



Lecture 3
Natural History and Natural Theology

*“I will praise thee; for I am
fearfully and wonderfully
made: marvellous are thy
works; and that my soul
knoweth right well.”*

Psalm 134: 14

"But with regard to the material world, we can at least go as far as this—we can perceive that events are brought about not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws."

WHEWELL: *Bridgewater Treatise*.

"The only distinct meaning of the word 'natural' is stated, fixed, or settled; since what is natural as such requires and presupposes an intelligent agent to render it so, i.e. to effect it continually or at stated times, as what is supernatural or miraculous does to effect it for once."

BUTLER: *Analogy of Revealed Religion*.

"To conclude, therefore, let no man out of a weak conceit of subtlety, or an ill-applied modesty, think or maintain, that a man can search too far or be too well studied in the book of God's word, or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both."

BACON: *Advancement of Learning*.

Lives, Bromley, Kent.
October 1st, 1809. (1st Thousand.)
Third Edit., March, 1861.

ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE
FOR LIFE.

By CHARLES DARWIN, M.A.

FELLOW OF THE ROYAL SOCIETY, LONDON, AND HONORARY
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1861.

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From Darwin's frontispiece

"To conclude, therefore, let no man upon a weak conceit of sobriety or an ill-applied moderation think or maintain that a man can search too far, or be too well studied in the book of God's word, or the book of God's works, divinity or philosophy; but rather let men endeavour an endless progress or proficiencie in both..."

Francis Bacon, The Advancement of Learning (1603)

The “two books” doctrine

- Many leading figures of the “scientific revolution” in England in the 17th century were religiously devout men
- They tended to believe that it was their religious duty to study the natural world, the “second book” of God’s revelation to humankind
- This belief gave them an obvious interest in “natural theology”

What is natural theology?

A branch of theology based on reason and ordinary experience rather than the teachings of sacred scripture

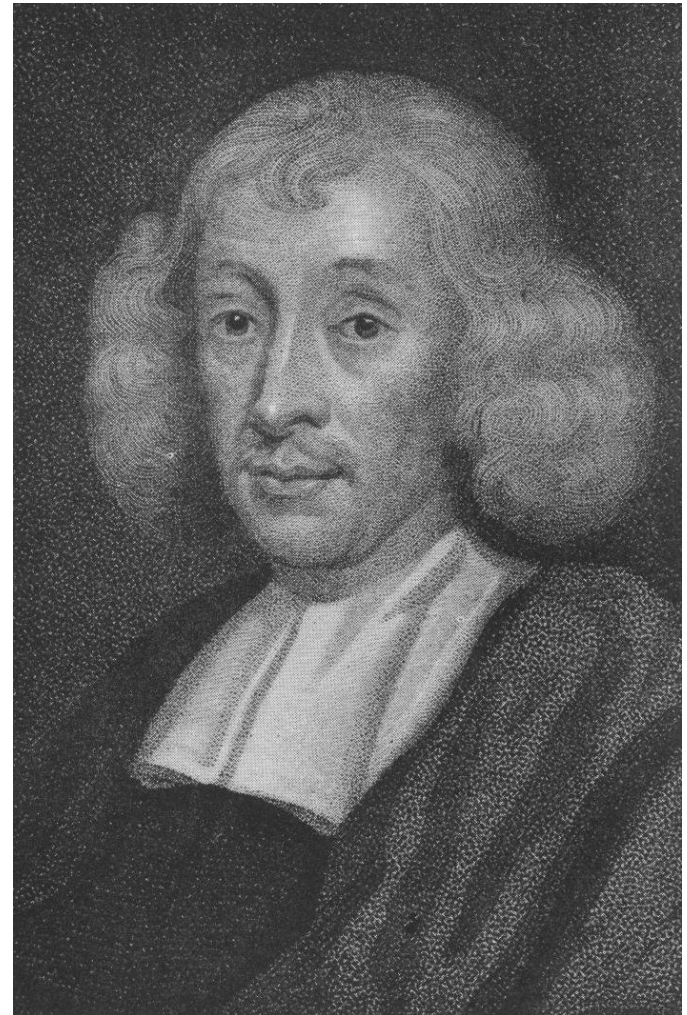
Isaac Newton was an advocate of natural theology

“This most elegant system of the sun, planets, and comets could not have arisen without the design and dominion of an intelligent and powerful being.”

Newton, Principia Mathematica, 2nd Ed., 1713 (General Scholium)

John Ray (1627-1705)

- A contemporary of Isaac Newton
- Fellow of Trinity College, Cambridge (Newton's college)
- Took holy orders in 1660
- Undertook major botanical collecting tours in Britain & continental Europe in 1650's & 1660's



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Ray's work as a naturalist

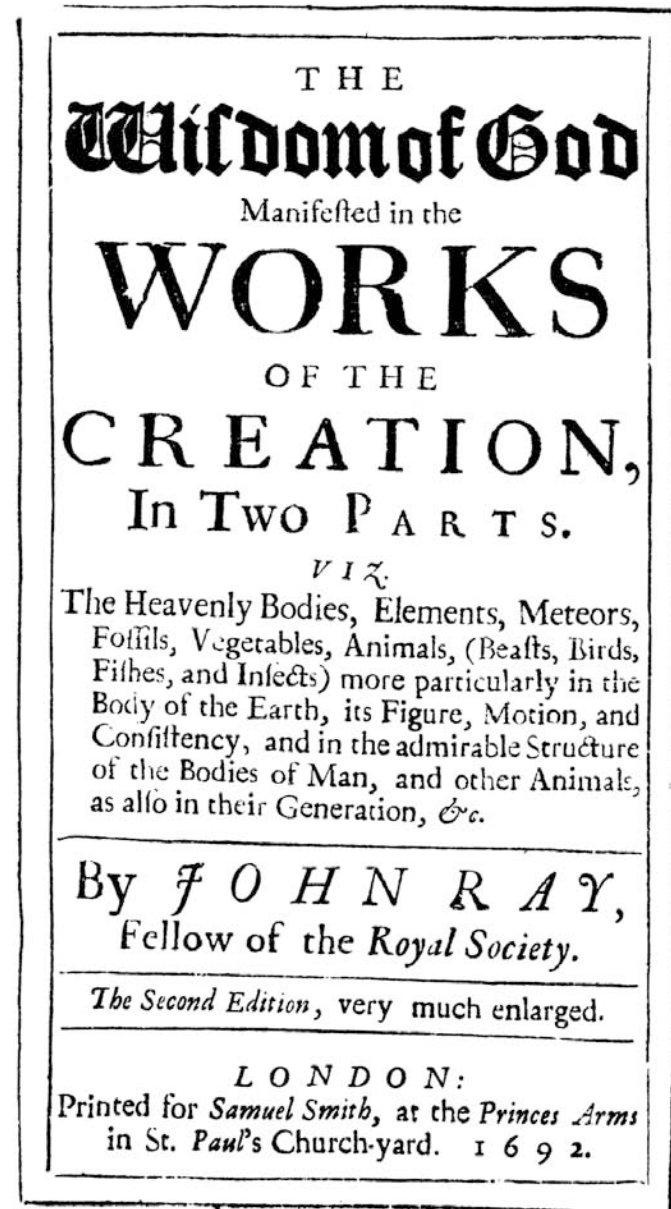
- Fine observer of the natural world
- Described the movement of sap in trees
- *Catalogus plantarum Angliae* (1670) became the basis of all later English floras
- Historia Plantarum (3 vols., 1686, 1688, 1704) helped found the science of taxonomy
- Coined the term "species"

Ray's definition of a species

"... no surer criterion for determining species has occurred to me than the distinguishing features that perpetuate themselves in propagation from seed. Thus, no matter what variations occur in the individuals or the species, if they spring from the seed of one and the same plant, they are accidental variations and not such as to distinguish a species... Animals likewise that differ specifically preserve their distinct species permanently; one species never springs from the seed of another nor vice versa".

Ray, History of Plants, 1686

- Ray was a seriously religious man
- He preached regularly in his College chapel and in Great St Mary's, the University Church
- Among his sermons were his discourses "On the Wisdom of God Manifested in the Works of Creation", which were published as a book in 1691



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Ray's twin legacies

- The concept of naturally distinct species, each of which can be discerned by careful observation and comparison
- The concept that each species is the individual handiwork of a wise Creator

Carl Linnæus (1707-1778)

- Swedish botanist, physician, zoologist
- “Father of taxonomy”
- Author, Systema Naturae (1735)
- Inventor of binomial nomenclature, the convention used to classify species today



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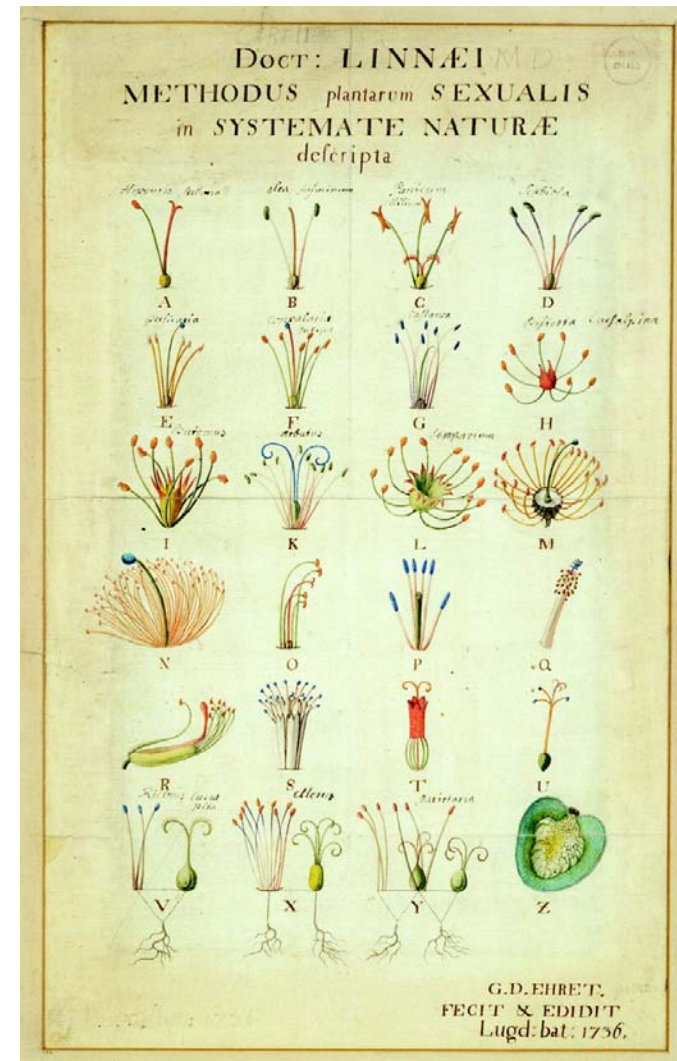
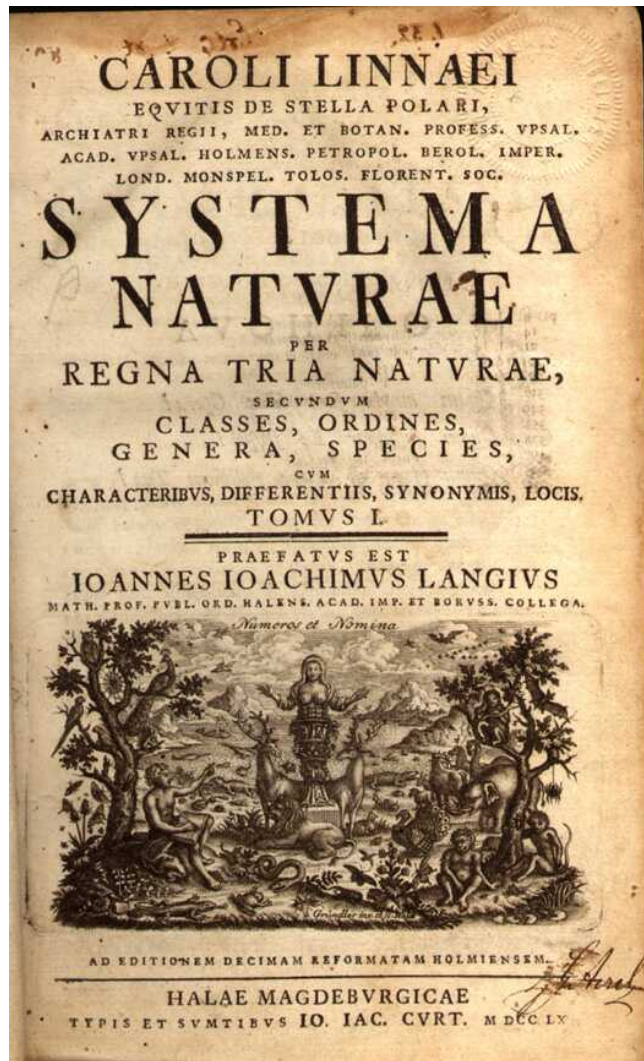
Hierarchical Classification

- Question: How to reliably classify the rapidly growing numbers of known plants and animals?
- Linnaeus' answer: Use a hierarchical system of "sets within sets"

Linnæan classification of humans

| | | |
|---------|---|-------------|
| Species | | sapiens |
| Genus | | Homo |
| Family | | Hominids |
| Order | | Primates |
| Class | = | Mammals |
| Phylum | | Vertebrates |
| Kingdom | | Chordates |
| Domain | | Animals |
| Life | | Life |

Linnæus' *System of Nature*



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Linnæus and natural theology

“The flowers' leaves. . . serve as bridal beds which the Creator has so gloriously arranged, adorned with such noble bed curtains, and perfumed with so many soft scents that the bridegroom with his bride might there celebrate their nuptials with so much the greater solemnity...”.

Classical natural history

- Built around the orderly classification of plants and animals into Linnæan species
- Preoccupied with the attempt to find a “natural classification” of plants and animals, based on their underlying affinities
- Essentially *atemporal*: in all important respects, the world of life is presumed to be unchanged since the creation

And so, finally, we come to...

The bird and the pocket watch

Puzzle for today: How is a bird like a pocket watch?



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Photo courtesy of [blmiers2](#) on Flickr.

How is a bird like a pocket watch?

- It's complex
- It's statistically improbable
- It has multiple parts that perform specific functions
- It has means that serve discernible ends
- *Both objects give the appearance of having been designed*

Puzzle for today: How
is a bird not like a
pocket watch?



Photo courtesy of [iJammin](#) on Flickr. CC-BY.



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How is a bird not like a watch?

- It's not something we've ever seen anyone make
- It's not something we can easily imagine anyone making
- It grows from an apparently undifferentiated egg, and is capable of producing more eggs
- It's part of a larger world of life governed by its own distinctive laws – of reproduction & inheritance, etc.

WILLIAM PALEY, 1743–1805

- Influential Christian apologist
- Fellow and tutor, Christ's College, Cambridge
- *Principles of Moral and Political Philosophy* (1785)
- *View of the Evidences of Christianity* (1794)
- *Natural Theology; or, Evidence of the Existence and Attributes of the Deity* (1802)



Paley, *Natural Theology* (1802)

"In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there, I might possibly answer, that, for anything I knew to the contrary, it had lain there for ever; nor would it, perhaps, be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given – that, for any thing I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for the stone? Why is it not as admissible in the second case as in the first? For this reason, and for no other, namely, that when we come to inspect the watch, we perceive (what we could not discover in the stone) that its several parts are framed and put together for a purpose..."

"The Argument Cumulative"

"Were there no example in the world of contrivance except that of the eye, it would be alone sufficient to support the conclusion which we draw from it, as to the necessity of an intelligent Creator. It could never be got rid of....[The eye's] coats and humours constructed, for the refraction of rays of light to a point, which forms the proper office of the organ: the provision in its muscles for turning its pupil to the object, similar to that which is given to the telescope by screws, and upon which power of direction in the eye, the exercise of its office as an optical instrument depends....these provisions compose altogether an apparatus, a system of parts, a preparation of means, so manifest in their issue, so precious, and so infinitely beneficial in their use, as, in my opinion, to bear down all doubt that can be raised upon the subject."

Paley, continued...

"There cannot be design without a designer; contrivance, without a contriver; order, without choice; arrangement, without anything capable of arranging; subserviency and relation to a purpose, with that which could intend a purpose; means suitable to an end, and executing their office in accomplishing that end, without the end ever having been contemplated, or the means accommodated to it. Arrangement, disposition of parts, subserviency of means to an end, relation of instruments to a use, imply the presence of intelligence and mind."

Paley's Challenge



Photo courtesy of [iJammin](#) on Flickr. CC-BY.



Photo courtesy of [blmiers2](#) on Flickr.

*Which object is the
bird more like?*



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The argument from design for the existence of God

Paley's is the single most famous instantiation of the "teleological" argument for the existence of God, based on perceived evidence of order, purpose or design in nature

Who is speaking here?

“In order to pass the B.A. examination, it was also necessary to get up Paley's [*Evidences of Christianity*](#), and his [*Moral Philosophy*](#). This was done in a thorough manner, and I am convinced that I could have written out the whole of the *Evidences* with perfect correctness, but not of course in the clear language of Paley. The logic of this book and, as I may add, of his [*Natural Theology*](#), gave me as much delight as did Euclid. The careful study of these works, without attempting to learn any part by rote, was the only part of the academical course which, as I then felt and as I still believe, was of the least use to me in the education of my mind. I did not at that time trouble myself about Paley's premises; and taking these on trust, I was charmed and convinced by the long line of argumentation.”

Charles Darwin!

In his autobiography (1876), Darwin recalled his time at Cambridge University in the late 1820s, when he read Paley as part of academic studies intended to train him for a career in the Anglican ministry.

Darwin not only went to Paley's College, Christ's; he lived in Paley's former room....



Assignment #1

What, in your view, are the principal strengths and weaknesses of William Paley's famous "argument from design for the existence of God", as set out in his Natural Theology (1802)? Please give a clear summary of the argument, and try to think of at least 3 possible strengths and 3 possible weaknesses of it. In doing this, please try to avoid "the wisdom of hindsight" (i.e., what we know, or think we know, today). In other words, try to use only ideas and knowledge that were available at the time that Paley wrote. [Maximum 3 pages.]

Coming up next...

Some of the discoveries that began to unsettle classical natural history at the end of the 18th century

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