

# Fossils, Natural Heritage and Philately

**Dr. Ajit Vartak**





# Heritage

Heritage is our legacy from the past, what we live with today, and what we pass on to future generations.



# Types of heritage

According to UNESCO, heritage is of two types

1. Cultural – paintings, coins, sculptures, monuments, archaeological sites, underwater ruins and cities, oral traditions, performing arts
2. Natural – biological (flora and fauna), geological (landscapes, minerals, rocks and fossils)



# What are fossils

In Latin – Fossils are anything obtained by digging.  
But currently, include indicating some sort of life.

Fossils are the remains or traces of plants or animals from the distant past.

Fossils vary in size from microscopic to gigantic and can weigh many tons.



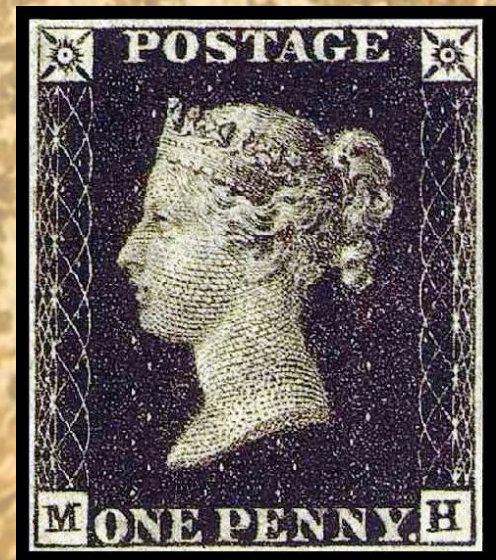
# Why conserve fossils

- Science
- Natural heritage
- Education
- Recreation
- Economic
- Ecological
- Cultural



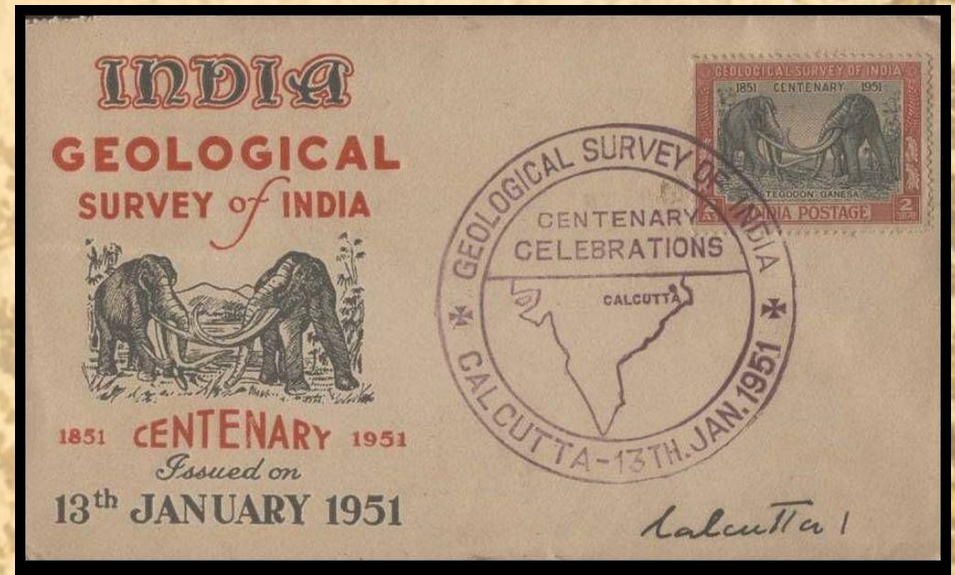
# Philately

- Philately is the hobby of collecting and studying stamps.
- Rowland Hill, an English schoolmaster, suggested the idea of a postage stamp in 1837.
- The first stamp, the well-known Penny Black, was issued by the United Kingdom in 1840.
- The first stamp on prehistoric life was issued by India in 1951.





# First reconstruction of pre-historic animal



In 1951, the Geological Survey of India celebrated its centennial. For this occasion, a commemorative stamp was issued showing the fossil elephant 'Stegodon ganesa', likely a direct ancestor of our modern elephant.



# Jurassic Park



- Stamp issued in 2000 featuring the movie Jurassic Park (1993)
- Highest grossing film ever at that time





# Paleoart and paleoartist

- Paleoart is original work that attempts to depict prehistoric life according to scientific evidence.
- Paleoartists work with scientists to accurately depict anatomy, associated fauna and flora known from the same geological formation.
- They visit museums to study the original fossils.

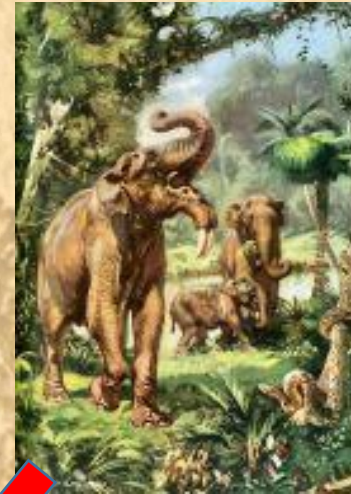


# Zdeněk Burian (1905-1981)

- Famous Czech painter, book illustrator and paleoartist
- Regarded as one of the most influential paleoartists of all time
- Worked with paleontologists like Josef Augusta, Zdeněk Špinar to make first-hand sketches and drawings, with little anatomical error
- Many fossil stamps issued around the world are based on his illustrations
- Google Doodle in 2015 on his 110<sup>th</sup> birthday



# Czech Republic 2005





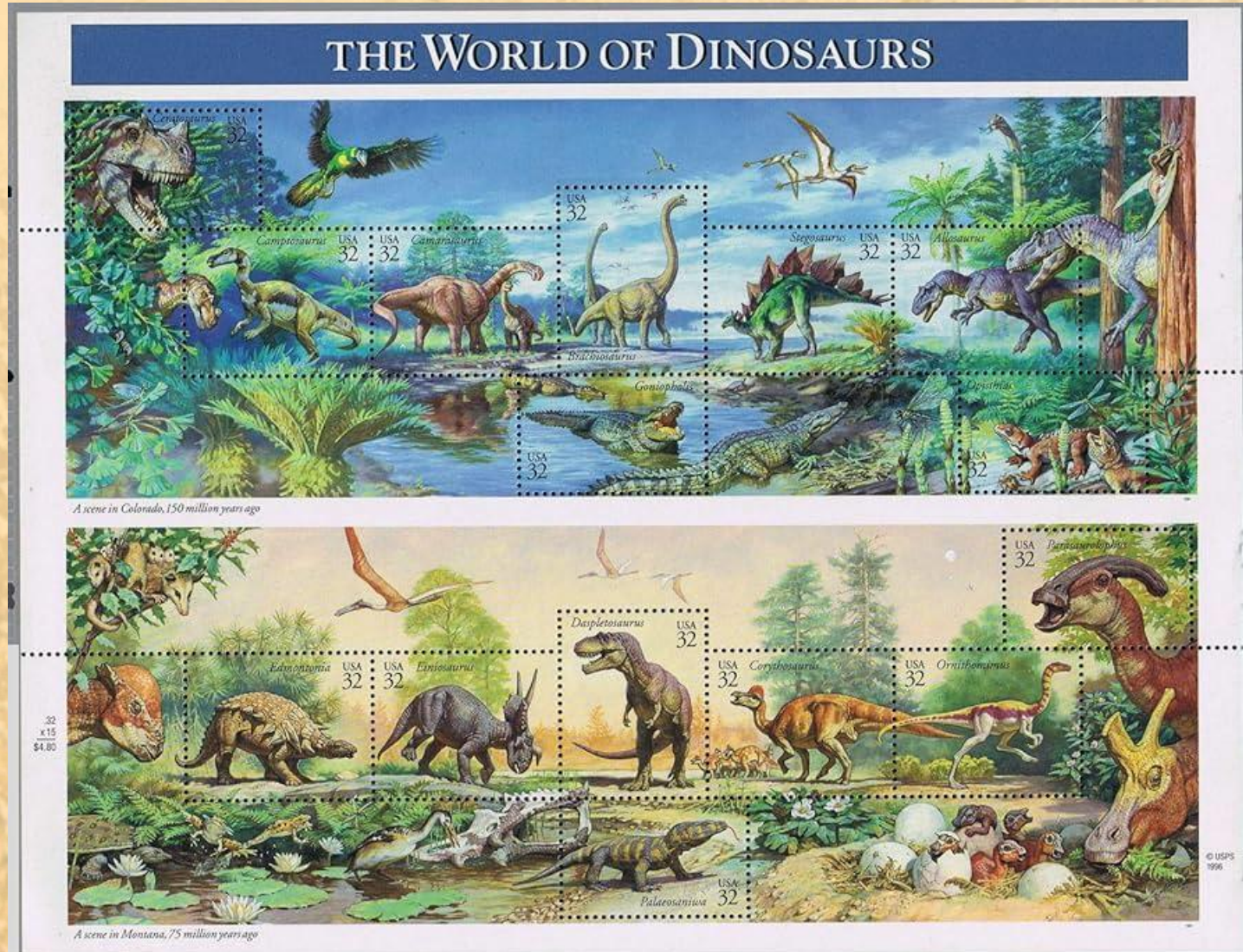
# James Gurney (1958-)



- American author, artist, anthropologist and the illustrator of the best-selling Dinotopia books.
- Designer of many stamps like 'The World of Dinosaurs' U.S. 1997, 'Australia's Age of Dinosaurs' 2013.



# The World of Dinosaurs-1997





# Australia 2013



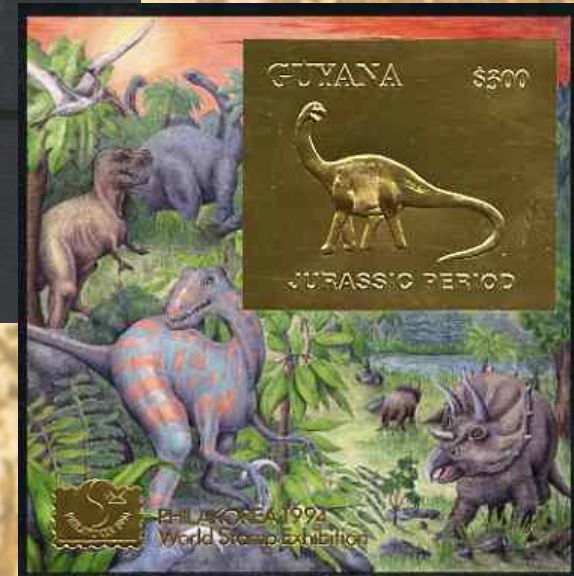


The background of the slide features a detailed view of fossilized plant structures, likely ferns, embedded in a light-colored, porous matrix. The fossils are dark brown to black, showing intricate branching patterns. The overall appearance is that of a well-preserved fossil specimen.

# **Exotic stamps on fossils**

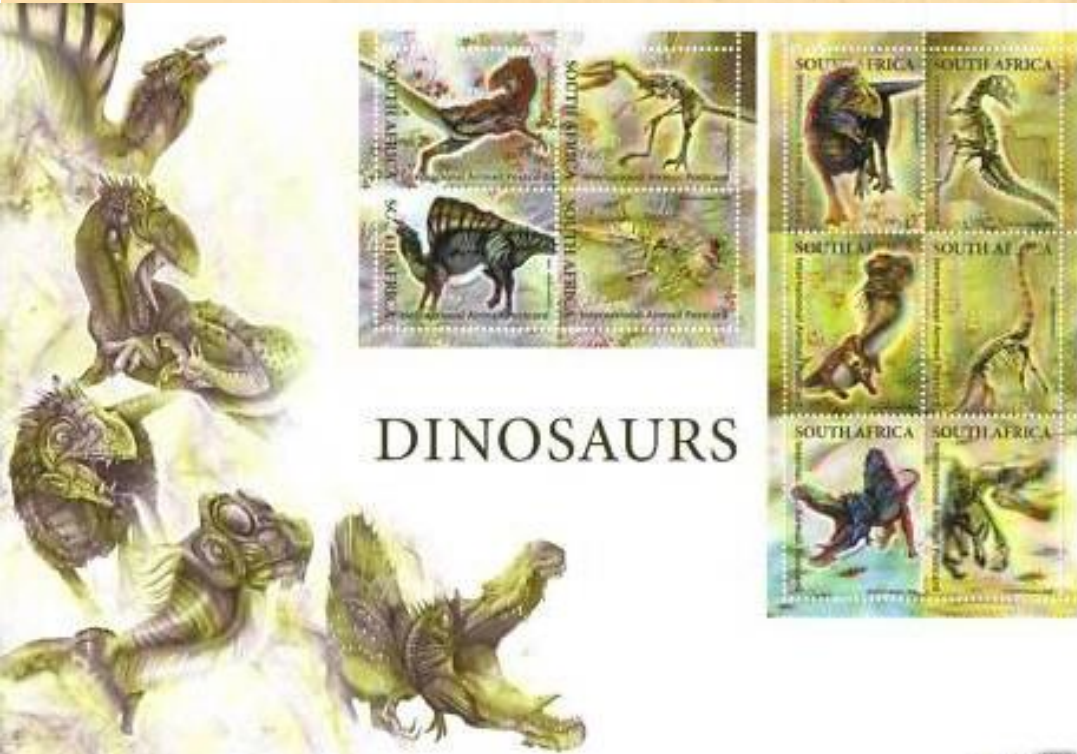


# Guyana 1994 - gold/silver foil





# South Africa 2009 3D anaglyphs





# China 2017 – Glow in the dark





# Australia 2020 Opalised fossils

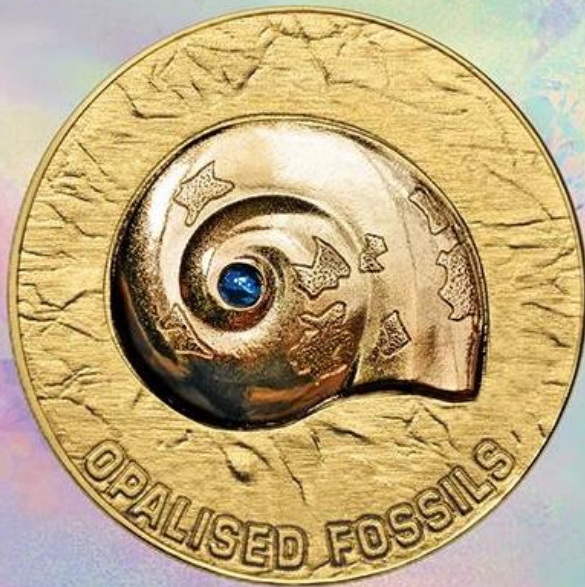
OPALISED





# Limited edition medallion cover with an Australian opal insert

OPALISED  
FOSSILS



001/200





# Medallion with an Australian opal insert





# Paleontology

Palaeo – Ancient

Onto – Life

Logy – Science or Study

There are many branches of palaeontology

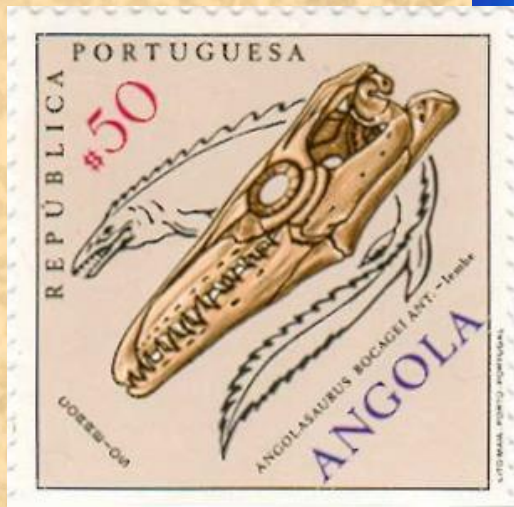


# Micropaleontology





# Megapaleontology

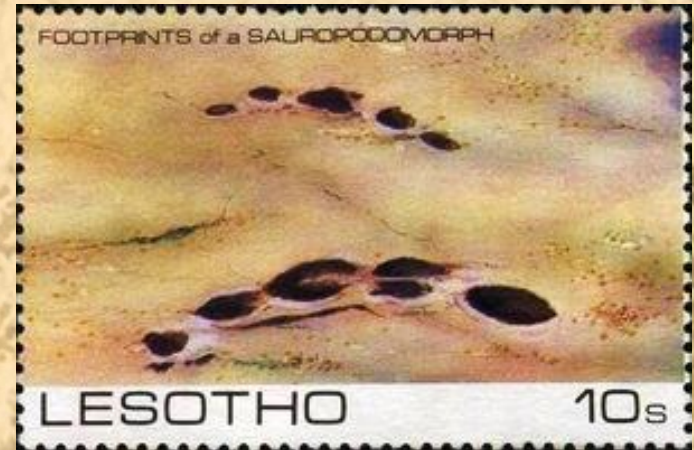




# Ichnology



Footprint of a *Lesothosaurus*



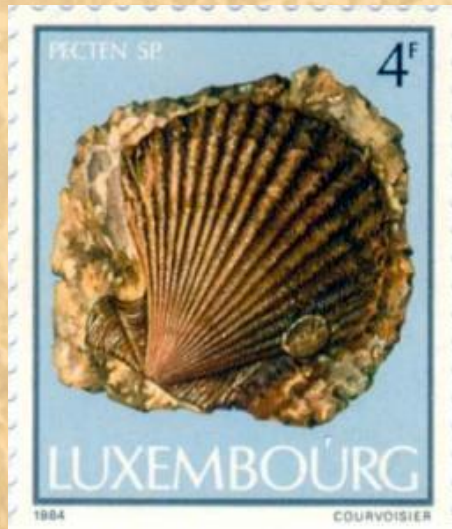
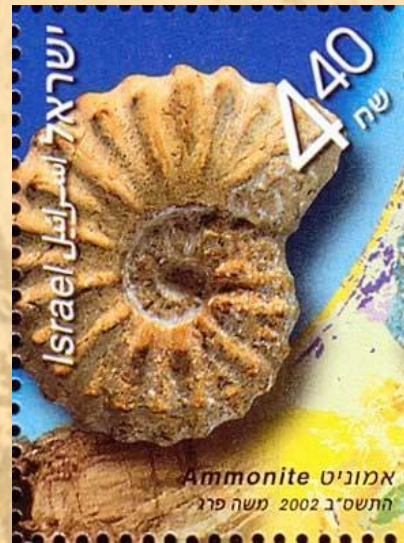
Footprint of a Sauropodomorphs



Footprint of a carnivorous dinosaur



# Invertebrate paleontology





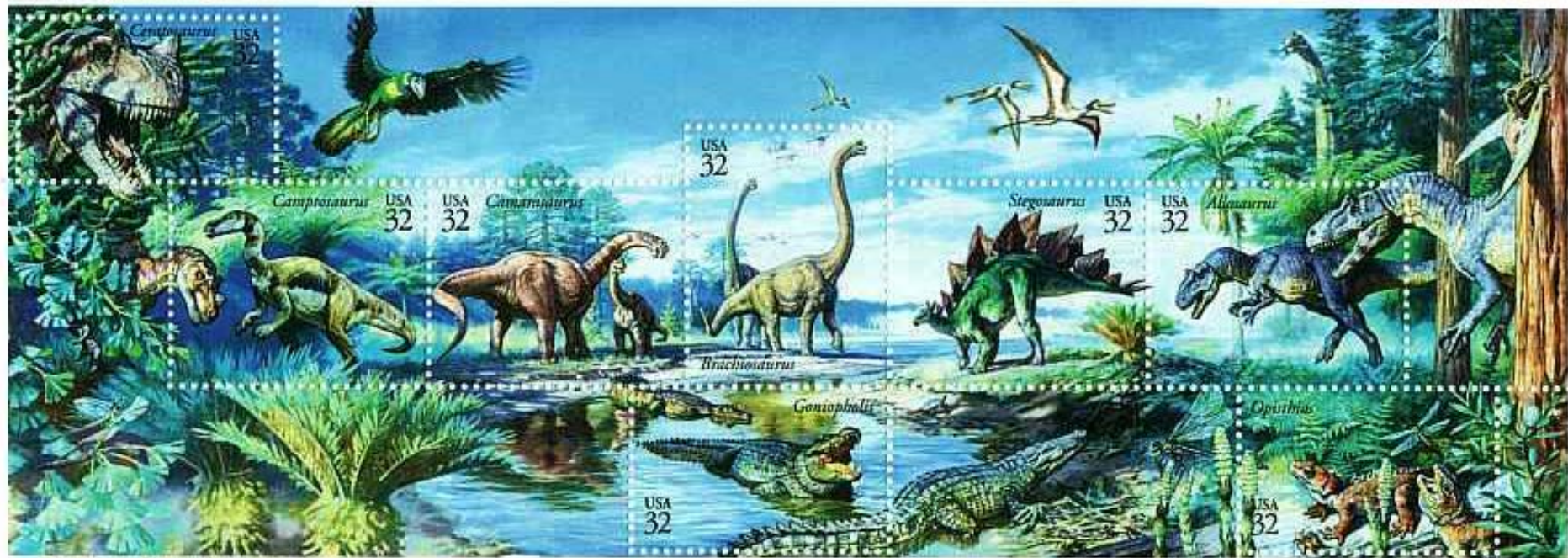
# Vertebrate paleontology





# Paleozoology

## THE WORLD OF DINOSAURS





# Paleobotany





# Paleopalynology

ශ්‍රී ලංකා இலங்கை SRI LANKA 30.00



Prehistoric Era

ANCIENT SRI LANKA SERIES 4/38

Prehistoric agriculture on the Horton Plains ;  
13,000 years old fossilised barley pollen grain.

2005

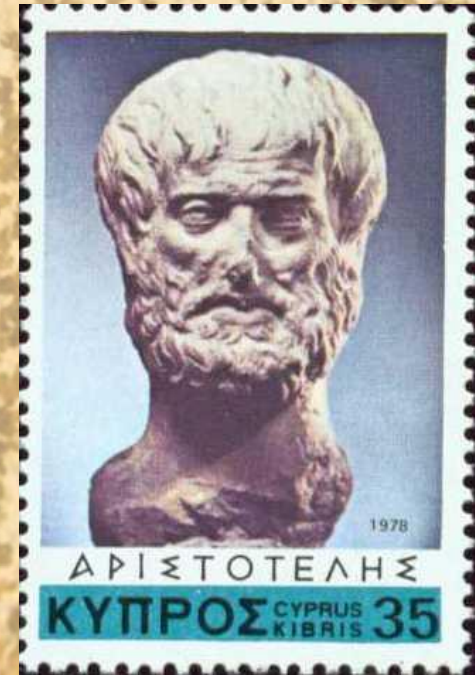
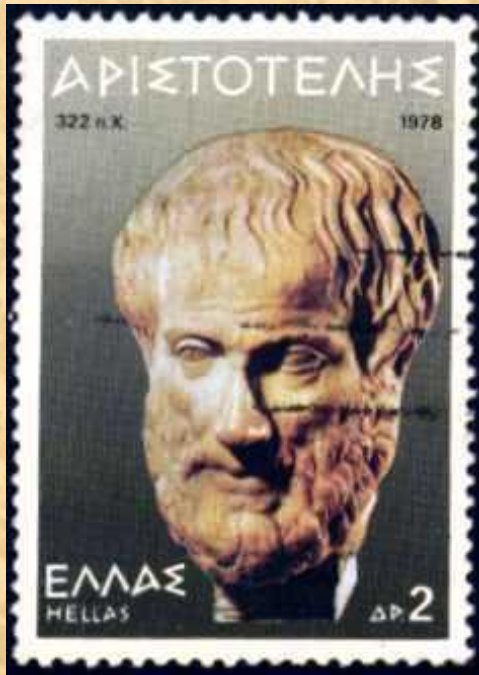


# History of Paleontology



# Aristotle (384-322 BCE)

Aristotle the Greek philosopher was one of the first to classify living things into either plants or animals.





# Agricola Georgius (1494-1555)

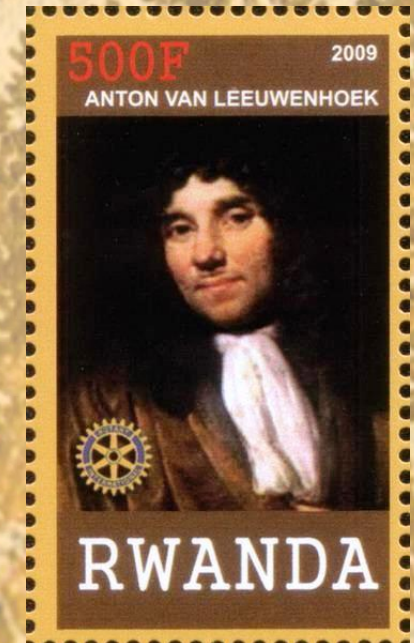
- German scholar and scientist was a town physician and considered as the 'Father of Mineralogy'
- He coined the term 'fossil' to include all objects which could be dug up. As the science of paleontology matured the term 'fossil' strictly refers to remnants of biological entities.





# Anton van Leeuwenhoek (1632-1723)

Leeuwenhoek of the Netherlands used a simple microscope with excellent lenses that he manufactured. He was the first to observe bacteria in 1676 using his self-designed microscope.





# Nicolaus Steno (1638-1686)

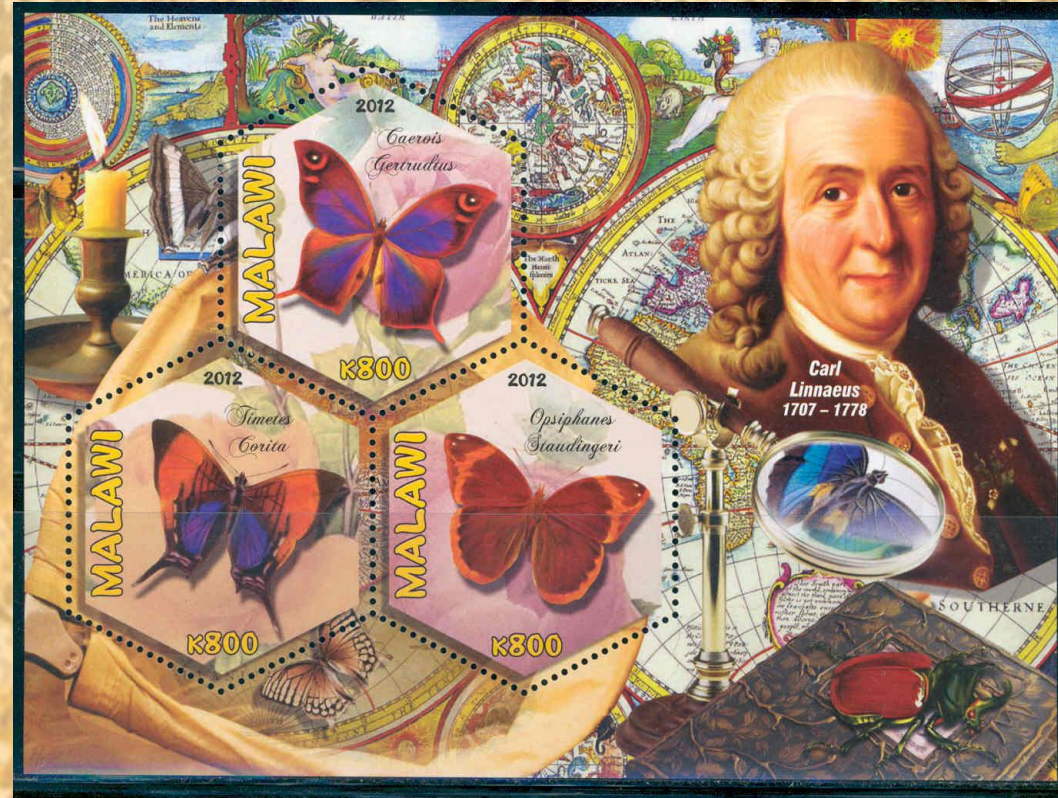
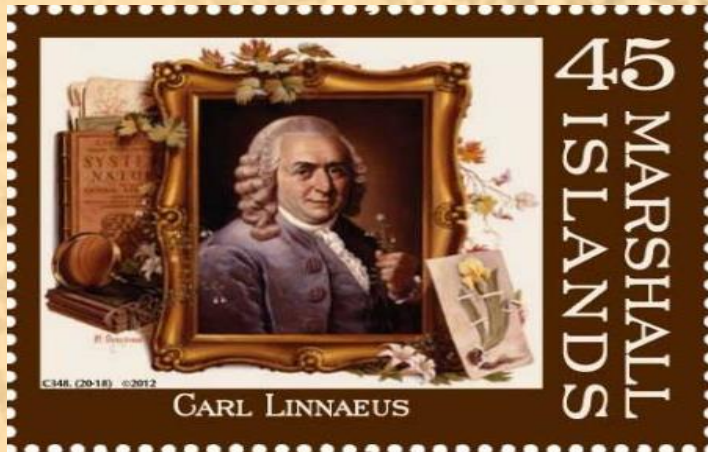
- Danish geologist who established one of the basic principles of stratigraphy ‘**Principle of order of superposition**’
- Discovered the parotid duct and recognized the muscular nature of the heart.





# Carolus Linnaeus (1707-1778)

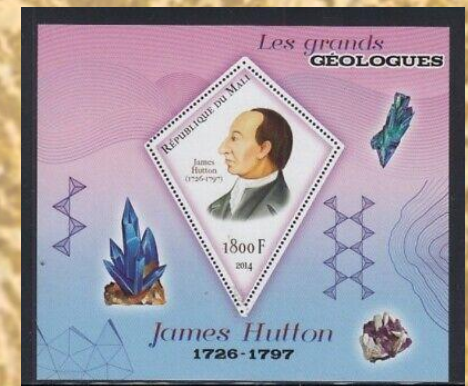
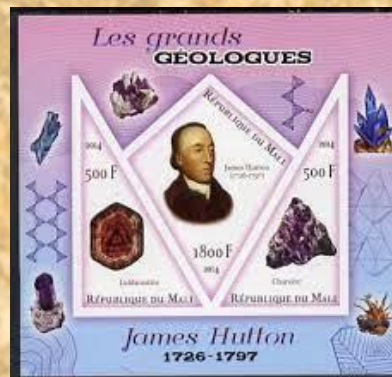
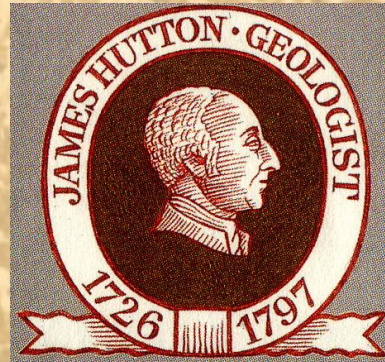
- Carolus Linnaeus (Carl von Linné) of Sweden, had a medical education, receiving his doctorate in the Netherlands. He proposed **binomial classification**.





# James Hutton (1726-1797)

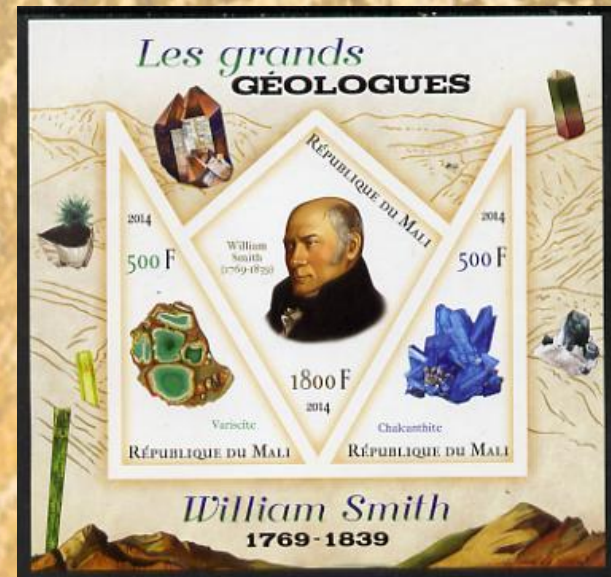
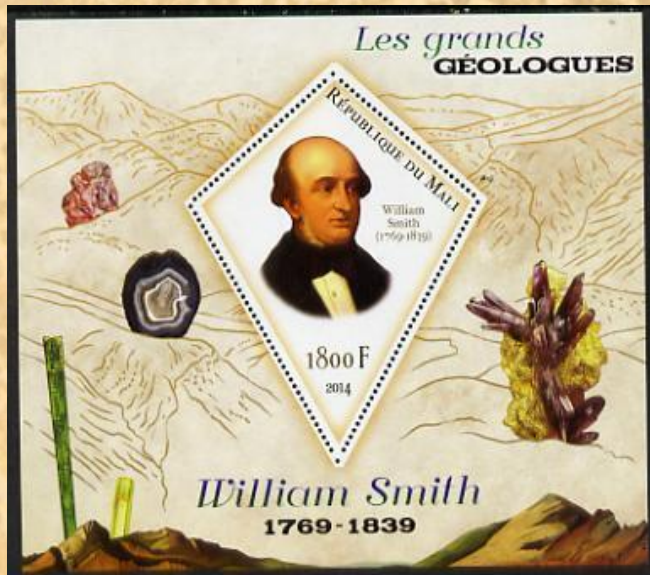
- Scottish geologist, physician, naturalist and chemist
- Father of **Modern Geology**
- Proposed the **Principle of Uniformitarianism**





# William Smith (1769-1839)

- British geologist, author of first Geological Map of Great Britain
- Father of English geology
- Principle of Faunal Succession





# Mary Anning (1799-1847)

- A British fossil collector and paleontologist
- Discovered first Ichthyosaur skeleton, first two Plesiosaur skeleton ever found, first Pterosaur skeleton outside Germany, belemnite fossils with ink-sacks and coprolites
- Two fossil fish and a ostracod species, one reptile and one bivalve genera are named after her
- Her name was included in a list of ten British women who have most influenced the history of science



# Mary Anning (1799-1847)



165º Aniversário de  
**MARY ANNING**

1799-1847



165º Aniversário de  
**MARY ANNING**

1799-1847



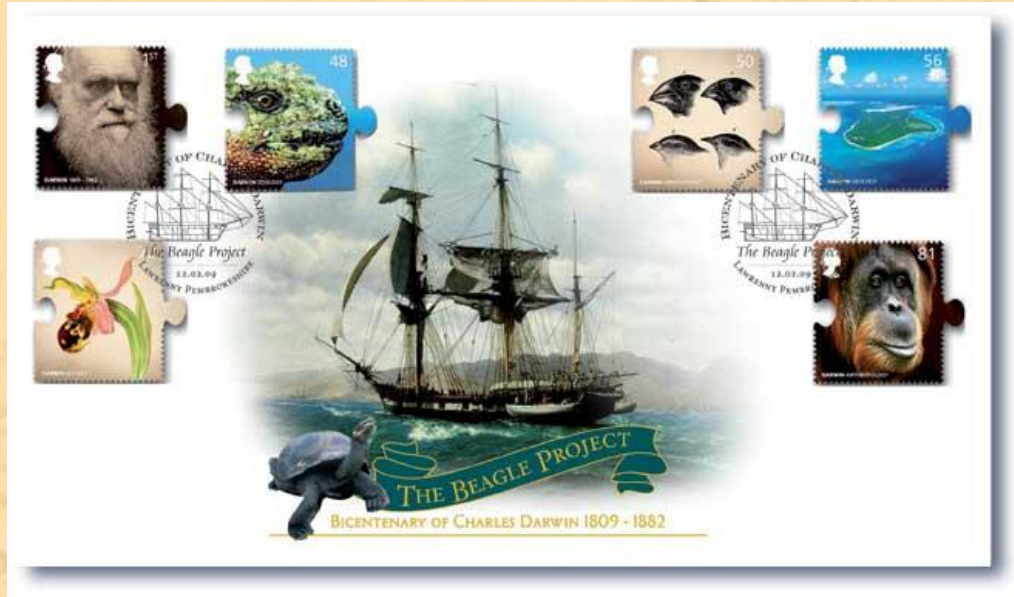
# Alcide d'Orbigny (1808-1854)

- French naturalist, Father of micropaleontology
- Alcide d'Orbigny of Paris museum studied Chevalier's collection from Pondicherry

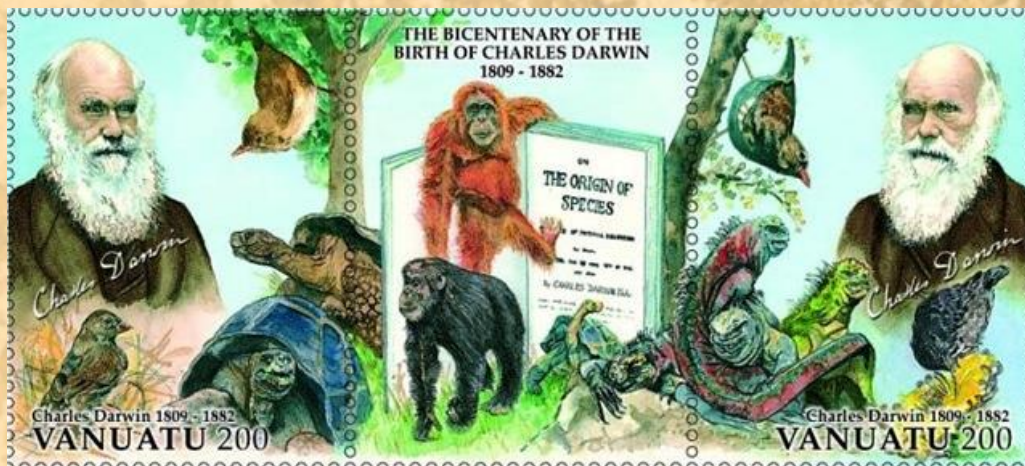




# Charles Darwin(1809-1882)



- English naturalist; Father of the theory of evolution
- 2009 was his birth bicentenary and 150 years for his book 'Origin of Species'.





# Edward Forbes (1815-1854)

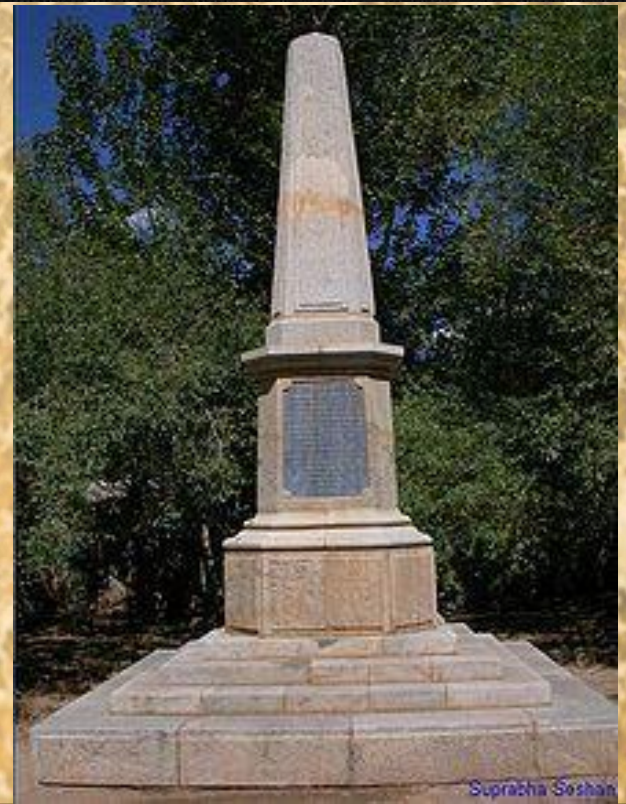
- British naturalist, born on the Isle of Man
- Got degree in medicine. He left the field to devote himself to natural history.
- Extensive work on mollusks and sea stars
- He was a major figure in establishing the field of oceanography, biogeography and paleoecology
- Published a paper on Cretaceous fossils of Pondicherry in 1846.





# F. Stoliczka (1838-1874)

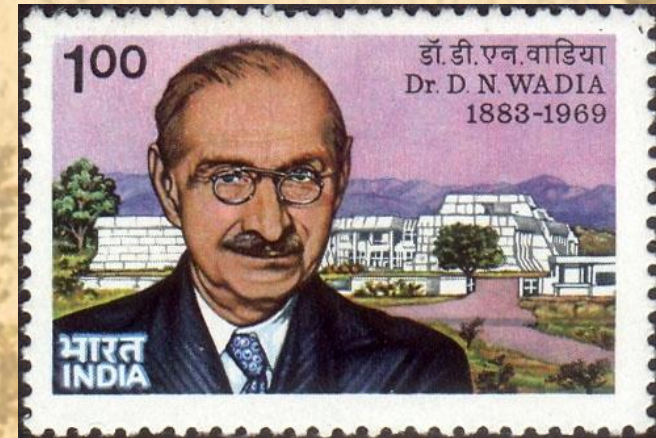
- Czech geologist, paleontologist and zoologist
- Studied at Vienna under the guidance of Prof. Suess
- Joined GSI as first appointed palaeontologist in 1862 and carried out an exhaustive study of the entire fossil fauna from South Indian Cretaceous deposits
- Died in 1874 at Moorgi in Ladakh





# Dr. D. N. Wadia (1883-1969)

- Born in Surat, Gujarat and educated in Baroda
- Joined M. G. College, Jammu & Kashmir then GSI. Laid the foundation for geological investigations in India.
- Awarded Padma Bhushan in 1958
- Published **'The Geology of India'** in **1919** and the first soil map of India
- The Institute of Himalayan Geology was renamed as Wadia Institute of Himalayan Geology







# **Applications of Paleontology**



# Evolution through time

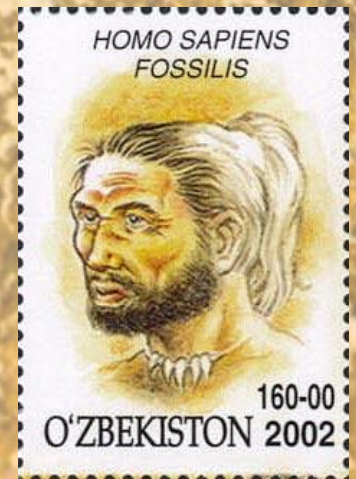
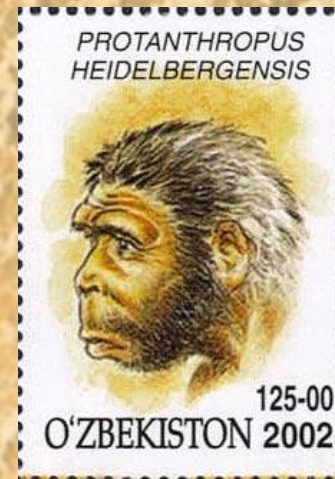
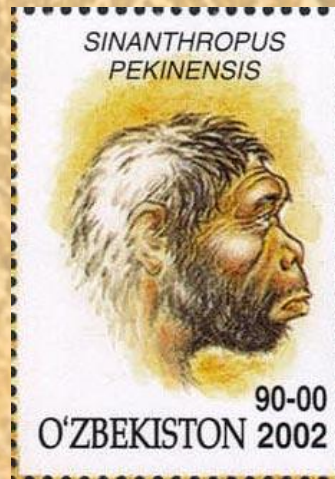
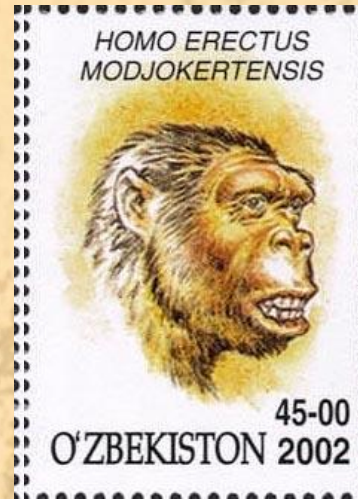


THE PLANET EARTH





# Evolution of Man





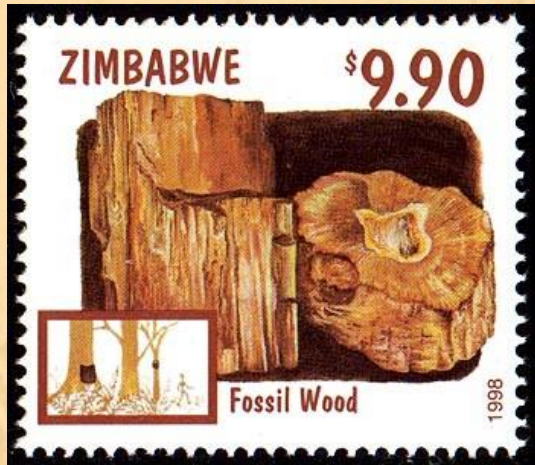
# Alfred Wegener (1880-1930)

- German geologist and Arctic explorer, advanced the theory of continental drift
- The supercontinent Pangaea, supposedly broke up into our present continents, which then drifted apart, as shown on the middle stamp





# Study of paleoclimate





# Exploration of fossil fuel





# Geopark

A geopark aims to:

- protect geodiversity (rocks, minerals, landforms and fossils)
- promote geological heritage to the general public, and
- support sustainable economic development of geopark territories, primarily through the development of geological tourism.

Palaeopark is part of a geopark which aims to protect fossil heritage.

195 UNESCO Geoparks in 48 countries.





# Geopark

Year- 2014

Year- 2017





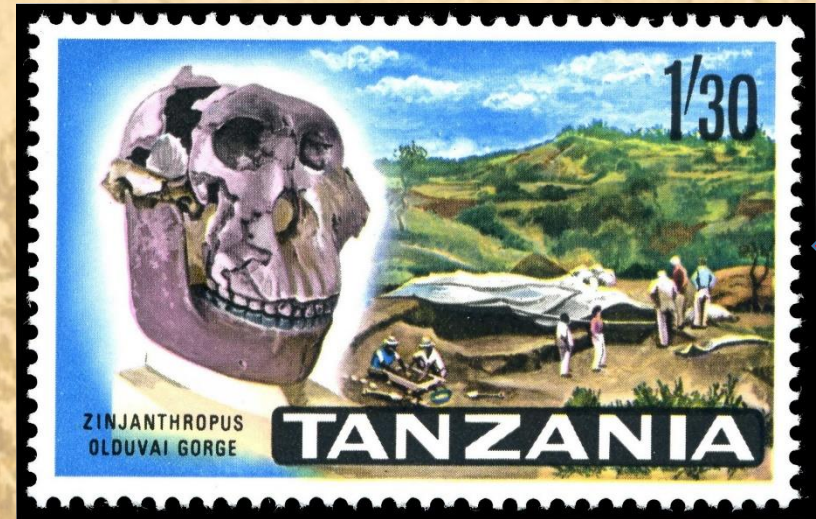
# Fossil Sites

The background of the slide is a close-up photograph of a fossiliferous rock surface. It features a repeating pattern of small, branching, tree-like structures, likely fossilized plants or animals, in shades of brown and tan against a lighter, yellowish-tan matrix. The overall appearance is that of a well-preserved fossil site.



# Olduvai Gorge, Tanzania

Exceptionally rich archaeological site of human history spanning nearly 2 Ma. Abundant human, animal fossils and stone artifacts preserved in well dated stratigraphic sequence.





# Dunarobba fossil forest, Italy

These trees were growing in Italy more than a million years ago. Here, the trees (1.5 meters in diameter and between 5-10 meters in height) are preserved in life position (up right position).

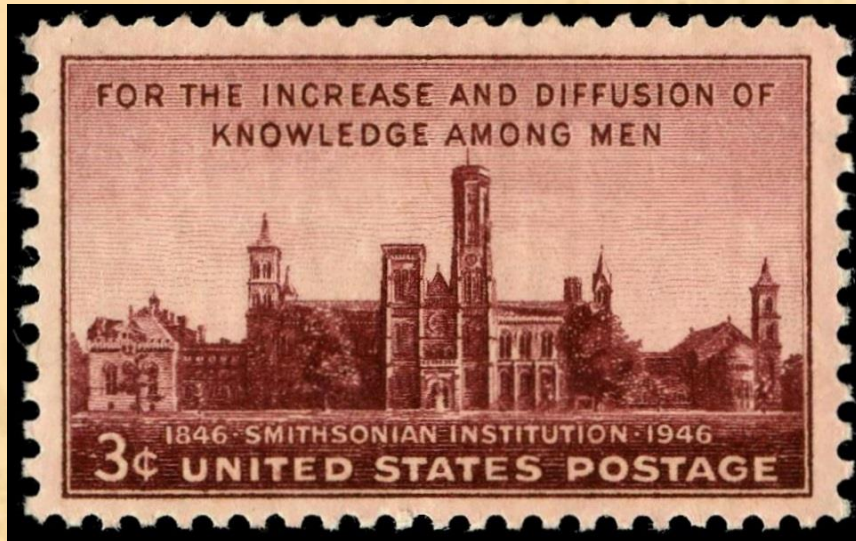




# Museums



# Smithsonian Institution, USA

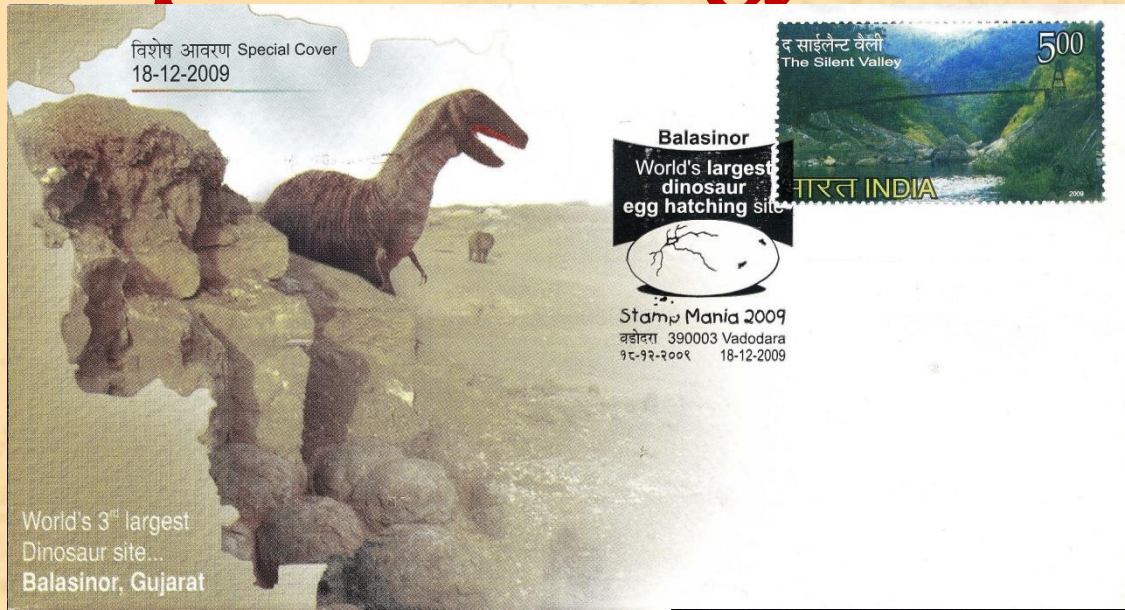








# Indian special covers on paleontology





# Indian special covers on paleontology



विशेष आवरण  
हीराक जयन्ती 2006

Special Cover  
Diamond Jubilee 2006



Institute devoted to the study of plant fossils and allied disciplines



वीरबल साहनी पुरावनस्पतिविज्ञान संस्थान,  
Birbal Sahni Institute of Palaeobotany,

53 विश्वविद्यालय मार्ग, लखनऊ 226 007 (भारत)  
53 University Road, Lucknow 226 007 (INDIA)





# Indian special covers on paleontology

500

भारत  
INDIA



**ELEPHANT FOSSIL**  
(Genus Stegodon in Shivalik Forest)





# Indian special covers on paleontology







# Threats to our heritage



# Threats to fossil sites

Quarrying – Commercial quarrying of fossiliferous limestone mainly for cement industry. For example, Ariyalur in T.N., Kutch in Gujarat and Bagh in M.P where millions of fossils are crushed everyday





# Permian-Triassic boundary at Khonmoh, Kashmir



**IS QUARRYING  
DESTROYING FOSSILS  
IN KASHMIR?**



# Threats to fossil sites

Fossil collecting – Irresponsible Fossil collecting  
Rare and scientifically valuable fossils should not be collected and kept in private collections. In Lahul and Spiti Valley, fossils are mined and sold as souvenirs. In the world market, rare fossils from Mongolia and Morocco are commonly available.





# Threats to fossil sites

Burial – Urbanisation involving, for example, construction of dams, buildings and roads can bury fossil sites. An example is Malabar Hill in Mumbai (intertrappean fossils)





# Threats to fossil sites

Natural erosion – particularly sea and river cliffs





# Dorset coast, England - Jurassic fossil site





# Fossils: laws, regulations and policies

- India has also come out Policies and regulations for preserving and protecting fossils and fossil sites.
- In European countries, collecting and selling fossils is strictly prohibited





# Future fossils





# Conclusions

- Through philately, national geoheritage and geo-resources can be brought to the attention of the common man
- Fossil stamps are an effective media to educate the public about past life on our planet and its conservation
- It can bring awareness and interest among amateurs



# Acknowledgements

For sharing their knowledge and collection, I am thankful to the following:

- Late Dr. V. D. Vartak
- Late Prof. P. V. Sowani, ex-Vice Principal and ex-H.O.D. Geology Dept, Fergusson College
- Dr. Ton van Eijden (Holland)
- Mr. Michael Kogan (Germany)
- Prof. Jere Lipps (USA)
- Dr. Sanjeev Kalaswad (USA)
- Kaustubh Mudgal.

I am also thankful to the organisers for giving me this opportunity.





**Thanks !**