

Lecture 12:  
“The Reception of Darwinism”

*“Darwin’s book is out and created a tremendous furore on all hands.”*

*Joseph Dalton Hooker*

# Road Map

- Thinking about “scientific revolutions”
- The Darwinian debate
  - Darwin’s basic proposal
  - Supporters
  - Critics
- Was there really a “Darwinian revolution”?
- Now it’s your turn!
  - Student Darwinian Debate

# Darwin's Basic Proposal

- The diversity of life is the result of descent with modification as a result of discoverable natural laws
- Chief among these laws is the principle of natural selection
- Once we view the diversity of life as the result of descent with modification by means of natural selection, “*there will be a considerable revolution in natural history....*” (Darwin, *The Origin*)

# Thomas Kuhn, *“The Structure of Scientific Revolutions”* (1962)

- Kuhn’s model of the history of science:
  - Over time, science develops erratically: quieter periods of steady growth are punctuated by occasional revolutionary upheavals in which almost everything changes
  - *“Normal science”* happens when scientists puzzle solve within a given framework or *“paradigm”* of research
  - *“Revolutionary science”* happens when one paradigm is dramatically replaced by another
  - Scientific revolutions represent such sharp breaks that it’s difficult or impossible to meaningfully compare research done under two alternative paradigms

# What does Kuhn's model predict at a time of "scientific revolution?"

- A sense of crisis
- The existence of large-scale controversy
- A clash between fundamentally incompatible ways of thinking
- Clear winners and losers
- The overthrow of one way of doing a particular science in favor of another

# Was there a “Darwinian Revolution”?

- Let’s review the debate around Darwin’s *Origin of Species* with Kuhn’s model in mind.
- Our question will be:
  - *To what extent did the Origin of Species inaugurate a “scientific revolution” in Kuhn’s sense of the term?*
- To do this, we’re going to review the contributions of 12 different contributors to the Darwinian debates in the 1860s & 1870s

# Darwin's supporters

- Joseph Hooker
- Charles Lyell
- Thomas Huxley
- Alfred Russel Wallace
- Asa Gray
- Charles Kingsley

# Joseph Dalton Hooker, 1817–1911

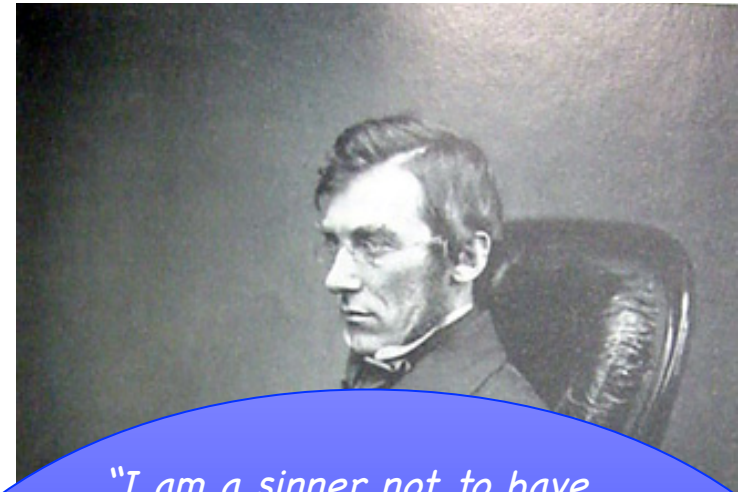
- Botanist, explorer, Director of Kew Gardens
- Darwin's closest friend and *confidante*
- Early and very prestigious convert to Darwin's ideas





# Joseph Dalton Hooker, 1817–1911

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- Darwin's closest friend and *confidante*
- Early and very prestigious convert to Darwin's ideas



*"I am a sinner not to have written you ere this, if only to thank you for your glorious book—what a mass of close reasoning on curious facts and fresh phenomena—it is capitally written and will be very successful....Lyell, with whom we are staying, is perfectly enchanted, and is absolutely gloating over it."*

# Charles Lyell, 1797-1875

- Close friend of Darwin
- Geological mentor
- Cautious acceptance of Darwin's basic proposal, with the significant exception of a fully naturalistic theory of human origins



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*“If, in conformity with the theory of progression, we believe mankind to have risen slowly from a rude and humble starting point, such leaps may...have cleared at one bound the space which separated the highest stage of the unprogressive intelligence of the inferior animals from the first and lowest form of improvable reason manifested by man.”*

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• **significant exception of a fully naturalistic theory of human origins**

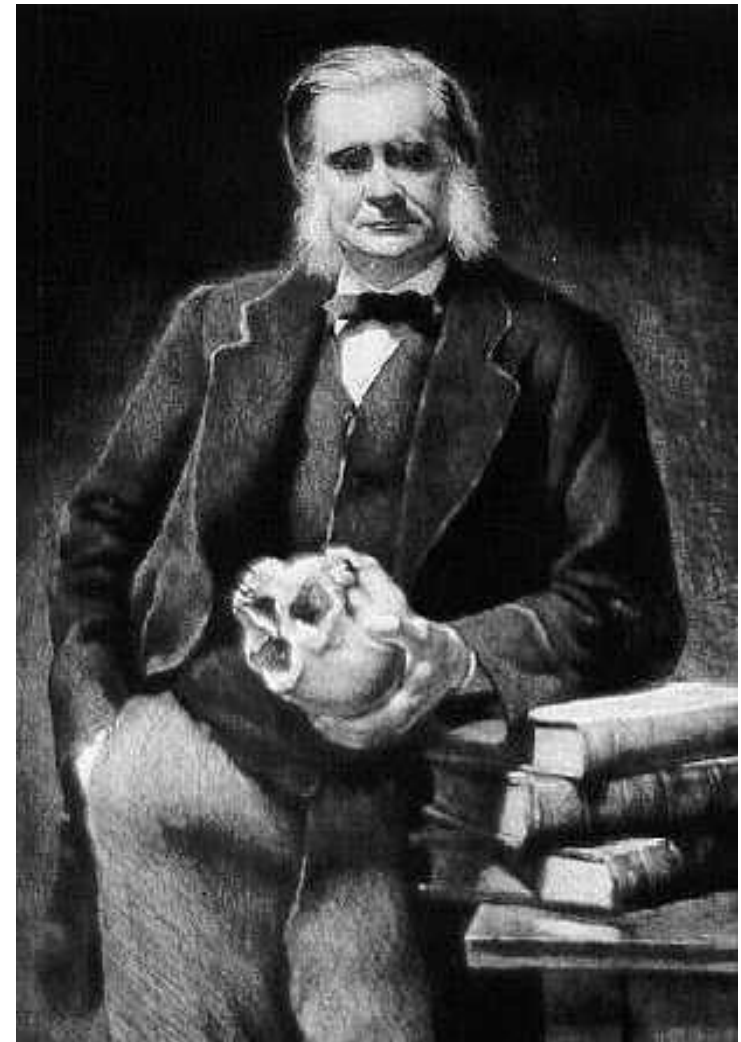
"Oh!"

"Sentence at top of p. makes me groan."

*Chas Lyell*

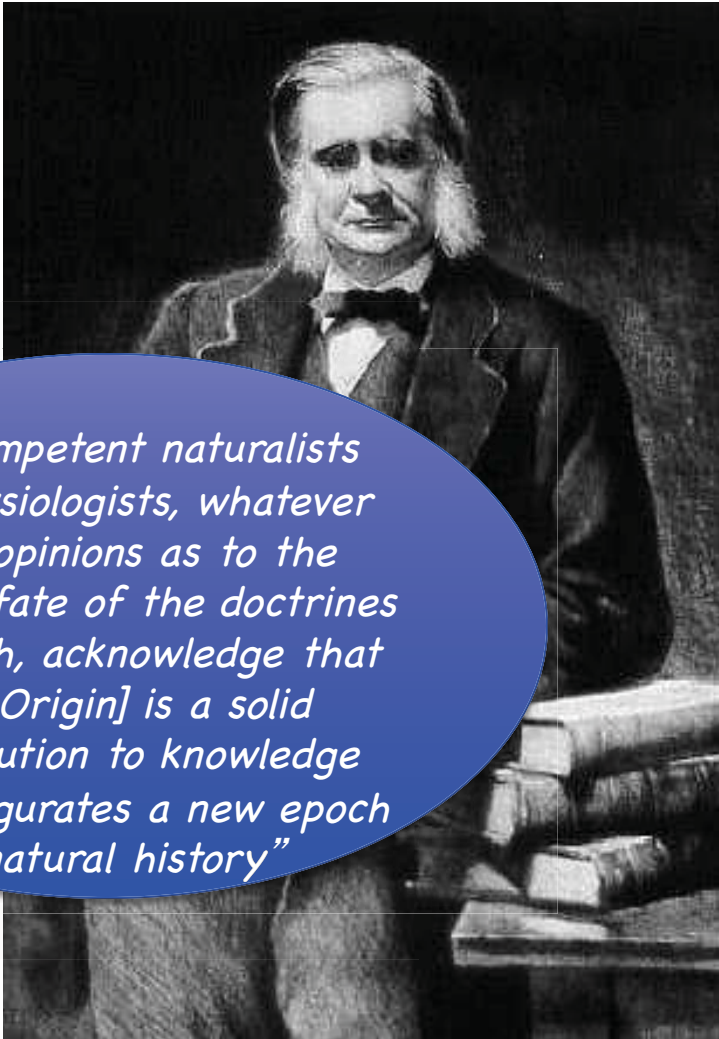
# Thomas Henry Huxley, 1825–1895

- “Darwin’s Bulldog”
- Seized on the *Origin* as a cause celebre on behalf of a new, self-confident scientific naturalism
- Had significant reservations about natural selection as the principal cause of descent with modification



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A black and white portrait of Thomas Henry Huxley, an elderly man with long, wavy hair, wearing a dark suit and a bow tie. He is standing next to a stack of books.

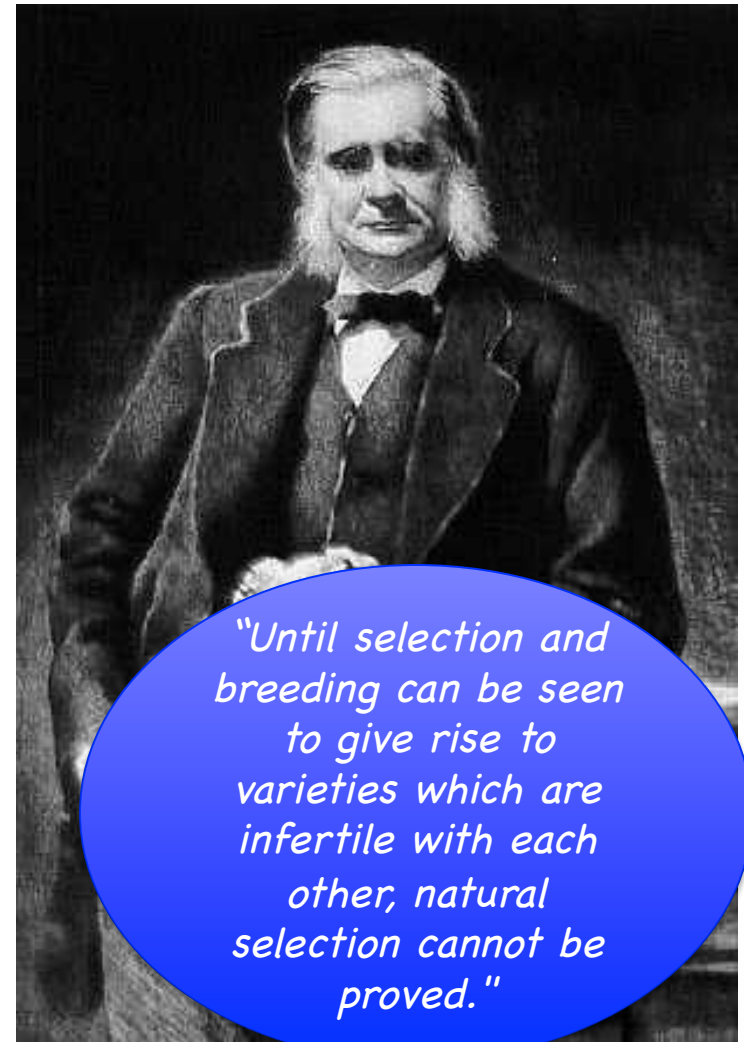
*“All competent naturalists and physiologists, whatever their opinions as to the ultimate fate of the doctrines put forth, acknowledge that [the Origin] is a solid contribution to knowledge and inaugurates a new epoch in natural history”*



*“My dear Huxley, “I must send you a line to say what a good fellow you are to send me so long an account of the Oxford doings. I have read it twice & sent it to my wife & when I get home shall read it again: it has so much interested me.— But how durst you attack a live Bishop in that fashion? I am quite ashamed of you! Have you no reverence for fine lawn sleeves? By Jove, you seem to have done it well....”*

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# Alfred Russel Wallace, 1823-1913

- Co-discover of natural selection
- Important supporter after his return to England in 1862
- Came to differ with Darwin in the late-1860s, particularly over the key question of human origins

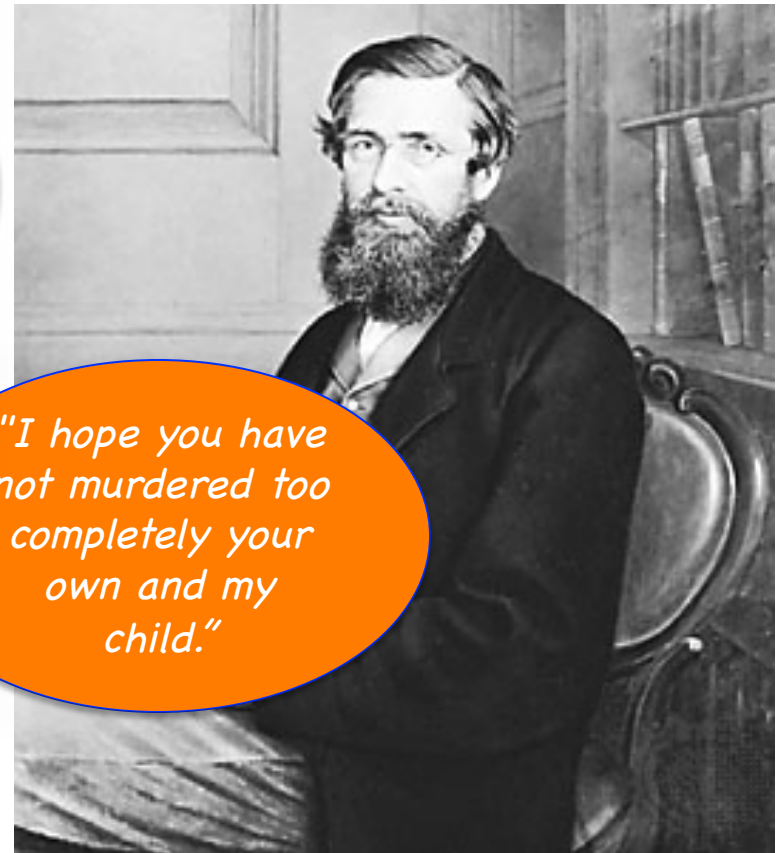


# Alfred Russel Wallace, 1823–1913

- Co *"The inference I would draw from this class of phenomena is, that a superior intelligence has guided the development of man in a definite direction, and for a special purpose, just as man guides the development of many animal and vegetable forms."*

Eng

- Came to differ with Darwin in the late-1860s, particularly over the key question of human origins



*"I hope you have not murdered too completely your own and my child."*

# Asa Gray, 1810–1888

- Professor of Botany, Harvard University
- Darwin's leading supporter in the U.S.
- Devotedly religious, worked to reconcile Darwinism and Christianity
- Had an extended debate with Darwin about natural selection and design



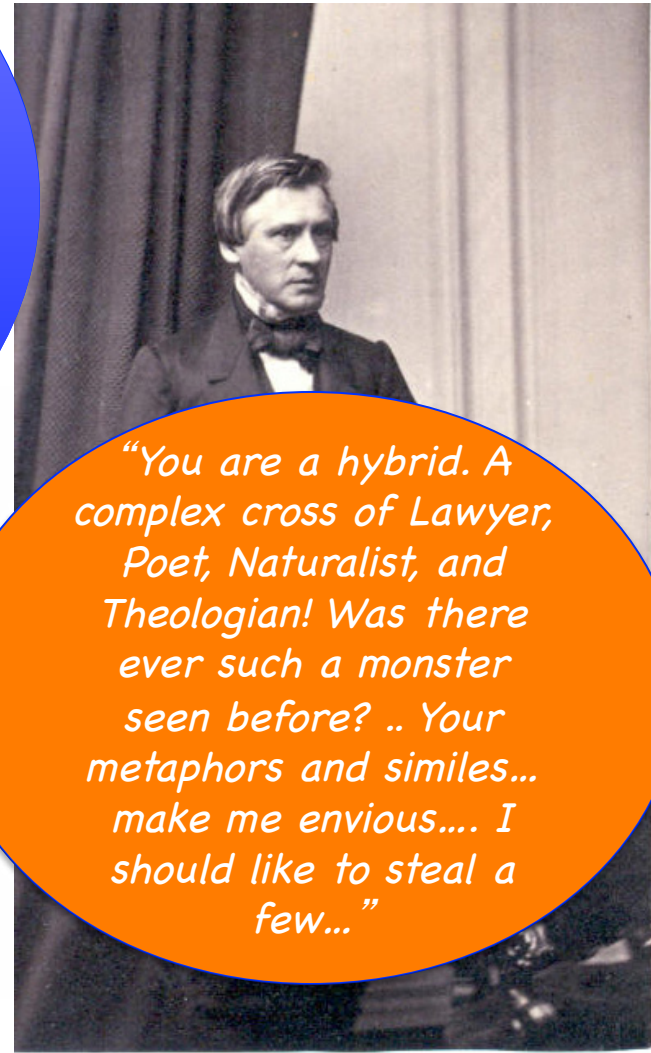
1810-1888

*"Paley, in his celebrated analogy with the watch, insists that if the timepiece were so constructed as to produce other similar watches, after a manner of generation in animals, the argument from design would be all the stronger. What is to hinder... [us] from giving Paley's argument a further a fortiori extension to the supposed case of a watch which sometimes produces better watches. And contrivances adapted to successive conditions. And so, at length, turns out a chronometer..[or] a town clock"?*

WORK

Darwinism and Christianity

- Had an extended debate with Darwin about natural selection and design



*"You are a hybrid. A complex cross of Lawyer, Poet, Naturalist, and Theologian! Was there ever such a monster seen before? .. Your metaphors and similes... make me envious.... I should like to steal a few..."*

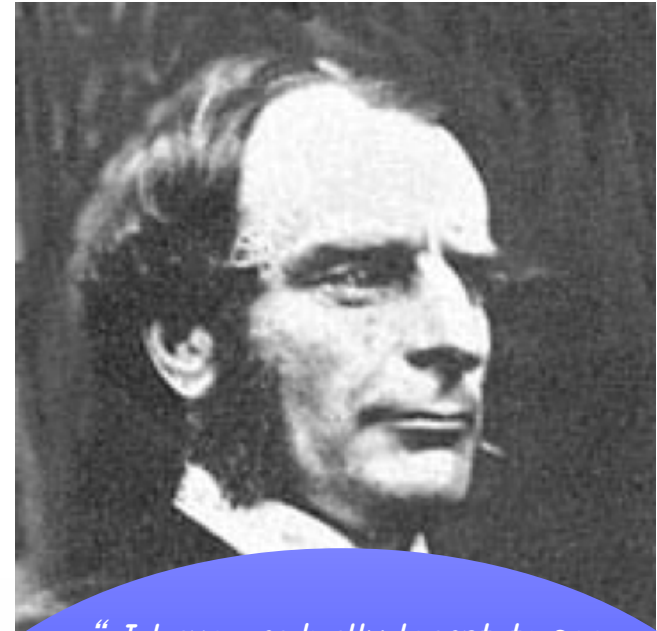
# Charles Kingsley, 1819–1875

- Anglican clergyman, historian, writer, naturalist
- Important early “convert” from within Christian community
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*“ I have gradually learnt to see that it is just as noble a conception of Deity, to believe that he created primal forms capable of development into all forms needful pro tempore & pro loco, as to believe that He required a fresh act of intervention to supply the lacunas wh. He himself had made. I question whether the former be not the loftier thought”*

# Darwin's supporters: points to notice

- All asserted Darwin's right to advance his theory on behalf of a (newly self-confident) science
- Only Hooker and Kingsley among our six accepted Darwin's basic proposal without serious qualification
- The others accepted descent with modification, but added important caveats e.g., about natural selection
- Many even among Darwin's close supporters enlisted him in the service of "larger" (philosophical, religious, social) causes

# Darwin's critics

- Louis Agassiz
- Richard Owen
- Samuel Wilberforce
- St George Jackson Mivart
- William Thomson, Lord Kelvin
- Henry Fleeming Jenkin



# Louis Agassiz, 1807–1873

- Professor of Natural History, Harvard University
- Darwin's leading critic in the U.S.
- Held out for species being originally distinct long after most other U.S. naturalists had shifted to an evolutionary view

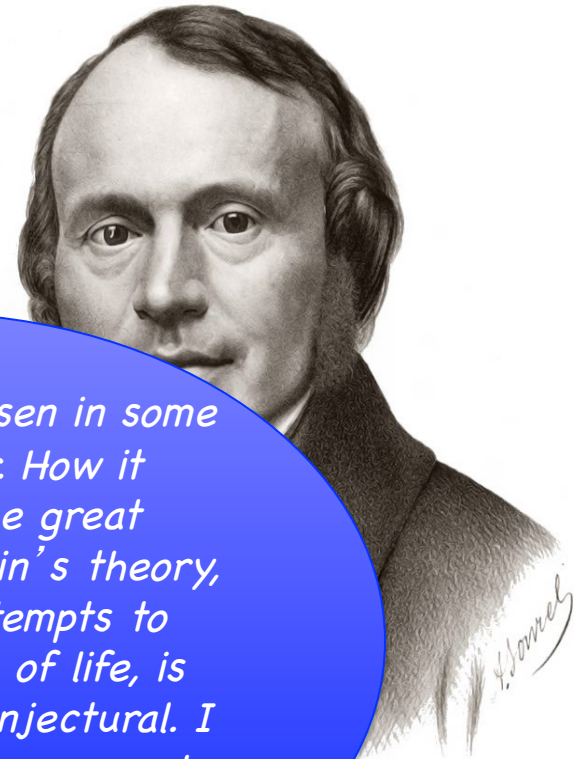


# Louis Agassiz, 1807–1873

*"Agassiz—when I saw him last, had read but a part of [the Origin]. He says it is poor—very poor!! (entre nous). The fact is he growls over it, like a well cudgelled dog,—is very much annoyed by it—to our great delight—and I do not wonder at it."*

- Held that species being originally distinct long after most of U.S. naturalists had shifted to an evolutionary view

*"The world has arisen in some way or another. How it originated is the great question, and Darwin's theory, like all other attempts to explain the origin of life, is thus far merely conjectural. I believe he has not even made the best conjecture possible in the present state of our knowledge."*



# Richard Owen, 1804–1892

- Eminent comparative anatomist, founder of the Natural History Museum, London
- Arch-critic of Darwin's, who nonetheless accepted a broadly transformist view of the history of life
- Had a high-profile run-in with Huxley on the anatomical differences between humans and apes



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*“But, as we have before been led to remark, most of Mr Darwin’s statements elude, by their vagueness and incompleteness, the test of Natural History facts.”*

# Samuel Wilberforce, 1805-1873

- High profile Bishop of Oxford; well-known debater (“Soapy Sam”)
- Led the charge against Darwin at the BA meeting in 1860
- Came to symbolize theologically motivated opposition to Darwin, though his arguments were mainly borrowed from Owen



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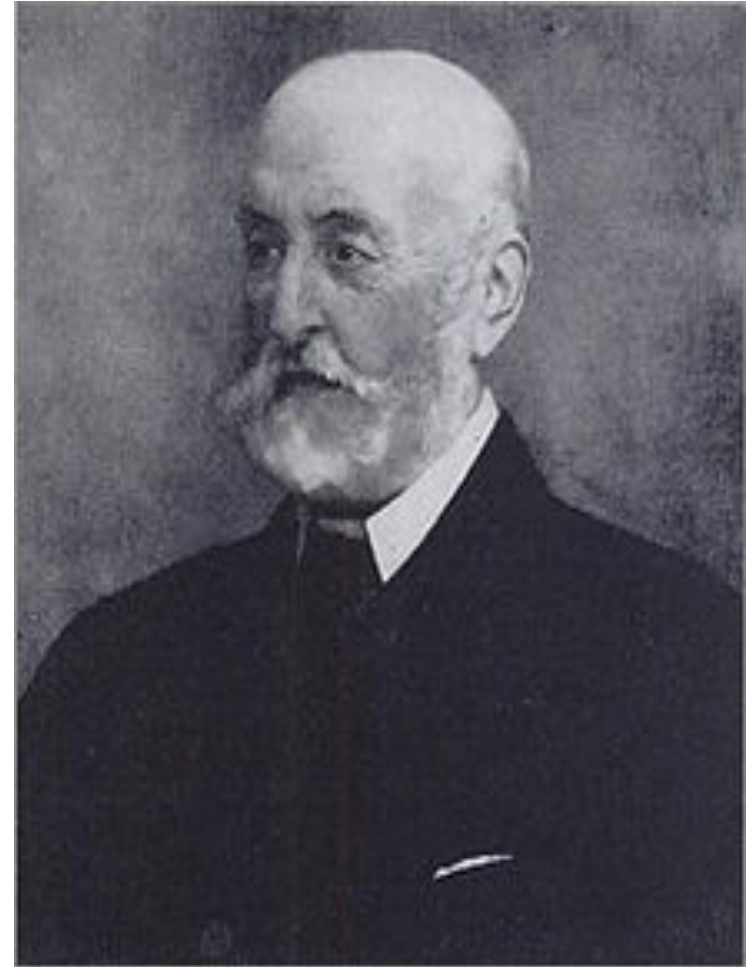
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*"[The Origin of Species is] a rotten fabric of guess and speculation"*

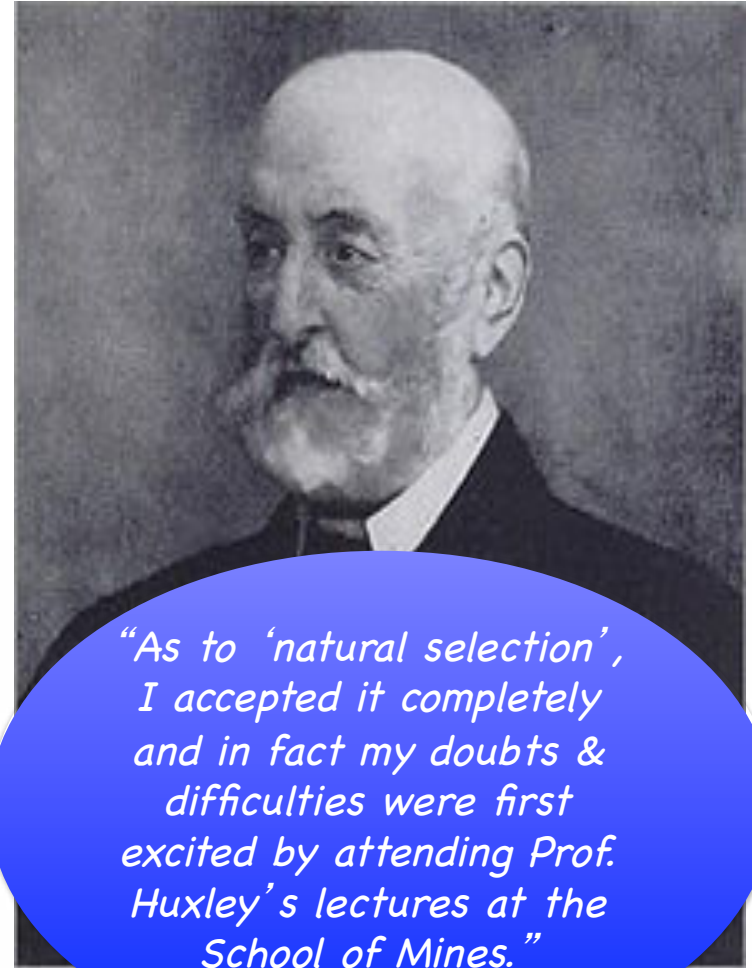
# St George Jackson Mivart, 1827-1900

- Professor of Zoology, St Mary's Hospital Medical School
- Initially positive, he became increasingly critical of Darwin's theory in the 1860s
- Fell out personally with the Darwin circle
- Wrote the most substantial early book-length critique of *Origin*



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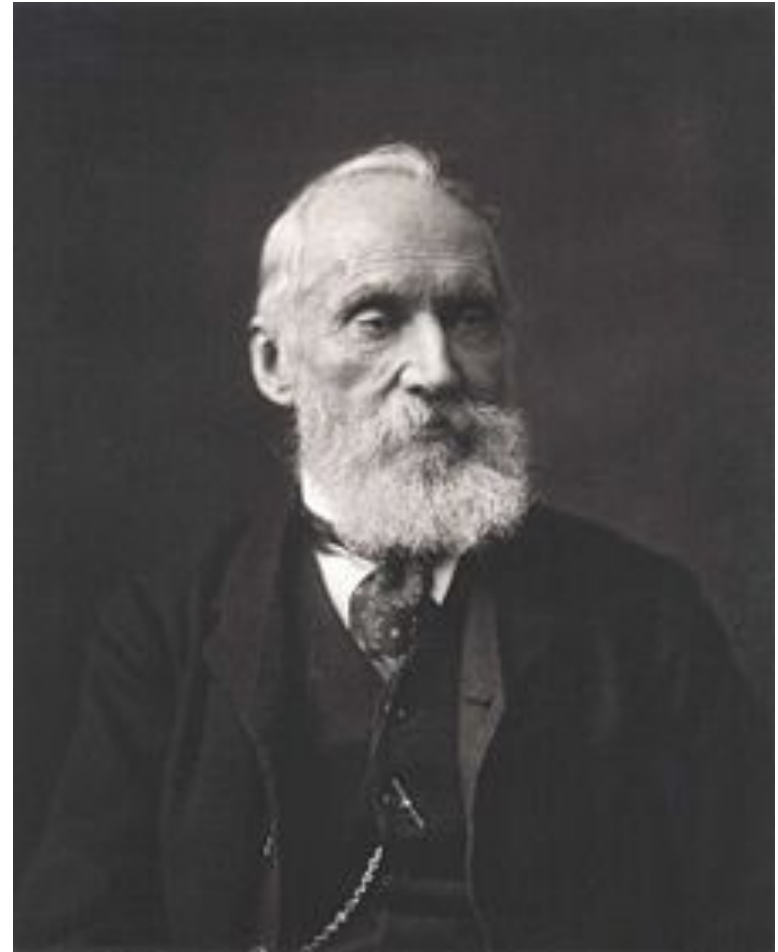


*"As to 'natural selection', I accepted it completely and in fact my doubts & difficulties were first excited by attending Prof. Huxley's lectures at the School of Mines."*



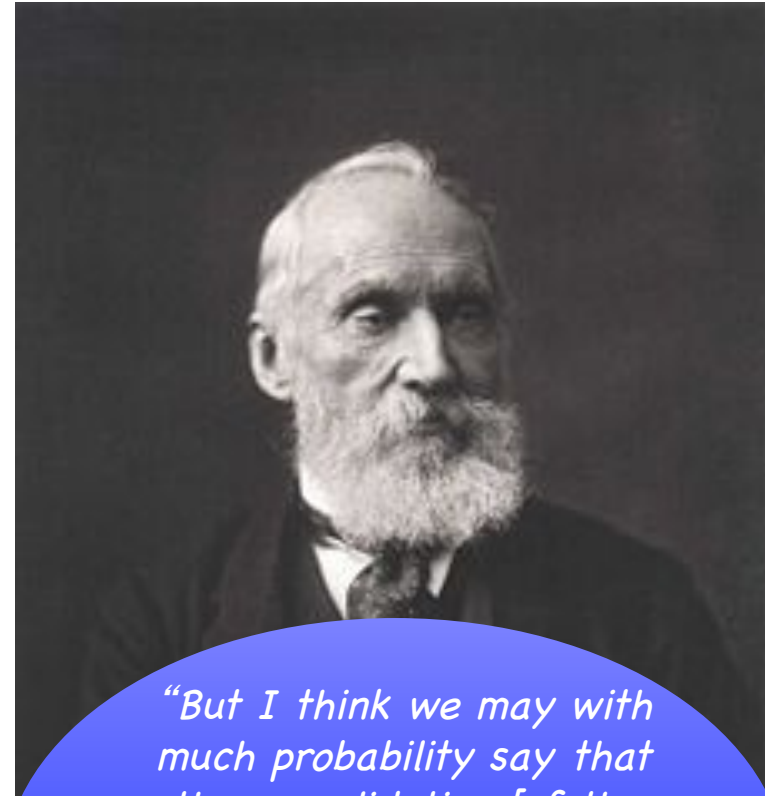
# William Thomson, Lord Kelvin, 1824–1907

- Eminent physicist, engineer, inventor
- Christian beliefs made him skeptical of Darwin's larger claims
- Calculated age the age of the earth, based on estimates of cooling
- Progressively reduced the estimated age of the earth, depriving Darwin of the time he assumed was needed for naturalistic evolution to occur.



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*“But I think we may with much probability say that the consolidation [of the earth] cannot have taken place less than 20,000,000 years ago...nor more than 400,000,000 years ago...”*

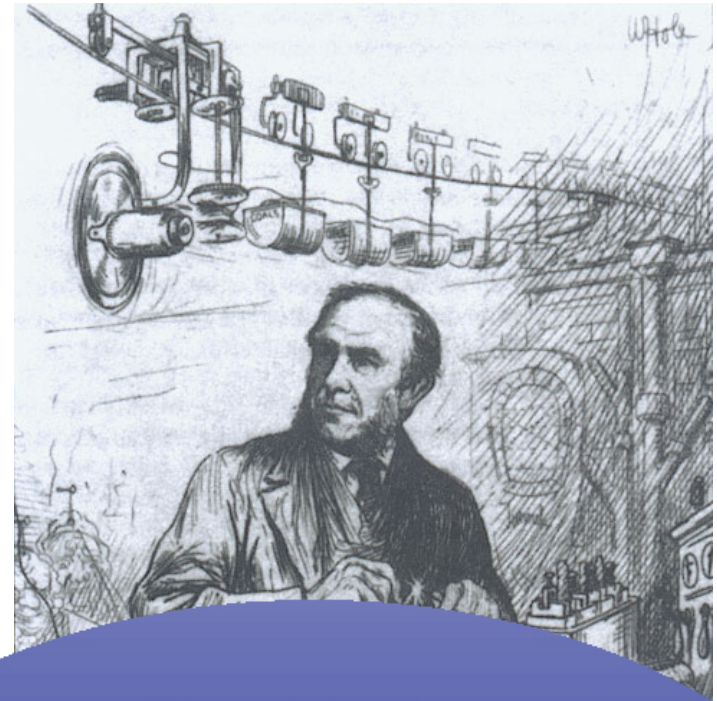
# Henry Fleeming Jenkin, 1833-1885

- Engineer, friend & colleague of Kelvin's
- Involved in laying of Atlantic cable
- Shared Kelvin's religiously-motivated doubts about the Darwin's claims
- In 1867, published what is often seen as one of the most powerful critiques of the *Origin*



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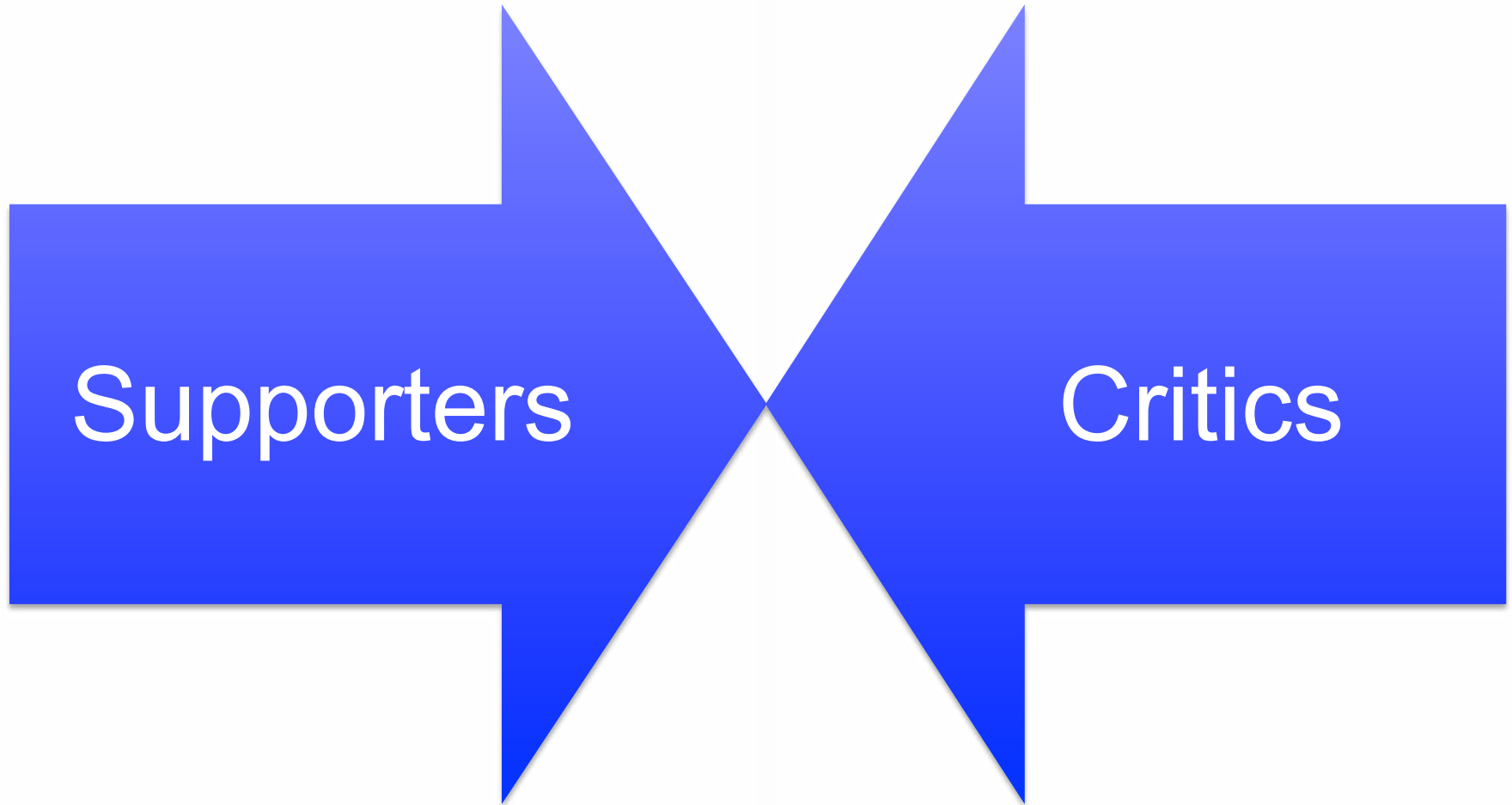


*“Suppose a white man to have been wrecked on an island inhabited by negroes, and to have established himself in friendly relations with a powerful tribe, whose customs he has learnt. Suppose him to possess the physical strength, energy, and ability of a dominant white race, and let the food and climate of the island suit his constitution; grant him every advantage which we can conceive a white to possess over the native... concede that in the struggle for existence his chance of a long life will be much superior to that of the native chiefs; yet from all these admissions, there does not follow the conclusion that, after a limited or unlimited number of generations, the inhabitants of the island will be white...”*

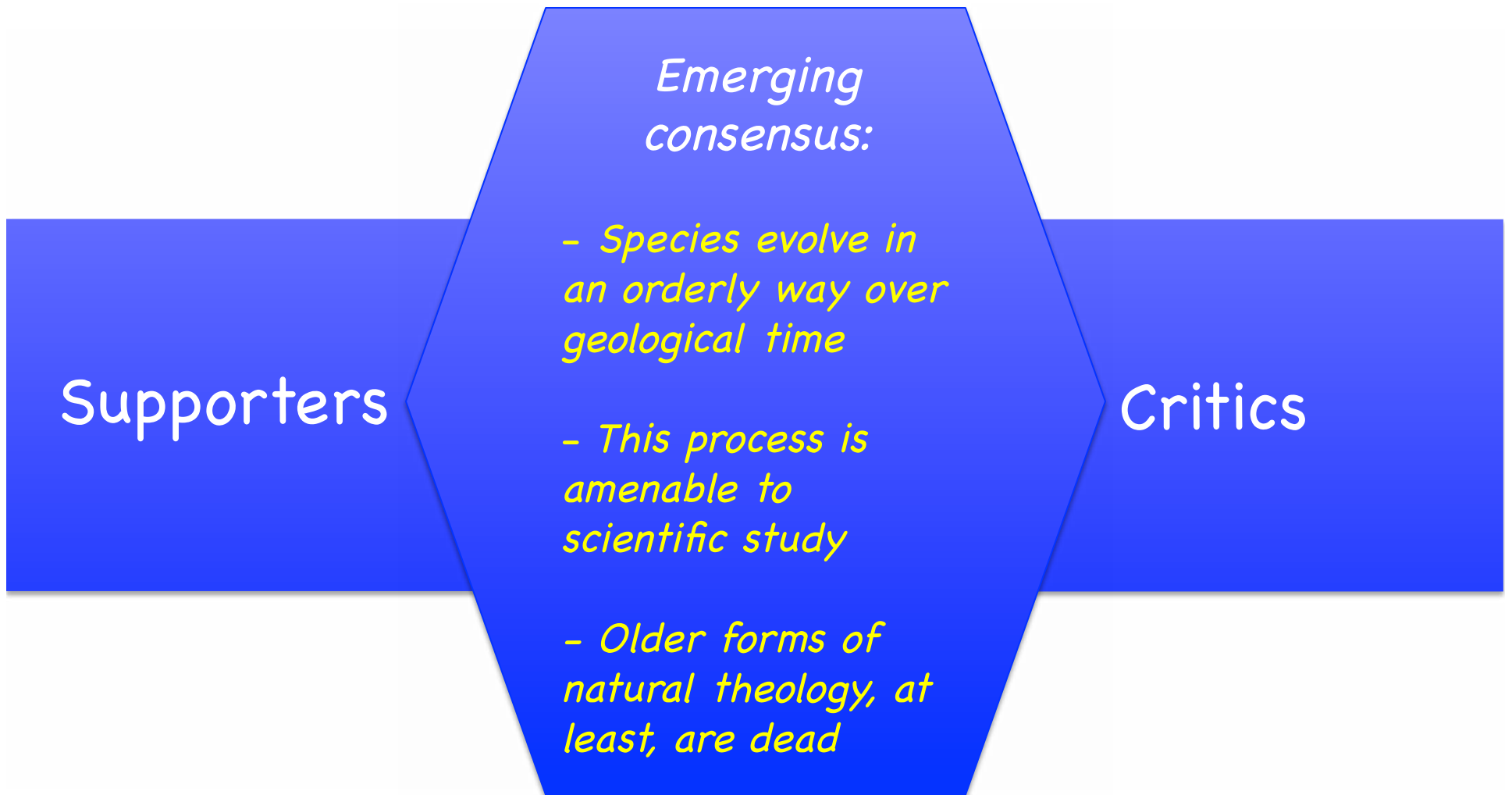
# Darwin's critics: points to notice

- Few denied Darwin's right to advance his theory on behalf of a (newly self-confident) science
- None used a "literalistic" interpretation of Genesis as a reason for rejecting Darwin's claims
- Most accepted accept some form of the principle of descent with modification, but rejected Darwin's distinctive account of how it had happened.
- Many focused on the appearance of orderliness or "design" in nature that they claimed was not explained by Darwin's theory

## Supporters versus critics: take #1



# Supporters versus critics: take #1



## Questions:

*If there was so much consensus, why was there so much – often fierce – dispute?*

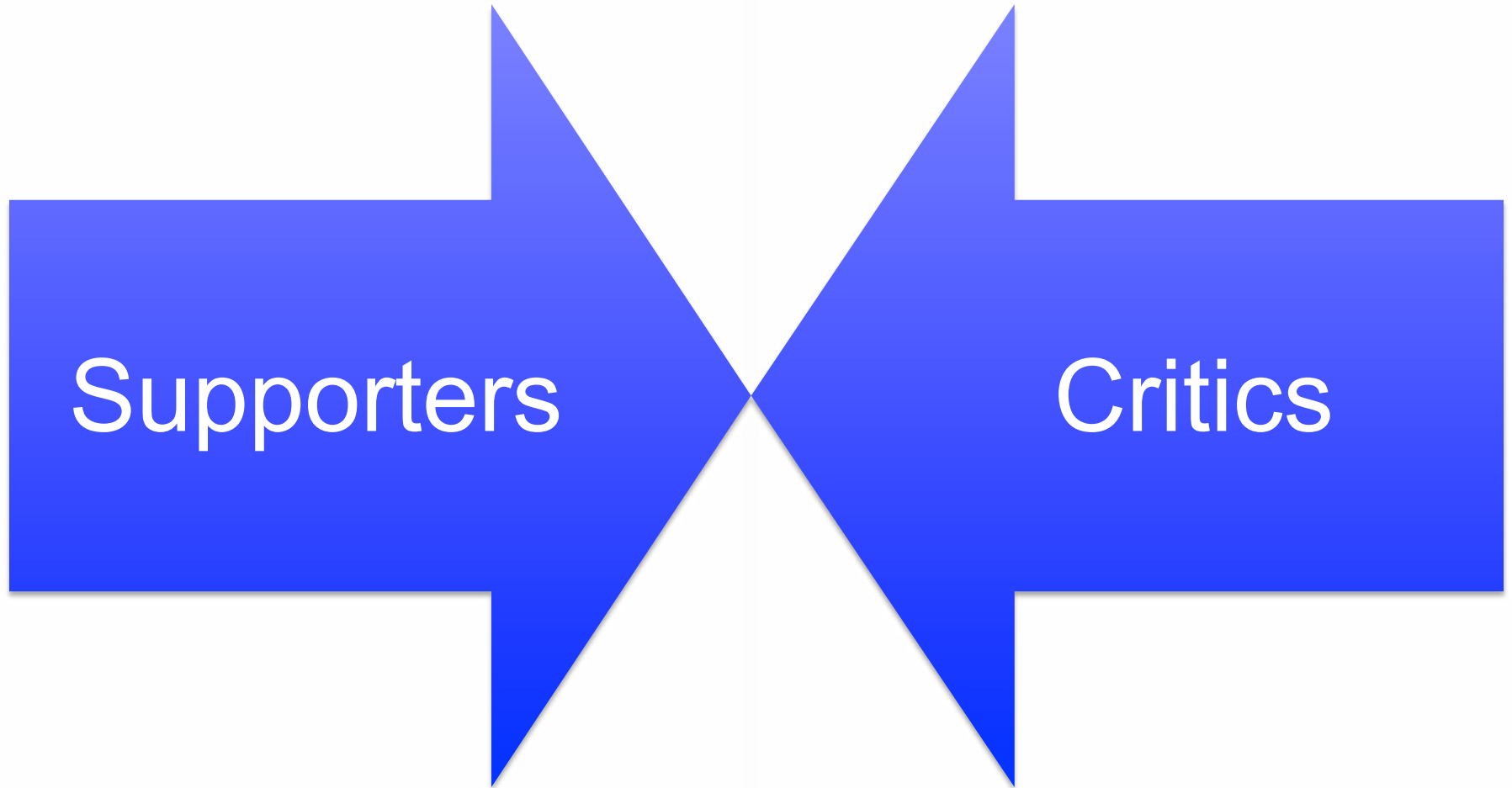
*Beyond the area of emerging consensus, what was at stake for different participants in this debate?*



# What was really at stake?

- Philosophy/theology
  - *Is evolution God's method of creation? If so, where is the evidence of beneficent design & purpose?*
- “Man's place in nature”
  - *Are we humans wholly part of nature? If so, how are we to account for seemingly unique human attributes such as language and the “moral sense”?*
- The place of scientists in Victorian society
  - *What are the respective roles of science (and scientists) and religion (and clerics) in society? What forms of social authority attach to each of these groups?*

## Supporters versus critics: take #2



# Supporters versus critics: take 2



**So...back to our question**

***To what extent did the Origin of Species inaugurate a “scientific revolution”?***

# Re-visiting the five criteria for judging whether we have a “scientific revolution”

- Was there a sense of crisis?
  - *Yes!*
- Was there a large-scale controversy?
  - *Yes!*
- Were there clear winners and losers?
  - *More or less, over time...*
    - Who won, who lost? What was won, what was lost?
- Was one way of doing science abandoned in favor of another?
  - *Rather unclear*
    - How did the practice of geology and biology science change after 1859?

# So...was there a “Darwinian Revolution”?

- *Yes, because most people*
  - converted fairly rapidly to acceptance of the principle of descent with modification
  - conceded fairly quickly the ability of science to investigate how this may have happened
  - gave up older, stricter natural theologies based on the notion of separately supernaturally designed species
- *No, because most people*
  - rejected Darwin’s distinctive views about the role of natural selection in descent with modification
  - rejected Darwin’s view that humans have evolved in exactly the same way as other animals
  - refused to abandon the appeal to divine providence to explain particular features of the living world

# Either way, some things changed

- After 1859, there was a decisive and fairly rapid shift to an evolutionary view of the world of life
- After 1859, there was a significant *secularization* of large parts of intellectual culture
  - Natural theology ceased to prevail as the unifying framework for a wide range of scientific, social and political debates
  - Scientific naturalism offered itself as an alternative (secular) framework for knowledge and belief
- Suddenly, the scientists were in the ascendant

# Now it's your turn!

- You're going to participate in a re-enactment of the Darwinian debate
- Each of you will pick a historical character to "play"
- I'll post "debate fact files" on the 12 characters I've talked about today on the Stellar site. (There were many other players in the debate; you could even go and "discover" someone else to play if you prefer...)
- Working in sections, your task is to "adopt" a character and present arguments from his point of view



# Points to remember

- Choose a character in discussion with your TA and the other students in your section; we need balance here...
- You don't have to personally agree with your chosen character; this is role play, folks...
- Your task is to contribute to the debate in your own words, but in the spirit of your chosen character
- Ideally, when you get up to speak in the debate you should be thinking like your character did about Darwin's work

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STS.009 Evolution and Society  
Spring 2012

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