

# The Dao of Scimat

人科之道

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## In One Sentence

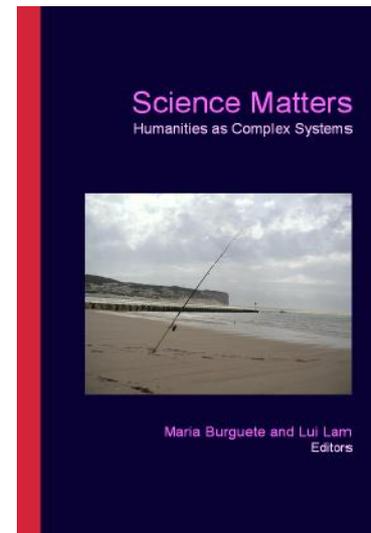
**Scimat** (Science Matters, 人科), a new multidiscipline introduced by Lam in 2007/2008, deals with the **science of humans**. It aims to raise the scientific level of the humanities by encouraging interaction between humanists and natural scientists.

In one sentence:

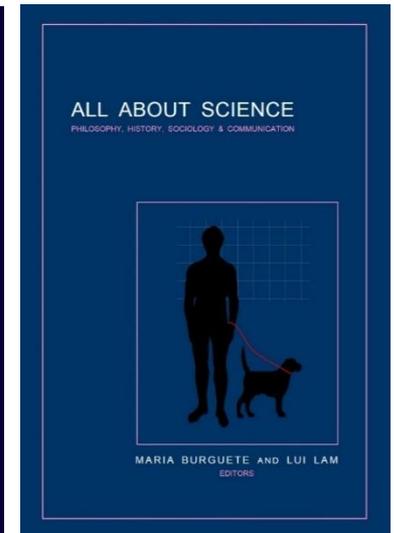
Everything in Nature is part of science !

That is, everything in Nature, humans included, are legitimate subjects of study in science.

Scimat website:  
[www.sjsu.edu/people/lui.lam/scimat](http://www.sjsu.edu/people/lui.lam/scimat)



2008



2014

# Four Tenets

**Conceptually**, scimat represents the four tenets:

1. Science is humans' effort to understand Nature without bringing in God or any supernatural.
2. Science covers everything in Nature.
3. Nature includes humans and all nonhuman systems.
4. All research on human matters, humanities in particular, are part of science.

**Disciplinarily**, scimat represents the collection of research disciplines that deal with humans:

Scimat = Humanities + Social Science + Medical Science

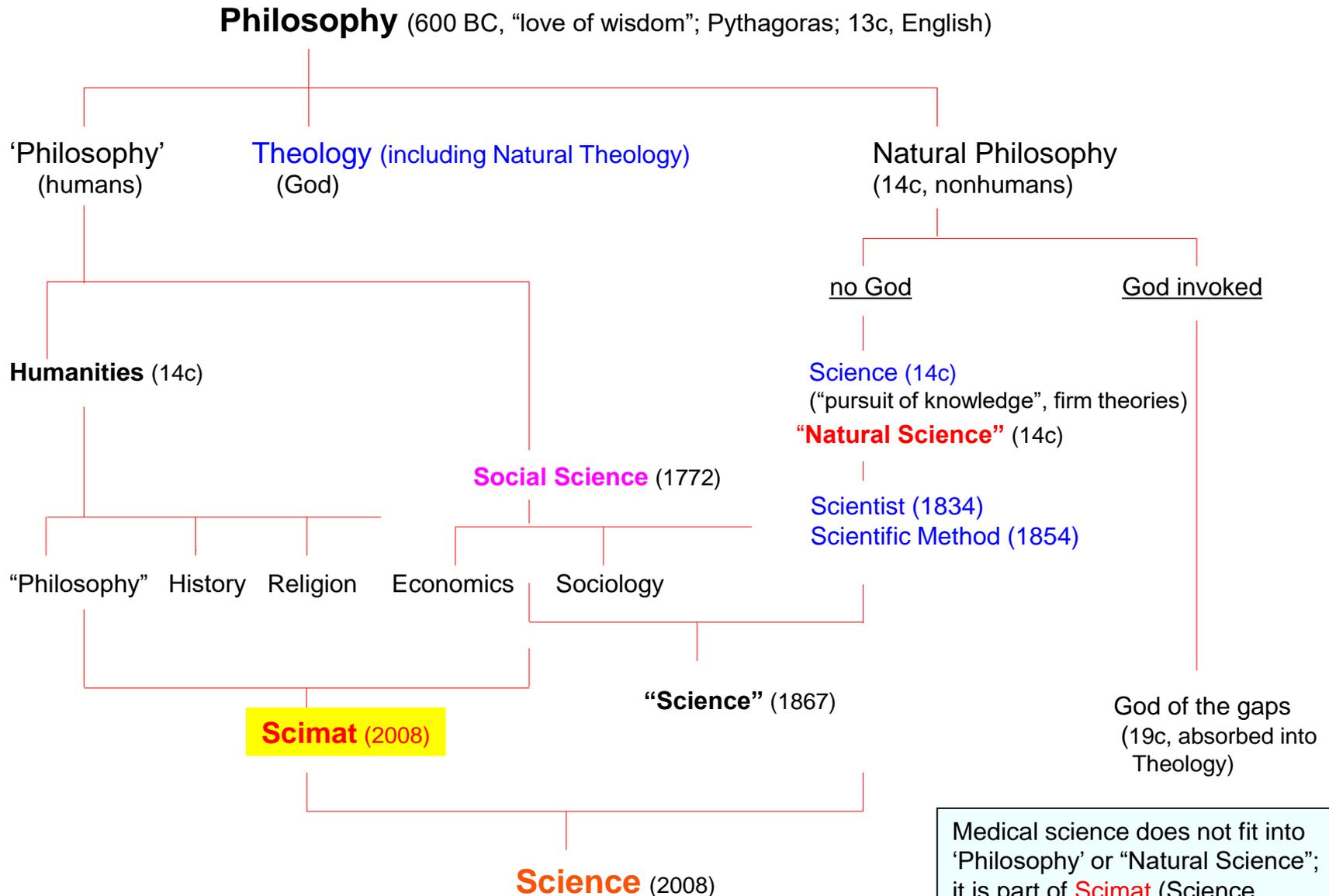
# One Insight

## The 1-2-3 insight:

One culture, two systems, three levels !

- There is only **one** culture—the scientific culture.
- All systems are simple or complex systems; the **two** are quite different.
- There are always **three** research levels (empirical, phenomenological, bottom-up) in any discipline.

# Birth of Disciplines & of Science



Medical science does not fit into ‘Philosophy’ or “Natural Science”; it is part of **Scimat** (Science Matters, 人科) which includes **all** human matters.

# Relationships of Disciplines

Science = Natural Science

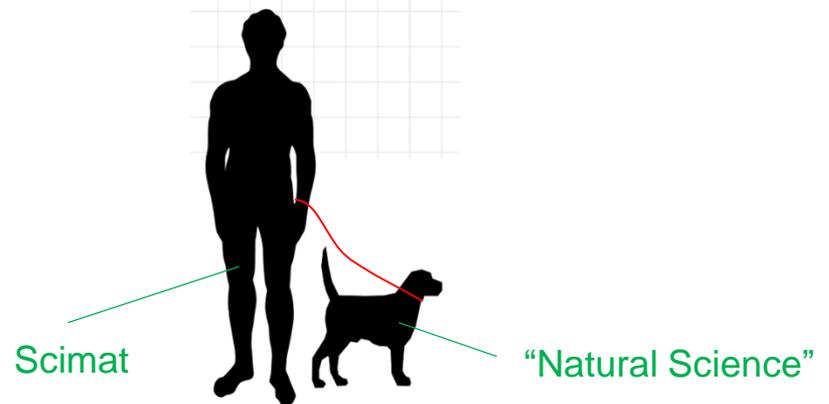
= Science of nonhumans + Science of humans

“Natural Science”

Scimat

Humanities + Social Science + Medical Science

The proper image of science:  
Two linked animals (one controls the other)



(not test tubes or nuclear symbol...)

# Basic Message 1: It All Started with the Big Bang

The cosmic timeline continues with fairly well-established events leading to the present day.

## Earliest Moments of the Big Bang → Formation of Atoms →

**$10^{-35}$  second**  
Cosmic inflation creates a large, smooth patch of space filled with lumpy quark soup

**$10^{-30}$  s**  
One potential type of dark matter (axions) is synthesized

**$10^{-11}$  s**  
Matter gains the upper hand over antimatter

**$10^{-10}$  s**  
A second potential type of dark matter (neutralinos) is synthesized

**$10^{-5}$  s**  
Protons and neutrons form from quarks

**0.01–300 s**  
Helium, lithium, and heavy hydrogen nuclei form from protons and neutrons

**380,000 years**  
Atoms form from nuclei and electrons, releasing the cosmic microwave background radiation

## Dark Ages → Modern Era →

**380,000–300 million yr**  
Gravity continues to amplify density differences in the gas that fills space

**300 million yr**  
First stars and galaxies form

**1 billion yr**  
Limit of current observations (highest-redshift objects)

**3 billion yr**  
Clusters of galaxies form; star formation peaks

**9 billion yr**  
Solar system forms

**10 billion yr**  
Dark energy takes hold and expansion begins to accelerate

**13.7 billion yr**  
Today

Atoms formed in stars

Earth formed

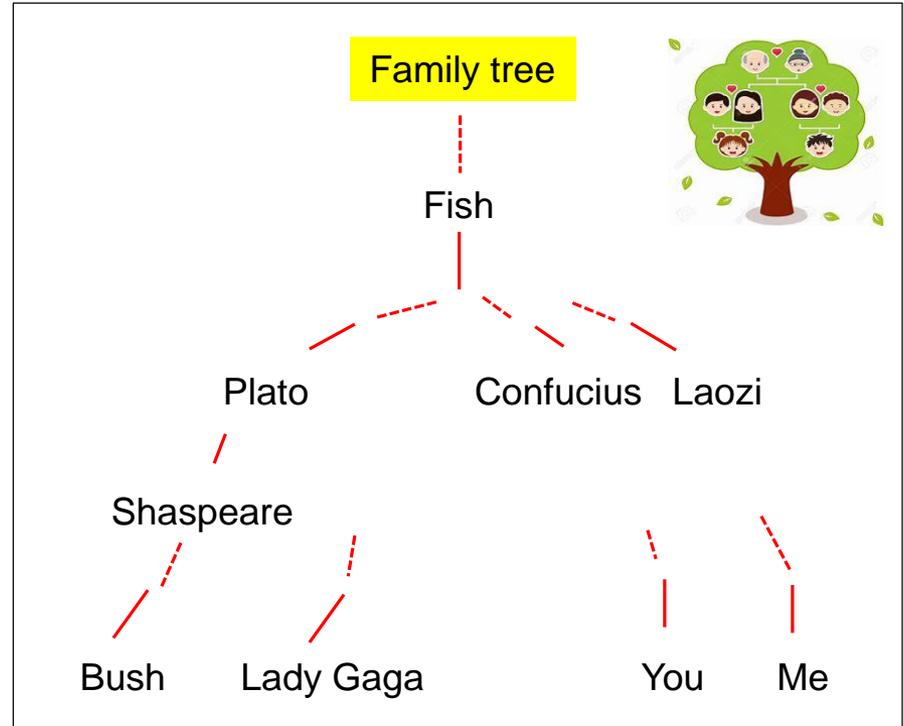
Life began

# Basic Message 2: We Are One Family, Descendants of Fish

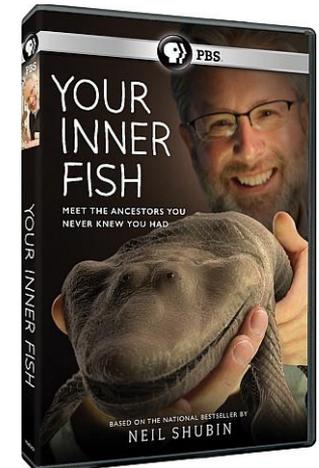
Our ancestor

**Microbrachius**

8 cm, 0.4 billion years ago



Darwin's evolutionary theory (1859)

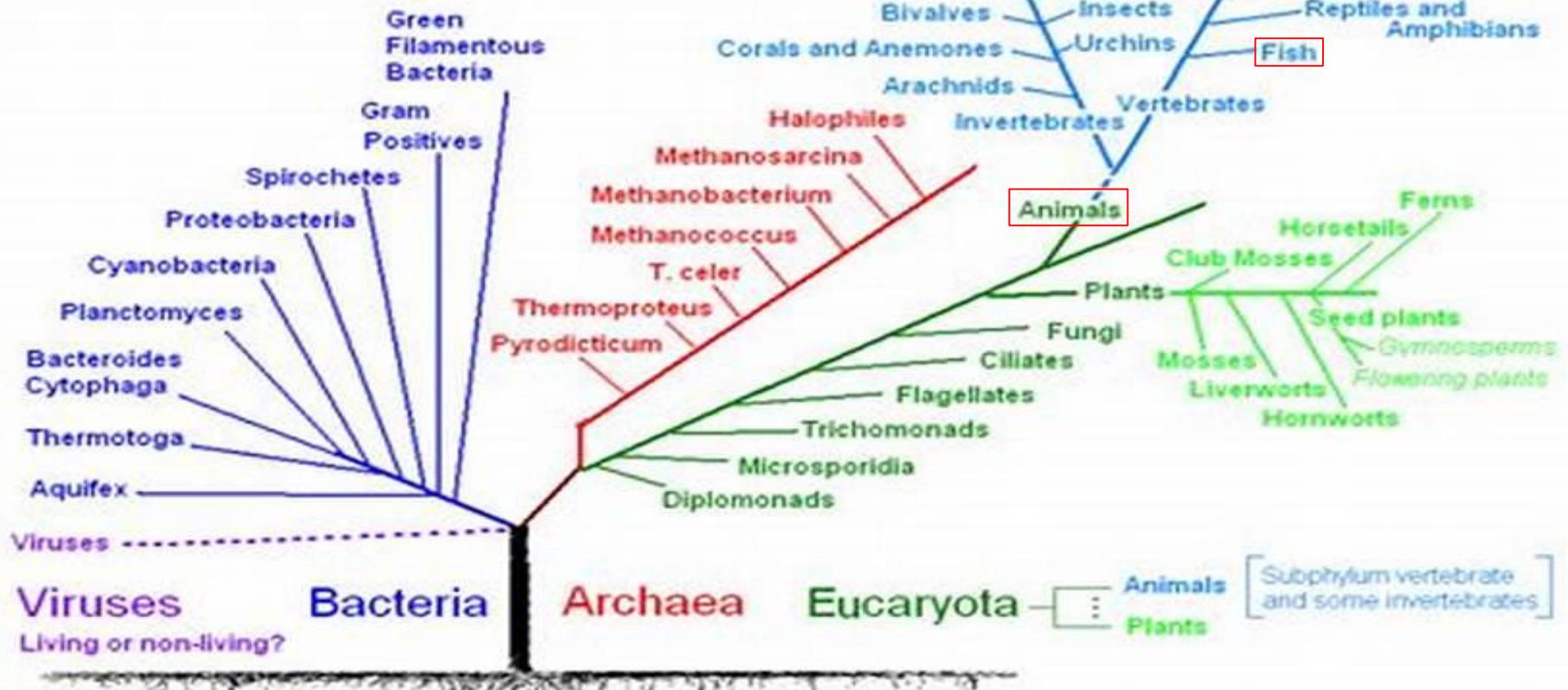




- Some 375 million years ago, the first **fish** crawled up onto land
- Fish **Tiktaalik** had enough strength in its front fins to do pushups and heave itself out of the water
- Our **arms, legs, necks and lungs** can be traced to fish (supported by DNA trace)
- Every one of us is **just a (jury-rigged) fish**

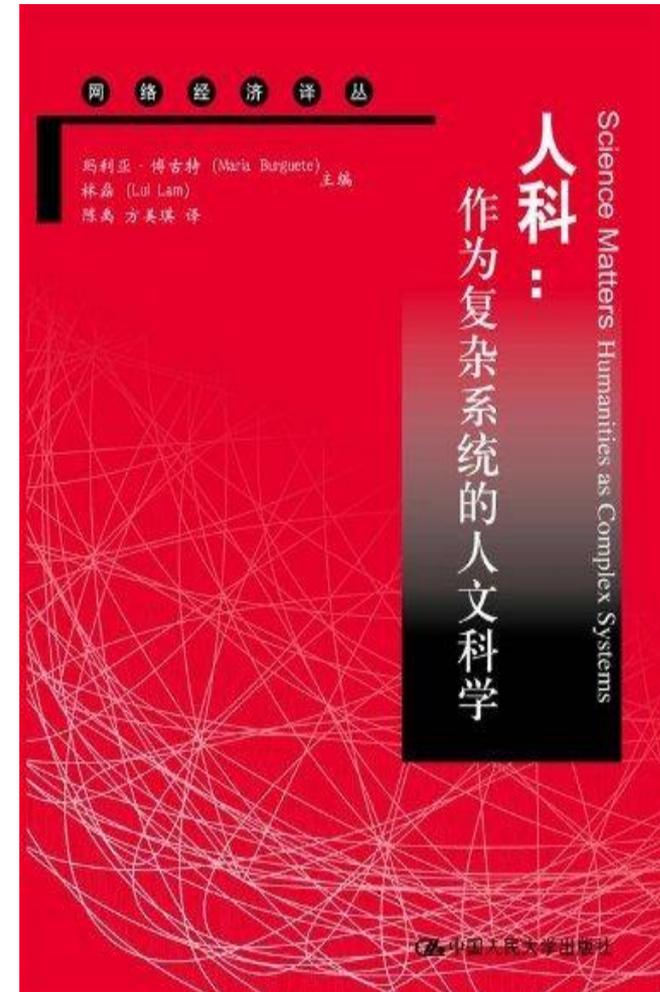
## Tree of Life

<http://www.greennature.ca/>



## Basic Message 3: We Are Recycled Stardust

- Everything on Earth, humans included, is made up of atoms.
- All atoms came from the stars (except H, He, and Li were formed soon after the big bang; Ag and Au, produced from neutron-star mergers). We are thus stardust
- Every atom in our body is recycled from somewhere else (which could be other peoples' body, dead or alive, which you never know).
- We thus could be related to each other physically. We are recycled stardust



2013