

Zoogeography

PROF. CHIARA MANFRIN – CMANFRIN@UNITS.IT



Course calendar

From today (**September 26th**) up to **November 29th**

Thursday from 12:00 to 15:00

Friday from 9:00 to 11:00

Except (NO lesson): Friday November 1st



Course organisation



MAIN TOPICS

Lessons from the Past

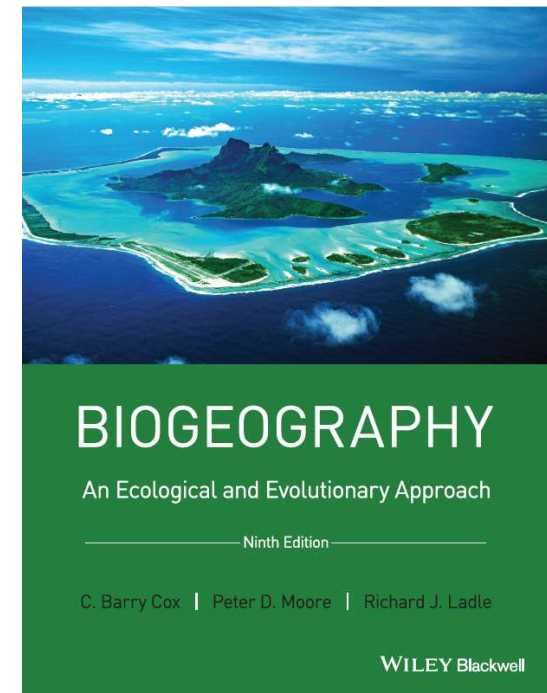
The challenge of existing

The Fauna of Islands

Patterns of Life

Conservation Zoogeography

See the specific Syllabus



Course organisation

The screenshot displays the Moodle LMS interface for the University of Trieste. At the top, the URL is `moodle2.units.it/?redirect=0`. The user is logged in as CHIARA MANFRIN. A search bar contains the text "zoogeography". A red arrow points to this search bar. Below the search bar is a navigation menu with links for Moodle@Units, Corsi, Supporto, Dashboard, Eventi, I miei corsi, Italiano (it), Nascondi blocchi, and Pieno schermo. The main content area features a grid of course categories with representative images: Clinico di Scienze mediche, chirurgiche e della salute; Fisica; Ingegneria e Architettura; Matematica e Geoscienze; Scienze Chimiche e Farmaceutiche; Scienze della Vita; Scienze Economiche, Aziendali, Matematiche e Statistiche; Scienze Giuridiche, del Linguaggio, dell'Interpretazione e della Traduzione; Scienze Politiche e Sociali; and Studi Umanistici. Below this grid are links for Login, Guida a Moodle, and Supporto Tecnico. A second instance of the Moodle interface is overlaid on the right, showing the search results for "zoogeography". The search bar contains "Cerca corsi". The navigation menu is identical. The search results section shows "Risultati della ricerca: 1" for the course "947SV - ZOOGEOGRAPHY 2022" by teacher CHIARA MANFRIN, categorized for the academic year "A. A. 2022 - 2023". A "Navigazione" sidebar on the left of the search results shows links to Dashboard, Home del sito, Moodle@Units, and I miei corsi.



Ricerca nei forum

Ricerca avanzata

Annunci recenti

Aggiungi nuovo argomento...
(Nessuna news è stata ancora spedita)

Prossimi eventi

Non ci sono eventi prossimi

Vai al calendario...
Nuovo evento...

Attività recente

Attività recente da sabato, 1 ottobre 2022,
12:16



Annunci

Modifica

Modifica

+ Aggiungi un'attività o una risorsa

Argomento 1

Modifica

+ Aggiungi un'attività o una risorsa

Argomento 2

Modifica

+ Aggiungi un'attività o una risorsa

Argomento 3

Modifica

+ Aggiungi un'attività o una risorsa

Argomento 4

Modifica

<https://www.biologia.units.it/upload/insegnamenti/5aef0f03eac2b83745683316cde459f7.pdf>

Exam grade scheme

- oral examination in the form of an interview includes at least three questions and lasts on average about 30 minutes.
- The **final exam grade** may be increased by **2 points out of 30** by the **Journal Club** evaluation:

Each student presents a scientific article in front of peers and the teacher. The latter will assign a maximum of 2 points, which are divided as follows: **Clarity of presentation** (max. 0.5 points), clarity of **graphical presentation** (max. 0.5 points), **mastery of the chosen topic** (max. 0.5 points), and **consistency of answers** formulated at the colleagues' request (max. 0.5 points).

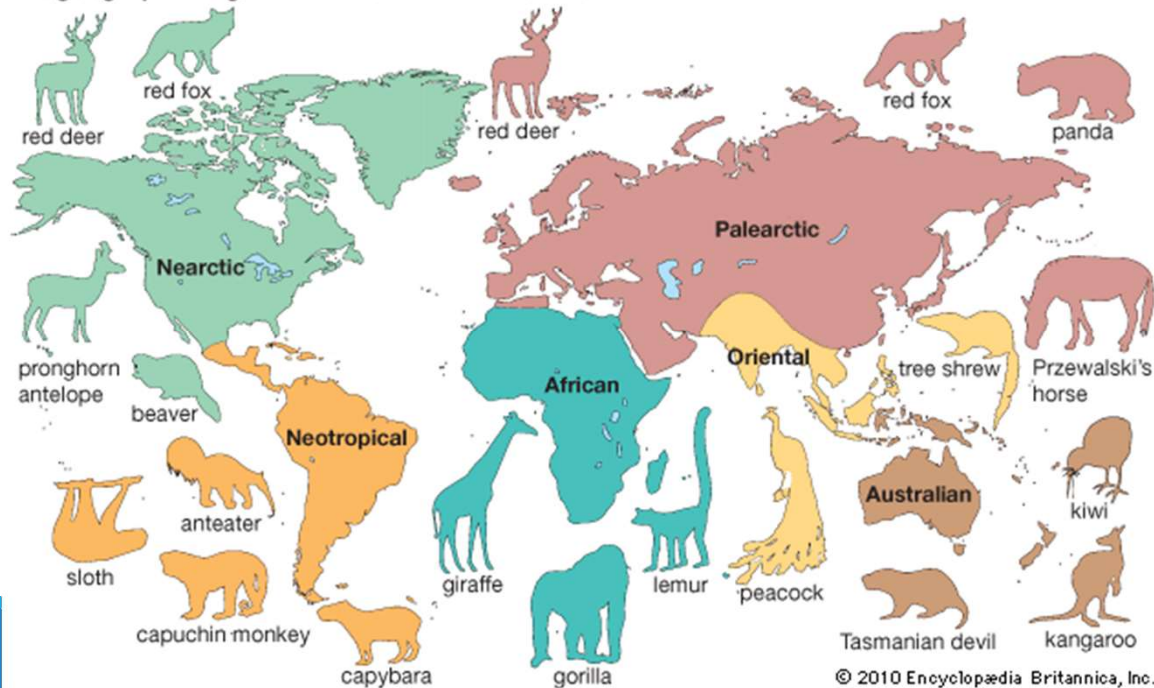
Introduce yourself



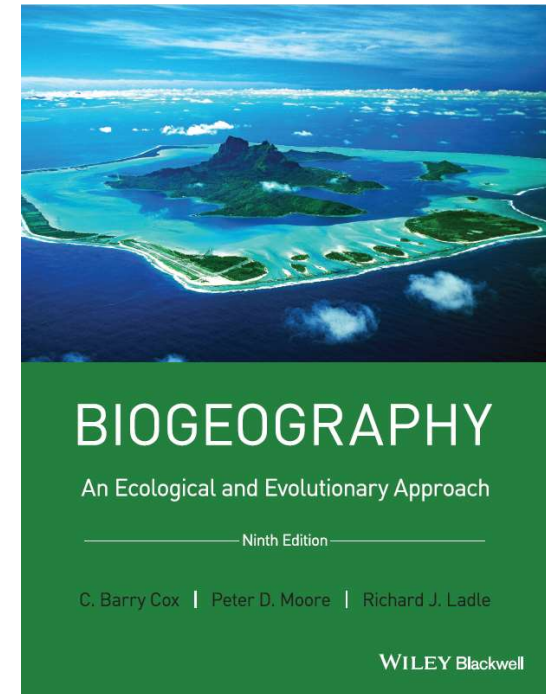
What's Zoogeography?

Study of the distribution, and of the **patterns of distribution**, of living organisms at all levels, ranging from **genes to whole organisms and biomes**, and of the **evolution** of these.

Zoogeographic regions and some characteristic animals



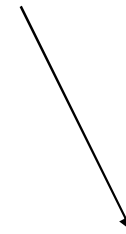
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Zoogeography (and phyto as well) is a meeting point between **Biological sciences** and **Earth sciences**.




Lack of progress in one area has held back the other.



Temptation for workers in one field to accept, uncritically and without proper understanding, new ideas in the other field that seem to provide a solution.

Lack of progress in one area has held back
the other



Continental drift theory (1912)

German meteorologist **Alfred Wegener** hypothesized that the continents once formed part of a single landmass called supercontinent (Pangea)

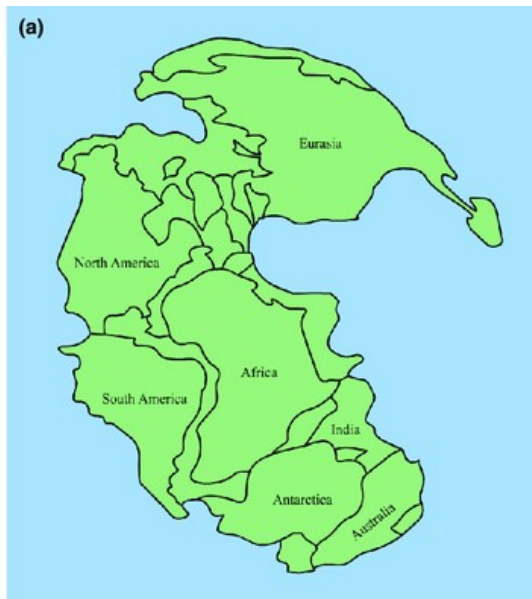


Plate tectonics is the theory that Earth's land masses are in constant motion

Continental drift theory (1912)

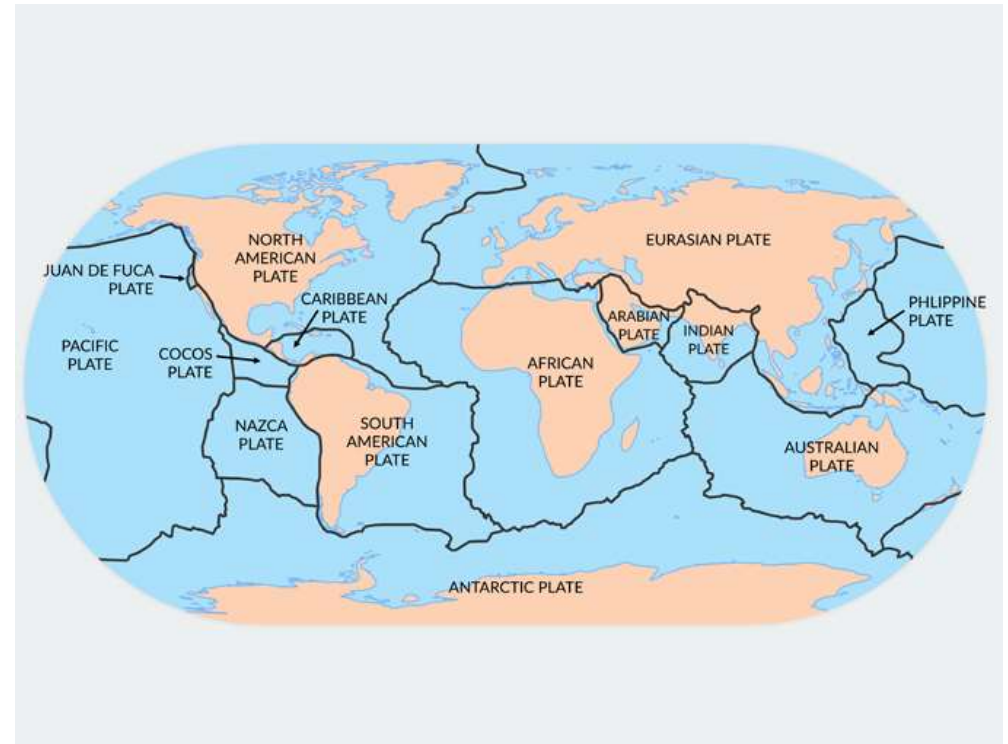
German meteorologist Alfred Wegener

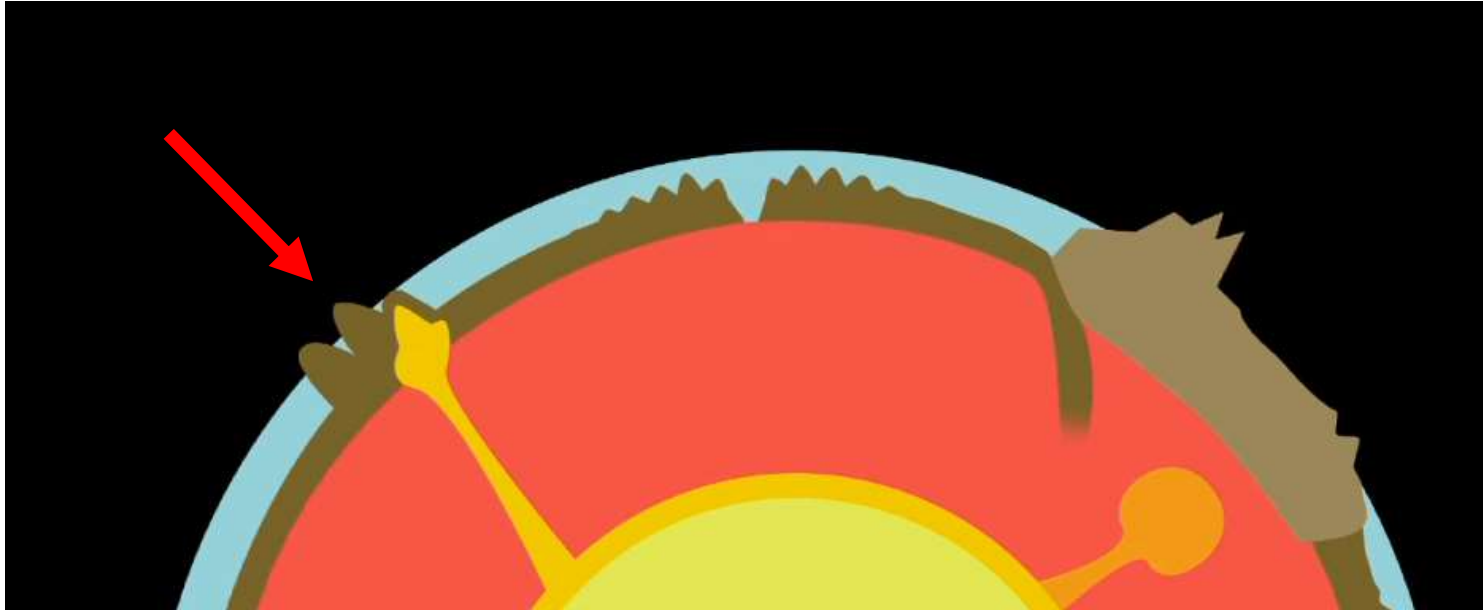


This explanation did not convince the majority of workers in either field, largely because of the lack of any known mechanism that could cause continents to move horizontally or to fragment.

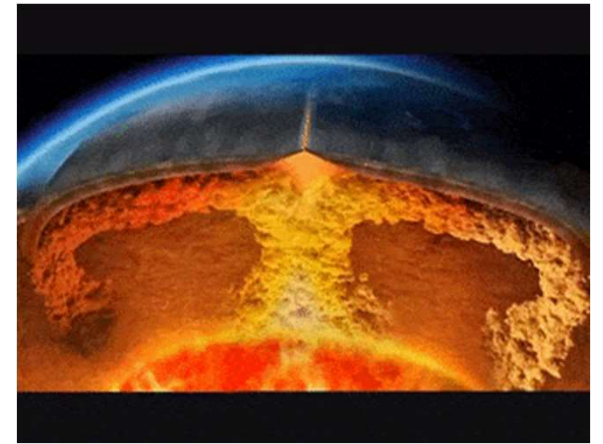
Part of the theory that Earth's land masses are in motion

1960s: Plate tectonics theory is the central paradigm of the earth sciences





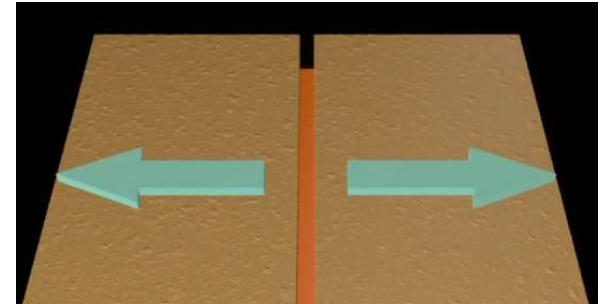
From Vimeo video: <https://vimeo.com/69911511>



St. Andrea's fault

Plate boundaries are of 3 types

DIVERGENT MARGIN: plates spread apart
(e.g. mid-Atlantic ridge)



CONVERGENT MARGIN: where one
plate goes down and beneath another
(subduction zone) (e.g. Japan)

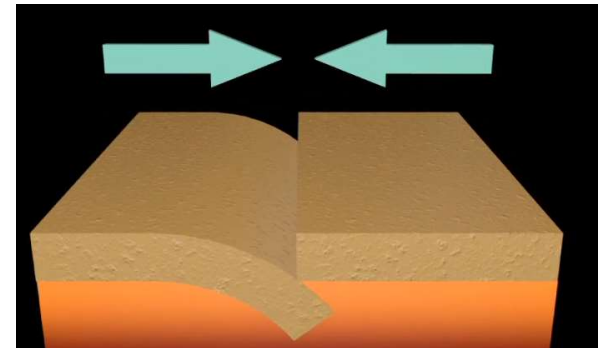
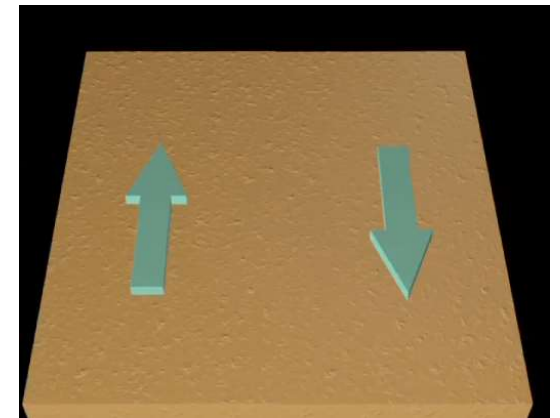



Plate boundaries are of 3 types

TRANSFORM FAULT: where the plates slide by one another (S. Andrea fault)



Temptation for workers in one field to accept, uncritically and without proper understanding, new ideas in the other field that seem to provide a solution



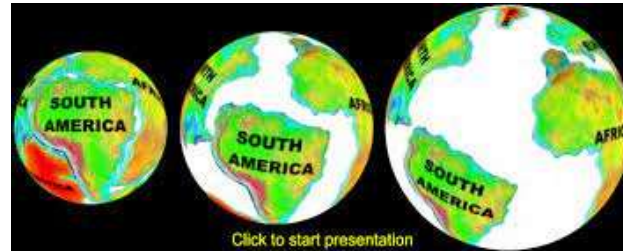
Published: 03 November 1977

Lost Pacifica continent

AMOS NUR & ZVI BEN-AVRAHAM

Nature **270**, 41–43 (1977) | [Cite this article](#)

207 Accesses | 83 Citations | [Metrics](#)



J. Phys. Earth, **26**, Suppl., S 21–S 37, 1978

SPECULATIONS ON MOUNTAIN BUILDING AND THE LOST PACIFICA CONTINENT

Amos NUR* and Zvi BEN-AVRAHAM**

*Department of Geophysics, Stanford University,
Stanford, California, U.S.A.

**Department of Mathematics, Weizmann Institute of Science, Rehovot and
the Israel Oceanographic and Limnological Ltd., Haifa, Israel

(Received October 6, 1978)

The notion of Pacifica and its breakup may provide an explanation for the similarities of flora, fauna, and rock sequences in widely separated locations in the mountain belts across the Pacific, and may tie in divergent paleomagnetic data.

WILEY



JOURNAL ARTICLE

Guest Essay: New Geological Theories
and Old Biogeographical Problems

C. Barry Cox



Journal of Biogeography
Vol. 17, No. 2 (Mar., 1990), pp. 117-130 (14 pages)

Published by: [Wiley](#)

Today, the acceptance of plate-tectonic theory is as complete as was acceptance of a stabilist Earth in Wegener's time. But also, now as then, some voices are being raised suggesting modifications to the accepted paradigm – slow or rapid expansion of the Earth, an ancient Pacifica continent, a mosaic of intrusive terranes inserted into the circum-Pacific continents, a radically different pre-Pangaea supercontinent. All these suggestions stimulate biogeographers to ponder again the implications for their own studies and, in particular, to consider whether any of these ideas may help to solve their own biogeographical problems. This requires not only an unprejudiced evaluation of the validity and scope of the new theories within the earth sciences, but also of their impact on biogeography as a whole. For it would be self-defeating to accept a theory which simplified existing biogeographical problems, if that same theory simultaneously disassembled the framework which at present explains the vast majority of biogeographical problems.

Main questions relating to Ecological zoogeography

Why is a species confined to its present range in space?

What enables it to live where it does, and what prevents it from expanding into other areas?

What roles do soil, climate, latitude, topography and interactions with other organisms play in limiting its distribution?

How do we account for the replacement of one species by another as one moves up a mountain or seashore, or from one environment to another?

Why are there more species in the tropics than in cooler environments?

Why are there more endemic species in environment X than in environment Y?

What controls the diversity of organisms that is found in any particular region?



Main questions relating to **Historical zoogeography**

How did the taxon come to be confined to its present range in space?

When did that pattern of distribution come to have its present boundaries, and how have geological or climatic events shaped that distribution?

What are the species' closest relatives, and where are they found? What is the history of the group, and where did earlier members of the group live?

Why are the animals of large, isolated regions, such as Australia or Madagascar, so distinctive?

Why are some closely related species confined to the same region, but in other cases they are widely separated?

Phyto vs Zoo

Plants

- static
- Form and growth closely related to environmental conditions
- easy to collect and preserve and to note soil and climate conditions in which they live.
- fossil remains less common
- seeds, wood, fruits and pollen difficult to be found associated among them.
- more difficult to interpretat
- taxonomy of flowering plants is based on flower morpho

**Ecological
biogeography**

Animals

- not-static
- Less closely related to environmental and ecological conditions
- bone remains associated in skeletons (easy to allocate to the correct family)

**Historical
biogeography**

At the beginning of the biogeography

Descriptive work

Mid-18th century: through worldwide explorations greater diversity of organisms was discovered.

Most people accepted the statements in the Bible: Earth and all living things that we see today had been created in a **single series of events** occurred a few thousands years before.

Since **God's actions** had always been **perfect**. **Animals and plants** that had been created were perfect, and **had not changed (evolved) or become extinct**, and that the world itself had always been as we see it today.

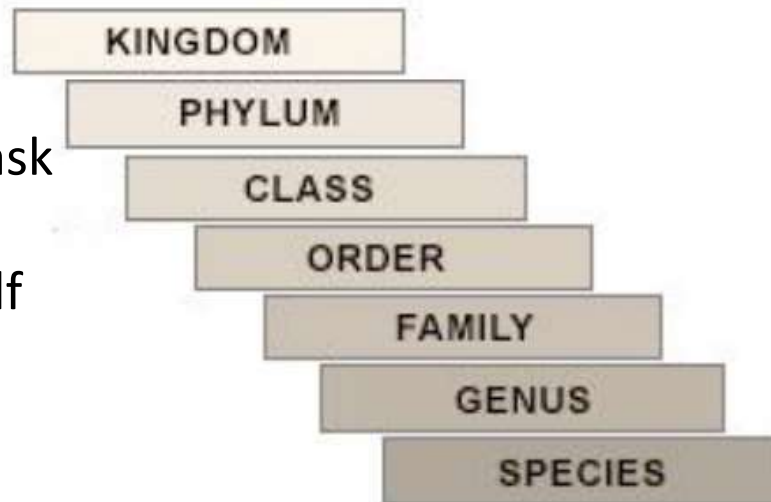
Explanation of the facts

Between then and mid-20th century: the limited vision was gradually replaced by the realization that both the living world and the planet that it inhabits are continually changing, driven by two great processes – the **biological process of evolution** and the **geological process of plate tectonics**.



Carolus Linnæus (1708-1778)

- Swedish naturalist and taxonomist
- Developed a system to classify life that included binomial nomenclature
- Believed in Creation and thought it was his task to catalogue all of God's creations – called himself «God's registrar»



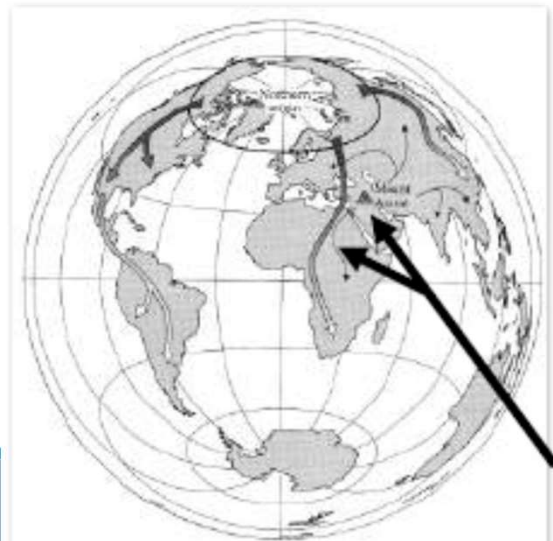
- He thought species were immutable, a question he pondered was:

How did different species become adapted to so many different environments?



His explanation was that Noah's Ark had landed on Mount Ararat

- This tall mountain had many different elevational zones
- Each immutable species was already adapted to a particular zone
- Each species spreads out to its respective environment over the globe after the Great Flood



He recorded also whereabouts in the world each species is found, but he did not synthesise these observations into floral or animals assemblages of the different continents or regions.

Georges-Louis Leclerc de Buffon

(1) He observed that different parts of the world, even those with similar conditions, were inhabited by distinct kinds of plants and animals.

(2) He found it unlikely that all species would be able to disperse across inhospitable habitats (and there were many inhospitable barriers)

Buffon's Law:

environmentally similar but isolated regions have distinct assemblages of mammals and birds



Buffon's hypothesis of species dispersal



He suggested that America and Eurasia were in the «Old World» adjacent.

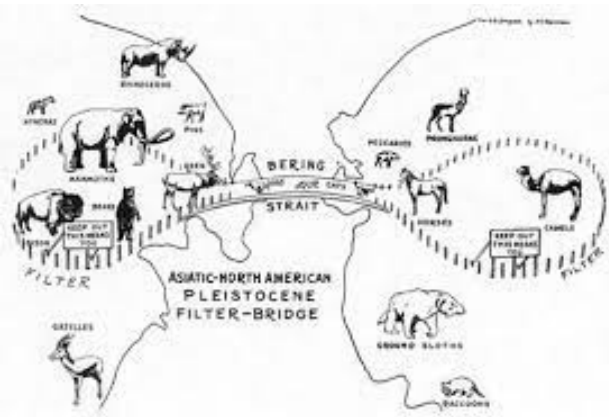
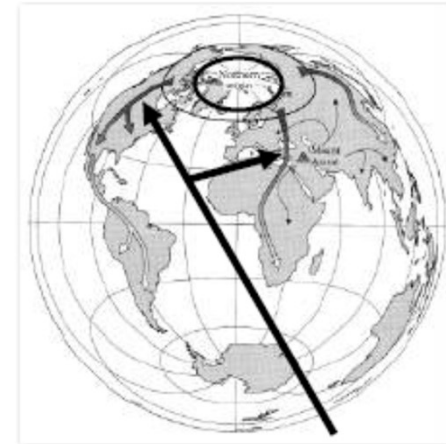


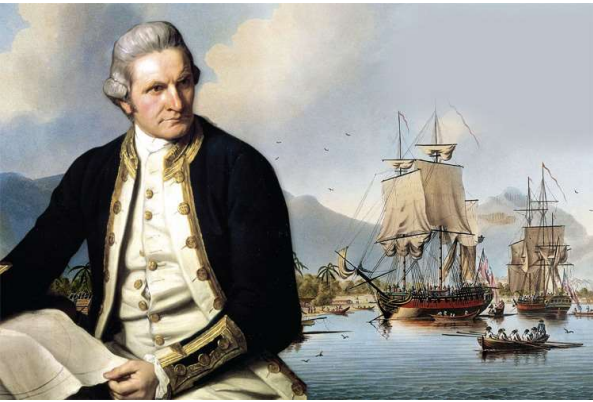
Different mammals sought out whichever area they found most congenial (Species Dispersion)



Only later the ocean separated the two continents, and the two **now-different faunas** might have been due to the action of the **climate**.

Buffon used **fossil records** to reconstruct life history (ten thousands of yrs). Only in the **last part the human beings arrived**. In earlier periods **tropical life had covered areas that now are temperate or subarctic**.





1772-1775 in his second voyage around the world, Captain James Cook and



British botanist Joseph Banks



German Johann Reinhold Forster and his son Georg Foster



Foster found Buffon's Law applied to plants as well as animals, and also applied to any region of the world that was separated from others by geographical or climate barriers.



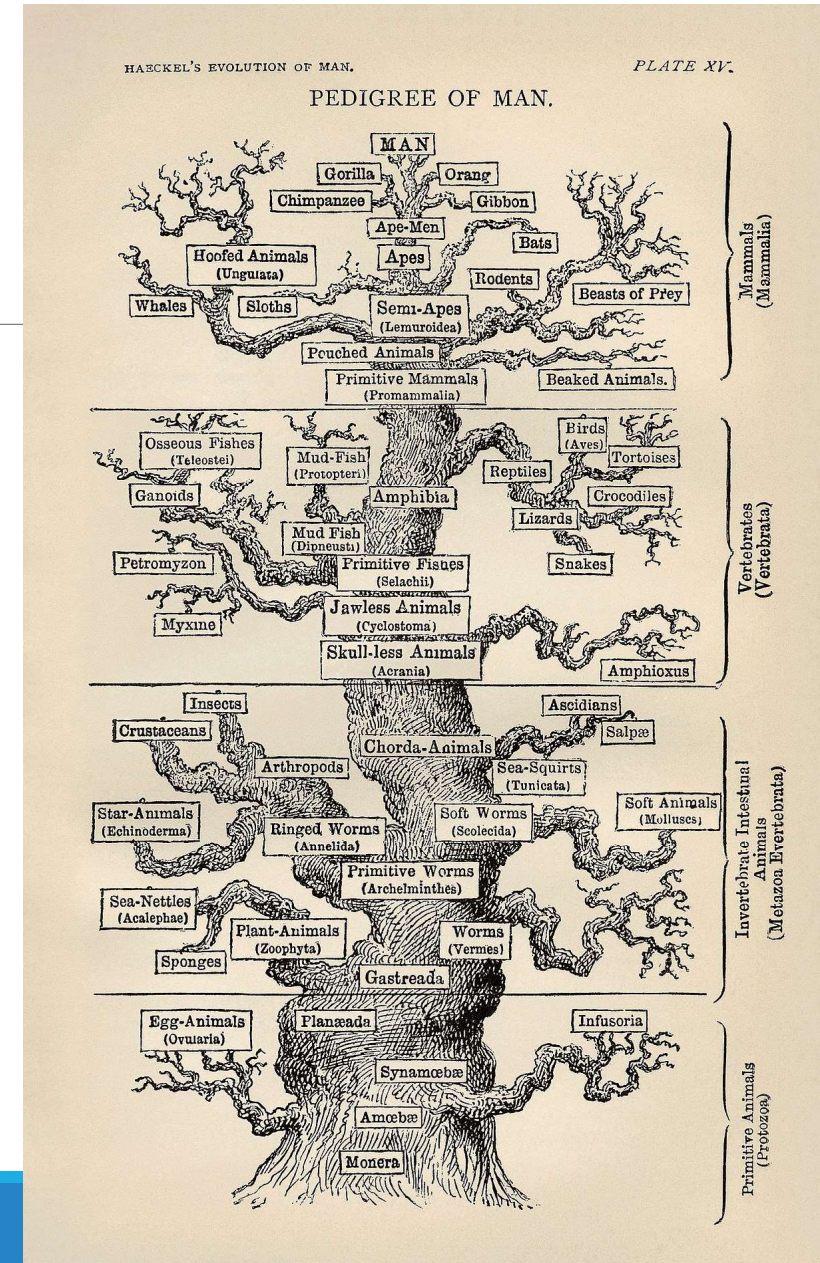
He realised the existence of the now-called GRADIENTS OF DIVERSITY

First seeds about the Evolution

Late 18th century: SCALE OF BEINGS

Different groups of organisms could be allocated to 'lower' or 'higher' places according to the level of 'perfection' of their organisation, with human beings at the apex.

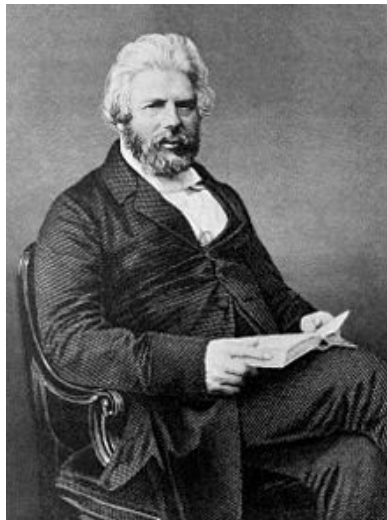
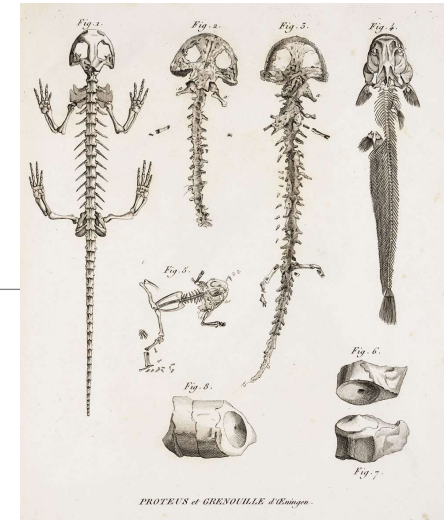
Lamarck (1802) suggested that 'lower' organisms might be found earlier in time and that they might gradually change into the 'higher' forms, due to an 'inherent tendency of life to improve itself'



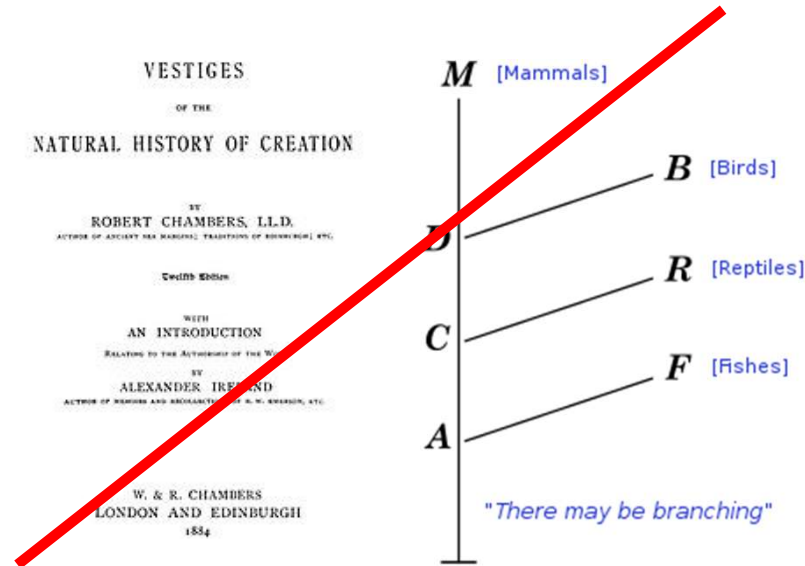


Mammoths of Europe and North America, as well as many others, belonged to a quite different species from those of today and were **extinct**

→ Opponent of Lamarck's theories

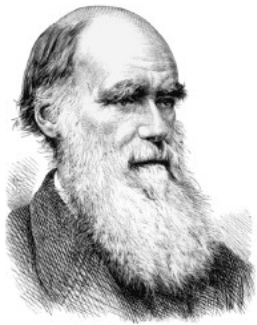


VESTIGES
OF THE
NATURAL HISTORY OF CREATION
BY
ROBERT CHAMBERS, LL.D.
AUTHOR OF ANCIENT AND MODERN TRADITIONS OF EDINBURGH, &c.
Twelfth Edition
WITH
AN INTRODUCTION
RELATING TO THE AUTHORITY OF THE WORK
BY
ALEXANDER IRVING
AUTHOR OF REMAINS AND DISCOVERIES OF A. N. SHERIDAN, &c.
W. & R. CHAMBERS
LONDON AND EDINBURGH
1884

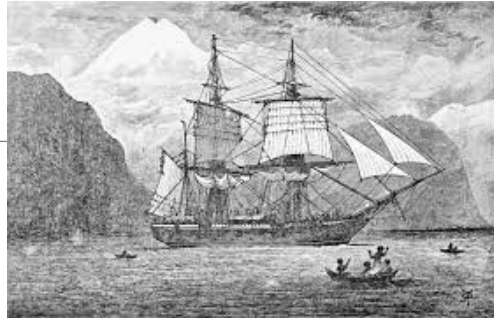


The progressively more **detailed fossil record** that was by then being revealed also gave **no hint** or indication that the **major groups of organisms**, traced back in time, **converged towards a common, ancient ancestor.**

Early 19th century



CHARLES DARWIN



Alfred Russel Wallace (1823-1913)

father of biogeography



The Malay Archipelago

20 April 1854 (arrived in Singapore) - 1 April 1862



