

25/7/18

## Anthropocene and the Nine Planetary Boundaries Framework.

→ Anthropocene: Present geological era.

human beings → wild view  
\* humans became most superior species

→ Holocene: (X. Geol) Geological era before Anthropocene

etc. ← \* Lasted for 10,000 yrs.  
Industrial ← \* almost all revolutions happened here  
Scientific ← \* stable period, progression (much progress)  
Agricultural ← \* But ecology got disturbed  
Transport  
Transport

\* In 1970's, few students of MIT came up with a report "Limits to Growth".

— but govt. rejected this report

\* Gradually the report triggered up.

\* In 1990's, IPCC again raised voice <sup>for</sup> report.

\* Then govt. gave verification part for NAS, so there got result as the report.

\* They declared the degradation of environment.

- changing climate
- global warming

→ climate scientist  
\* Stockholm Resilience Centre : Johan Rockstrom (see lectures)  
↓  
→ nine planetary boundaries framework explained  
in a journal

• ozone has depleted, and now it's getting better.

9 Thresholds

- ① Climate change
- ② Ocean acidification
- ③ Biodiversity loss
- ④ Land use change
- ⑤ Fresh-water use
- ⑥ Biogeochemical flows
- ⑦ Aerosol loading
- ⑧ Chemical Pollution
- ⑨ Deforestation

In 2009 results : 3 thresholds are already crossed

→ 1, 3, 6 ←  
↓ ↓ ↓  
N<sub>2</sub> & P<sub>4</sub> flows

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

↓ ↓ ↓

## Renaissance Science

- Copernicus, Galileo, Newton
  - 3 G's - God, Glory, Gold
    - ↓ spread Christianity
    - superiority complex
    - control over economy
  - Europe started colonization, claims agency
  - Scientific revolution also changed world.
    - ↓ Magnetic Compass — supported geographic exploration

8/8/18

- main stream knowledge — generally accepted  
↓  
indoctrination — majority believe in that and are made to believe it

- Renaissance Time:

Rebirth  
Recovery  
Rescue

Period

to  
Revive  
Recreate

\* Modernity

- Feudalism, Middle Age - Dark Age
- Italy — city states — completely democratic  
POLIS

centres of Renaissance movement

because it is a commercial centre

(Trade, etc)

no authorities

⇒ Economic Revival.

- Developments : Science

Humanism



stresses dignity of man & best of God's creature below the angels.

- Gutenberg → Print press

- Telescope, Compass, Maps

- Humanism — critical thinking

- Men are made, not born — Erasmus

- Human — most superior

→ Anthropocene came from Renaissance.

q18/18

### Scientific Revolution:

evolution - slow steady process — mainly naturally

revolution - sudden radical process → manmade mostly  
human induced

\* Ptolemy - Map

→ J. Bailliu → Scientific Renaissance @

most acceptable (15<sup>th</sup>-17<sup>th</sup> century)

(European)

↓  
Scientific Revolution ⑬

@— Scientists were rescuing & recover the knowledge system (already existed) dumbed under civilization

↓  
laid path to ⑬ (new knowledge evolved)

very imp. years

Land mark years

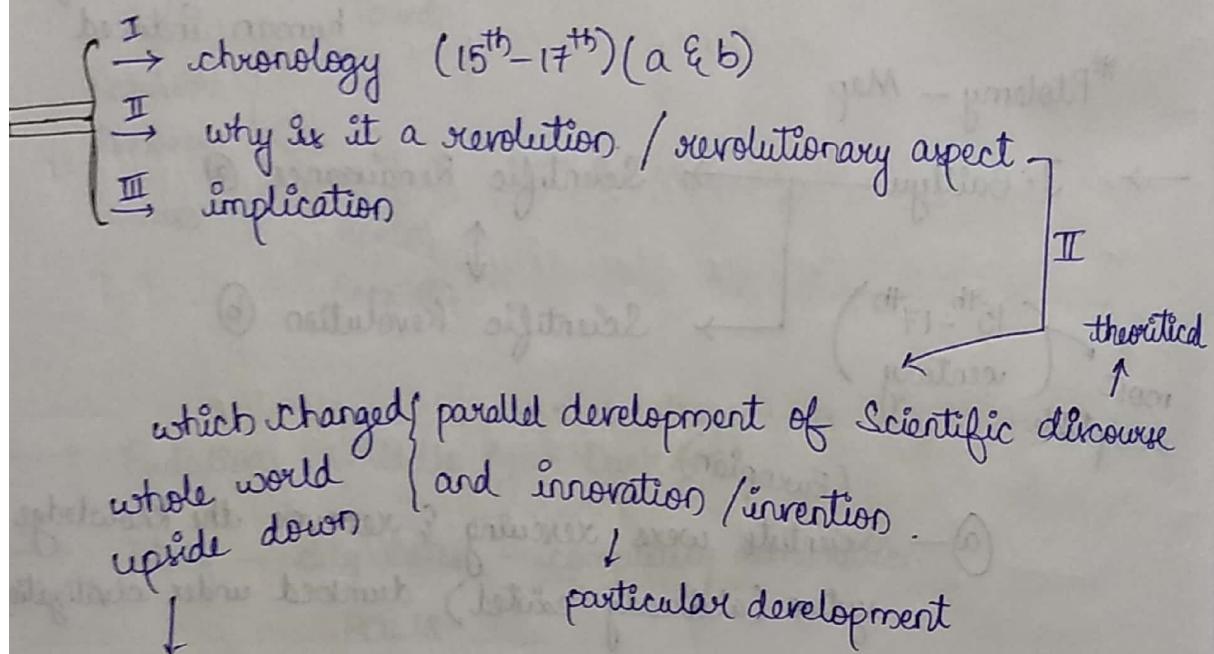
1543 - Copernicus "On the revolution of the Heavenly spheres"  
1632 - Galileo "Dialogue..."  
1687 - Newton "Principia"

Discourses → Heliocentrism  
→ Gravitation

\* 1600 : W. Gilbert De Magnete } Magnetism

\* R. Cook — Magnetism

→ Francis Bacon - Empiricist - innovated in which scientific things can be practiced  
/ formulated rules and  
laid out methodology → \*Baconology  
for Experiments



So its called a revolution

II → Few things were developed in this era which were unique.

\* 4 Characteristics & Attributes

(i) Empiricism

(ii) Experimentation

quantitative measurement → (iii) Mathematization

(iv) Institutionalization

→ Amrit Bala - Indian Scientist (Find details)

- multicultural influence.

III → Theoretical Implication paved a Debate b/w exact Science and Non-exact Science.

Experimentation → Documentation → Theorisation → Practice

Europeans claim that Exact Science is considered if it passes through all these stages.

10/8/18

→ Ex Wealthy people were searching for "Spheres of influence".

↓ ↓ needed space for investment used by Lenin  
they believe that on investing money time to time, we get profits/returns time to time

→ 1<sup>st</sup> World War — Inter European fight

\* Imperialism, the highest stage of capitalization — Download it

→ Indian Railways — sponsored by Britain private merchant trading class  
(1850) — even now

→ "Drain of Wealth" — how a country's wealth drain and  
"Deindustrialization" channelling by other country

→ Gold — determines Greedy of European countries

shows the relation  
btw coloniser &  
colonised

- 70% of Indian area =
- Goto Columbian exchange
  - \* Potatoes - Peru
- "Ecological Imperialism - Biological expansion of Europe"

16/8/18

- Did Islamic contribution foster the European Renaissance
- Backcasting - To establish the reasons for present
  - Baghdad - Islam started - 7<sup>th</sup> Century
    - centre for European Renaissance
  - The House of Wisdom
    - Jim Al-Khalili
  - Arabs were bridge btw past & present knowledge.

8<sup>th</sup> - 13<sup>th</sup> Century :- Arabs translated the ancient treasures

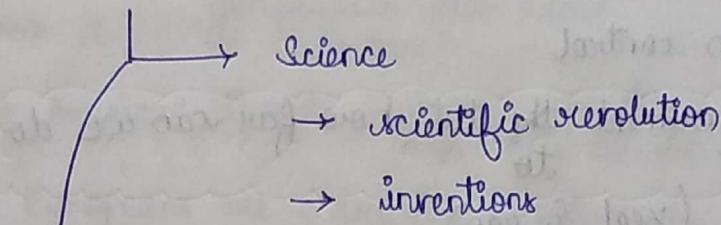
15<sup>th</sup> Century :- Europeans & Jewish recovered these works.

From Arabic to European languages through Latin

- Europeans not only translated, but also added their interpretations

17/8/18

→ Renaissance



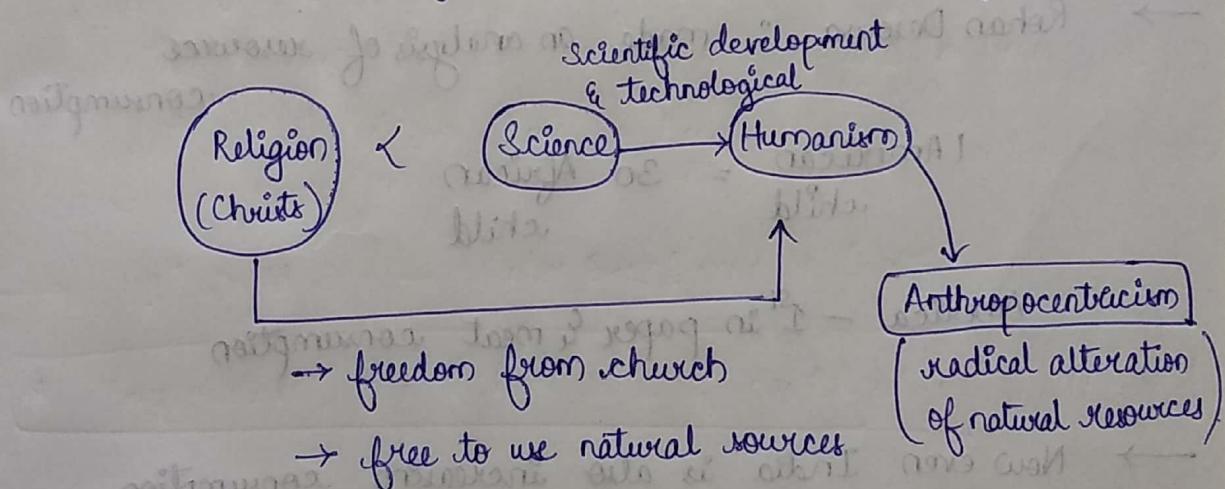
Humanism

→ (human at centre of everything)

→ scientific evidences proved @.

→ then started movement (slowly) towards anthropocentrism

→ Through Scientific developments, man developed.



→ everytime an invention was made, people triggered their capacity / capability proving human being beings radically alter the entire planet.

(while other species try to adapt to nature)

↳ no other situation than establishing resistance

→ An attempt is made for Linear progression.

- Human made experiments because
  - needs and luxuries
  - gain control
  - experiment ~~the test~~ how far can we do to  
(zeal & ego)
- Carl Marx\*
  - $I = P A T$
  - Population → Aff
- Rohan Desouza : made an analysis of resource consumption
  - 1 American child = 30 African child
  - America - 1<sup>st</sup> in paper & meat consumption
- Now even India is also increasing consumption.
- Thomas Babington Macaulay
  - promoted English in India

"The objective behind promotion of Western education is to create Indians in bloode colour and European in mind,
- Al-Biruni

- major outcome of colonization — death of natives
  - |
  - because they are diseased (epidemic)
- ⇒ gun powder also added (warfare)
  - \* Americans thought it was gun powder was only reason
  - plague, small pox
- Europeans are already resistant to these germs, but Americans were not, so got diseased.
- Also Columbian exchange (like potato) also created disease. → disaster.
  - ↓
  - Transplantation of seeds.
- These things created more depopulation than warfare.

29/8/18

→ Renaissance — Transnational / Transcultural.

Oriental Civilization & Science : Orient - the west

→ What is 'Orient'?

↳ the ~~west~~ east (normally study of east)

→ Edward Said (1970s) — Orientalism

\* Orient, it has a deeper meaning

\* Orientalism is a method / process in which the orient ~~is~~ has been inferiorized by the west.

\* This process is used by Euro American world to ~~and~~ inferiorize the ~~the~~ east.

— make east neglect their own culture.

→ Chicago's Speech (1890's)

— "India needs a Leader"

— "I am a philosopher, mobilizing youth"  
but not a political Leader.

Same year — Netaji Subash Chandra Bose was born

(40 yrs - project)

→ \* Will Durrant → The oriental civilization  
\* Joseph Needham → challenged Europeans about their superiority → challenged this idea

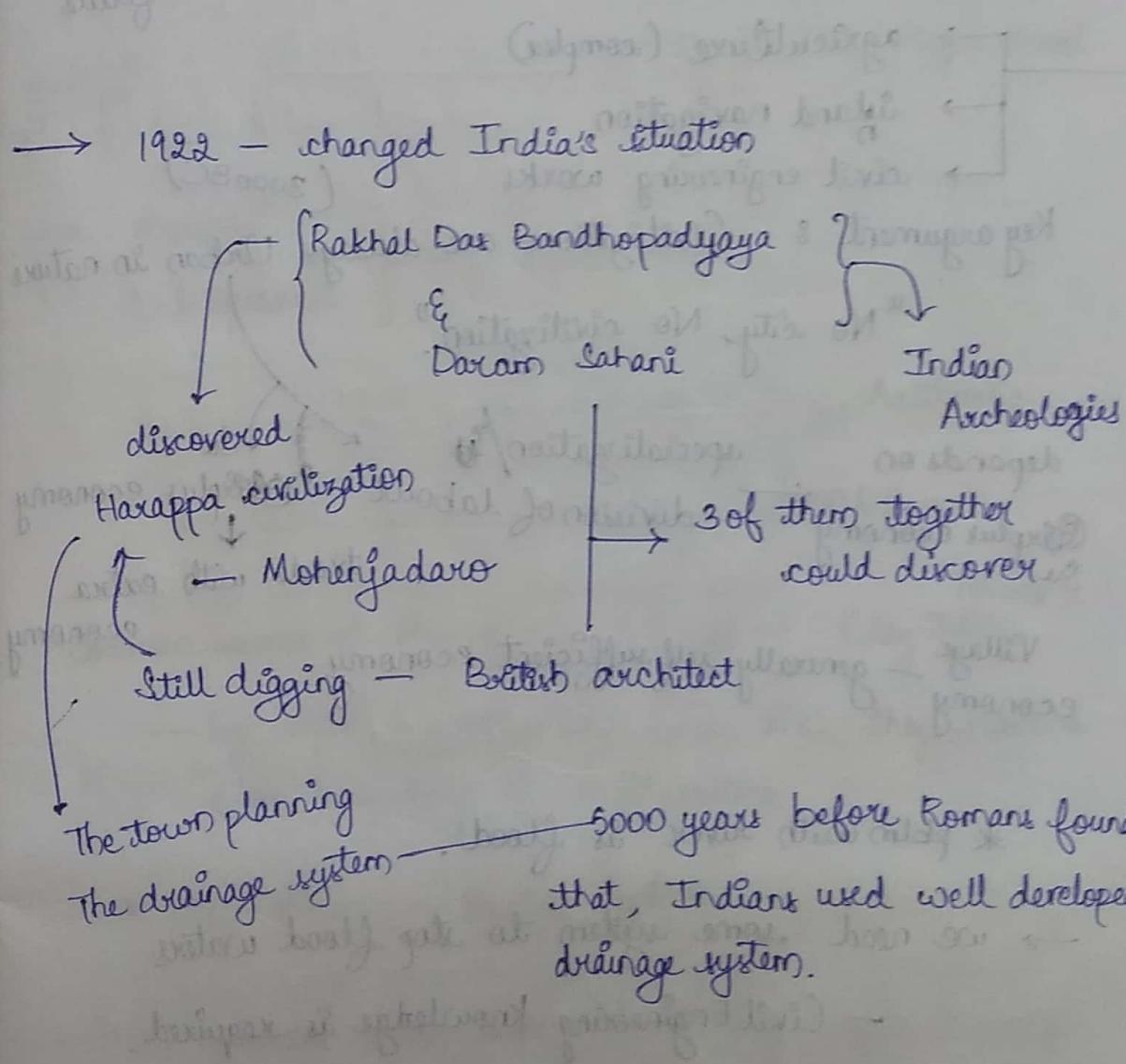
In 1950s, 1960s — Europeans are torch bearers

— by Europe

→ Science + Society in Ancient Culture China

- These two started research to collect evidences, data, hardcore empirical resources to reflect the superiority of west, and established Research centres.
- They need to learn literature of many countries (scripts)
- - \* Will Durrant → Scientific activities of China, India, Mesopotamia
  - \* Joseph Needham → China

(1950's — Today) Still research is going on



Gained pace by 1950's

- by the time countries were decolonized

Firstly, Europeans claimed that no science existed in east; but once they are proved wrong; they said that these sciences aren't Exact Sciences.

(a) Mesopotamia: Tigris & Euphrates — 2 rivers

\* Each and every civilization is built up on a bank of a river

Rivers - banks are fertile.

- agriculture (complex)
- inland navigation
- civil engineering works

(3000 BC)

Key argument: Civilizations are always Urban in nature

"No city, No civilization."

depends on

Complex economy

specialization /

division of labour

Surplus

economy

trade with extra

economy,

Village economy — generally self sufficient economy

\* pblm with river is flood.

→ we need some system to stop flood waters

- Civil Engineering knowledge is required.

• irrigation channels

• dams & embankments  
bunds

\* control and store flood waters to use them in dry seasons.

— First Scientific evolution.

scribes  
priests, craftsmen,

Invest funds on

many working classes

Sur ↓  
Complex production

→ Shaping the society

Hum Urabi — designed

3018/18

Doctor. Jodha → to strengthen legal court

→ Kramer      } Scholar Scientist  
· D.S. Bresserat      }

3R's — Read, Writing, Arithmetic  
Workers worked well as many  
tokens written directed with  
Common source of Mesopotamia & Egypt — Clay Tokens

— by which mesopotamians knew that they have a rich knowledge of mathematics.

\* Clay Tokens — Barter System

→ Farmers were supposed to give crop to Kings and priests

Complex things ← Temple Bureaucracy      Palace Bureaucracy → Complex

→ Administration — requires maths to compile, store information and analyze.  
(after complexity)  
in society increased

↓ after 30 yrs of war

Developed Mathematics & Writing.

→ Sources — Clay tokens / tablet

walls of temple

\* unique development of Scribal schools.

- organized systematic knowledge
- formal education
- systematic way

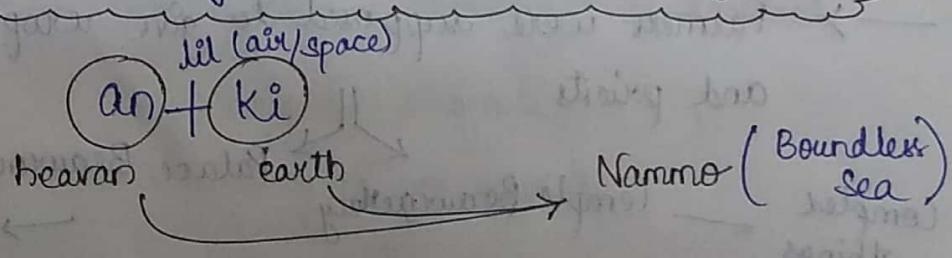
→ Scholar trains scribes trains citizens

→ Kramer : focusses on how sciences evolved

like botanist, political science, etc

→ Mesopotamians — one of the oldest people on earth to develop maths

Cosmology : Story of how universe has formed



(b) Egypt : (ancient) ~~history~~ — growing land +

→ The Nile — River

— very interesting development — Geometry

earth ←  
measurement

\* every year, floods would cut off lands

so land must be parcelled and renewed everytime  
i.e., distribute & redistribute

→ Geometry evolved

\* Hieroglyph writing — pictorial writing — easier

~ water      ☺ man

\* There was a 40-50 yr research to decode the writing  
and history.

→ Sources — walls of ~~peperades~~  
temples  
pyramids

→ Other major development : mummification

famous — extremely renowned for  
development in medicine

check  
\* again 15 ft peperades — 48 surgeries

(1600 BC) — many medicinal remedies

→ Ancient Egyptians are the healthiest people after

- Civil engineering — Pyramids.  
— fascinating manifestation

- idea was "Alive after death." ←
  - developed for pharaoh's - kings
  - also involves history of slavery, exploitation.

→ We are exposed to these Sciences after 1956.

- Documentation of Science is very important and a Theory about it.

→ They believe in amulets.

- Due to small things like "no idea blw of boundary  
blw magic and medicine" was used by Europeans  
to raise their voice that Egyptian sciences are  
not Exact.

5/9/18

## Water Harvesting and Water Use Techniques in Ancient India:

→ 17<sup>th</sup> - present : Modern  
century

Colonial/British period      Post Colonial / Post Independent period  
(17<sup>th</sup> - 1947)      (1947 - present (2018))

11<sup>th</sup>/12 to 16<sup>th</sup> — Medieval period ] Pre colonial period  
3000 BC to 10<sup>th</sup>/11<sup>th</sup> — Ancient period ]

→ We have richest history in ancient period.

→ Video lecture by PPG — Science, Technology, Philosophy,  
(Guru)

→ Back Casting :  "DYING TO WISDOM" — Agarwal & Narain

\* ethnography — getting exposed to fields

→ economically viable & environmentally sustainable  
ancient water harvesting systems

→ But they saw that these ancient practices are replaced  
by modern practices to some extent.

4<sup>th</sup> Century Text — Raj Tarangini — Patalan

on Jammu and Kashmir

## Indus Valley Civilization:

- irrigation, drainage system, city planning

6/9/18

- William Willcocks - Overflow irrigation (1930)

→ Due During floods, land gets filled up by water;  
Some dead canals (work only during ~~flood~~ floods)  
will receive <sup>flood</sup> water and is channelized to  
irrigation.

→ Even flood water washed away mosquito larva  
i.e., reduced chances for malaria disease.

- Due to time change

→ the system got disrupted

→ replaced overflow irrigation

→ increased malaria disease

→ establishment of railways were done by not  
considering these dead canals

→ water became stagnant along  
Railway paths

→ Orissa

Flood dependent → Flood vulnerable

new, modern, failing model did not between past ←

→ Modern : Solution directly to the Problem

Ancient : An Integrated solution to the problem

below are against dealing with all other factors.

for, removal of (villages) vulnerability → protection

" moving village " → <sup>protection</sup> → <sup>vulnerability</sup> ①

water → <sup>protection</sup> → <sup>vulnerability</sup> ②

oxygen → <sup>protection</sup> → <sup>vulnerability</sup> ③

the village problem at how does protection & vulnerability

knowledge, patients, villages make up

the people, they adapt more to grow less

waged by poor people ④ with between and ⑤

villages are with the go more than against

(aggregation) agent

agent → agent → agent at growing to —

agent below

steering group from

building know sand

Household

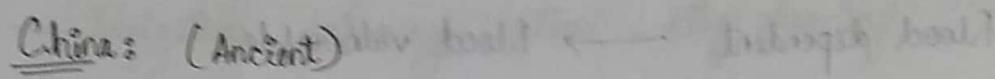
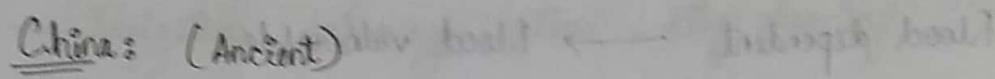
household

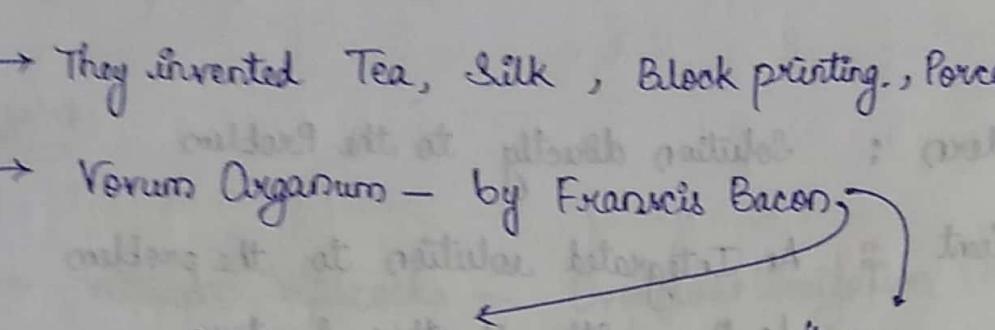
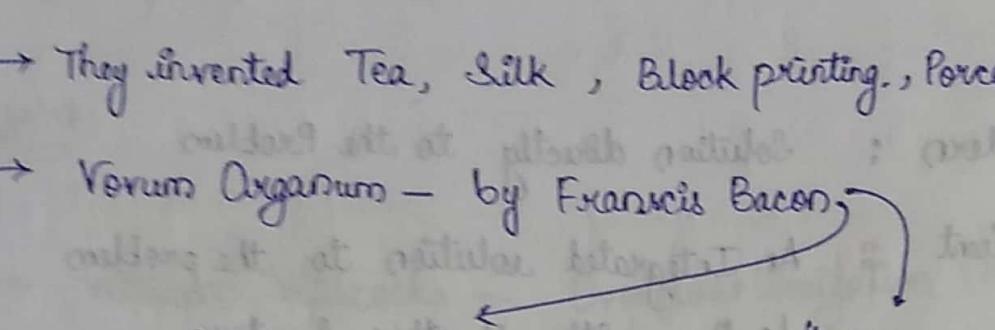
" user " and " do not tell the rest "

collaborative without group —

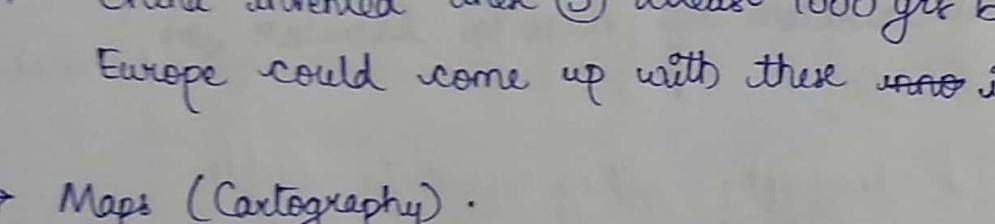
then (not at ) not want at bubbles exceed existing ←

12/9/18

China: (Ancient)  Built 

- They invented Tea, Silk, Block printing., Porcelene, Sugar
- Verum Organum - by Francis Bacon;   
making it at certain temperat 
- ① Printing - literature (culture) "Things are decided by humans, not  
② Gun Powder - warfare special powers."  
③ Magnetic Compass - navigation

These 3 inventions are used to radically alter the world's situation.

- China invented these ③ atleast 1000 yrs before, Europe could come up with these ~~was~~ inventions.
- Maps (Cartography).
  - 1<sup>st</sup> person to design —  Zheng He - 1410 world map, most appropriate
- Horology — Chinese were excellent Clockworks
- \* "For all the Tea in China by Rose"
  - during Industrial survolution
- British became addicted to Chinese Tea. (add sugar & mill to Tea)

Chinese - & boil off only tea and drink

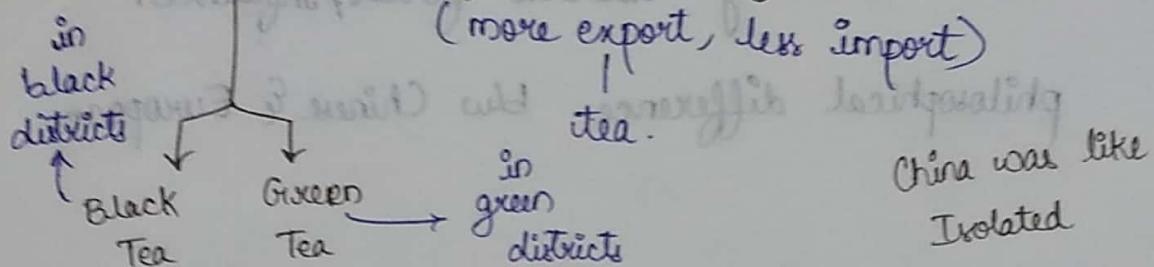
Indians - Learnt from British (tea + milk + sugar)

semi colony (control over some products)

— not a colony — no permission to enter China

China got tea in trade exchange balance.

(more export, less import)



→ Britshers wanted knowledge of Tea making and make up crops of tea. They require place to grow tea.

→ Robert Fortune was sent.

\* Glass Box - invented in Europe.

→ Tree Plantation is done in Darjeeling

→ Some expts were done in Assam

→ Pharmacology

"Materia Medica" (657 A.D.)

Chinese knowledge

833 names of all herbs with its medicinal value.

"Aaku Parkcha" - even Cancer can be treated

- Seismography — gravity measurements, etc  
→ Chinese — masters in ship building

\* Why Chinese didn't share knowledge or conquer others?

"Chinese are always interested in developing themselves."  
We don't need any external forces/influence.

philosophical difference b/w Chinese & Europeans

question b/w position of importance before meditation ←

not enough at. only superior post . not to sit

→ China: Confucianism → Confucius  
Europe: Stoicism → Stoic school

→ Islam (Muhammad) → prophet Muhammad ←

philosophy of life is well established ←  
monotheism with strict rules and ←

philosophically ←

(DA FOJ) "middle way"

the other school lie to senior sees ↑  
authoritarian → authoritarianism

different schools (ways) now — "middle way"

30M

$$1/2 - 10M \times 1 = 10M$$

$$4/5 - 5M \times 4 = \underline{20M}$$

30M

- Reading materials
- conceptual clarity
- structure of answer
- facts / empirical opinion ( more facts — more marks )
- good language
- don't attempt extra questions ↗ careless  
cunning

jenia mukhargee@gmail.com