia and Venezuela to win better return for oil producers whose output is controlled by Western multinationals.
- 1973 - An Arab oil embargo during Arab-Israeli war disrupts oil flows and triggers panic buying.
- OPEC countries wrest pricing fully from Western multinationals in first "Oil Shock" and prices soar from around $2.50 a barrel in January 1973 to $11.50 by 1974.

Pipeline Development: The Caspian Basin



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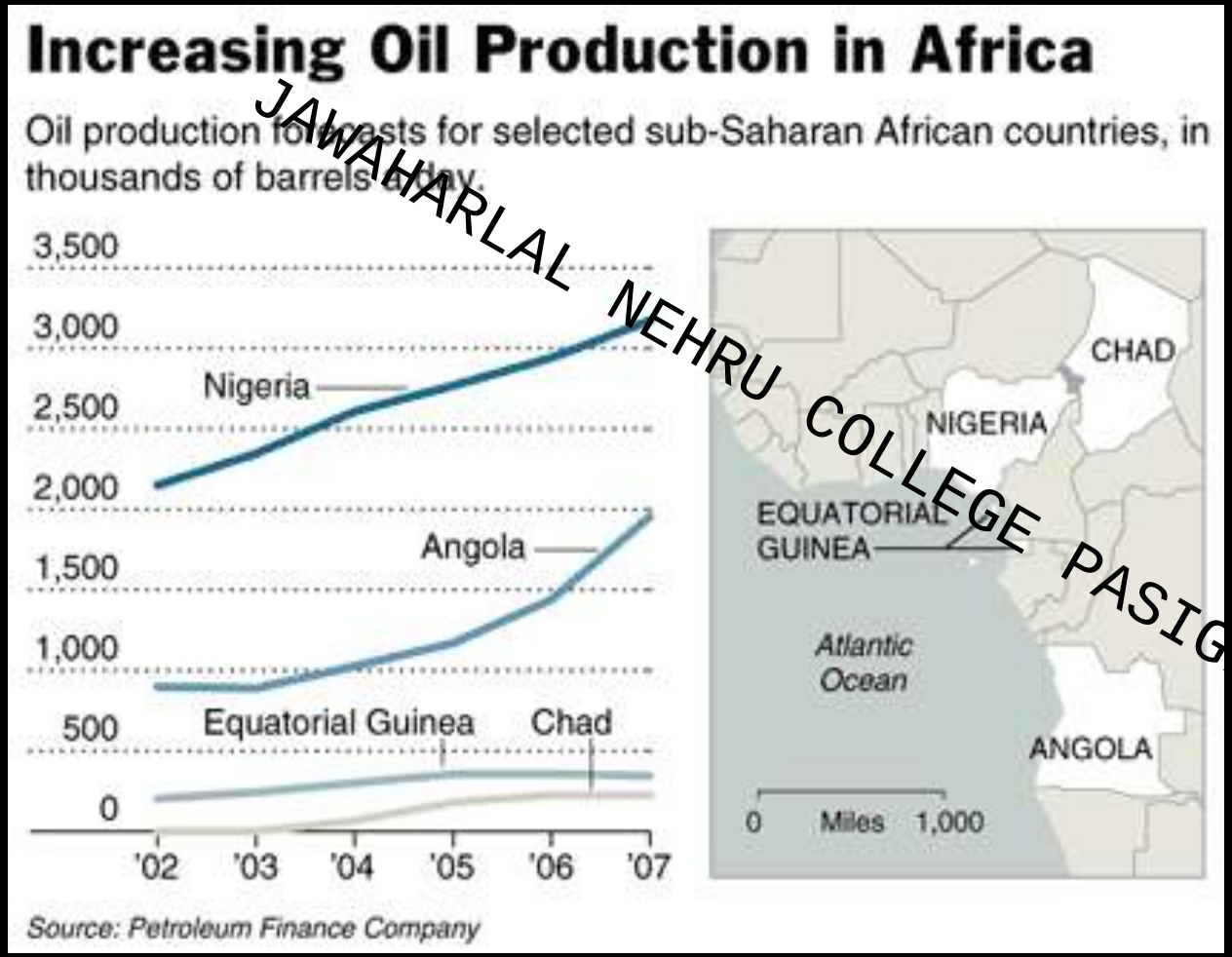
- Push for greater energy security; reduced dependence on Middle Eastern oil and OPEC
- Russia, a non-OPEC nation, attempting to garner foreign investment
  - Massive devaluation of the ruble, IMF loans; sell resources to garner foreign currency
- Major exploration efforts by US and European petroleum companies after 1989 collapse of communism
  - Potential for conflict with break-away republics: self-determination, economic development and emerging nations

Oil in Africa



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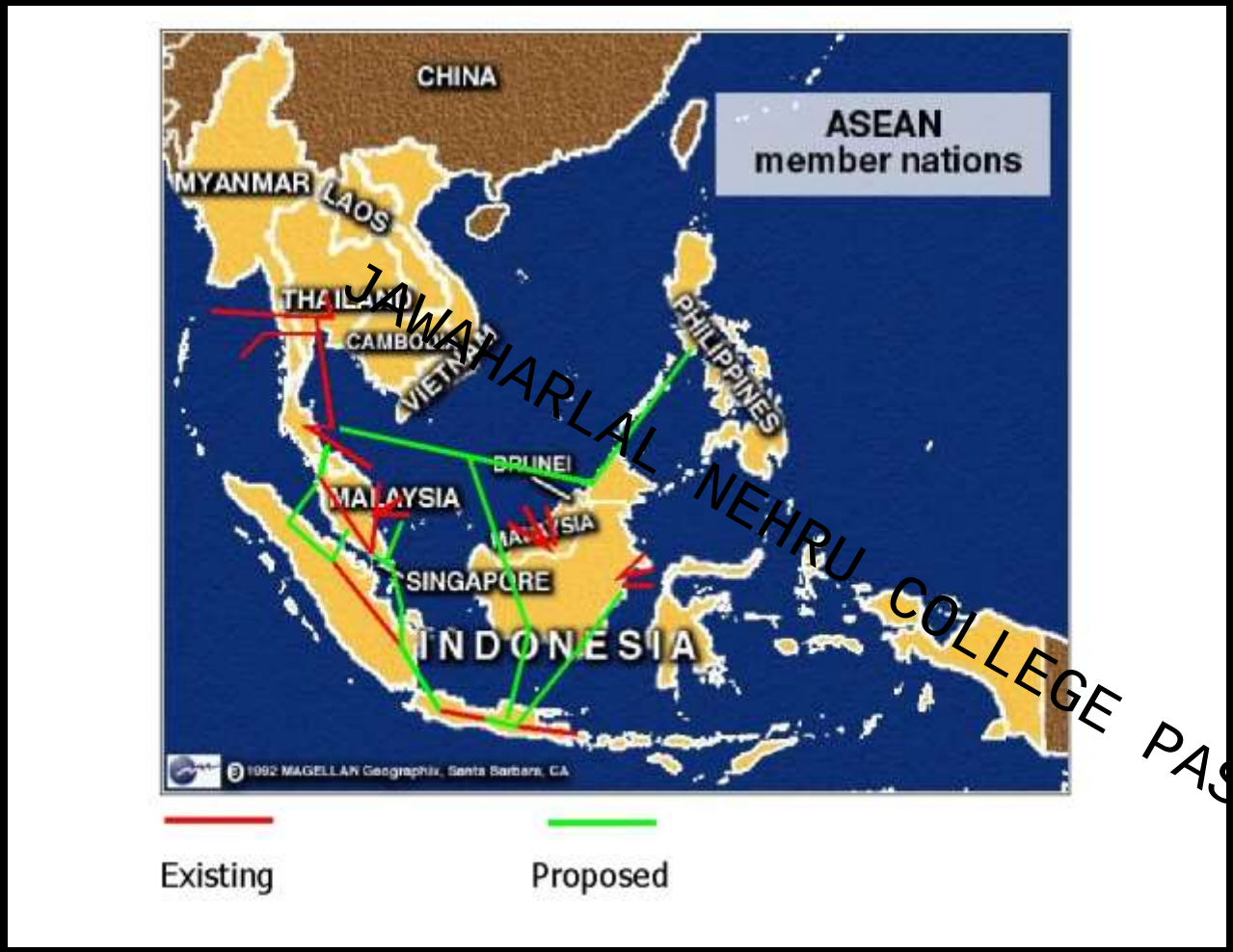
Pipeline Development: SE Asia



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- Economic development of impoverished nations
- Social, environmental, and cultural change: 'modernization' and resistance to it e.g. Kra isthmus, Thailand

Panama Canal

- constructed by USA after initial failed French attempt
- 1903 – USA supports Panama's separation from Colombia; gains control over strip bordering canal "Panama Canal Zone"
- 31 Dec 1999- sovereignty over Canal Zone given to Panama

Capital Cities

- Seat of government. Often centre of finances, education, health services
- Symbol of national or state pride
- May be oldest & largest city in state, centre of most activities -- *Primate City*

London is the *Primate City* of the United Kingdom

Primate Cities

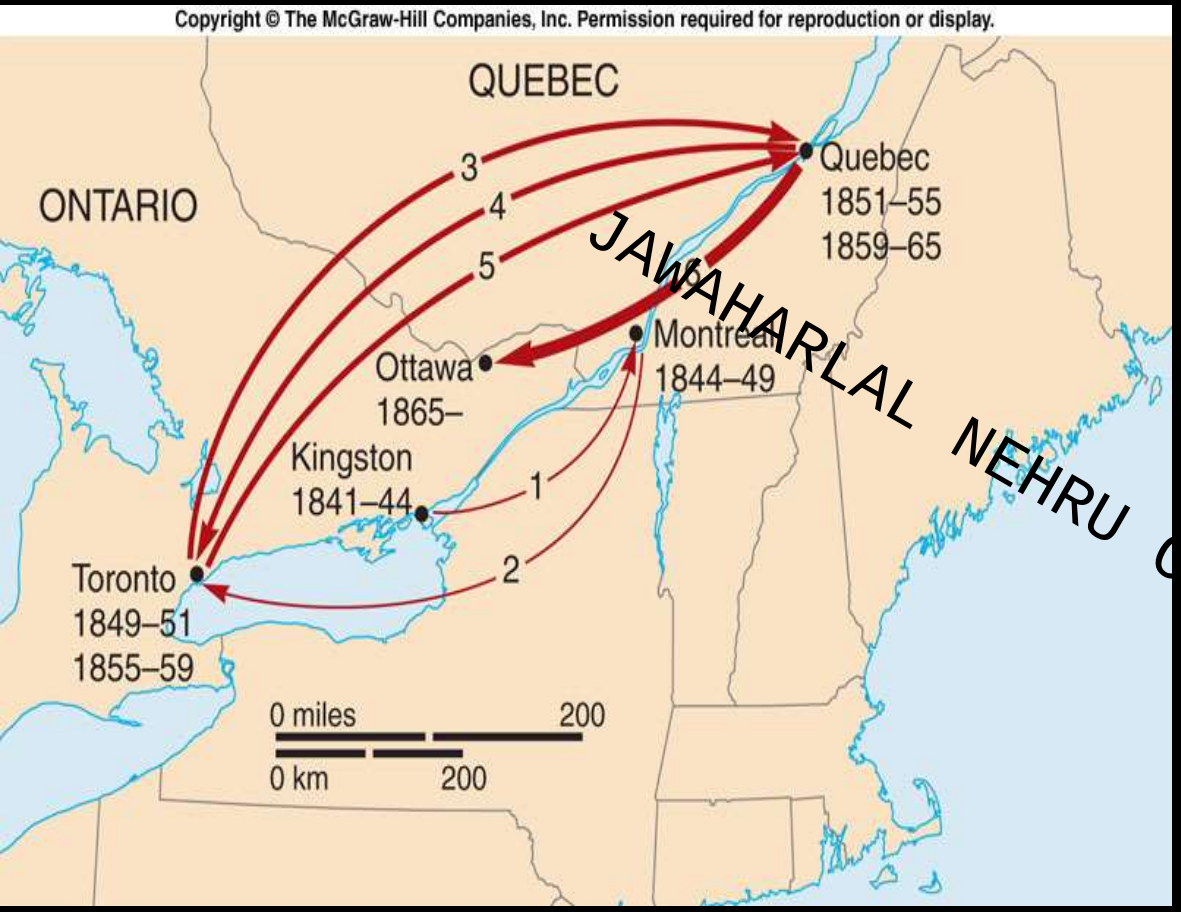
- A primate city is the largest and most important city ***by far*** in a country.
- It dominates the urban system of its country.
- Examples: Paris, London, Mexico City, Seoul
- Toronto and New York are ***not*** primate cities.
- Ottawa is a capital that is ***not*** a primate city

Moving the Capital …

Brasilia

- To access the ocean – St. Petersburg
- To open new territory – Brasilia
- Due to boundary change – Bonn; Berlin
- To choose a 'neutral' site – Washington, Canberra
- To lessen the dominance of a primate city – Ankara (vs. Istanbul)
- To change attitudes – all of the above

Moving the capital:



• Ottawa (Bytown) was selected in 1865 as a neutral site.
•small lumbering town.
• "in the middle of nowhere" and on the boundary between Lower and Upper Canada.
•More distant from the US and therefore less subject to attack.

What would be an equivalent choice today for a new capital for Canada?

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Canberra

- capital of Australia
- city planned as the centre of federal government
- separate from commercial and economic activity in Sydney and Melbourne
- deliberately situated in area of mild climate

Capital cities

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PALACE OF JUSTICE

Alliances of States - Power in Numbers

- United Nations
  - military, cultural, scientific, social welfare mandates
  - attempts to be universal
  - sponsors many agencies for common good of all people
- NAFTA - Canada, US and Mexico for economic reasons
- NATO - military alliance by western Europe, Canada and US

United Nations

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- Established in 1945 in response to World War II, and failure to avert war
- Initiated by US President FD Roosevelt
- has always involved states, not ‘nations’ (as understood by geographers)

UN objectives and structure

- Objectives:
  - international peace and security
  - development of friendly relations among states
  - cooperation in solving international economic, social, cultural, and humanitarian problems
- UN Structure:
  - All states members of General Assembly
  - Secretary-General appointed by GA
  - 15 states are members of Security Council
  - 5 permanent SC members – Russia, USA, UK, France, China

United Nations Membership

- Open to all "peace-loving" states
- 191 member states
- Most recent members: Switzerland and East Timor (both Sept. 2002)
- Observers (no voting rights) include Holy See (Vatican) and Palestinian Authority

Non-members

- States admitted only after General Assembly vote
- Western Sahara has not been admitted – government largely in exile
- Taiwan (Chinese Taipei) expelled in 1971; replaced by People's Republic of China
- Taiwan has applied for readmission on several occasions, vetoed by PR China
- Stateless nations cannot be members

State alliances: military & economic

- Military
  - NATO
- Economic
  - NAFTA
  - ASEAN
  - MERCOSUR
  - EU (European Union)

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NATO

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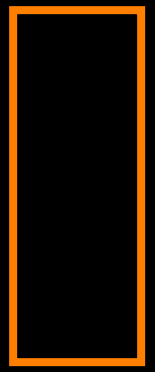
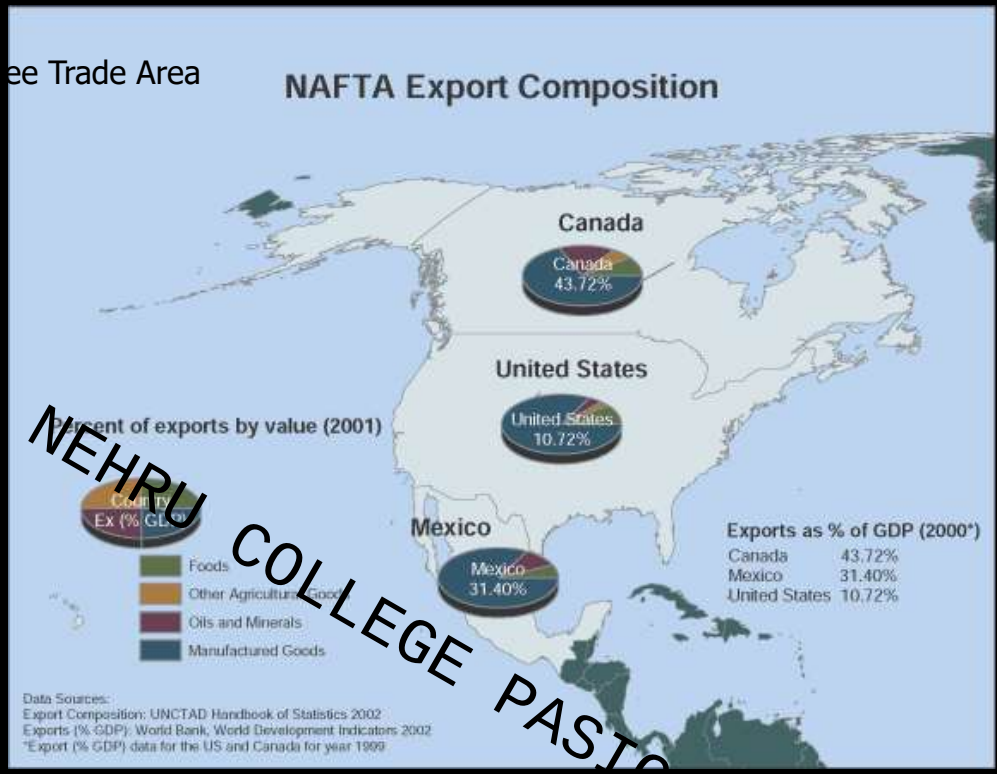
- North Atlantic Treaty Organization
- formed after World War II
- East. European states are recent applicants
- Renewed interest in alliance with USA request to invade Iraq

States alliances: economic



- Free-trade area: removal of member state trade restrictions; maintenance of policies toward non-members

State alliances: economic
Free trade areas



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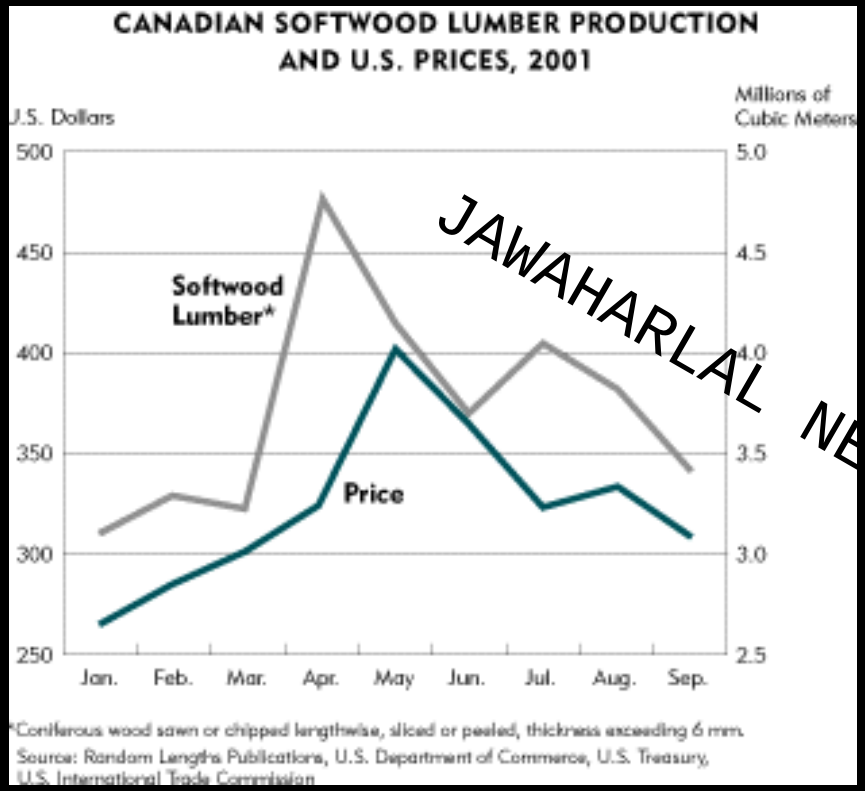
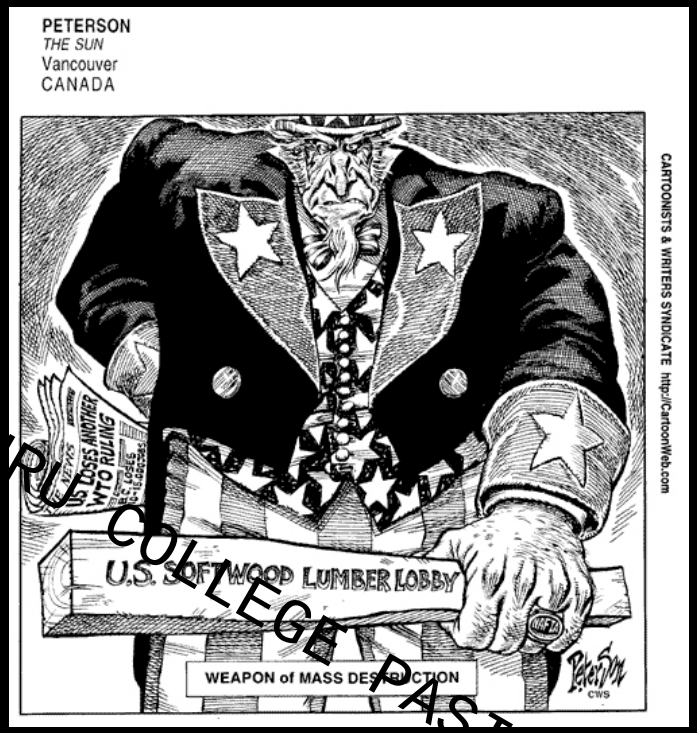
Map source: http://ucatlas.ucsc.edu/trade/subtheme_trade_blocs.php

State alliances: economics and conflict?





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- Can we think of states as economic actors on their own? Why or why not?
- Who are key actors in state alliances and conflicts? Where are some key sites of action?

State alliances: economic
Common market

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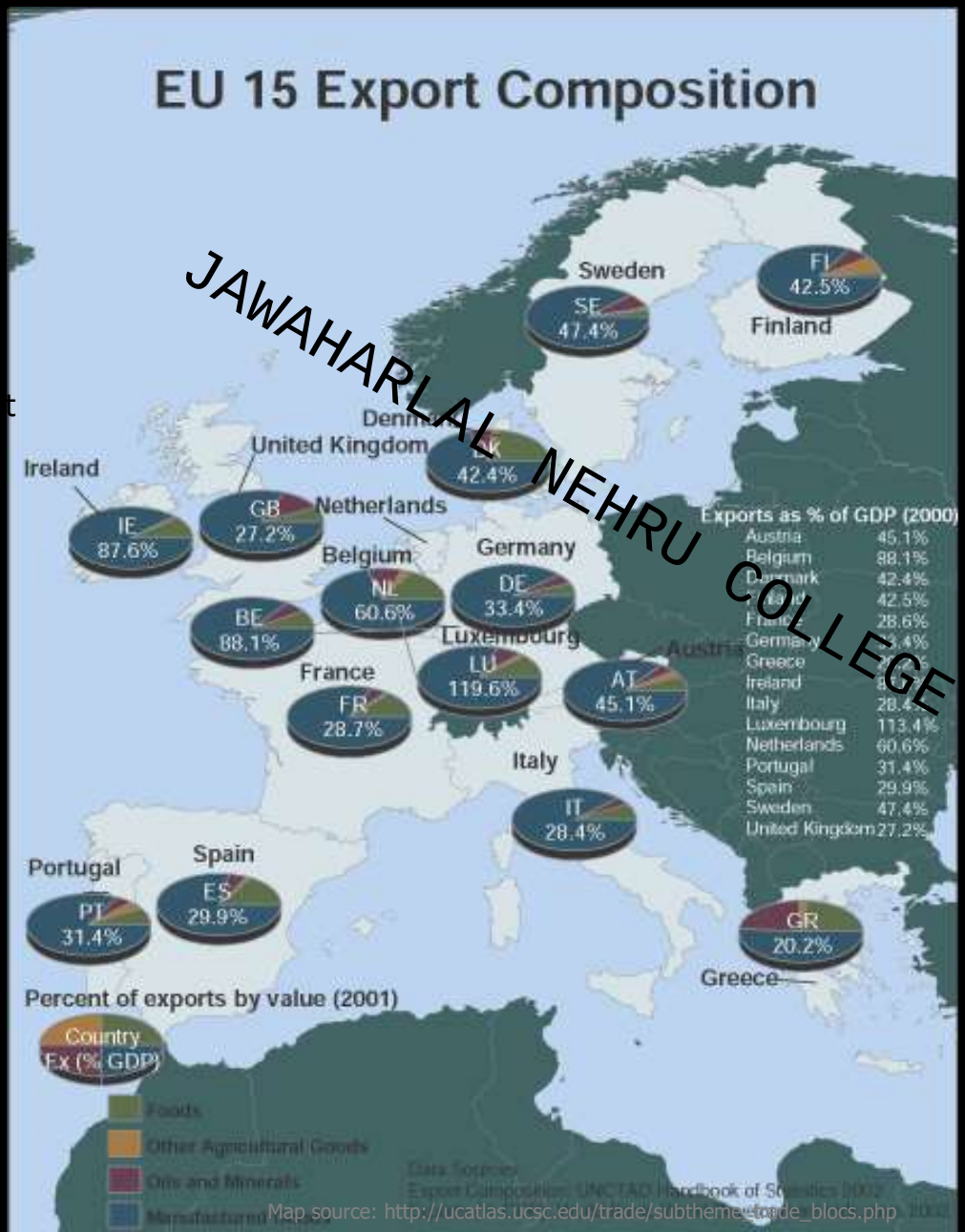
State alliances: economic

Economic union



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STATE AND NATION

DR K K MISHRA

JAWAHARLAL NEHRU COLLEGE PASIGHAT

Basics - Origin

- Somewhat **hierarchical** system – sometimes includes all three levels
  - International Political Systems
  - National Political Systems
  - Local and Regional Political Organization
- Early political systems may have developed partly in response to physical conditions
  - Early Egypt – cooperation needed to harness the Nile floods for productive agriculture
  - Eventually the kingdoms of upper and lower Egypt were combined under one ruler

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National Political Systems

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- **Terms: Nations, States, and Nation-States**
  - **Nation:** A group of people with a sense of oneness – an ethnic group.
  - **State:** A part of the earth's land surface which is organized under a government and has boundaries.
  - **Nation-state:** High coincidence between the territory occupied by a nation and that which is organized as a state – A nation which has its own political structure for the territory it occupies.
  - **Multi-national state:** A state in which more than one nation resides

Stateless nation & part-nation state

- **Stateless nation** – an ethnic group which is divided among several countries and which does not comprise the majority of the population of any of the countries.
  - **Kurds**
  - Poles before the Treaty of Versailles
- **Part-nation state** – A nation whose territory may expand beyond the territory of a state and may encompass several states
  - Arab nation

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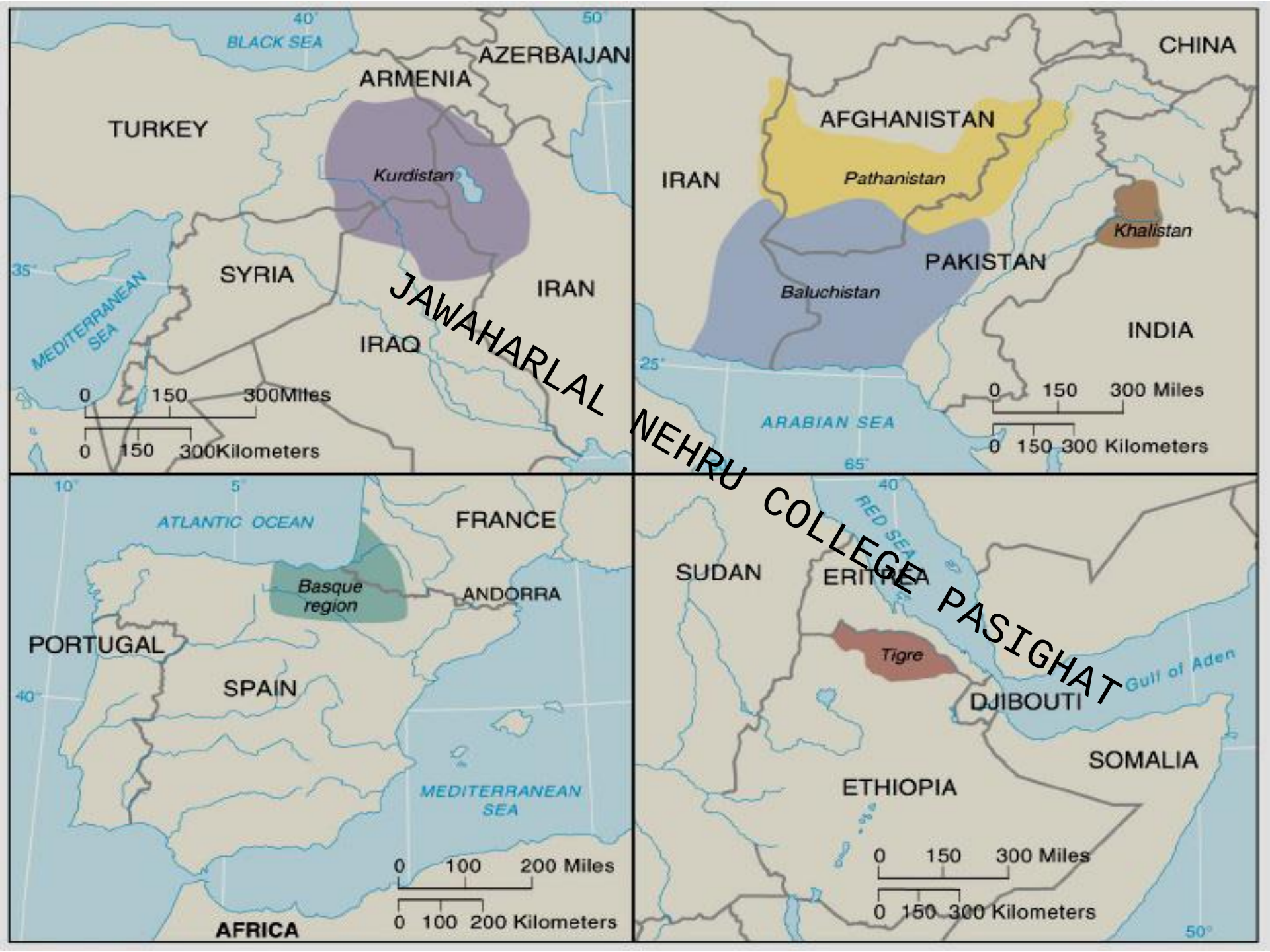

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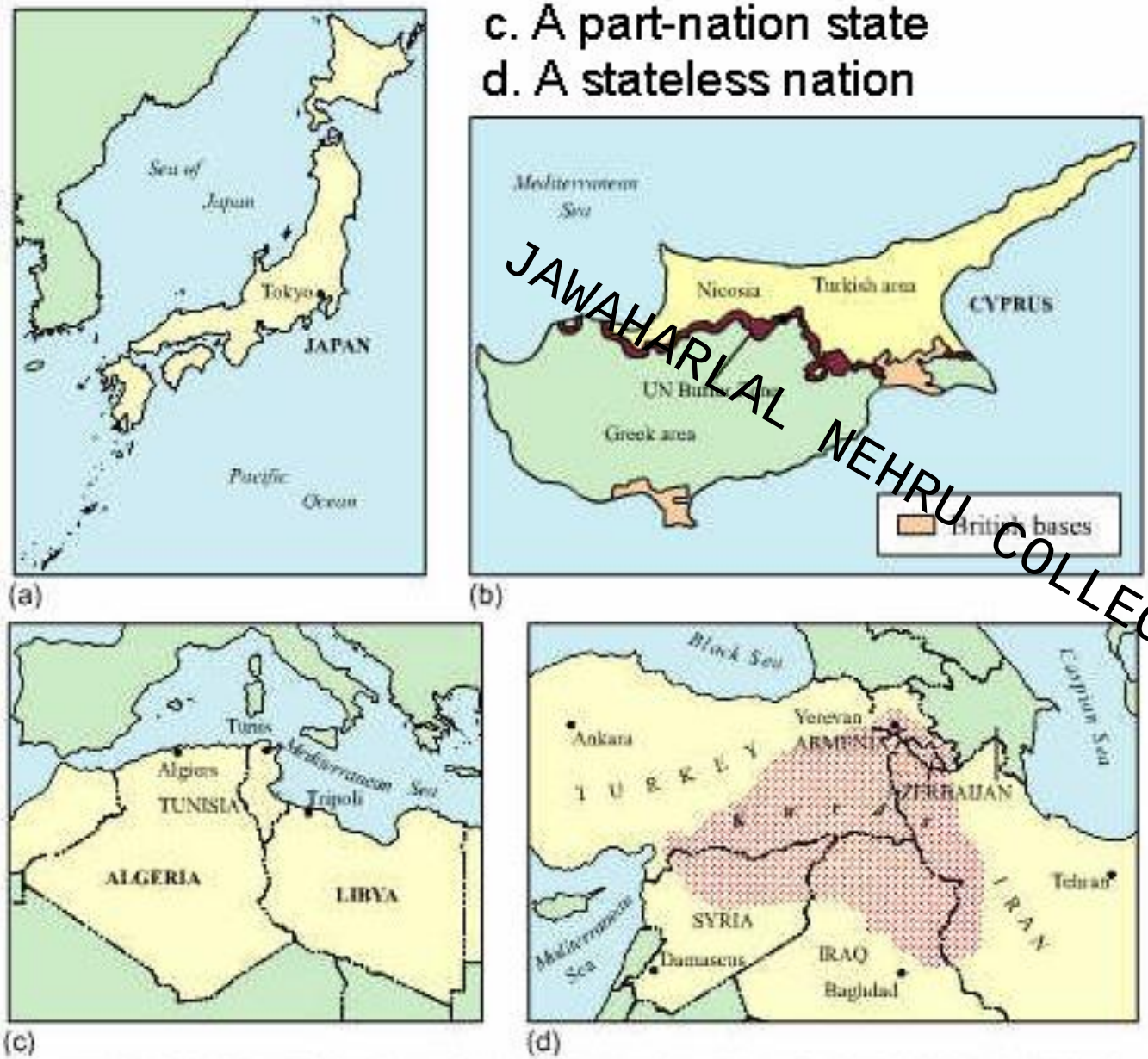
a. A nation-state
b. A multinational state
c. A part-nation state
d. A stateless nation



Types of relationships between "states" and "nations."

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State & Nation –

Both the multinational state and the stateless nation situations have the potential for armed conflict

The Evolution of the Modern State

- Developed by European philosophers in the 18th century
- **England** –Nation state in which the power gradually shifted from the monarch to the electorate – **"Democratic Evolution"**
- Idea spread through much of Europe by French Revolution
- The colonial period, and the demise of the colonial system, brought the model to much of the rest of the world

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Geographic Characteristics of States

- **Size** – larger countries **may** have more possibilities available to them – to carrying capacity
  - Climate variety & agriculture
  - Resources available
- **Shape** – can foster or hinder effective organization of the state – see categories in slide to follow.
- **Location** – relative and absolute
  - Landlocked – very disadvantageous relative location
- **Cores and Capitals** – Core area is the nucleus from which a state grew and developed – usually contains the capital city. Particularly true of unitary states.

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More on Shape

- **Compact State** – close to circular shape
- **Prorupt State** – nearly compact but with one or two narrow extensions of national territory.
- **Elongated State** – least efficient state administratively – long and narrow in shape
- **Fragmented State** – composed of disconnected parts (often islands or mainland plus islands)
- **Perforated State** – completely surrounds the territory of one or more states (usually small states)
- **Exclave** – a territorial outlier of one state is surrounded by the territory of another state
- **Enclave** – a piece of territory surrounded by a country which is not ruled by that country (may be an exclave of another country

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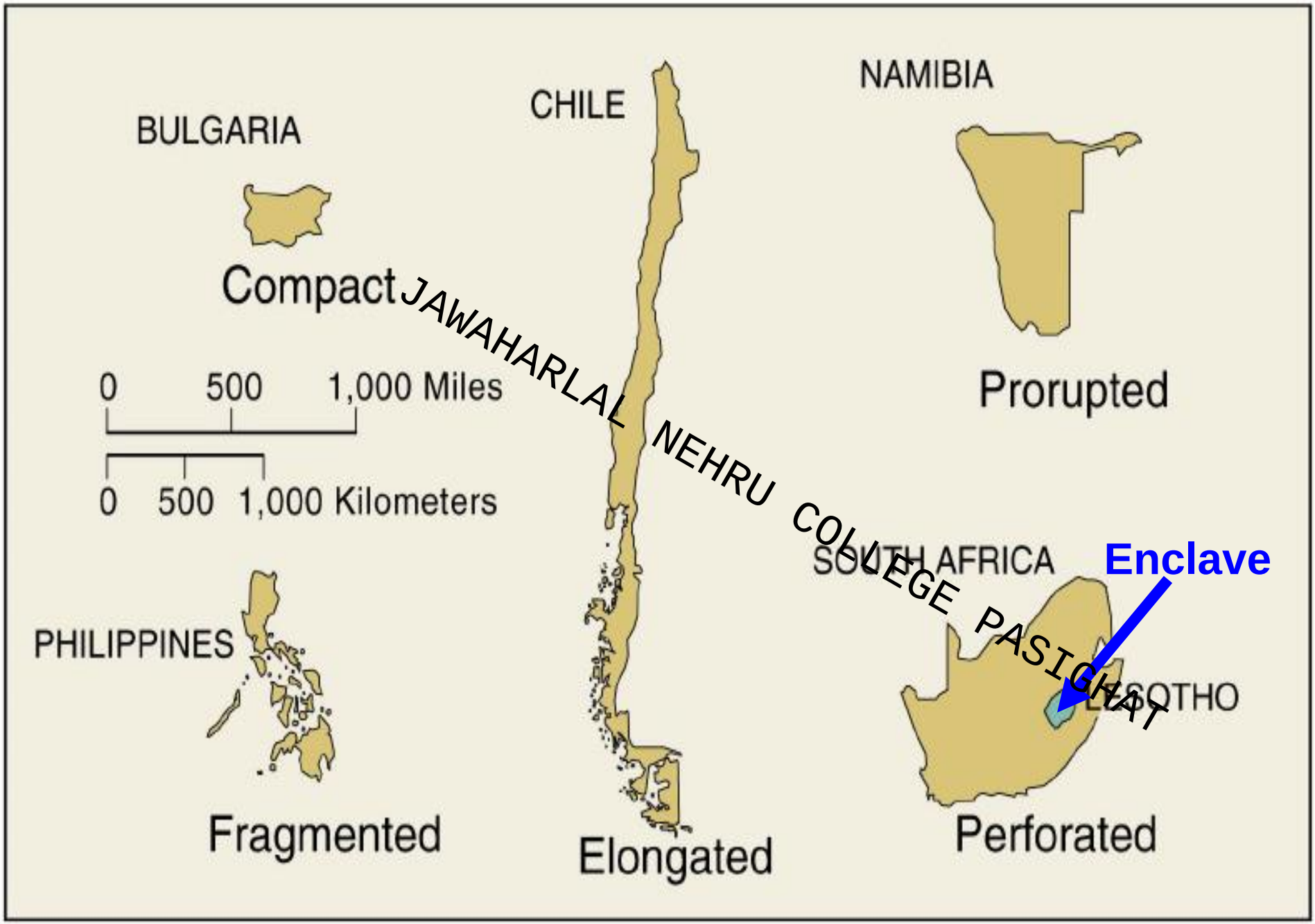
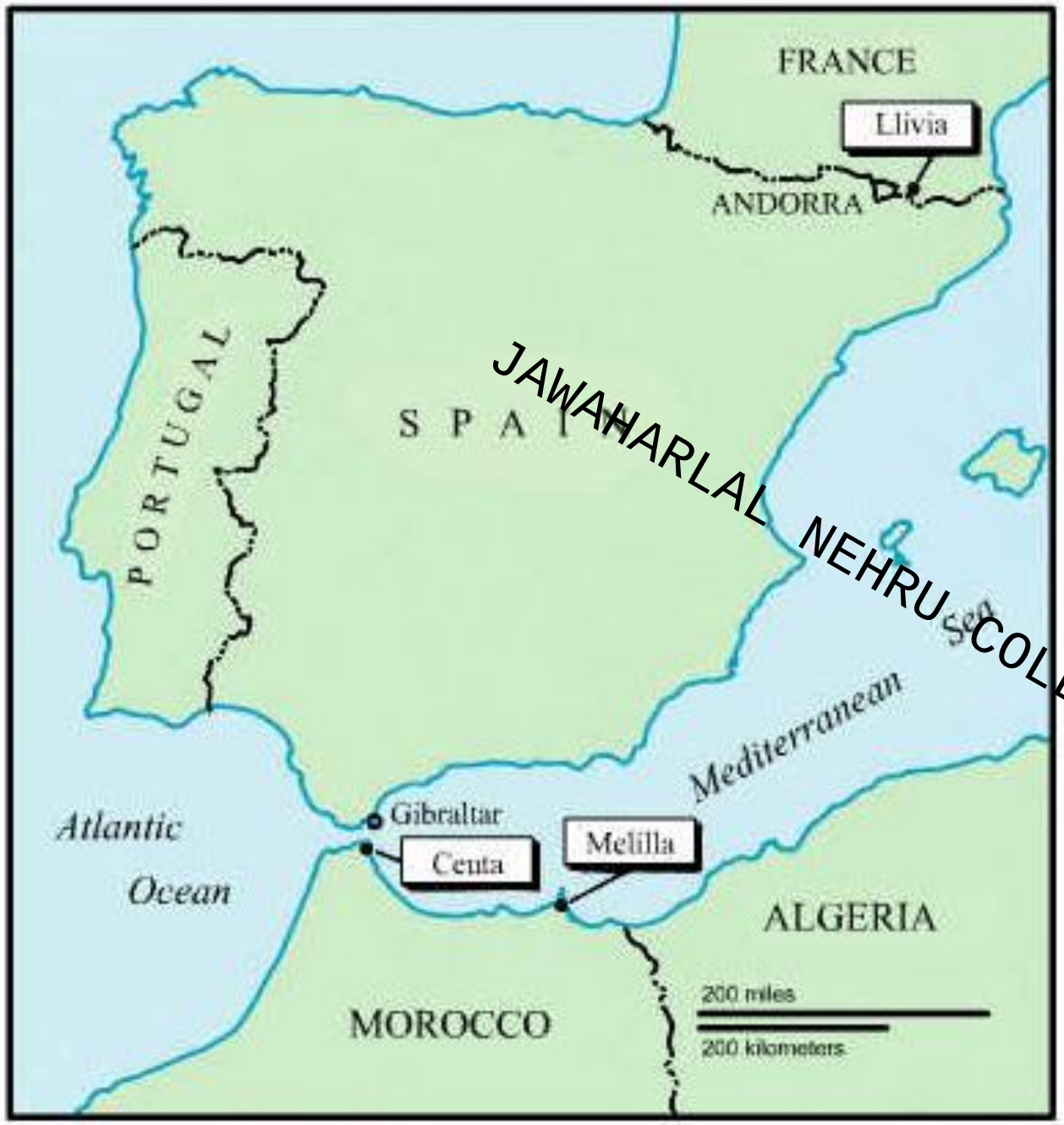

BULGARIA
CHILE
NAMIBIA
Compact
Prorupted
0 500 1,000 Miles
0 500 1,000 Kilometers
JAWAHARLAL NEHRU COLLEGE PASIGHAT
SOUTH AFRICA
Enclave
PHILIPPINES
LESOTHO
Fragmented
Elongated
Perforated



Spanish exclaves in North Africa and France.

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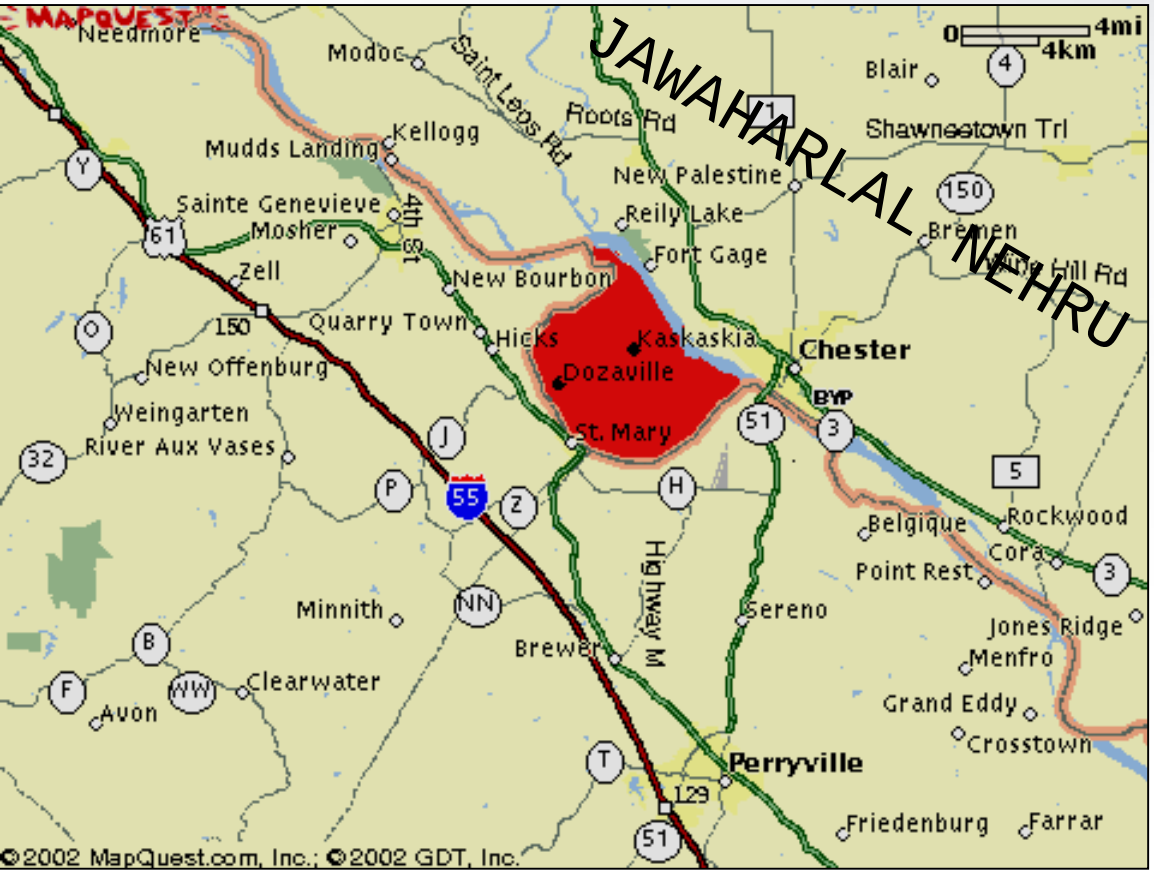
Exclaves –

May be difficult to maintain or to protect from being taken over by the country which surrounds them.

Exclave or Enclave?



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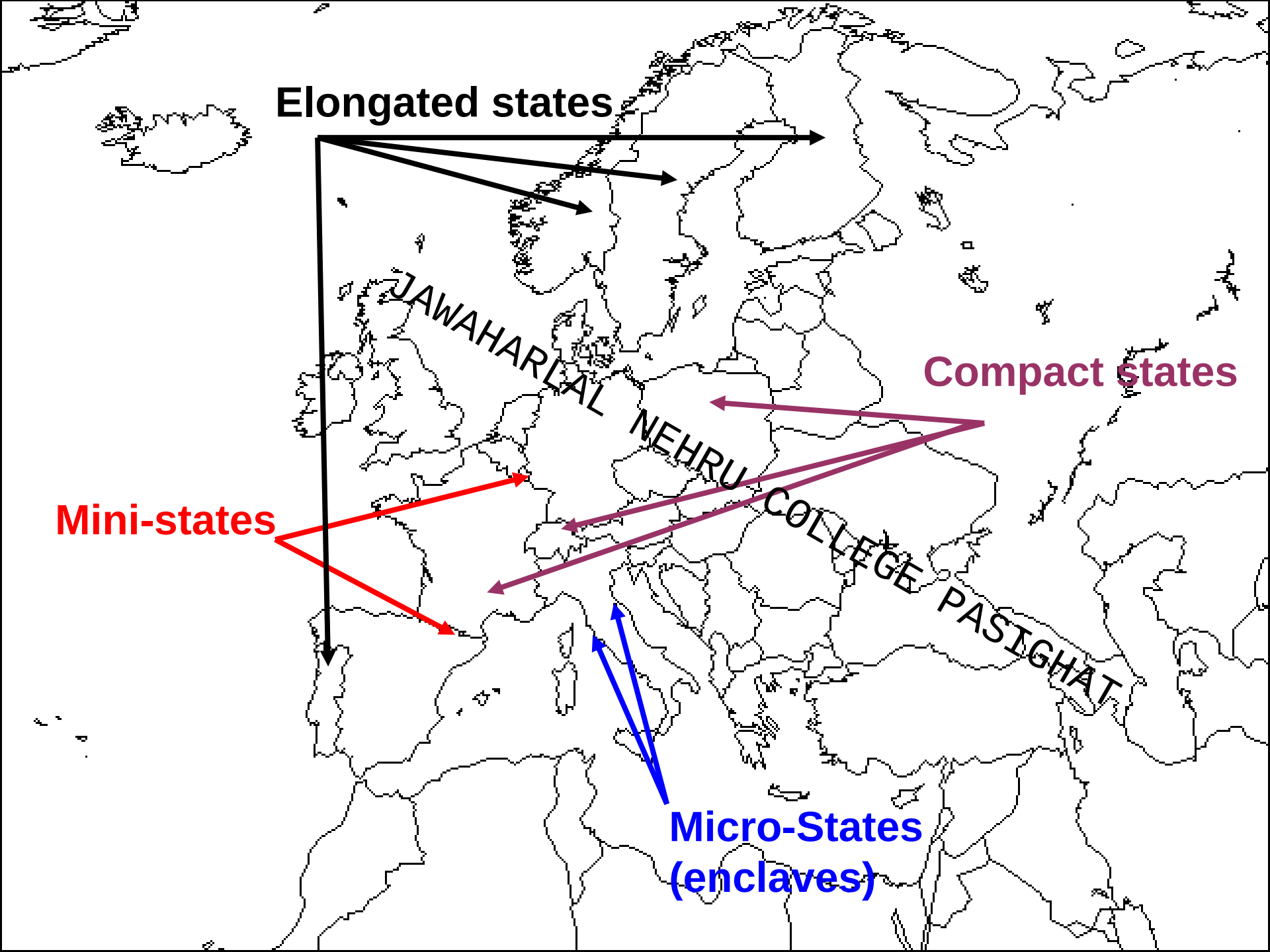
- The river moved so the red area is still part of Illinois but is on the west side of the Mississippi River.
- Illinois – it's an exclave
- Missouri – it's an enclave


Elongated states
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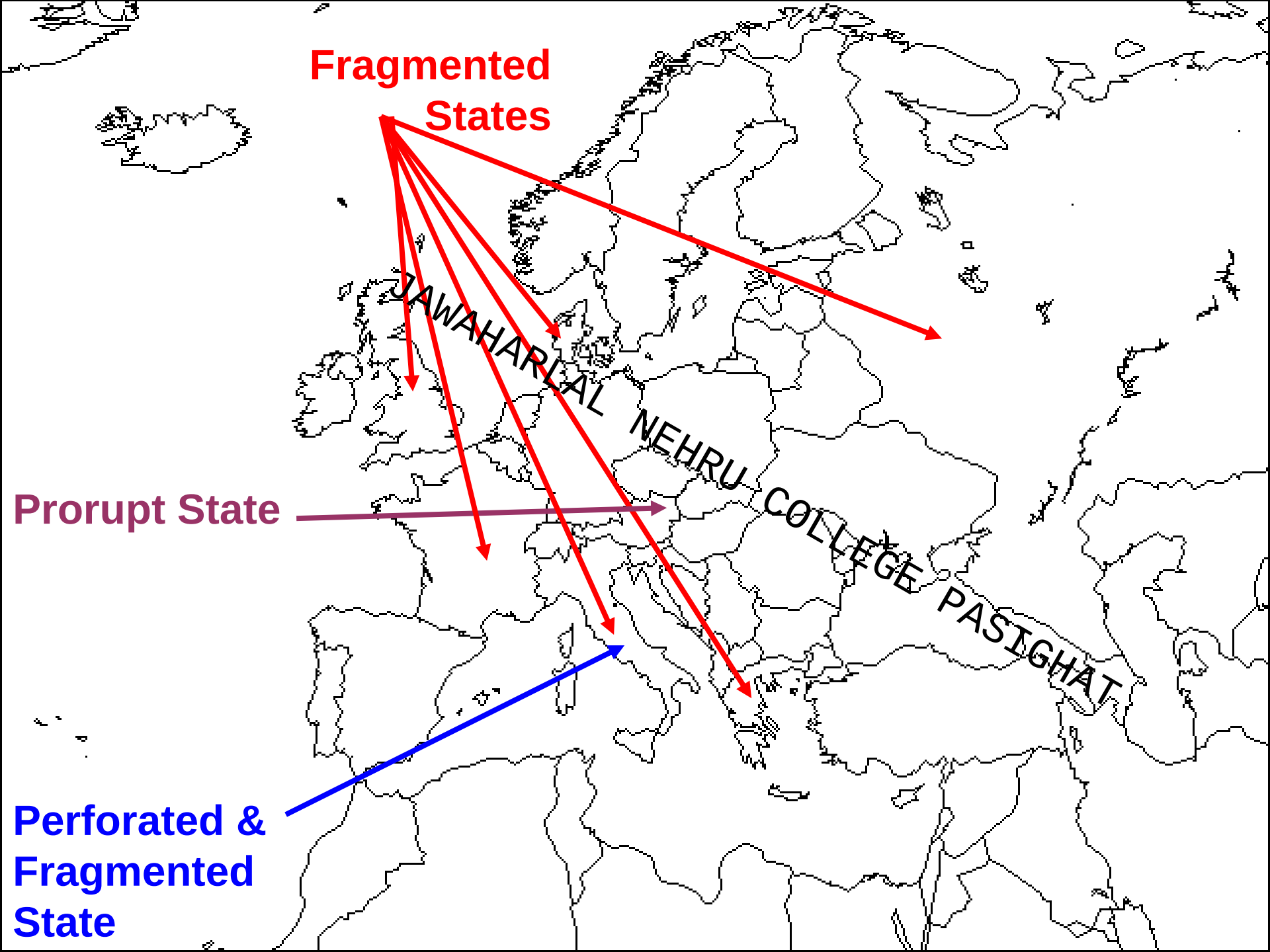
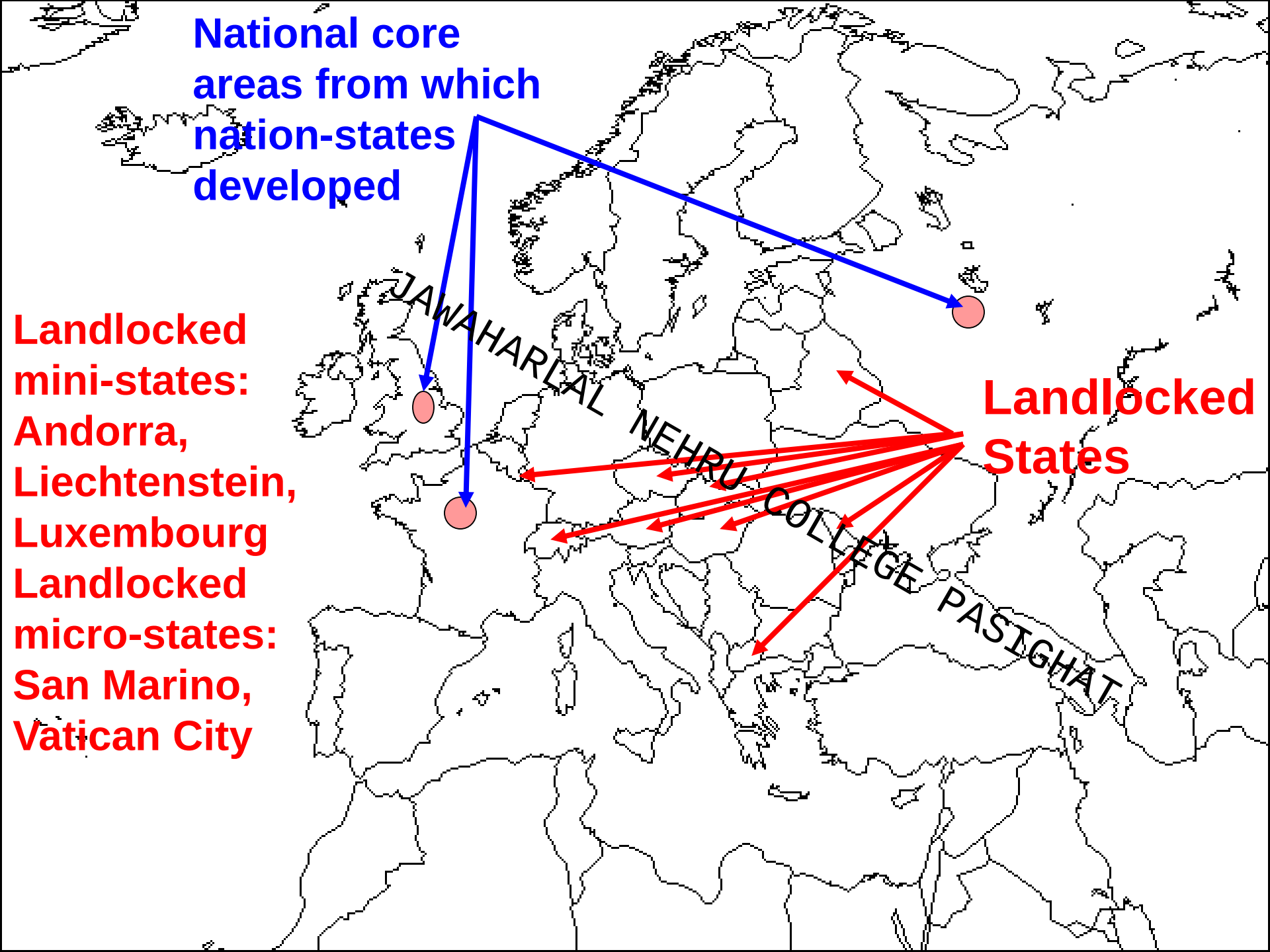
Compact states
Mini-states
Micro-States
(enclaves)


Fragmented States
JAWAHARLAL NEHRU COLLEGE PASIGHAT
Prorupt State
Perforated & Fragmented State


National core areas from which nation-states developed
Landlocked mini-states: Andorra, Liechtenstein, Luxembourg
Landlocked micro-states: San Marino, Vatican City
Landlocked States
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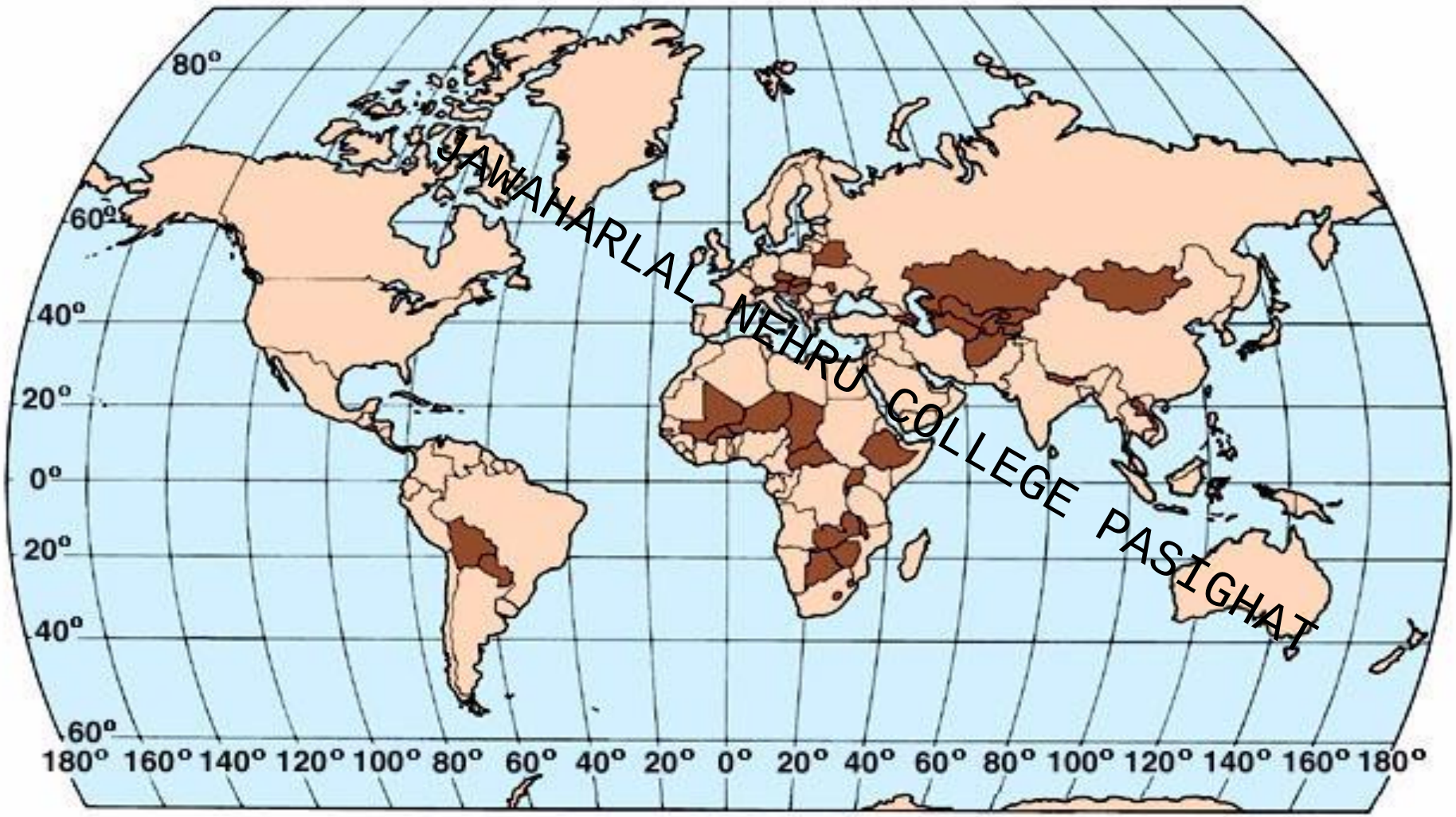
Landlocked States



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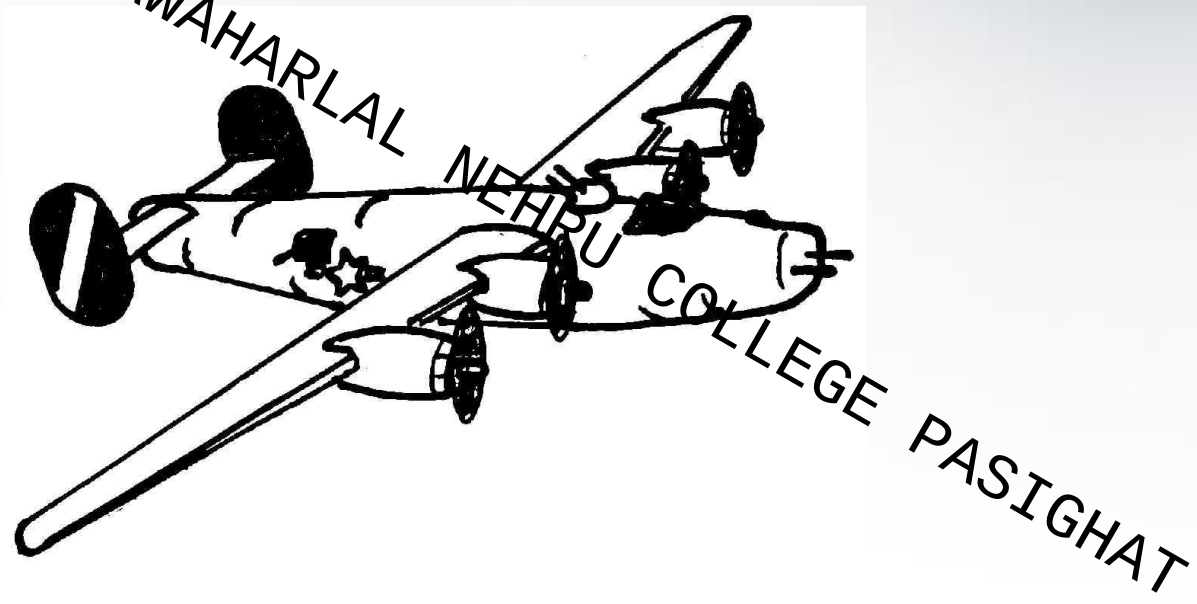
The Advent of the Air-Age Brought Both Political & Economic Changes



- **Click the picture above to see the video of pre-jet aircraft**

Only a few of the small states

Other small states include Singapore, island nations of the Pacific and Caribbean Sea, Andorra, Liechtenstein.

Table 11-1 A Few of the World's Smallest Independent States

	Area (km^2)	Area (mi^2)	Population (in thousands)	GDP (in U.S. dollars)
Bahrain	620	239	595	6.8 billion
Barbados	430	166	256	2.2 billion
Grenada	340	131	94	250 million
Maldives	300	116	252	140 million
Monaco	1.9	0.733	31	473 million
Nauru	21	8.1	10	90 million
San Marino	60	23.16	24	370 million
Tuvalu	26	10	10	6.4 million
Vatican City	0.438	0.169	0.811	NA

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Nationalism: double-edged sword

- Nationalism can bring a people together and provide a strong **centripetal force** holding the country together in a nation-state.
- Nationalism, particularly when carried to extremes, can be a divisive, **centrifugal force** working to tear a country apart when it is exercised in a multi-national state.
  - When a nation occupies a rather contiguous territory within a multi-national state, that can make separatist movements more likely to develop and/or succeed

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Multi-national state – former Yugoslavia – In Bosnia, the territory occupied by Bosnians and Serbs was so discontiguous that there was no way to divide the area along ethnic lines.

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Hatreds had been passed from one generation to the next. With the end of the totalitarian communist system, ethnic hatreds surfaced and led to violence and independence movements in Bosnia

Globalism and devolution

- Two seemingly contradictory trends
  - The **global economy** and, at least, economic unions of states with the possibility of greater political integration
    - European Union is still expanding
    - NAFTA may enlarge – Chile as a potential member
  - **Devolution** – the splitting apart of countries
    - Ethnic groups in multi-national states pushing for autonomy and even independence
    - Wounds that were inflicted hundreds of years ago surface and sometimes lead to violence
      - Bosnia, Kosovo, Chechnya

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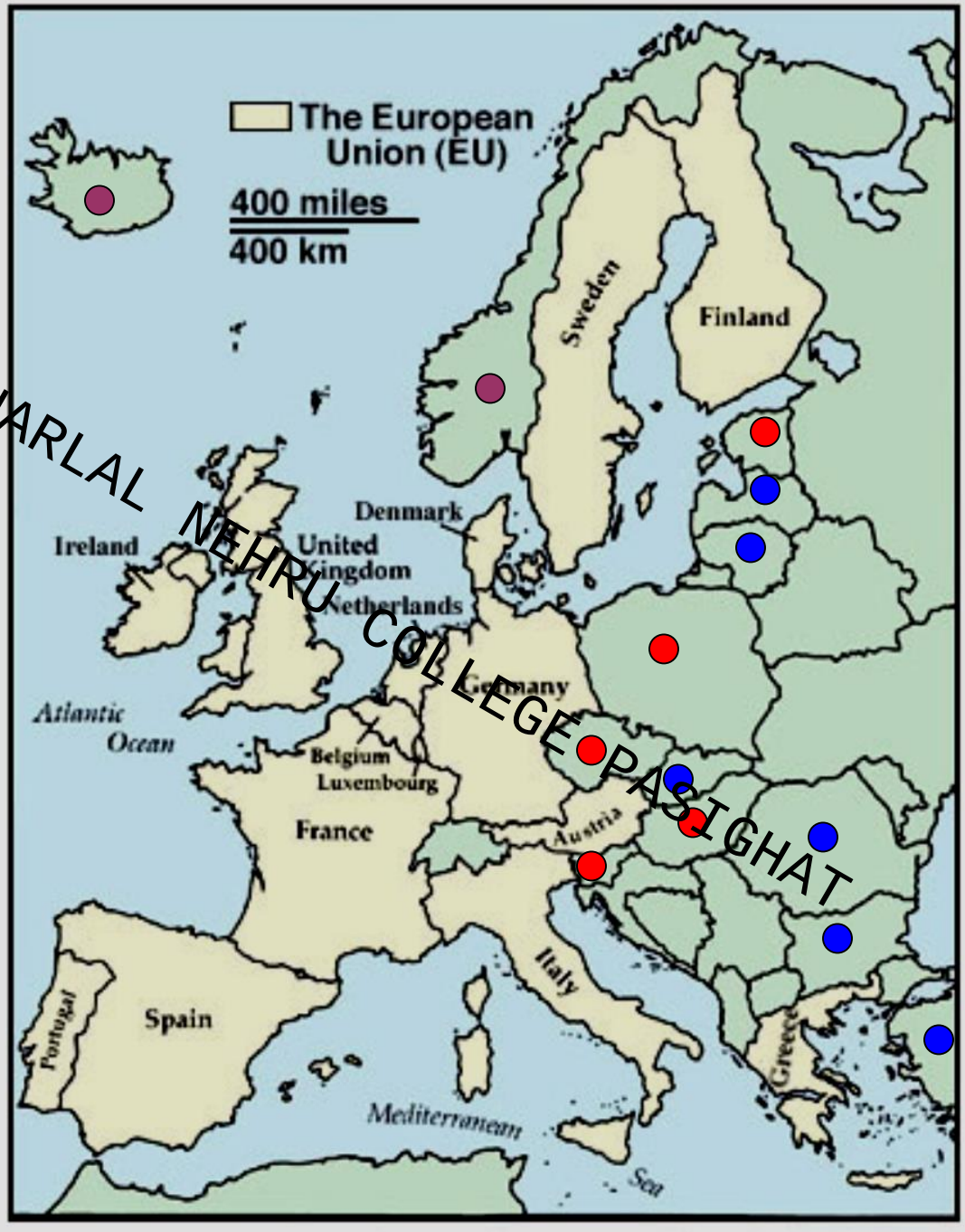
The European Union

Countries recently joined: Poland, Czech Rep., Slovenia, Hungary, Estonia, & Cyprus

Countries anticipating negotiations to join: Latvia, Lithuania, Slovakia, Romania, Bulgaria, & Turkey.

Countries voting not to join: Denmark & Norway



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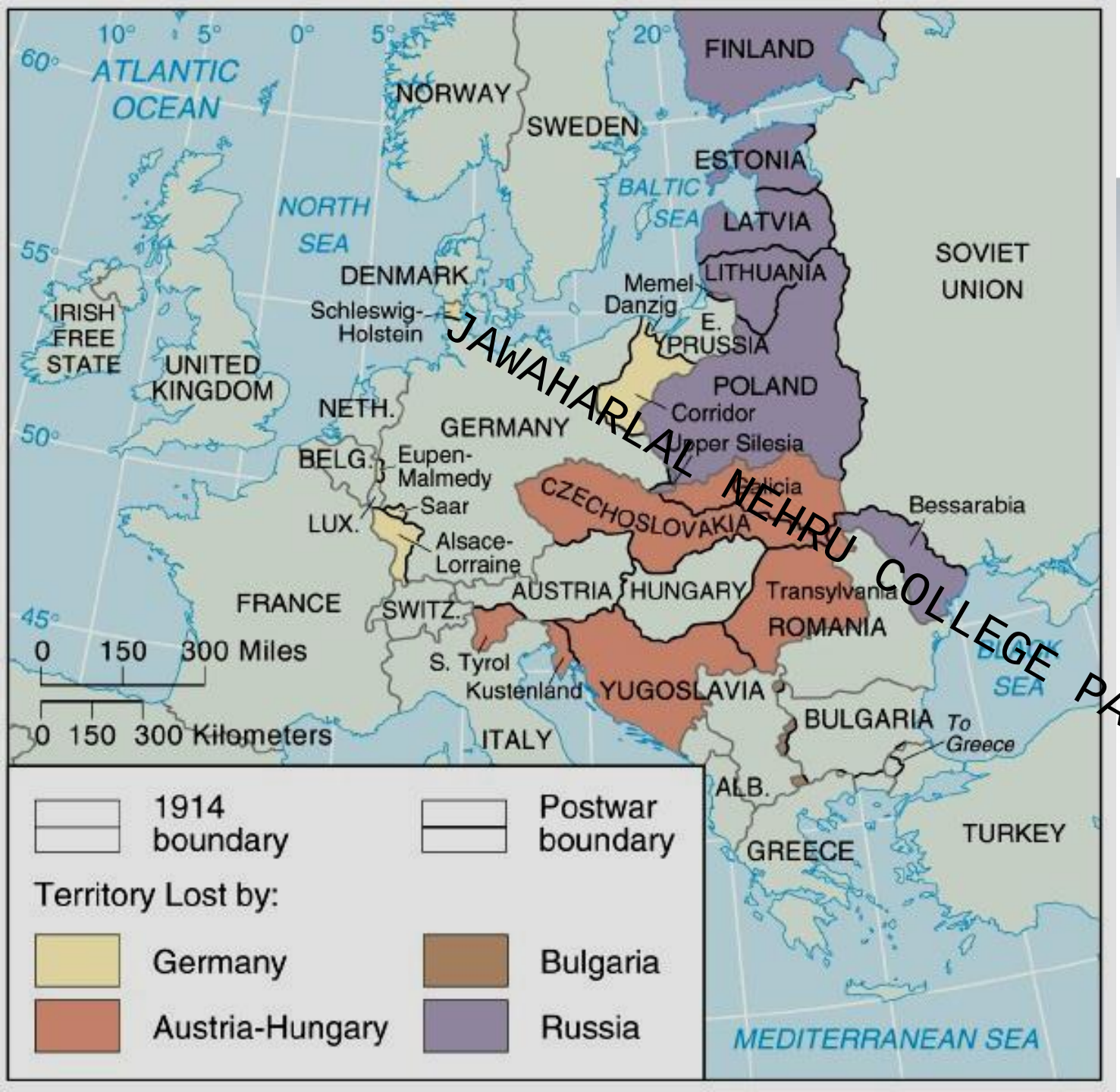

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Efforts to give political expression to nationalist groups in Europe at Versailles, 1918 addressed the desires of some ethnic groups

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Regions Seeking Autonomy

Britain has granted Scotland its own parliament and Wales may follow. Sometimes granting greater autonomy can stave off a full scale revolt and independence.

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Devolution–the former Soviet Union

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National Political Systems (cont.)

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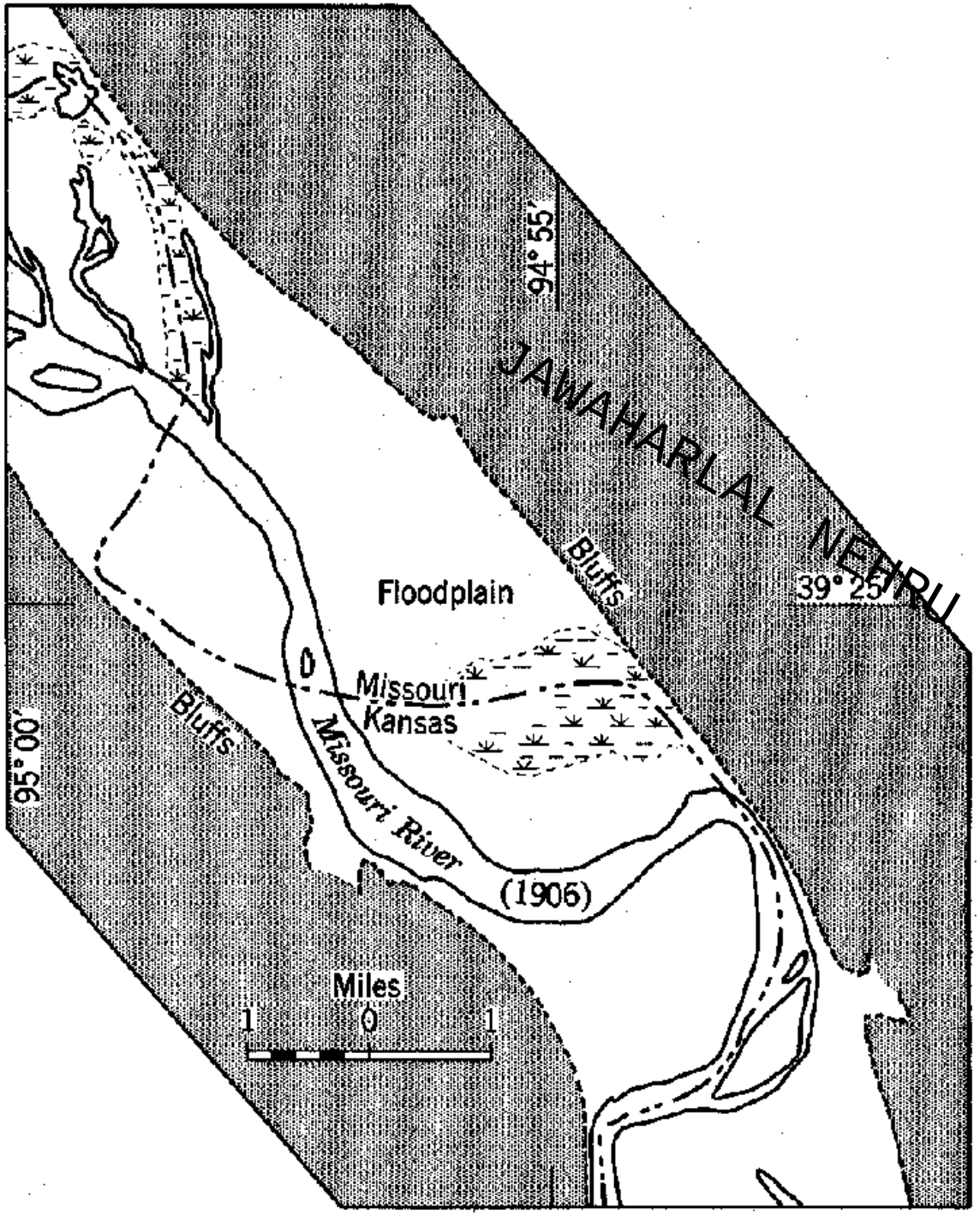
- Boundaries: Set The Spatial Limits of the State & replaced former frontier zones
- Classification of Boundaries
  - **Natural or physical boundaries** – often make poor boundaries
    - Mountains: rarely total barriers to interaction
    - Rivers: constantly shifting the course – usually gradually
  - **Geometric boundaries** (artificial)--easily delimited and demarcated
    - Antecedent – draw before area populated & cultural landscape is set
    - Subsequent – after settlement & development of cultural landscape
    - Consequent (subsequent) – drawn to accommodate differences
    - Superimposed – forced upon the cultural landscape (1948 – Israel)
    - Relic – no longer functions but still marks a transition



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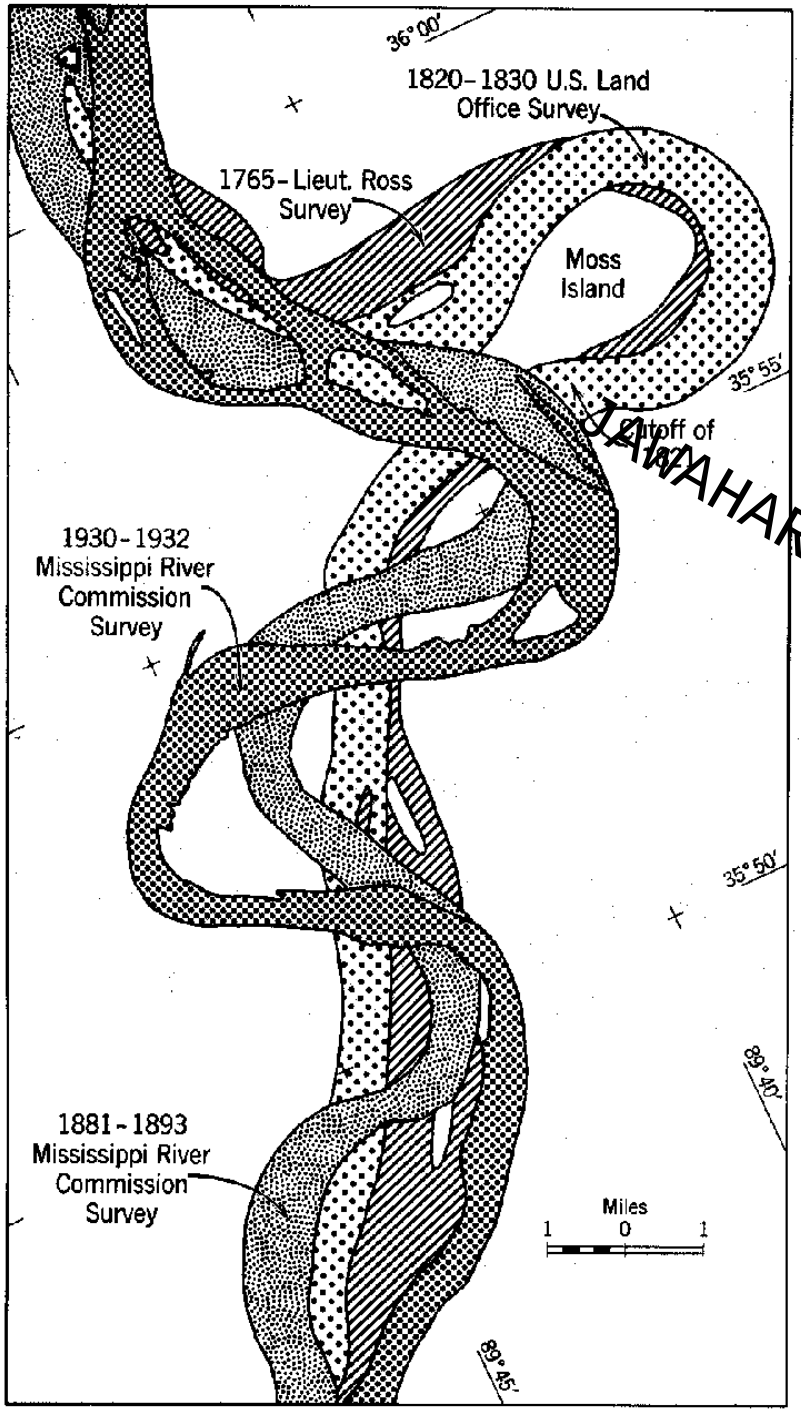
Rivers Make Poor Boundaries

The Missouri-Kansas boundary was originally surveyed along the midline of the Missouri River, but the river has since shifted to a new course. A similar situation exists between Illinois and Missouri along the Mississippi River.



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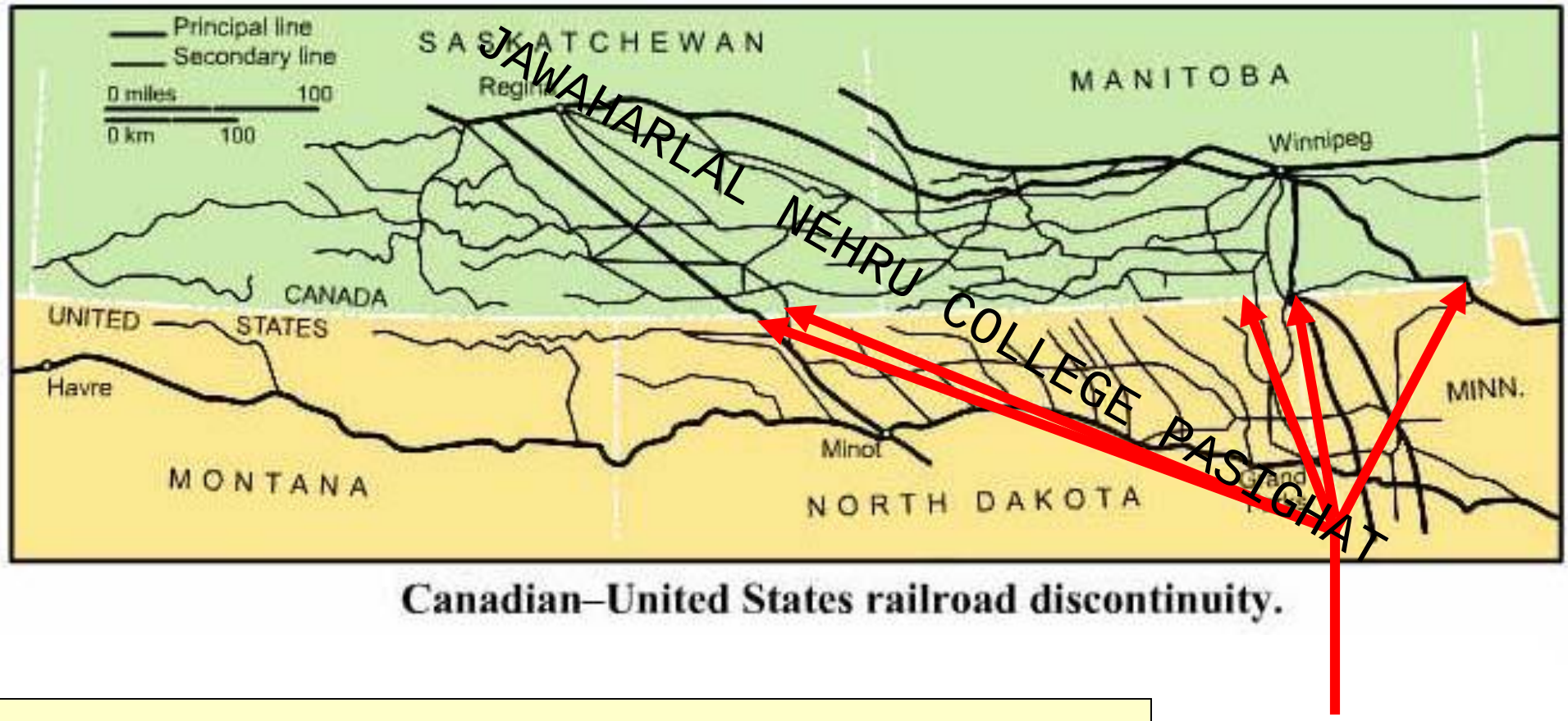
Shifting Rivers

A series of four surveys of the Mississippi River shows considerable changes in the position of the channel and the form of the meander bends. Note that one meander cutoff has occurred (1821) and new bends are being formed.

Transportation lines cross only at a few locations – if this weren't a national boundary, there would be more of a network, rather than two parallel systems



Canadian–United States railroad discontinuity.

Boundary effects on transportation patterns

Major border crossings

Boundary Disputes

- **Position disputes** – disagree to interpretation of the boundary treaty – Chile/Argentina in S. Andes
- **Territorial disputes** – over ownership of territory
  - **Irredentism** – land that was formerly part of another state with which there are ethnic ties
- **Resource disputes** – Kuwait & Iraq
- **Functional disputes** – disagreement over policies to apply to border – Mexico & U.S.A. over illegal aliens crossing into the U.S.A

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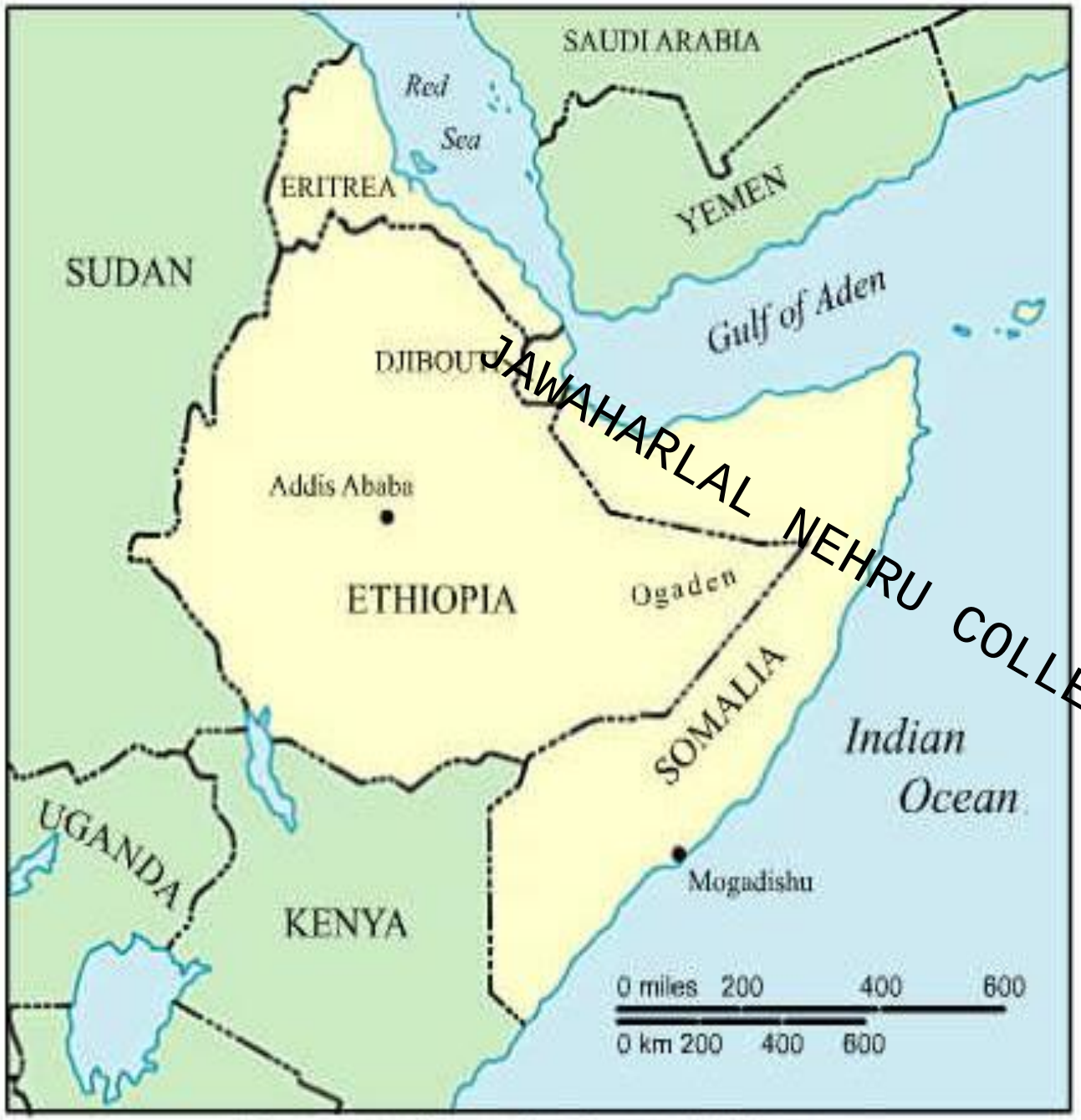

Irredentism in East Africa.

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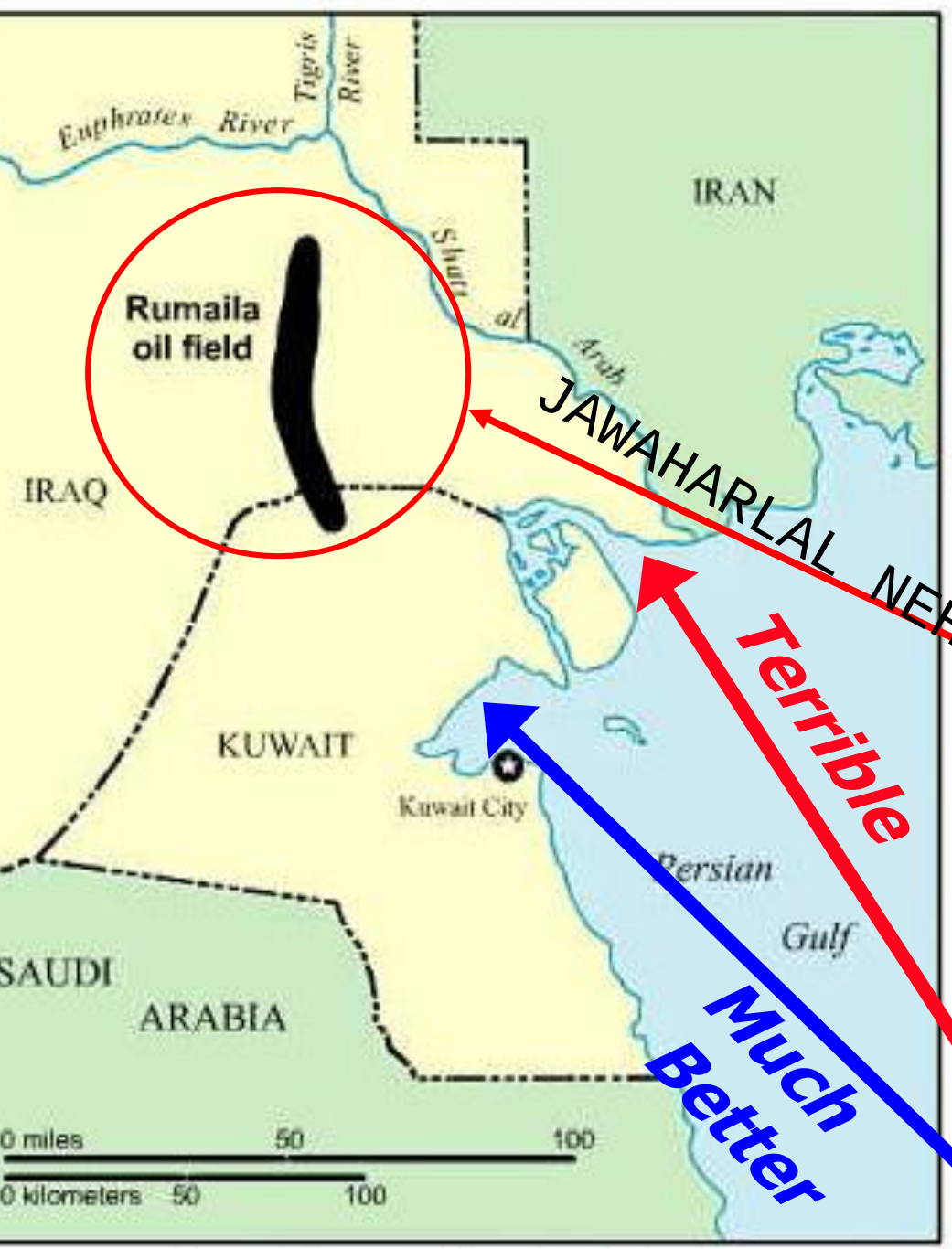
In the 1970s, Somalia claimed the eastern part of Ethiopia, Ogaden, because it is peopled primarily by Somalis. Unsuccessful guerrilla fighting continued until 1988 creating more than 1mil. refugees in Somalia.



The Rumaila oil field.

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Terrible

Much Better

Motivation for Iraq's Invasion of Kuwait –

1. Dispute of withdrawals from the oil field
2. Claim of Pre-British ownership
3. Desire for better access to the Persian Gulf

War in Iraq in 1991 and ????

- In 2005, the question is, will we still be fighting in Iraq in 2006?
- Click on the picture below to see the video

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Geopolitical Assessments

- Relating national power to geographic factors – somewhat tarnished reputation due to Germans in WWII.
- **Heartland** theory – Halford Mackinder
- **Rimland** theory – Nicholas Spykman
- Both theories see Eurasia as the “prime” real estate

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German school of geopolitik adopted by Hitler– eastern front aimed at controlling the heartland.

Geopolitical viewpoints.

U.S. policy of Containment

- Cold-war geopolitical strategy to counter the Soviet attempt to control the heartland.
- Major points
  - Control **rim** of exterior continents & islands.
  - Control strategic parts of the **rimland**.
  - Isolate communism and prevent its expansion.
  - Like a “cancer” which is not allowed to grow, communism would wither up and die.
- Was the Soviet demise the result of it’s own mistakes or of containment, or some of both?
  - Andre Amalric – *Will the Soviet Union Survive until 1984?*

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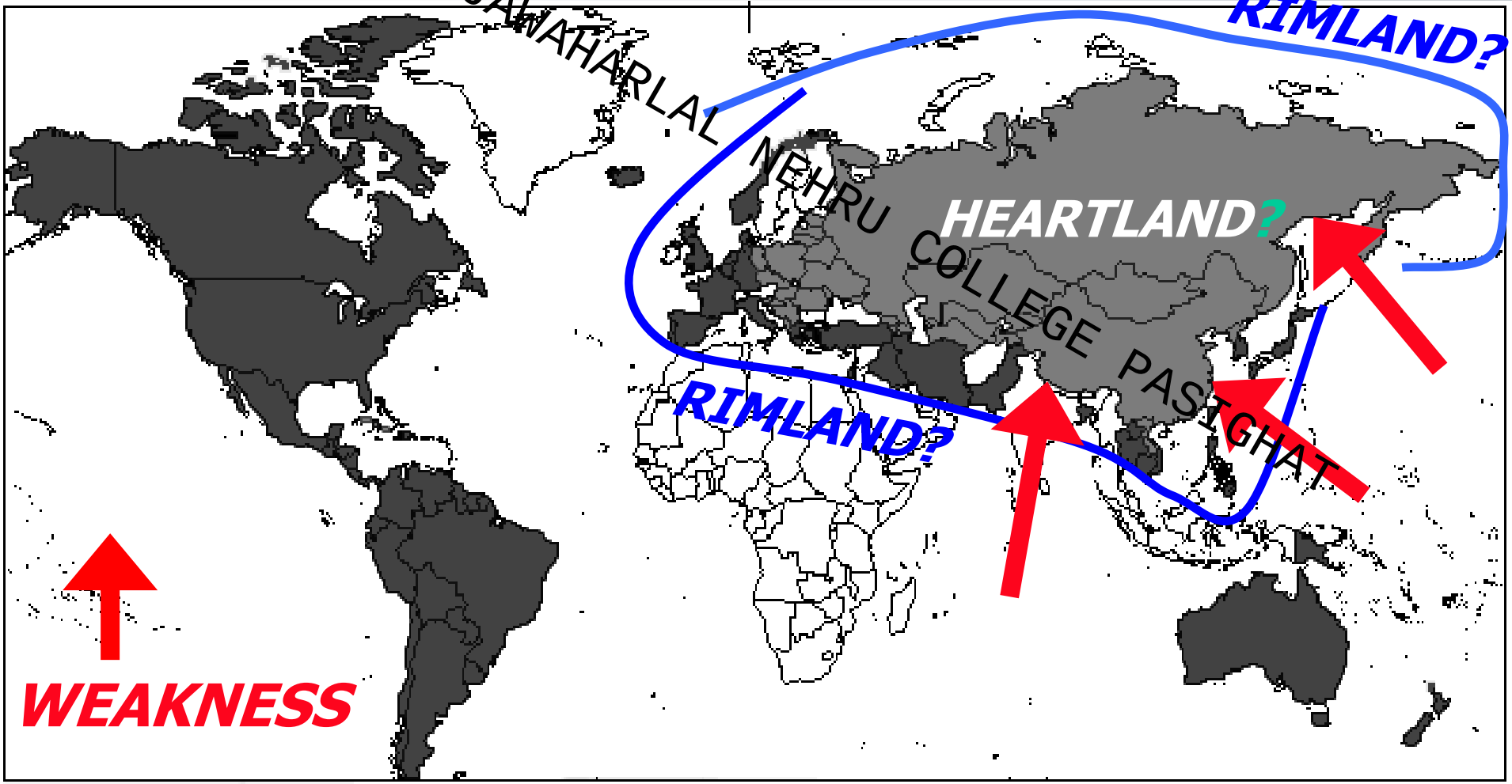
Cold War Alliances

- Dark Grey – USA & “Allies”
- Light Grey – Communist countries



Centripetal Forces: Pull Together

- **Nationalism**
- Primarily one language in common use
- Unifying Institutions – common religion, etc.
- Organization & Admin. – evolve from national core
  - Unitary state
  - Federal state
- Transportation & Communication – connect
  - French transportation system focuses on Paris
  - Transcontinental railroads in the U.S.
  - TransSiberian RR in the Russia/Soviet Union

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Centrifugal Forces: Disrupt

- **Multi-nationalism** – Canada, Bosnia, Afghanistan
- Incompatible religions – partition of India in 1947 – **still in conflict** with Pakistan over Kashmir
- Multiple languages in use
- Very strong regional differences (cultural and/or economic) – i.e. led to US Civil War
- Artificial creation – not evolving from a national core
  - Particularly true of most of the former colonies which became the countries of modern Africa
- Irredentism
- Insurgent groups operating within the country

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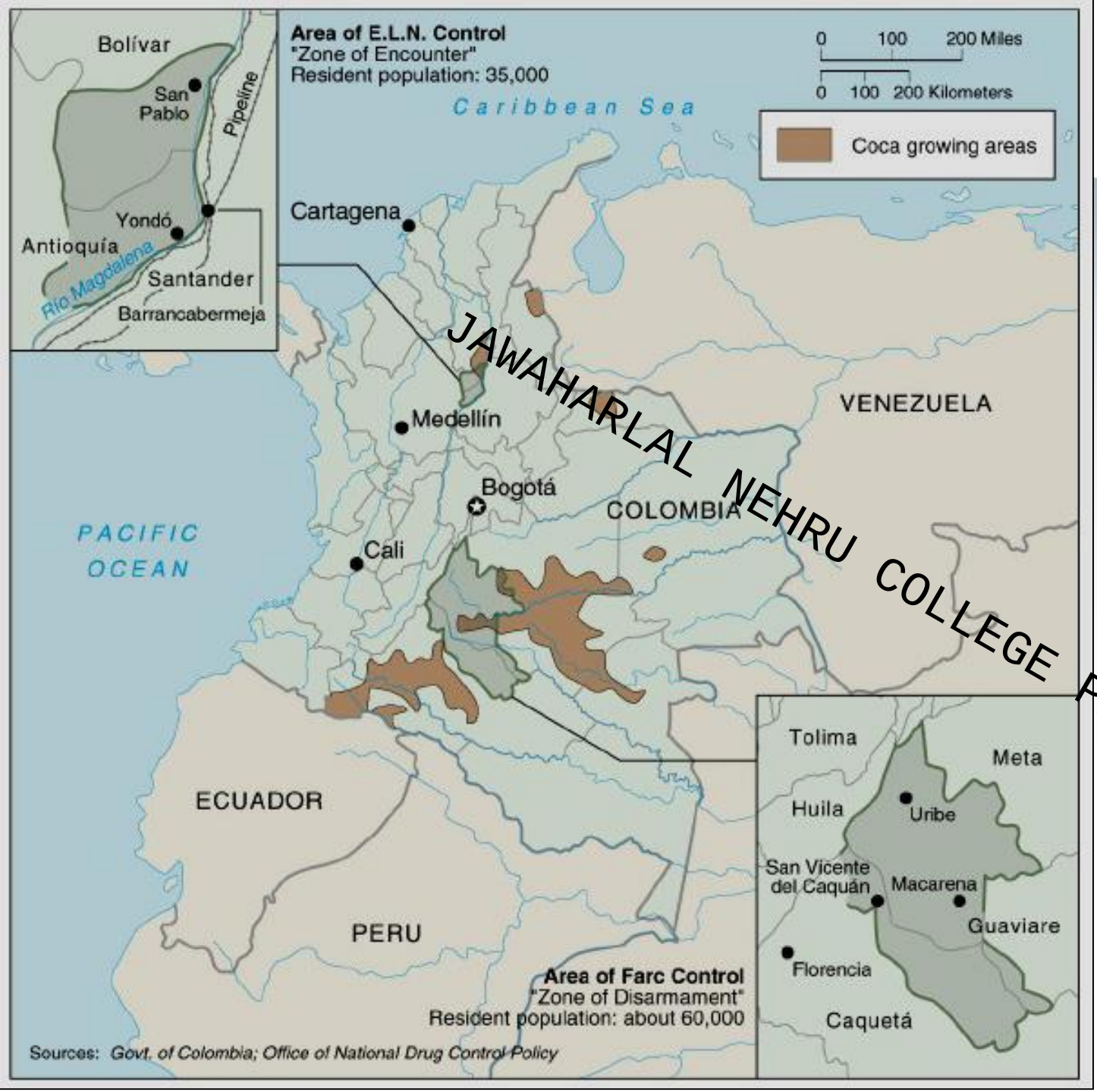

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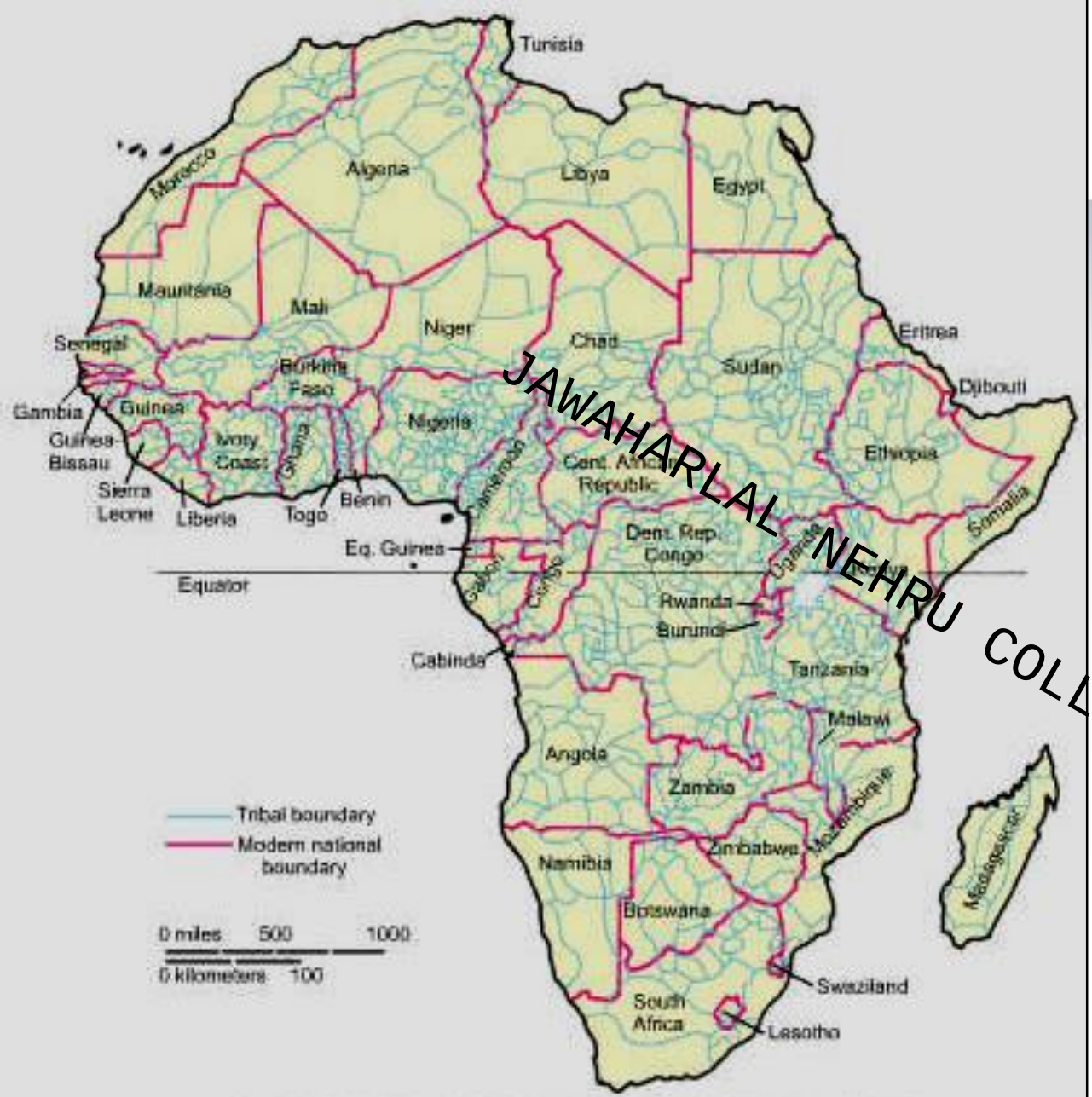
Insurgency

- Serious threat to the national govt. of Colombia



The discrepancies between tribal and national boundaries in Africa.

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Accounts for the lack of nationalism and for the potential for conflicts between countries and within countries.

International Political Systems

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- The **United Nations** and Its Agencies – reduced conflicts and improved the framework for international cooperation considerably
  - Maritime Boundaries – before UNCLOS there was no uniformity and there was great potential for conflict
  - An International Law of the Sea – established by United Nations Convention on the Law of the Sea – ratified 1994
    - Most coastal countries have accepted these provisions

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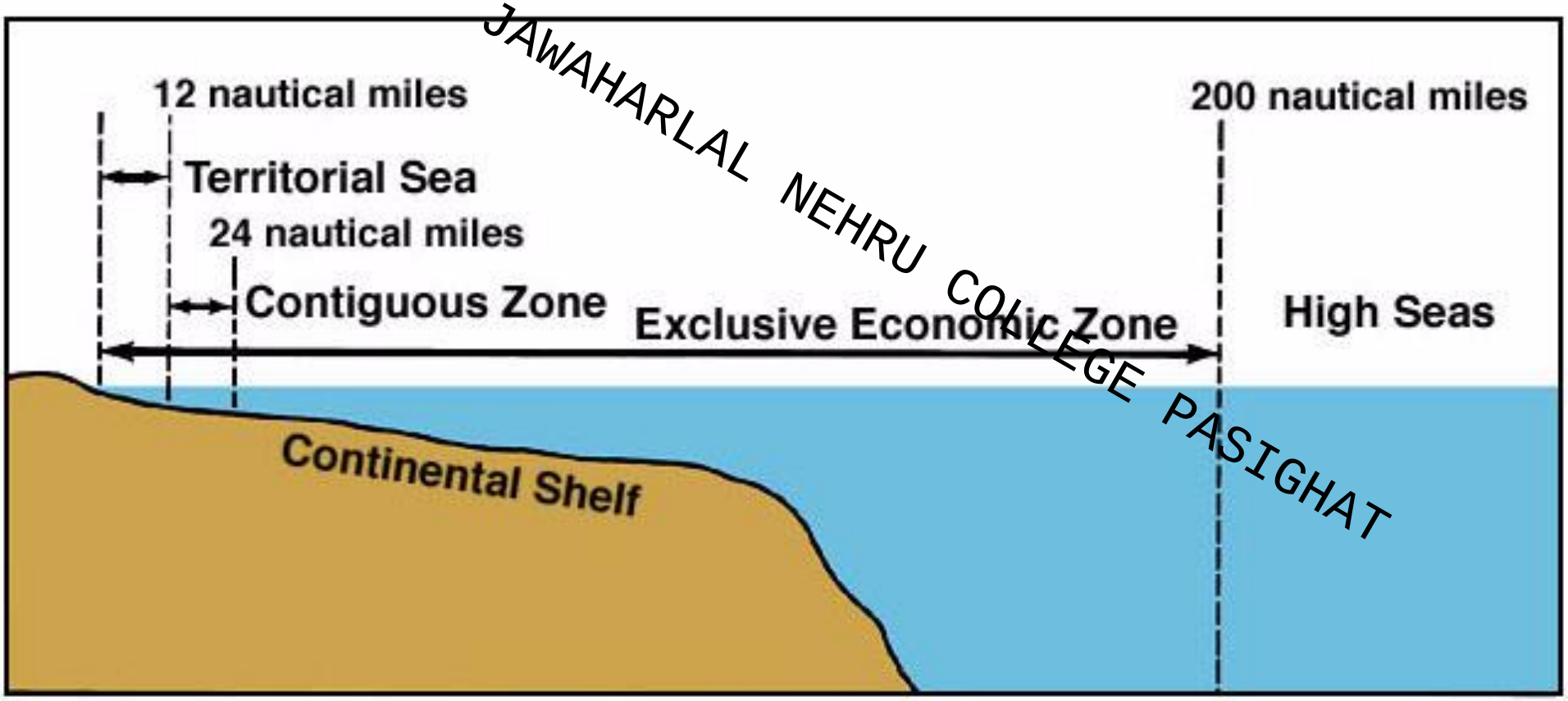
Territorial Claims Under UNCLOS



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Maritime terms:

- **Territorial Sea** – coastal states have sovereignty, including exclusive fishing rights
- **Contiguous Zone** – Coastal state can enforce its customs, immigration , and sanitation laws and exercise “hot pursuit” out of its territorial waters.
- **Exclusive Economic Zone** – State has recognized rights to explore, exploit, conserve, and manage the natural resources
- **Continental Shelf** – countries have exclusive rights to natural resources up to 350 nm.
- **High Seas** – beyond EEZ – “common heritage of humankind.”

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Regional Alliances Increasing

- Economic Alliances
  - **EU** – potential to become a political union
  - **NAFTA** – may expand into Central and South America
  - **World Trade Organization** (WTO)
  - **General Agreement on Tariffs and Trade** (GATT)
    - Reduce tariffs and promote world trade – economic globalism
  - **OPEC**
  - Groups in Central & South America & Africa
- Military & Political Alliances–feature of Cold War
  - **NATO** – growing & changing in nature
  - Political alliances are often short lived – i.e. United Arab Rep.

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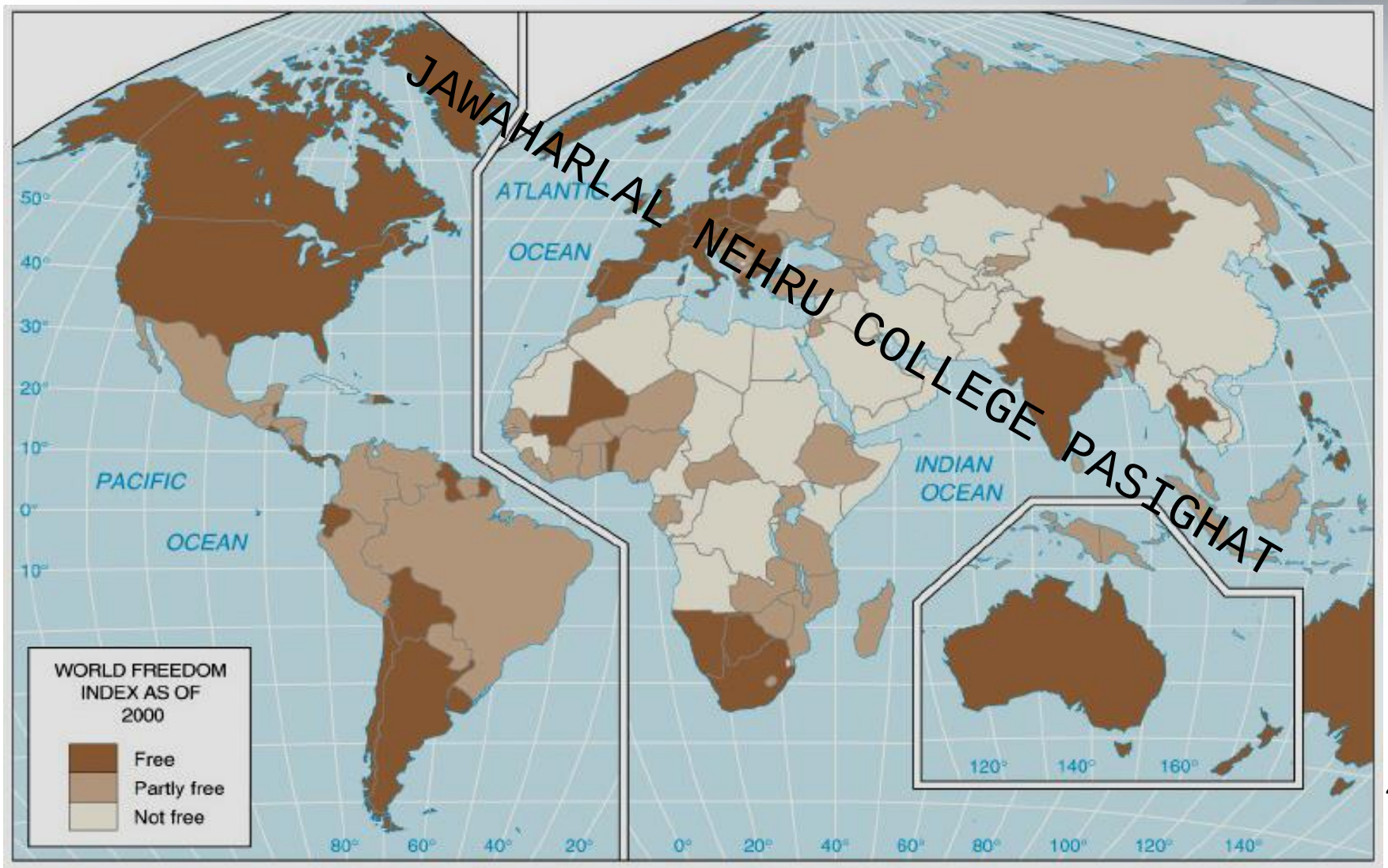
The NATO military alliance

World Freedom: reclassify Mexico?



Local & Regional Level

- The Geography of Representation: The Districting Problem
  - Party in power may try to manipulate boundaries to its benefit in the next elections
  - **Gerrymandering** – declared unconstitutional by the Supreme Court
    - Principle of compactness
    - Principle of one-man(person)-one-vote
- The Fragmentation of Political Power
  - Functional regions can be politically fragmented like St. Louis – rendered less effect and efficient

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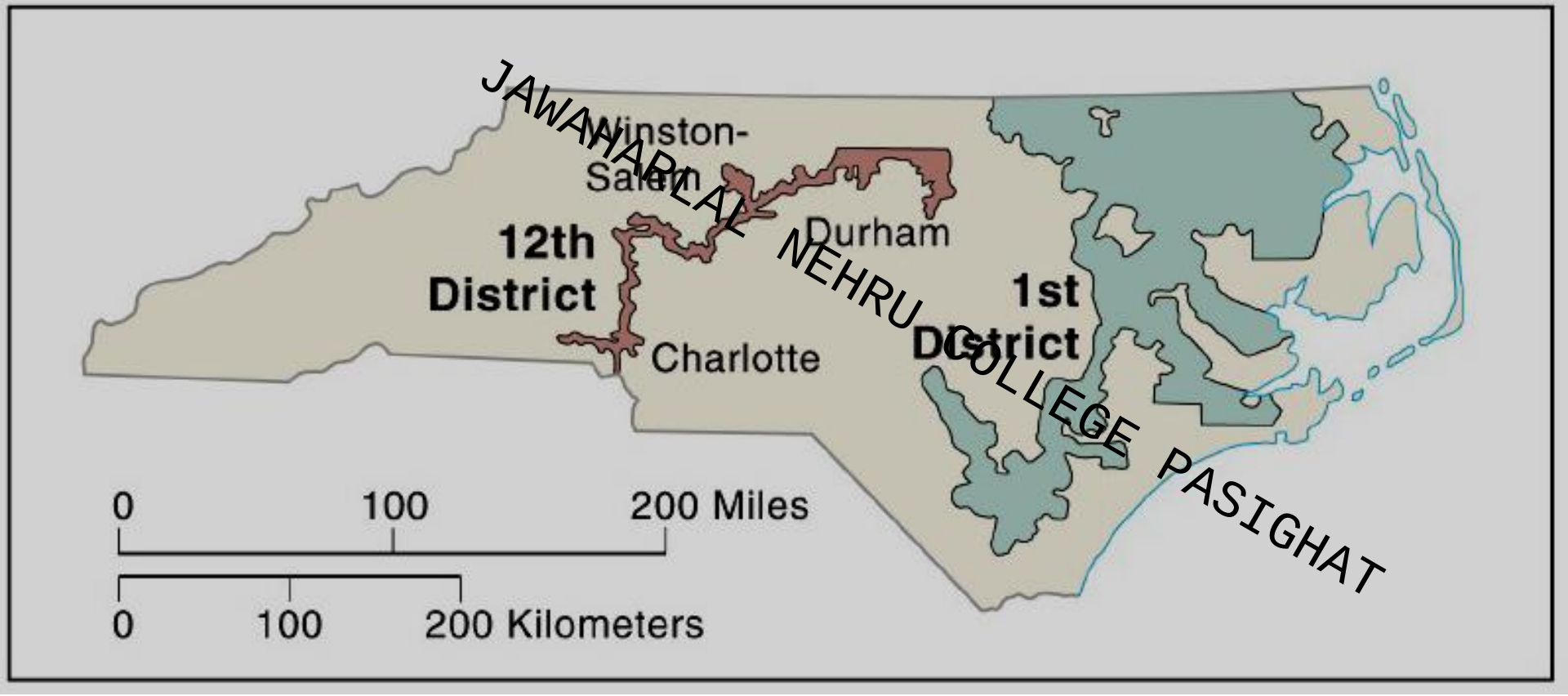
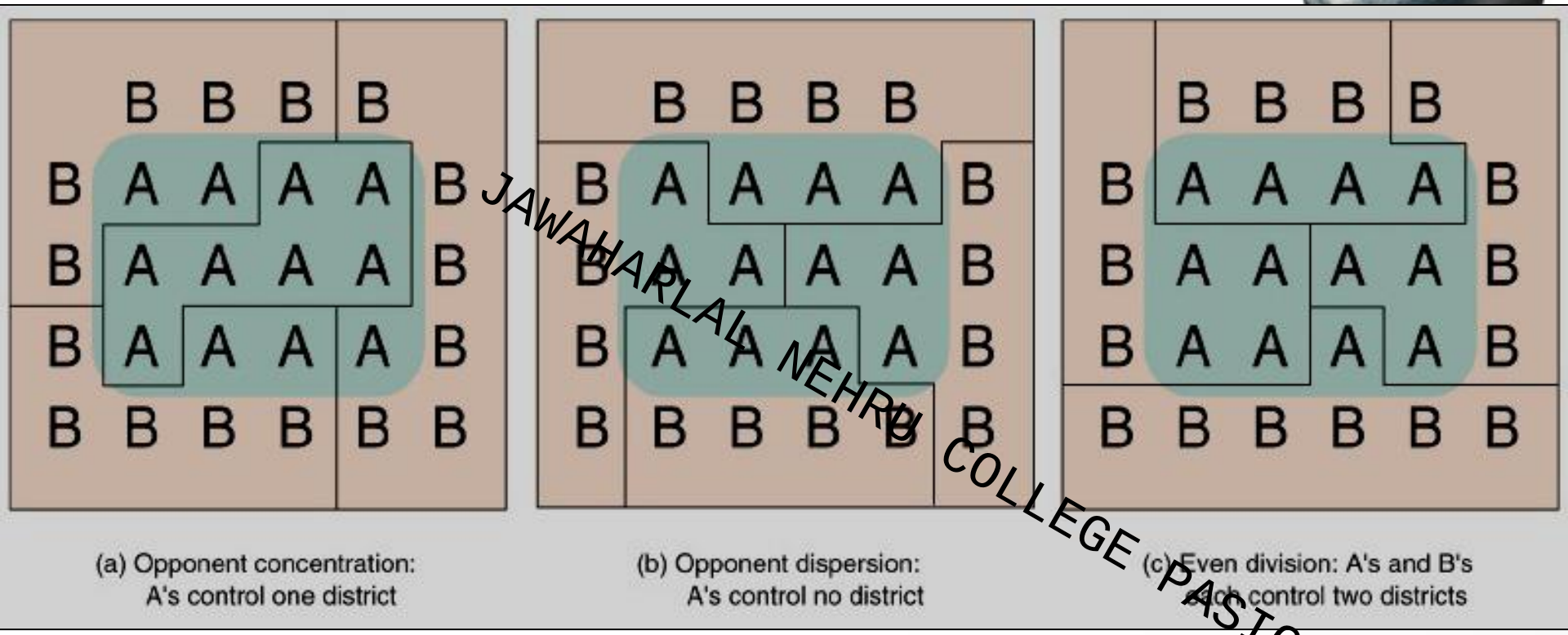
Gerrymandering



Violates the principle of compactness at the very least.

Redistricting Problem



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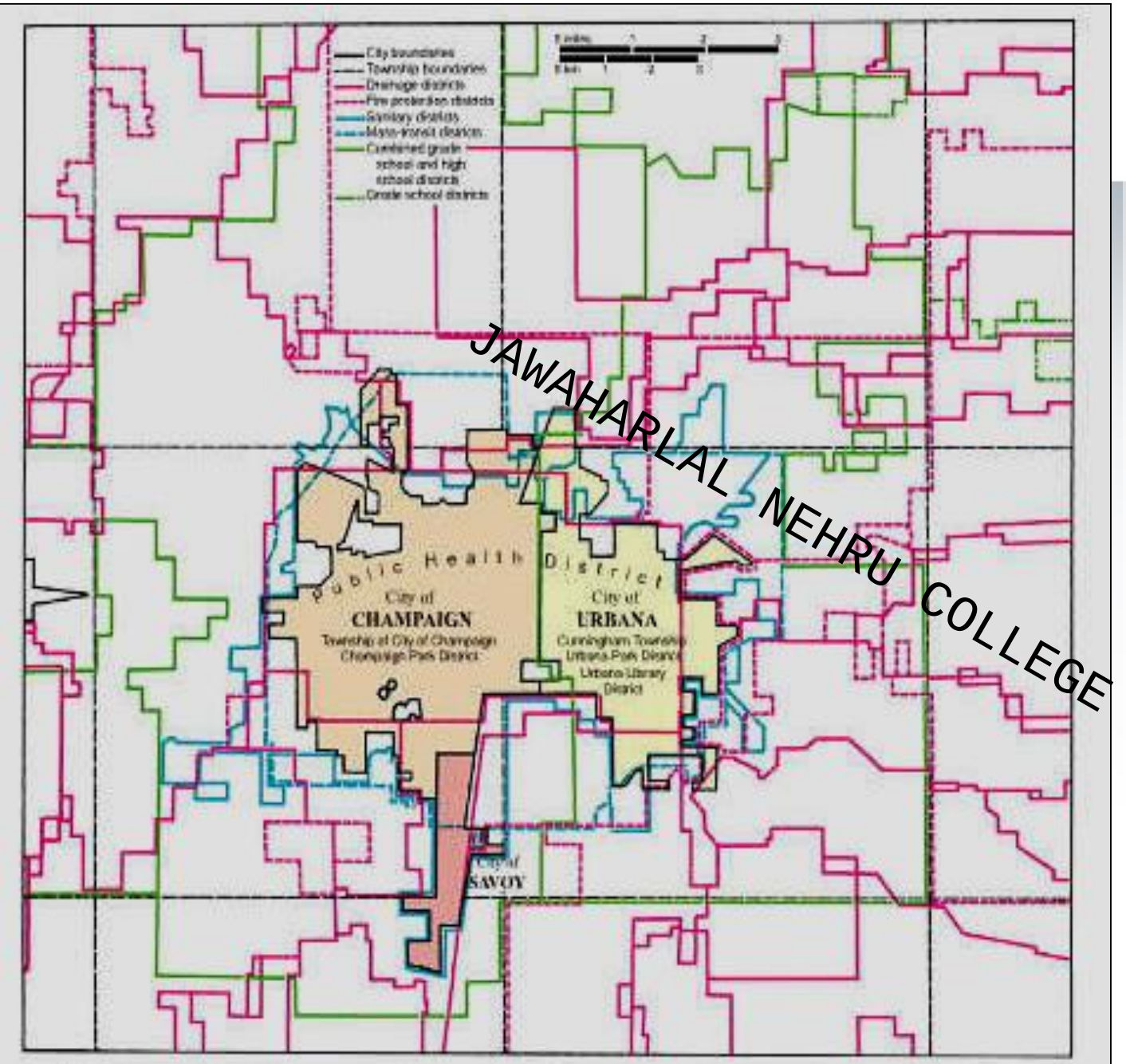
Often the boundaries are decided by the courts because the political parties cannot compromise on an acceptable plan.



Political fragmentation in Champaign County, Illinois.

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St. Louis **metro area is more complex, involving state boundaries as well as county and local ones – it can cause stagnation in the area.**

Conflict = System Breakdown

- In past largely relegated to formal conflicts – armies facing armies–minimal civilian casualties
- World War II "legitimized" civilian targets
  - Germans, Japanese, & Allies blanket bombed cities
  - Fire bombings & the A bomb
- Since WW II, insurgent groups, religious disputes, minority movements involve terrorism
  - Rejected the examples of Gandhi & ML King, Jr.
  - Escalating terrorism holds the potential to unhinge the political and economic structures of globalism

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Hindu Nationaism – centrifugal force?

Click on Shiva, below to see the video

- Religious problems since 1947
  - Partition
- Sikh complaints of persecution
- Hindu nationalists seeking a "Hindu" India win in 1998
- What of religious toleration?

Children as fighters & victims

Child enlisted to fight in Afghanistan

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Catholics run for cover in Northern Ireland

Taliban fighting anti-Taliban

Taliban fighter

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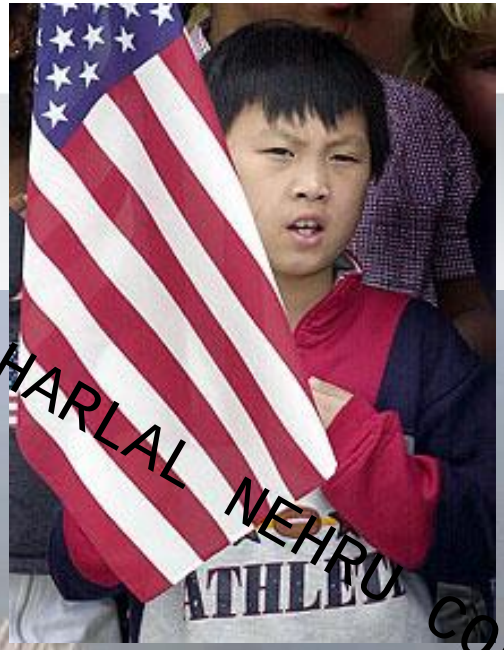
Former central market in Grozny, Chechnya – terrorism hasn't been carried to Moscow yet – the potential exists.

Basque separatist car bombing

Beginning of the ultimate in terror & war on terrorism – an oxymoron?

9/11/2001 – Patriotism reemerges from a nightmare of terrorism.

Response to 9/11/2001



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German destroyer & moral support

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A coming together

Moscow, Russia

US embassy, Japan

Australia

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Facing new weapons of terror

- Anthrax
- Bubonic plague?
- Smallpox?
- Threats to major bridges?
- Threats to nuclear power plants?
- Threats to food supply?
- Threats of “suitcase” atomic weapons?

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The future has the potential to be both very exciting and very frightening. Which will it be?

We must not destroy democracy to “save” it.

- How will our political system be altered?
- What rights may be reduced?
  - Immigration changes?
  - Profiling groups?
  - Increasing police powers in search and seizure?
  - Maintaining Habeas Corpus protections?
- How to maintain the checks and balances?
- How do we avoid reducing ourselves to the level of the “enemy”?
- Many questions with uncertain answers!

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WATER CONSERVATION

Every Drop Counts: Conserve WATER

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Lieutenant Dr K K Mishra
Associate Professor
Deptt of Geography
J N College Pasighat

OTA SHIVAJI COY CHEST NO 95

Only **2.5 percent%** of water is freshwater; **97.5 percent** is saltwater. Almost **69 percent** of freshwater resources are tied up in glaciers and ice caps; about **30 percent** is groundwater, and a mere **0.27 percent** is surface water.

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What is Water Conservation?

Water conservation is a practice in which people, companies, and governments attempt to reduce their water usage.

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Facts about Water

- Human body is 66% water
- A living tree is about 75% water
- Almost 80% of the earth's surface is covered with water

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Water is everywhere, so why do we need to conserve it?

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Residential Indoor Uses of Water Dev Countries

Leaks – 13.7%

Other – 2.3%

Dishwasher – 1.4%

Bath – 1.7%

Toilet – 26.8%

Faucet – 15.7%

Shower – 16.7%

Clothes Washer – 21.7%

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Source: Awwa Research Foundation (1999)

India

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How much water do you use?

- Estimate the number of times you do the following on a day you are at home.
  - Shower
  - Flush the toilet
  - Brush your teeth
  - Shave
  - Do a load of laundry
  - Run the dishwasher

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5 Easy Water Saving Tips

- Wash laundry & dishes with full loads
- Always turn off running water
- Take shorter showers
- Eliminate any and all leaks
- Reduce the flow of toilets & showerheads

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Always turn off running water

- Average faucet water flow:
  - Older 2 to 3 gallons per minute
  - New ≤ 1.5 gallons per minute
- Turn the water on and off when:
  - Brushing your teeth
  - Shaving
- Keep drinking water in refrigerator
- Defrost food in the refrigerator
- Compost instead of using the garbage disposal

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Always save clean running water

- Collect water in buckets while waiting for shower water to warm
- Use it for:
  - Watering indoor plants
  - Mopping the floor
  - Household chores

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Gray water

- Before reusing water or using “gray water” from bathtubs, showers, sinks and washing machines, contact your local health department/People. Several communities do not allow the use of gray water.

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Take shorter showers

- Reduce your 10-minute shower to 5 minutes
  - Save up to 80 gallons of water
- Take a "navy shower"
  - Turn the water off while you lather up and shampoo
  - Install a toggle switch to maintain a consistent temperature
- Lower your bath water
  - Follow the 5-inch rule

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Eliminate any and all leaks

- LEAKY FAUCET
  - One drop per second = 9.5 gallons a day
- LEAKY TOILET
  - 15 gallons of water a day lost
- FINDING TOILET LEAKS
  - Remove the toilet tank cover and put in 5 to 10 drops of food coloring.
  - Wait 30 minutes.
  - If any color leaks into toilet bowl then you have a leak and you should fix it immediately.

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Reduce the flow of toilets

- Almost half of the water used in a home is for toilets & showers.
- Replace old toilets with new models using 1.5 gallons per flush (gpf) or less

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Reduce the flow of showerheads

- Measure water flow
  - Hold a bucket under the showerhead.
  - Turn the water on full blast for thirty seconds.
  - Measure the number of cups of water in the bucket and multiply by two to get the number of gallons per minute.
- Replace showerhead if over 2.5 gallons per minute
  - Older showerheads use 3 to 10 gallons per minute

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Low-Cost Ways to Save Water

- Toilet
  - Flush less often
  - Don't use it for a trash can
- Shower
  - Cut your shower time in half
- Bathing (tub)
  - Reduce water level to 1/3 full or 5 inches

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Low-Cost Ways to Save Water

- Install aerators on faucets
  - Reduce the flow from 2 to 3 gpm to 1.5 gpm
- Wash full loads of laundry & dishes
- Stop washing one dish at a time
  - Save up to 15 gallons by washing & rinsing in the sink or a dish pan

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Low-Cost Ways to Save Water

- Change your teeth brushing and shaving behaviors
  - Wet your toothbrush and then turn the tap off (save about 5 gallons)
  - Turn the tap on and off while shaving
  - Brush your teeth and shave in the shower

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Long-Term Water Conservation

- Toilet
  - Install a low-flow or high efficiency model that uses 1.5 to 1.3 gallons per flush
  - When shopping, look for the WaterSense label
- Shower
  - Install a 1.5 gallons per minute showerhead

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Long-Term Water Conservation

- Clothes Washer
  - Replace your old washer with a high efficiency machine that uses less than 28 gallons per load
- Dishwasher
  - Replace your old machine with a high efficiency model that uses 4 to 7 gallons per load
- Look for the ***Energy Star*** label

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Long-Term Water Conservation

- Hot Water
  - Insulate water pipes to get hot water faster and avoid wasting water while it reaches the correct temperature
  - Install an on-demand or tankless hot water heater

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Summary

- Water Conservation is about more than buying new gadgets.....
- It's about changing your habits.

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5 Easy Water Saving Tips

- Wash laundry & dishes with full loads
- Always turn off running water
- Take shorter showers
- Eliminate any and all leaks
- Reduce the flow of toilets & showerheads

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- GO HOME, THINK TWICE FOR A DROP BEFORE USE

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- THANK YOU
- HAVE A NICE DAY

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Spykman's Rimland Theory

Lieutenant Dr. K. K. Mishra

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What countries are the three prominent world powers?

- Identify the 3 countries that are world powers?
- What factors do the 3 countries share in common?
- What role does geography play in a country's establishment as a world power?

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Nicholas Spykman (1893-1943)

- Dutch-American political geographer
- Develops the Rimland Theory
- Largely draws on and extends Mackinder's Heartland Theory
- Geography is the most fundamental factor in foreign policy because it is the most permanent. Spykman
- Even more important than the size of a state, is location, both in the world and in a particular region.Spykman

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So, what is the Rimland?

- The Rimland plays on the terms already developed by Mackinder
- Mackinder refers to the Heartland, Inner Crescent, and World Island

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- Spykman's emphasizes a rimland which has 3 sections: the European Coastland, Arab-Middle Eastern Desert land, and the Asiatic Monsoon Land.

Spykman's Premise

- He controls the rimland controls Eurasia and he who controls Eurasia controls the world.
- He argued that the power of the heartland could be kept in check by the peripheral rimland.
- By forming alliances along the Rimland the members can contain the heartland.
- Coastal areas or the Rimland has the advantage because of the population, resources and access to sea.

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Mackinder vs Spykman

- Mackinder asserts that Eastern Europe is destine to gain control of the world due to its control of the heartland.
- Spykman asserts that rimland States like Japan, Great Britain and China would likely become superpowers because of their greater contact with the outside world.
- Mackinder thought countries like Australia and the Americas were insignificant as they were not a part of the world island; therefore they were not essential to world dominance.
- Spykman saw the world as consisting of two great landmasses, Eurasia and North America & three islands, South America, Africa, and Australia. He realized that

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Spykman's Division of the World

- Spykman divided most states into three types:
  - "landlocked states,"
  - "island states,"
  - "states that have both land and sea frontiers."
- Spykman asserted that landlocked states usually faced security problems from their immediate neighbors.
- Island states normally faced potential pressure from other naval powers, but if they are offshore island states (Great Britain and Japan) they could also face security problems from nearby coastal powers.
- States with both land and sea frontiers determined their security based on several factors, including the extent of their sea and land frontiers and the power potential of their immediate or nearby neighbors.

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Spykman's Conclusions

- Spykman realized that nations acted based on their geography.
- Spykman realized that all states have a tendency to expand.
- He also realized this was true of both sea powers and land powers, and that shifts in the balance of power would change the dynamics of geopolitics. Therefore the heartland could not remain a constant seat of power.

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What does this final quote by Spykman mean?

- ‘States, cannot escape their geography. However skilled the Foreign Office, and however resourceful the General Staff. A state’s foreign policy must reckon with geographic facts. It can deal with them skillfully or ineptly, it can modify them; but it cannot ignore them. For geography does not argue. It simply is.”

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Special Economic Zone (SEZ) Presentation

Dr.K.K.Mishra

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What is SEZ

- Liberal economic laws
- First established by the Peoples Republic of China
- Increase in foreign investments

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The need for SEZ and Government's policy

- SEZ policy introduced on 1/4/2000 in India
- To increase exports
- SEZ can be set up by private, public, joint sector or by the state government
- Convert EPZ to SEZ

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Provisions under SEZ

- 100% FDI for manufacturing sector
- No caps on foreign investments for SSI reserved items
- Income tax benefit
- Duty free import of domestic goods
- Exemption from CST
- Exemption from Income tax on investments
- Enhanced limit of 2.4 crore for managerial remuneration
- Applicability of labor laws

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Performance of Units under SEZ

Zone	2003-2004 (Rs. in crores)	2004-2005 (Rs. in crores)
Kandla SEZ	1018.82	1060.14
SEEPZ-SEZ	7832.81	8298.59
Noida SEZ	1534.17	4266.00
Madras SEZ	1037.96	1376.91
Cochin SEZ	298.91	462.93
Falta SEZ	825.34	569.15
Visakhapatnam SEZ	435.67	579.27
Surat SEZ	869.90	1539.72

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Evaluation of SEZ

- Determine how resources are used
- Whether Employment opportunities are created
- Cost outweighs the benefit of SEZ

Advantages of SEZ

- Growth and development
- Attracts FDI
- Exposure to technology and global markets
- Increase in GDP and economic model
- Employment opportunities are created

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Disadvantages of SEZ

- Exploitation of laborers
- Women exposed to sexual harassment
- Loss of revenue for Government
- Fertile lands being used for establishing industrial units

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Conclusion

- Sez can become a dangerous tool
- A well defined strategy required for SEZs to be successful
- SEZs appeal to most developed countries

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Harmony

- Public sector private sector and government work in harmony.

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Territorial Morphology

DRKKMISHRA

- Territorial Morphology
  - Relationship between a state's geographic shape, size, relative location, and it's political situation
- Shape of states
  - Controls the length of its boundaries with other states
    - Shape affects potential for communication and conflict with neighbors
  - Shape is part of its identity
  - Shape can determine the difficulty or ease of internal administration and social unity

- 5 basic shapes
  - Compact
  - Elongated
  - Prorupted
  - Perforated
  - Fragmented

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Compact States

- Definition:
  - the distance from the center to any boundary does not vary significantly
    - Theoretically would be shaped in a circle or square
  - Capital at center and shortest boundaries to defend
  - Often the political ideal
  - Compactness is a beneficial characteristic for most smaller states
    - Good for communications
    - Does not necessarily means peace

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Elongated States

- Definition:
  - states with long and narrow shape
- Problems:
  - May suffer from poor internal communications and transporation
  - Region at north or south end may be isolated
  - Capital may lose influence over one end of the elongation
- Examples:
  - Chile, Malawi, Italy, Gambia

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Prorupted States

- Definition:
  - Also called protruded
    - compact state with large protruding extension
  - Proruptions created for two reasons
    - Can provide access to a resource
    - Separate two states that would otherwise share a boundary
- Problems
  - Protruding piece might be separated from core
- Examples:
  - Congo, Namibia, Afghanistan, Thailand

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Perforated States

- Definition:
  - A state that completely surrounds another one
    - "has a hole punched out"
- Problems
  - Relationship between the perforated state and perforating state can cause tension
- Example
  - South Africa
    - Completely surrounds state of Lesotho
      - Depends entirely on South Africa for import and export of goods

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Fragmented States

- Definition:
  - includes several discontinuous pieces of territory
    - Most extreme example
      - Indonesia
- Problems
  - Maintaining unity
- Two kinds of fragmented states
  - Those with areas separated by water
    - Tanzania, Indonesia
  - Those separated by an intervening state
    - Angola, Russia, Panama, India

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Landlocked States

- Lacks a direct route to the sea because it is completely surrounded by several other countries

- Most common in Africa
  - 14 countries landlocked
  - Remnant of colonial era
    - Built railroads, but now they run through several independent countries

- Direct access to ocean is critical for trading
  - Must use another country's seaport

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Internal Political Organization of States

- A state's size and cultural composition are also factors in its political situation and internal organization

- States are smaller in geographic size and population may be more politically unified, but not always
  - Microstate is a very small state
    - Such as Singapore
  - Often have a unitary government structure

- The governments of states are organized according to one of two approaches
  - Unitary state
    - Power is concentrated in the central government
  - Federal state
    - Allocates strong power to units of local government within the country

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Unitary vs. Federal

- Unitary state
  - Works best in nation-states with few cultural differences
    - Strong sense of unity
  - Requires effective communications
    - Smaller states more likely to adopt it
      - Common in Europe
  - Some multinational states have adopted it
    - Can impose value of nationality
      - Kenya, Rwanda

- Federal state
  - Federal states have local governments that adopt their own laws
    - Can empower nationalities in multinational states
    - Different names
      - States, provinces, estados
  - Suitable for larger states
    - United States, Russia, Canada, Brazil, India
    - Where capital is far away
  - Size doesn't matter though
    - Belgium= federal
    - China= unitary

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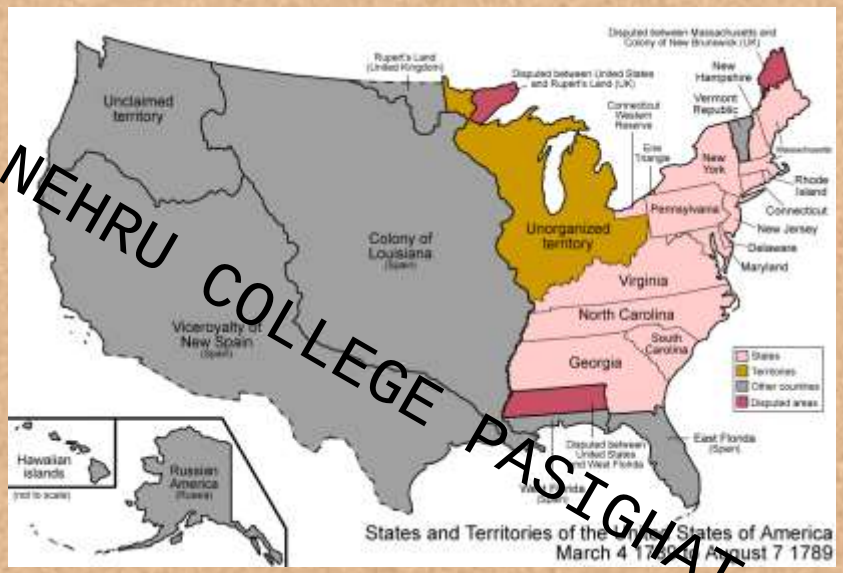
Confederation Structure

- Definition
  - Structure in which a weak central government exists with regional governments holding the majority of power
  - Or a group of states united for a common purpose
    - Articles of Confederation was the first document binding together the 13 American colonies
    - Confederacy during Civil War



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Trend toward Federal Government

- In recent years there has been a strong global trend toward Federal government.
- France
  - Good example of nation-state
    - Long tradition of Unitary government
  - Recently giving more authority to departments and communes
- Poland
  - Switched from Unitary to Federal government after fall of Communist rule
    - Lack of local government led to breakdown of infrastructure
  - 1999 adopted a three-tier system of local government
  - Transition difficult
    - Lack of experience
    - Thousands of positions

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Political Enclaves and Exclaves

- Enclaves
  - Territorial enclave is a state, or part of a state, surrounded completely by another state
    - Lesotho is an enclave surrounded by South Africa
    - West Berlin was an enclave within the state of East Germany

- Exclaves
  - When an enclave is land that is a political extension of another state, then it is called an exclave
    - Alaska is an exclave of the United States because it is cut off from the rest of the country by Canada

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