

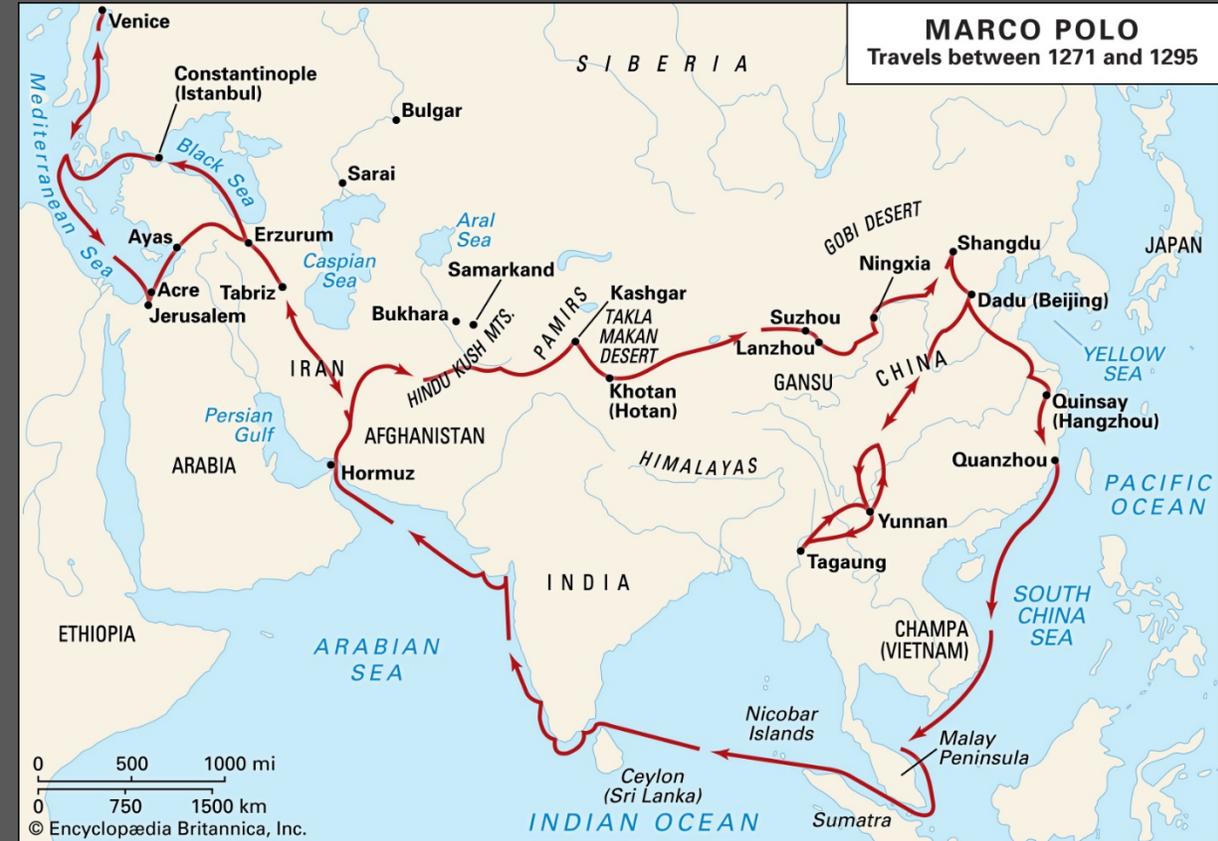
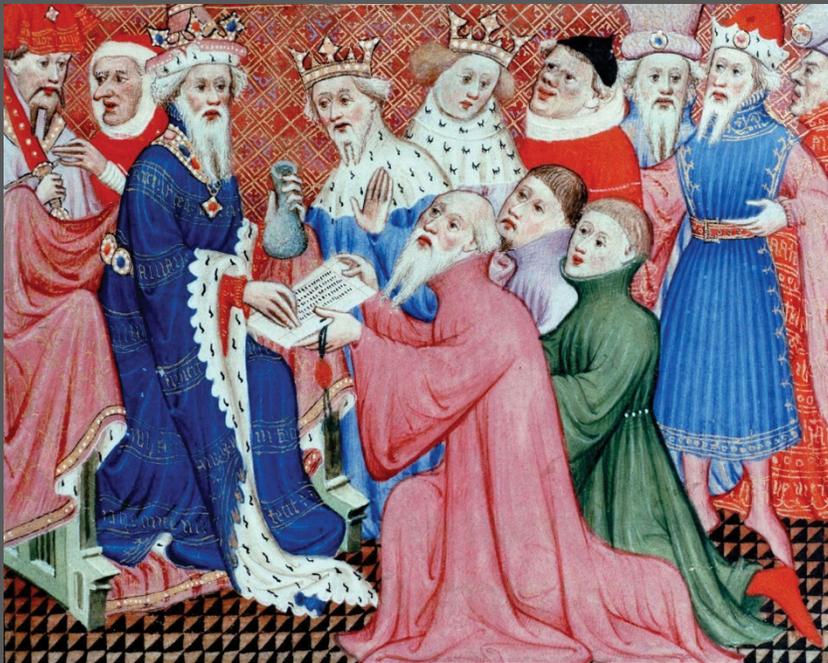
CONNECTED KNOWLEDGE

Das ist der edel kintter-Marcho polo von
Hendig der grodt landtrenter. der uns hrdhrchr die grodt
rgag der sunne. der gleyche vor nicht mer gebozt seyn



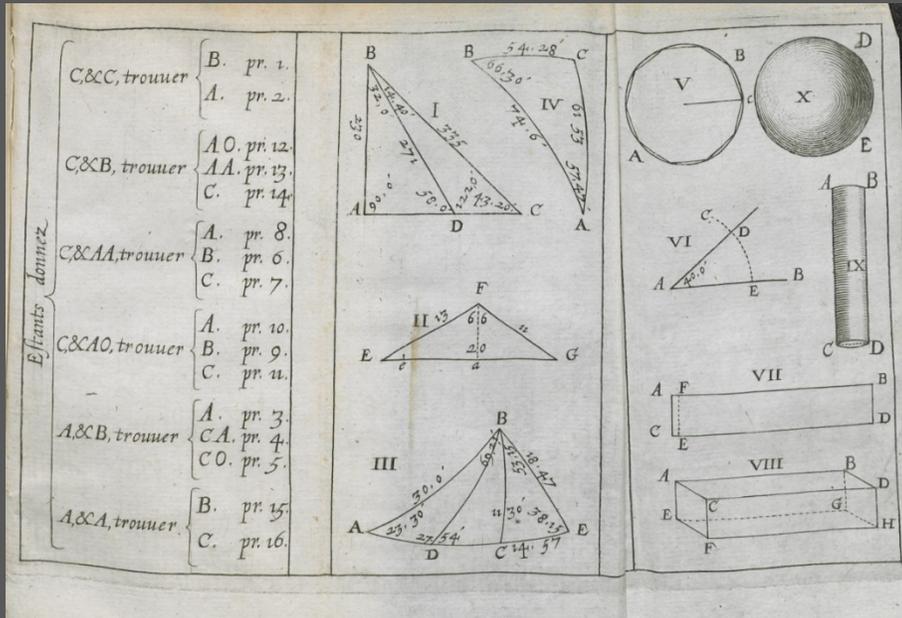
EARLY TRAVELLERS AND KNOWLEDGE

The Polo family appears to have been shrewd, alert, and courageous they moved across vast distances, creating diplomatic and business links with leaders such as Berke Khan, sovereign of the western territories in the Mongol Empire, and the great Kublia Khan. They remained in China for 17 years, eventually returning to Europe as Kublia Khan's ambassadors, carrying letters asking the pope to send him 100 intelligent men "acquainted with the Seven Arts".

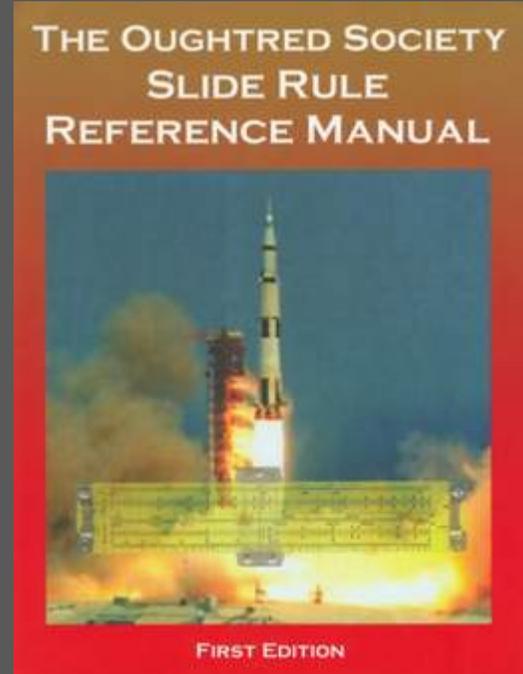


On his return to Venice, Marco Polo published "Il Millione", which he intended as a vast cosmography based on first hand experiences – as captured in its first title *Divisament dou monde*. It is a panoramic account viewed through a powerful wide-angle lens.

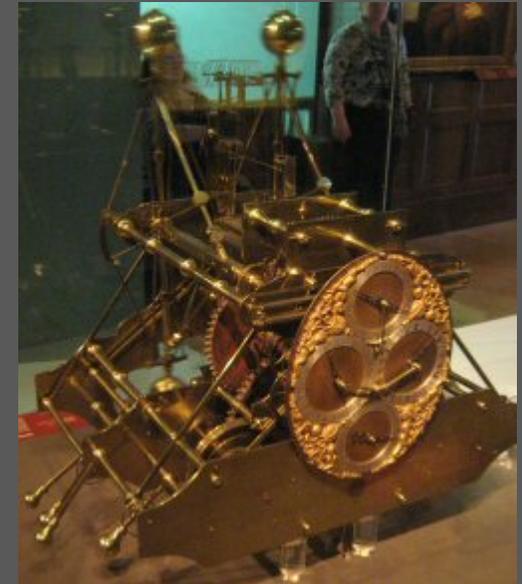
MEASURING THE NATURAL WORLD



Usage de la reigle de proportion en l'arithmetique et geometrie, 1624 Wingate



Oughtred and the Slide rule

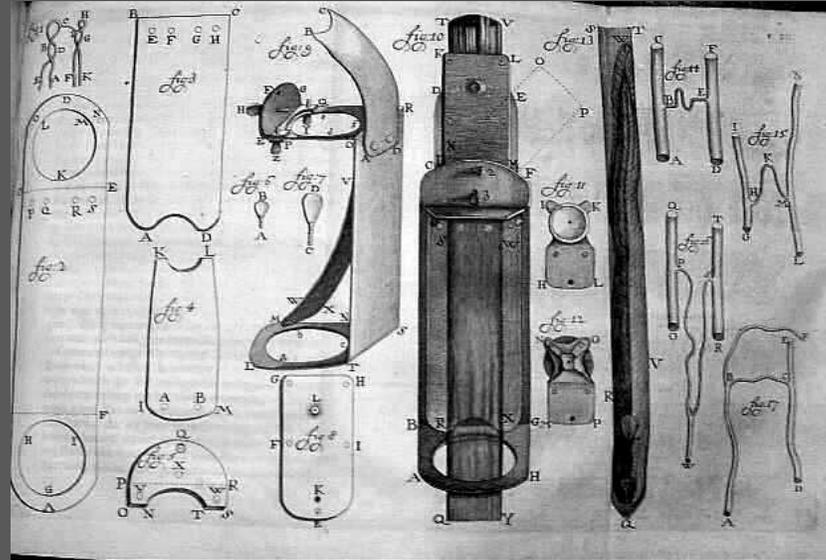


John Harrison's H1 Marine Chronometer

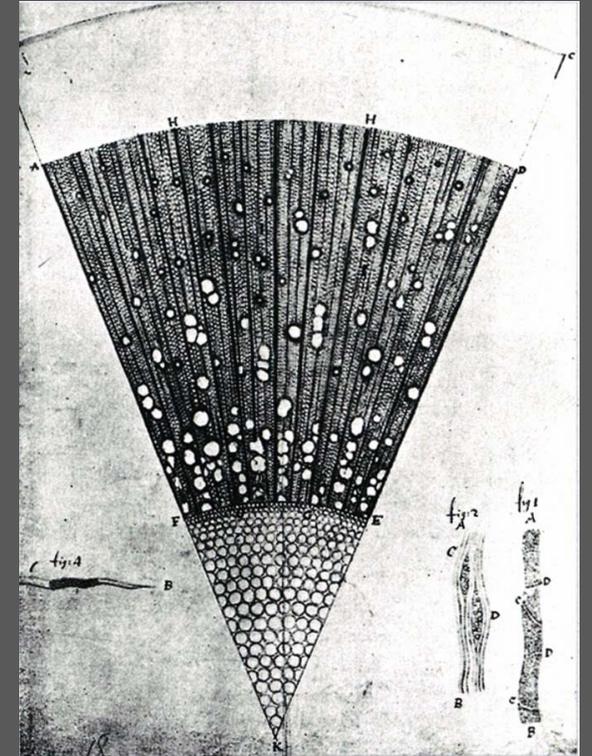
SAMPLING THE NATURAL WORLD



Antonie van Leeuwenhoek 1632-1723
“Father of Microbiology”



van Leeuwenhoek's microscopes
(Henry Baker)



A microscopic section of a
one-year-old ash tree (*Fraxinus*)
wood

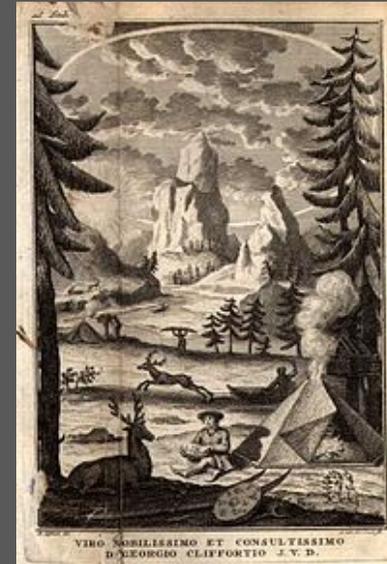
DETAILED OBSERVATIONS OF THE NATURAL WORLD



Carl Linnaeus 1707 -78



Lapland Expedition



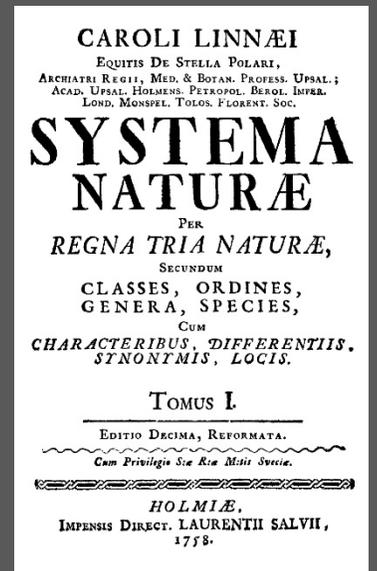
Flora Laponica



Praeludia Sponsaliorum Plantarum



Linnea borealis sp.



Linnean Classification

GAZETTING THE NATURAL WORLD

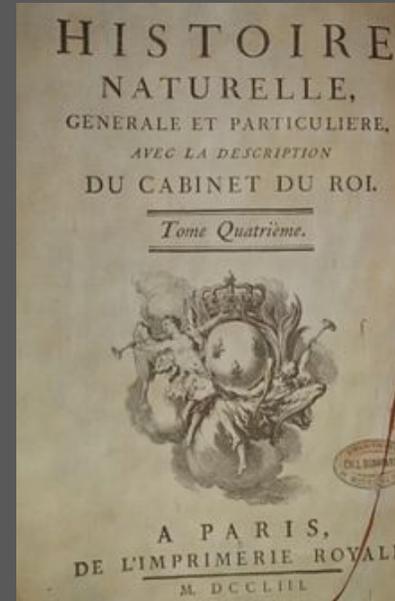


Solander and Banks accompanied James Cook to Australia 1768-1771



Brugiera conjugata

'Bustard Bay' [JB];
'No specimens for this'
[unknown]



Histoire Naturelle
1753;
The White Shark

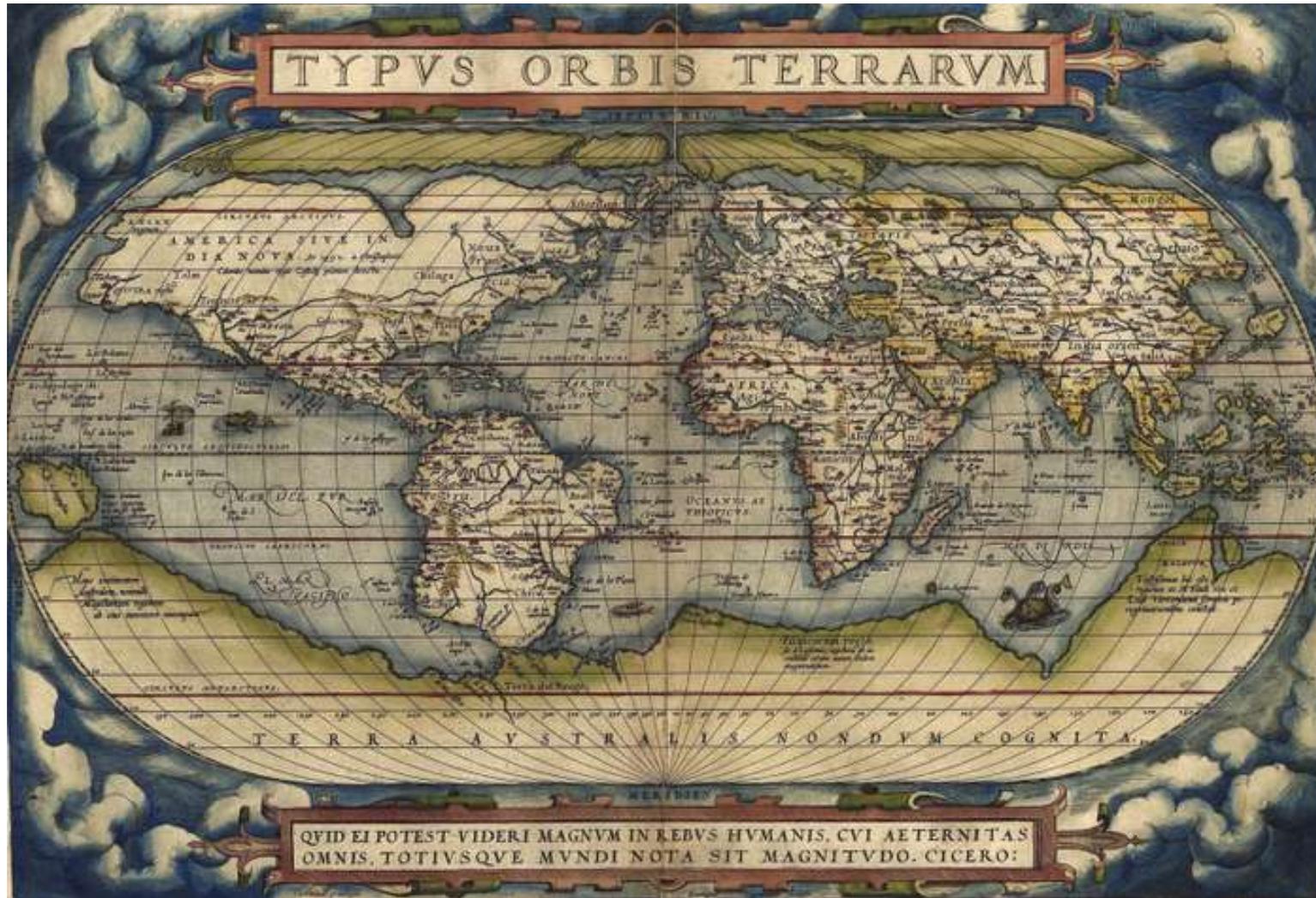


Georges-Louis Leclerc,
comte de Buffon

GEOGRAPHY MATTERS



THE THEATRE OF THE WORLD



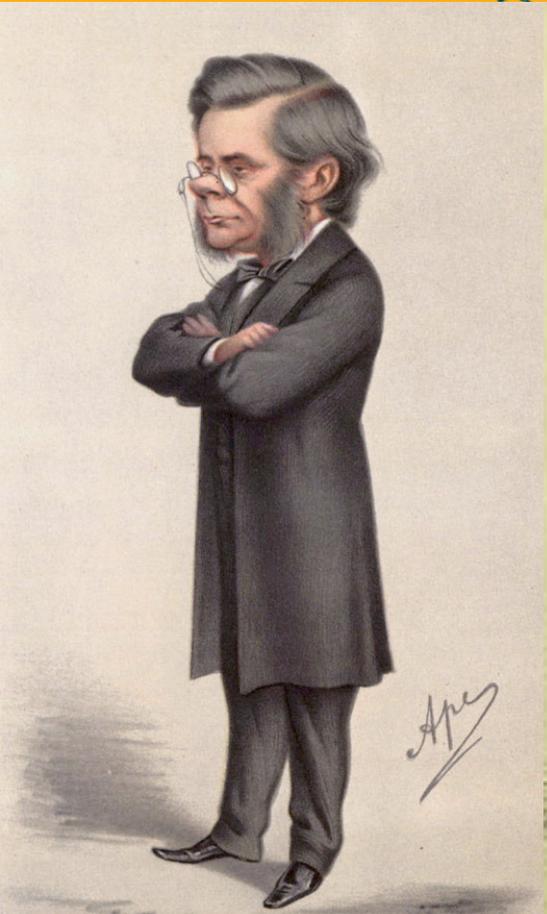
Collections of maps were assembled and published in atlases, a term first used by the 16th-century Flemish surveyor and cartographer Gerardus Mercator (Gerhard de Cremer) for his collection of maps of northern Europe, published in 1595; the first collection of maps of the world, *Epitome of the Theatre of the World* (1570), was produced by Mercator's contemporary, the Belgian cartographer Abraham Ortelius.

World map from *Theatrum orbis terrarum* by Abraham Ortelius, 1570.
Geography and Map Division/The Library of Congress, Washington D.C.

Background: Drawing of a silk cotton tree by Richard Spruce on his travels with Alfred Russel Wallace, 1850 (Image ©The Royal Society)

Prunus - m...
(the roots...
of a fig...
A... of the...

OBSERVATIONS AND THEORIES



From Darwin to DNA

A statement from the Royal Society celebrating the 150th anniversary of the publication of *The Origin of Species*



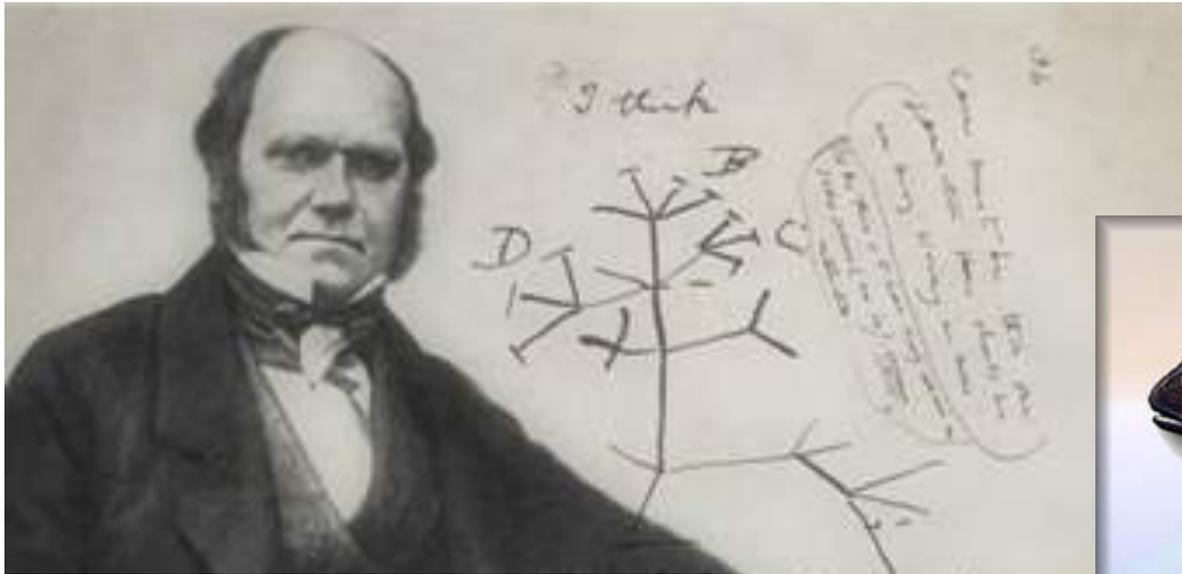
Huxley

Bishop Wilberforce

1860 Oxford evolution debate

THE ROYAL SOCIETY

DARWIN'S FISHES – SPIRITS OF WINE



Corvina adusta, Agaz. - . Exd 695. Fish. Above more coppery, with irregular transverse bars of brown; beautifully iridescent with violet. June. 696.

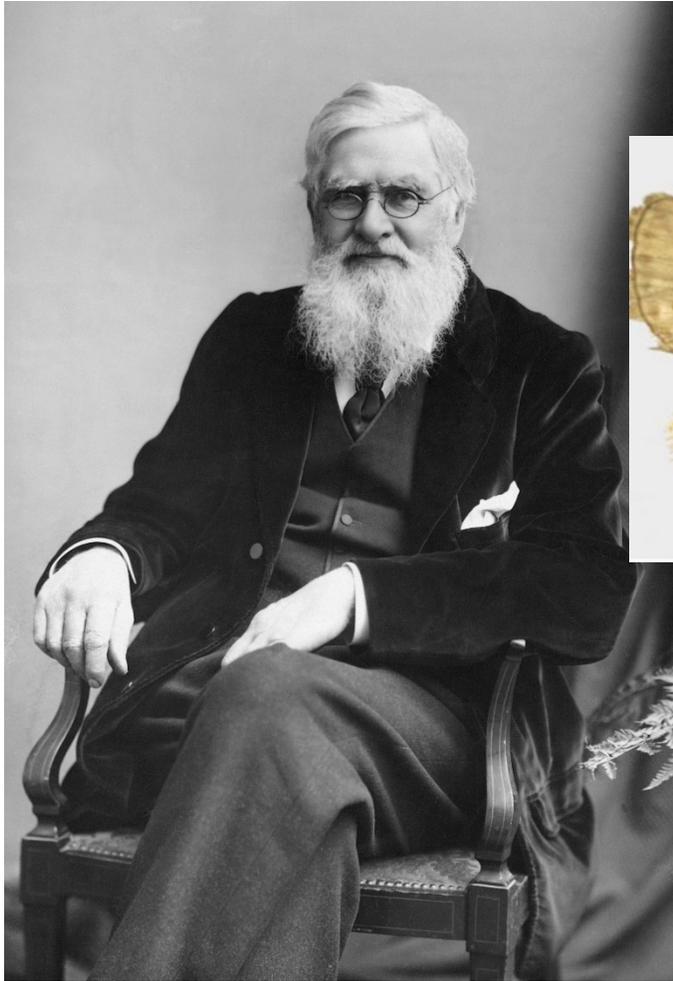


Dules auriga, Cuv. . Exd 696. Fish. Sides with numerous waving longitudinal lines of brownish red; intermediate species greenish - silvery, so figured as to look mottled; head marked with lines of dull red & green; ventral, and anal fins coloured dark greenish blue.



McGlade, J. (2004). Fish in Spirits of Wine. In D. Pauly (Author), *Darwin's Fishes: An Encyclopaedia of Ichthyology, Ecology, and Evolution* (pp. 213-233). Cambridge: Cambridge University Press.

WALLACE'S BIRDS AND BUTTERFLIES – FATHER OF BIOGEOGRAPHY



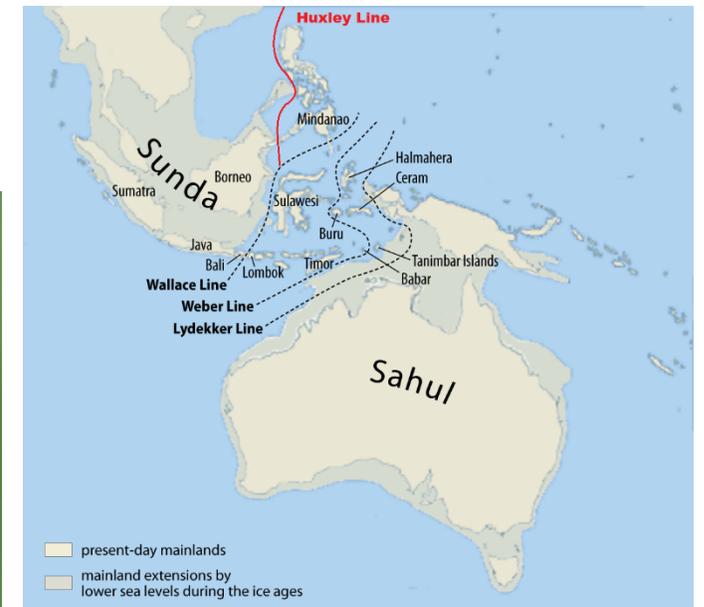
Alfred Russel Wallace



Famegan nisa

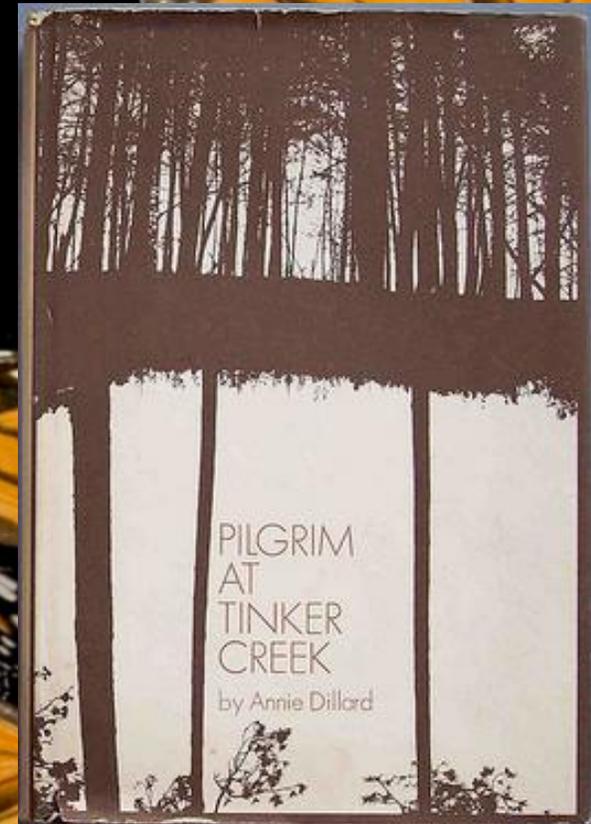
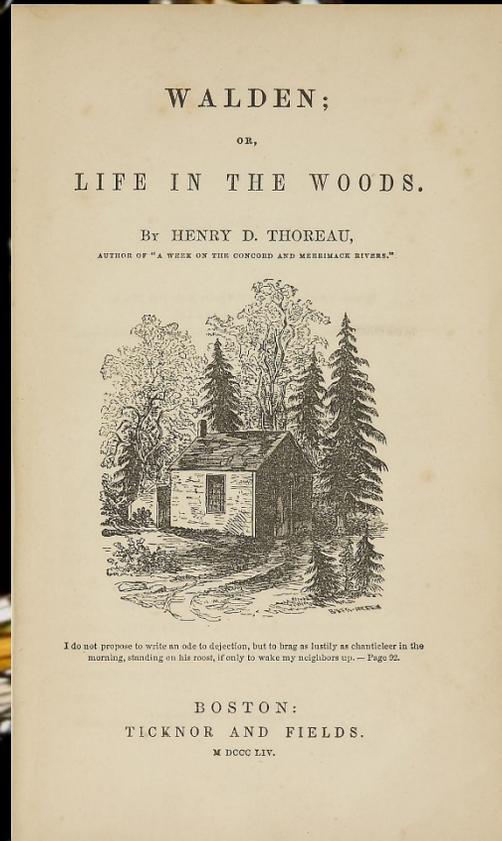
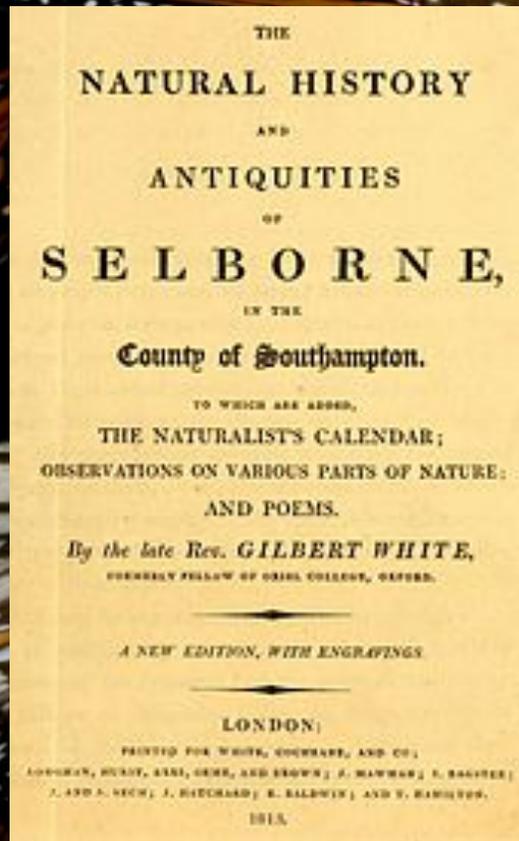


Nectarina jugularis



Wallace's Line delineates Australian and Southeast Asian fauna

CLOSE OBSERVERS OF NATURE



LORENZ CHAOS AND THE BUTTERFLY EFFECT

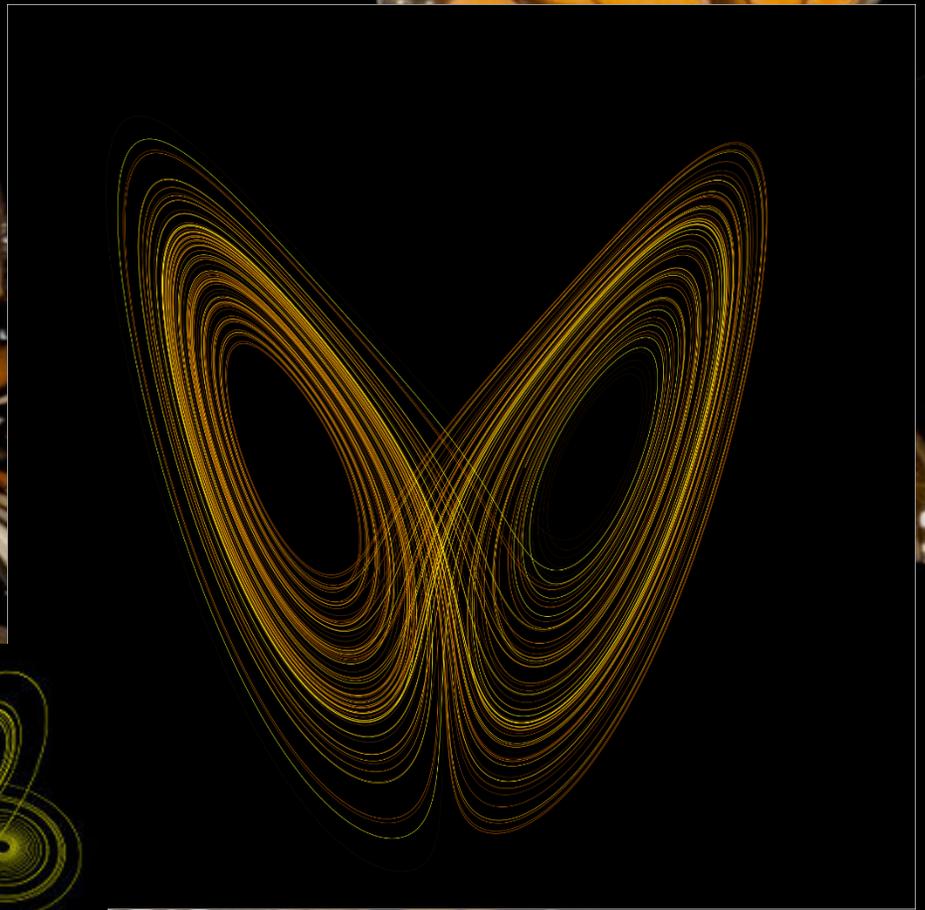
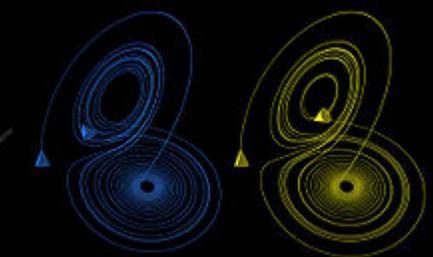
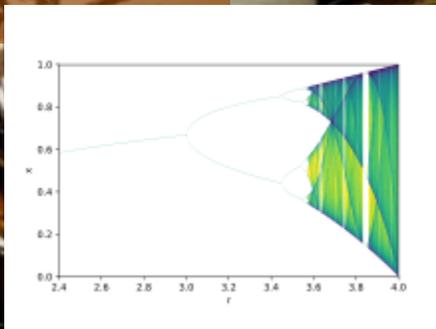
Sensitivity to initial conditions

Topological transitivity/ mixing

Dense periodic orbits

Strange attractors

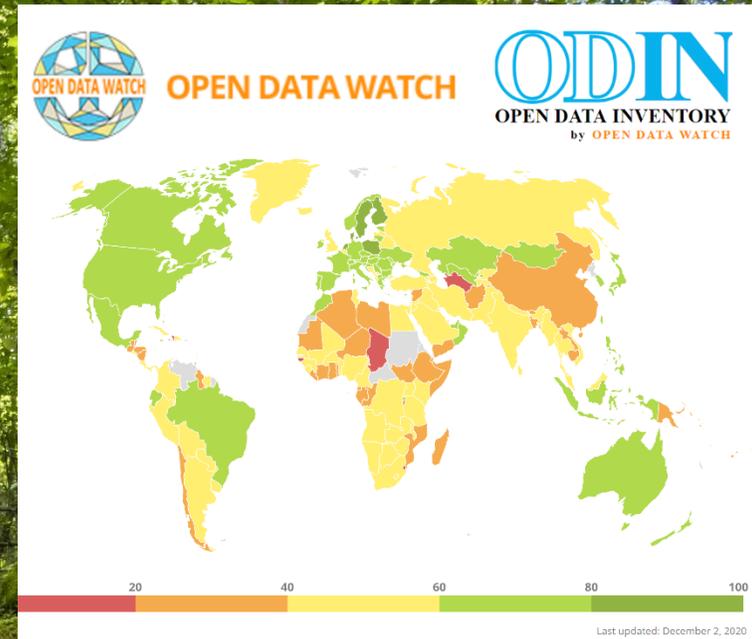
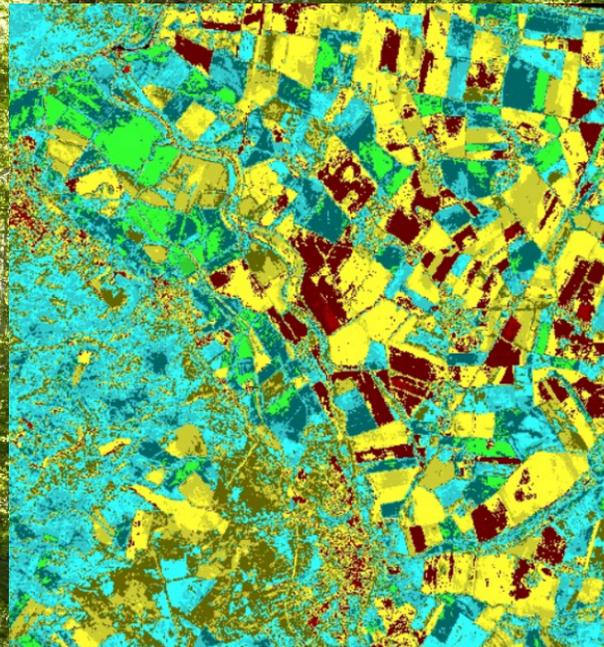
Minimum complexity



OPEN SCIENCE, OPEN DATA & OMICS

Darwin Tree of Life Project

aims to sequence the DNA of more than 60,000 species from across the British Isles.



ONTOLOGIES METAPHYSICS & AI

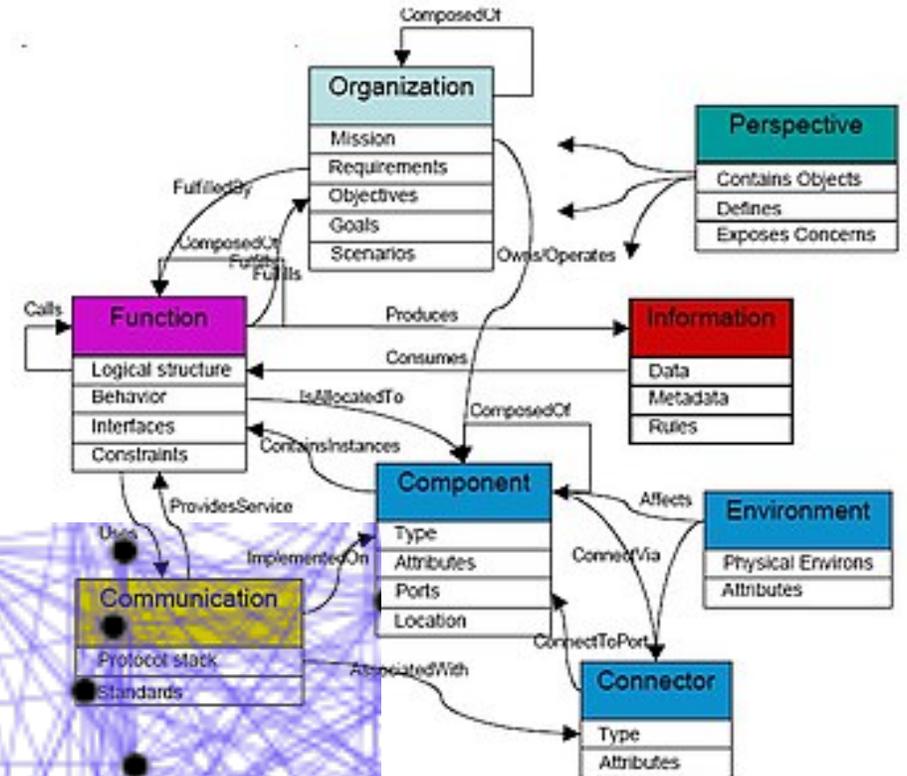
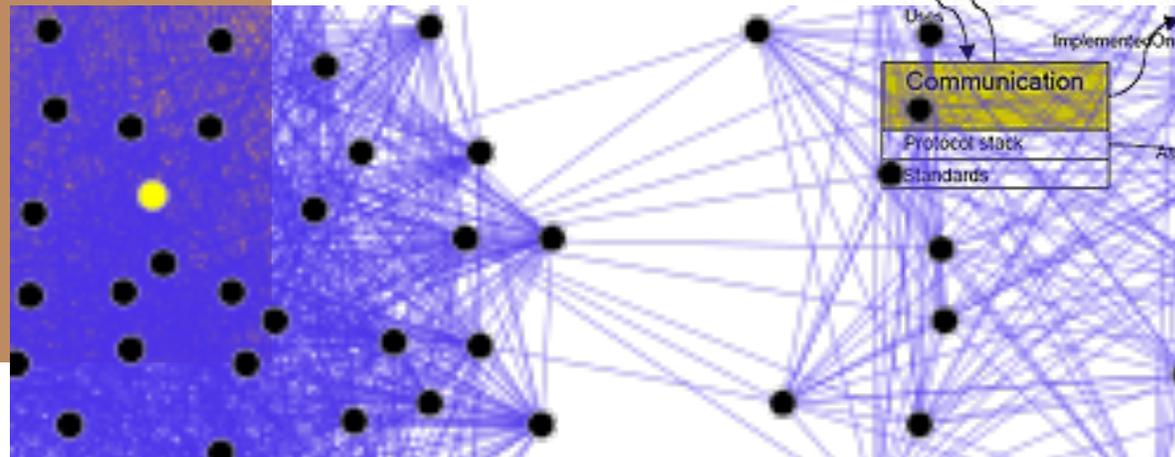
Universals

Intrinsic and extrinsic properties

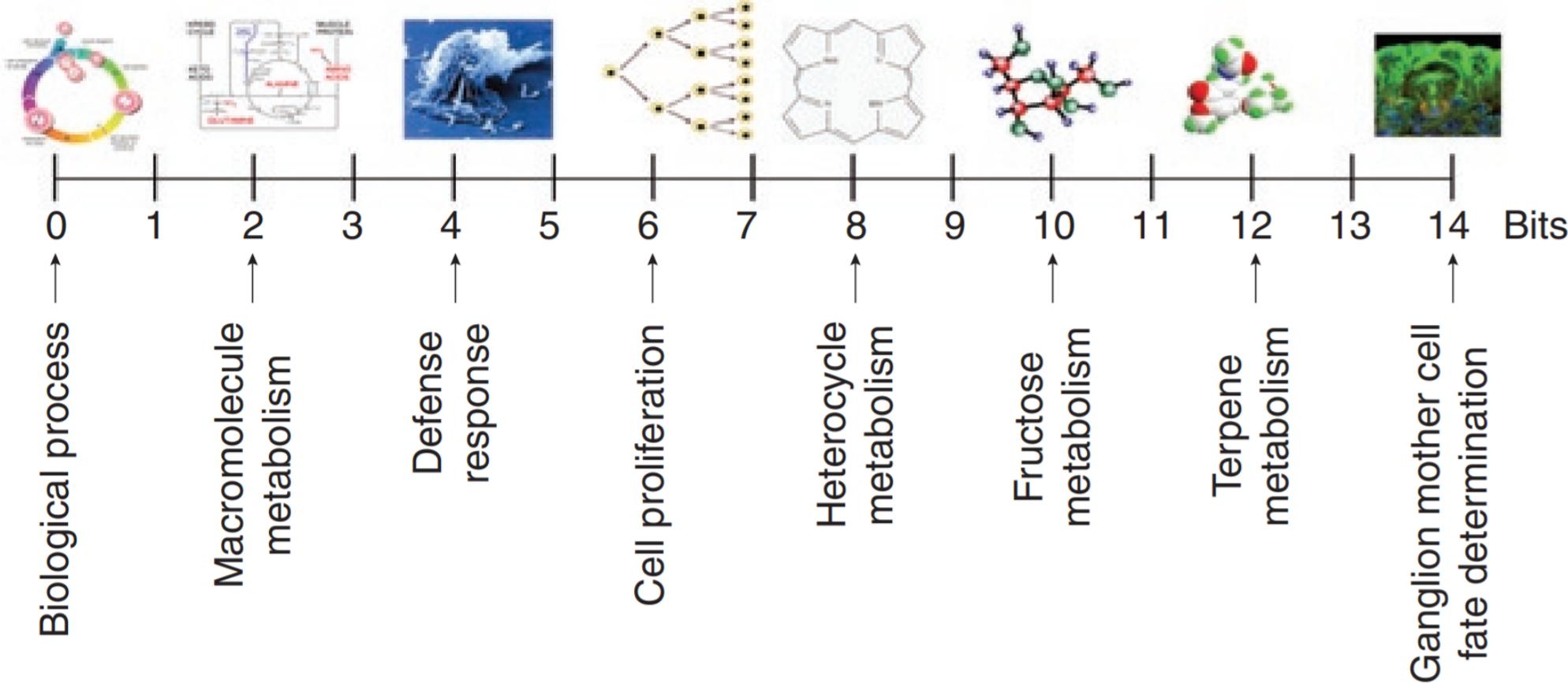
Semantic networks

Taxonomies

Semantic Web



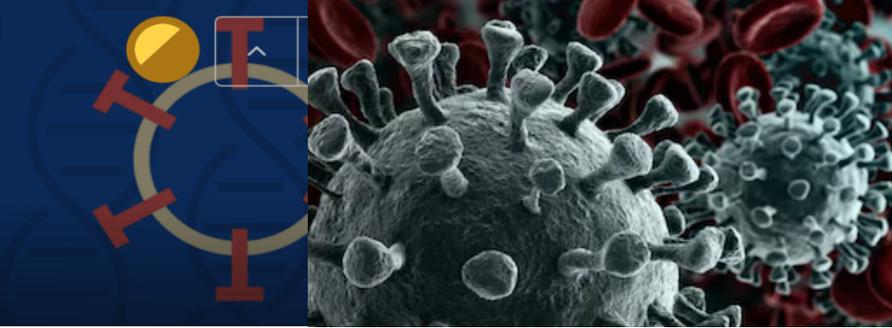
GENE ONTOLOGY – CROSS-SCALE TRANSLATION OF KNOWLEDGE



COVID-19 Open Research Dataset Challenge (CORD-19)

An AI challenge with AI2, CZI, MSR, Georgetown, NIH & The White House

AI2 Allen Institute For AI and 8 collaborators • updated 6 days ago (Version 72)



**CORONAVIRUS
RESOURCE CENTER**

- Home
- Tracking**
- Testing
- Tracing
- Vaccines
- By Region
- News & Resources
- About

- Tracking Home
- Critical Trends
- Global Map**
- U.S. Map
- Data in Motion

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Global Cases

85,497,369

Cases by

Country/Region/Sovereignty

- 20,739,217 US
- 10,340,469 India
- 7,733,746 Brazil
- 3,226,758 Russia
- 2,721,590 United Kingdom
- 2,716,997 France
- 2,255,607 Turkey
- 2,166,244 Italy
- 1,958,844 Spain



- Cumulative Cases**
- Active Cases
- Incidence Rate
- Case-Fatality Ratio
- Testing Rate

Global Deaths

1,849,054

- 352,620 deaths US
- 196,018 deaths Brazil
- 149,649 deaths India
- 127,213 deaths Mexico
- 75,680 deaths

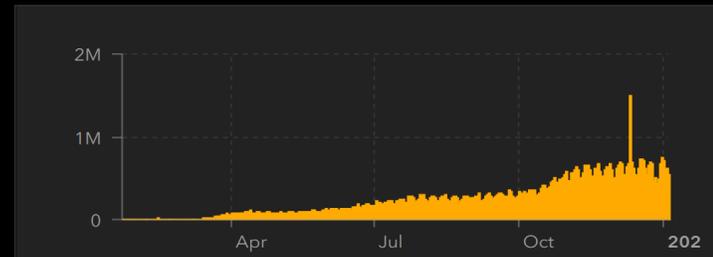
US State Level

Deaths, Recovered

- 38,575 deaths, **104,402 recovered** New York US
- 28,442 deaths, **1,451,846 recovered** Texas US
- 26,640 deaths, **recovered** California US
- 22,090 deaths, **recovered** Florida US

Global Deaths

US Deaths, Recov...

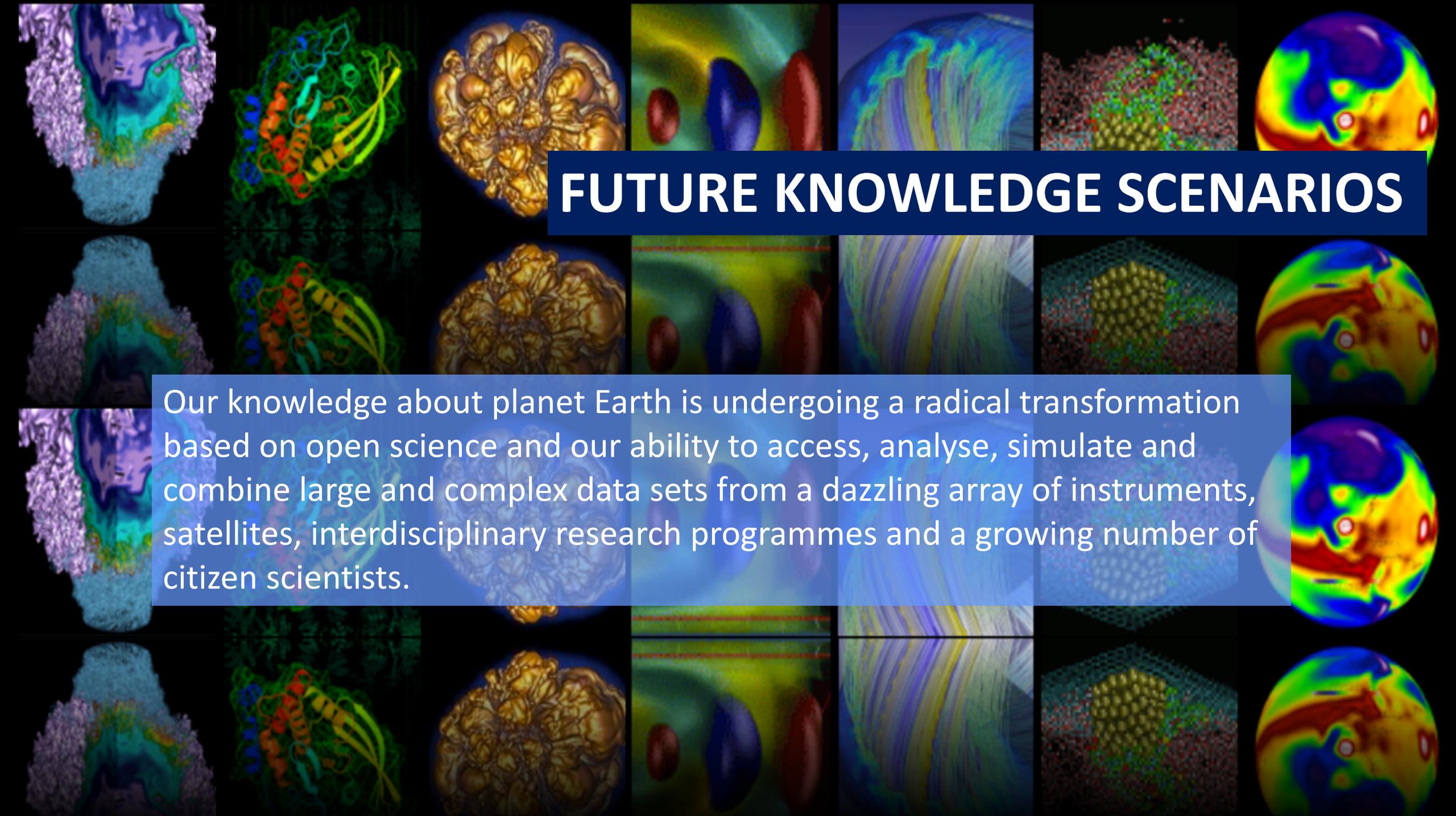


Daily Cases

191
countries/regions

Lancet Inf Dis Article: [Here](#). Mobile Version: [Here](#). Data sources: [Full list](#). Downloadable database: [GitHub](#), [Feature Layer](#).
Lead by [JHU CSSE](#). Technical Support: [Esri Living Atlas team](#) and [JHU APL](#). Financial Support:

Last Updated at (M/D/YYYY)
1/4/2021, 10:22 pm



FUTURE KNOWLEDGE SCENARIOS

Our knowledge about planet Earth is undergoing a radical transformation based on open science and our ability to access, analyse, simulate and combine large and complex data sets from a dazzling array of instruments, satellites, interdisciplinary research programmes and a growing number of citizen scientists.