

سه نگاه متفاوت به تکامل

نیما نریمانی

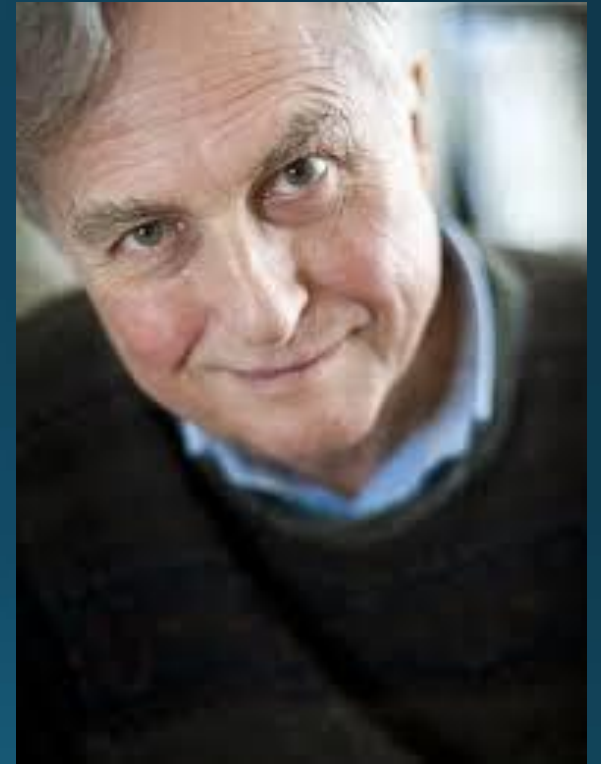
اسفند 97

مدرسه تکامل

1. Neo-Darwinism

Dawkins Answer

- We have seen that living things are too improbable and too beautifully 'designed' to have come into existence by chance. How, then, did they come into existence?
- The answer, Darwin's answer, is by gradual, step-by-step transformations from simple beginnings, from primordial entities sufficiently simple to have come into existence by chance(The Blind Watchmaker, 43)



Purely Materialistic Process

- The theory of natural selection has a big job—the biggest in biology. Its task is to explain how every adaptation evolved, step by step, from traits that preceded it (130).
- The message of evolution, and all of science, is one of naturalistic materialism. Darwinism tells us that, like all species, human beings arose from the working of blind, purposeless forces over eons of time (*Why Evolution is True?*, 244-5).
- This is nature red in tooth and claw(122).



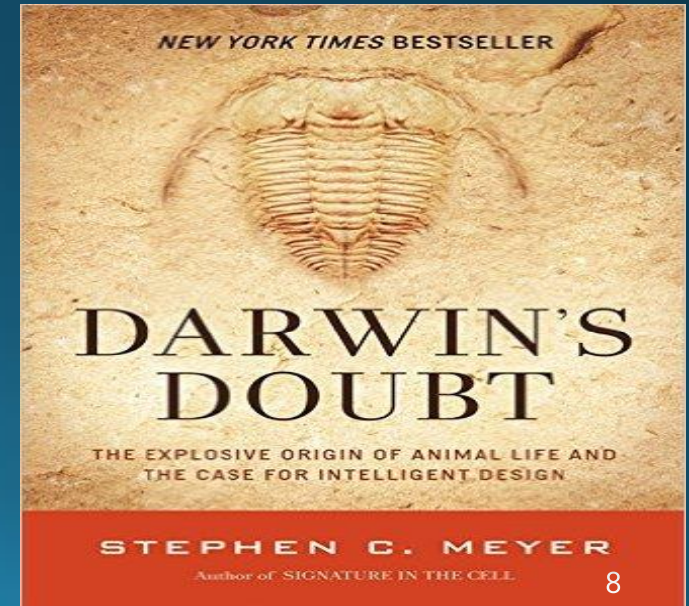
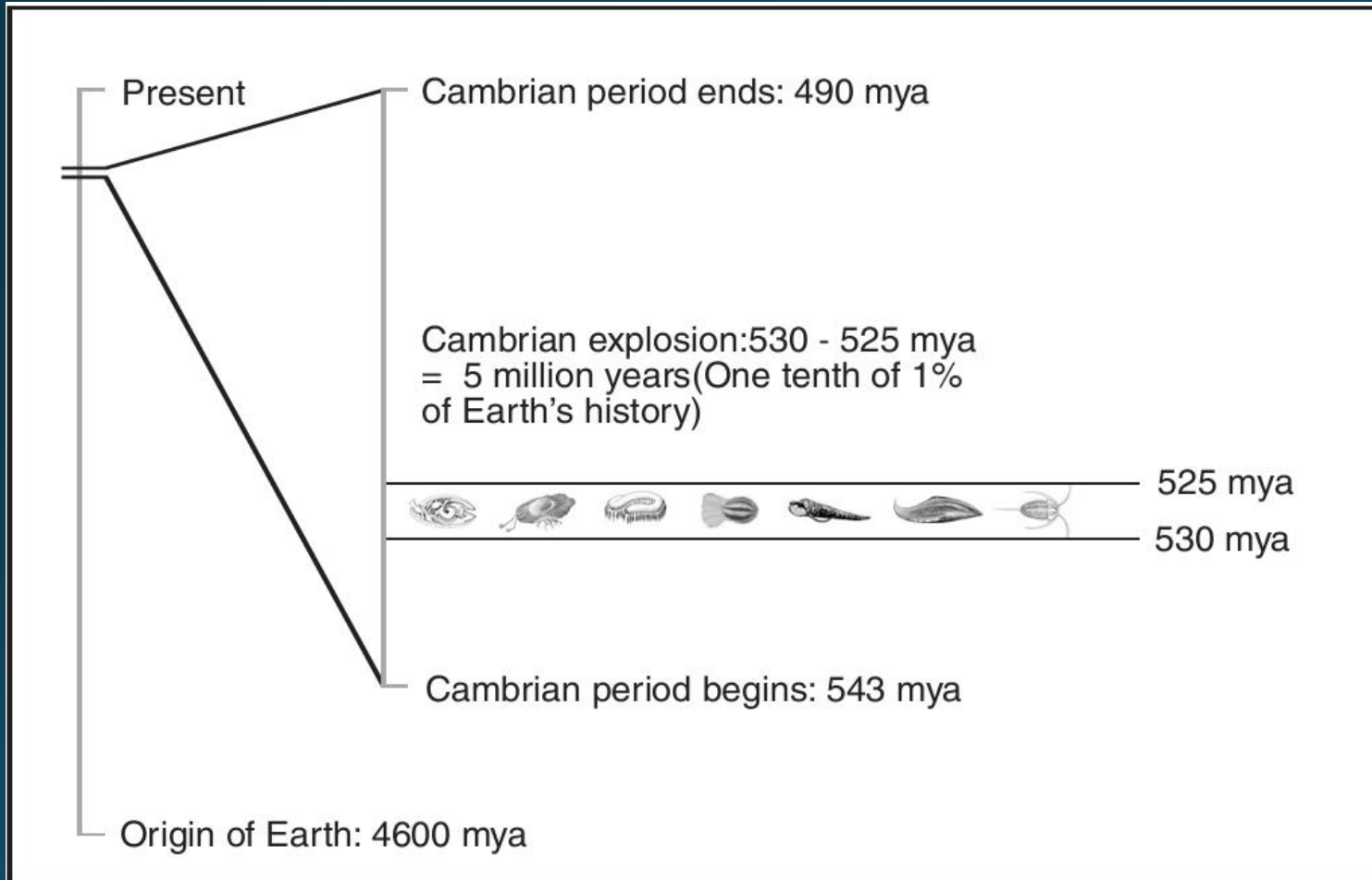
Just Advertising

- There are no experiments with results that challenge any standard neo-Darwinian understanding, no observations from the fossil record or genomics or biogeography or comparative anatomy that undermine standard evolutionary thinking, no theoretical unifications or simplifications, and no surprising predictions that have turned out to be true. In short, no science – just advertising (Atheism and Evolution, 137)



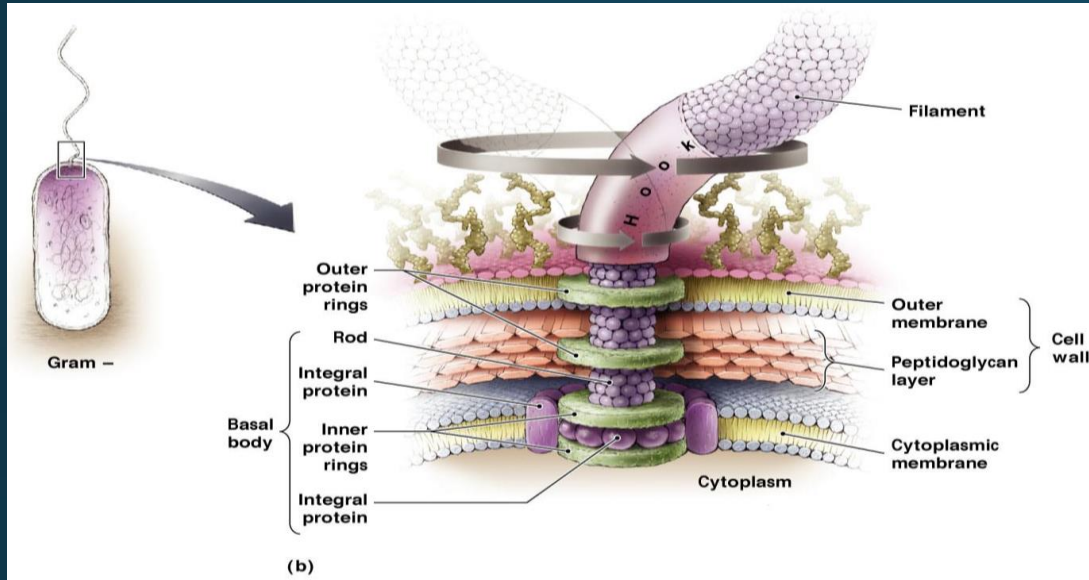
2. Intelligent Design

Combrian Explosion

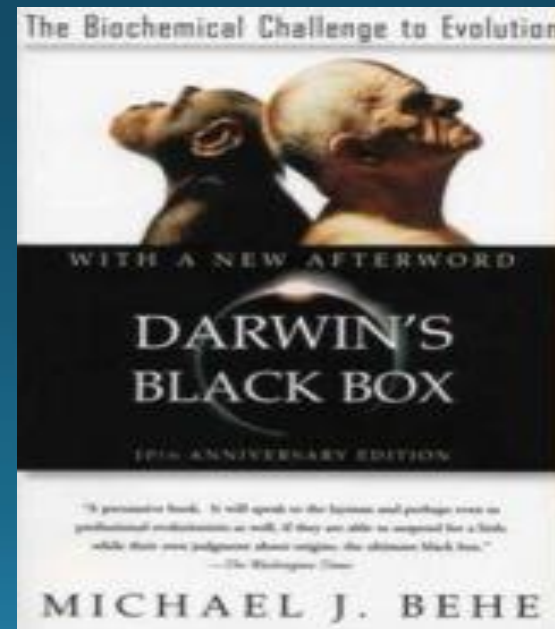


مایکل بهی و پیچیده غیرقابل تقلیل

مایکل بهی بر اساس سخن داروین که میگوید: "اگر بتوان ساختار پیچیده‌ای را نشان داد که توسط تعداد زیاد، موفق و کوچک اصلاح (ساختاری) و تغییر مطابق با ایده‌ی تکامل تدریجی، نتواند ایجاد شود، فرضیه‌ی من به طور کامل شکست خواهد خورد." با معرفی سیستم پیچیده غیرقابل تقلیل بیان میکند که این سیستم را نمیتوان از طریق تعداد زیاد اصلاح ایجاد نمود و نتیجه میگیرد، ایده‌ی داروین شکست خورده است.



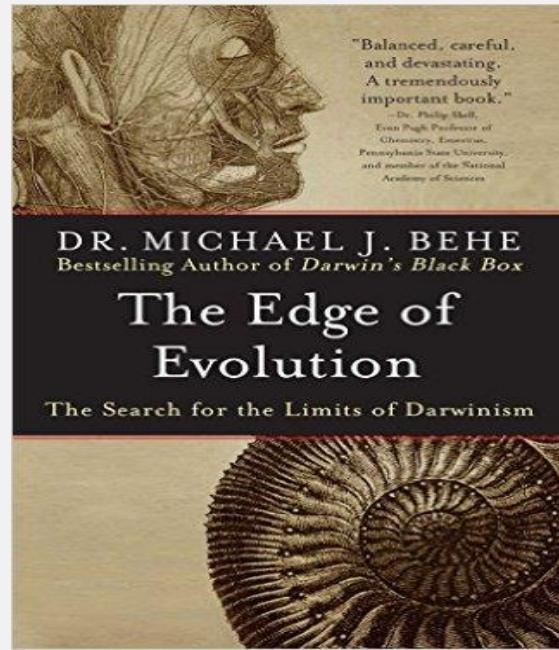
- تاژک باکتریایی موتور پیشران در ابعاد نانوست که در باکتریهای مشخصی قرار دارد. این تاژک تا 100000 دور بر دقیقه می‌چرخد و می‌تواند در هر یک چهارم دور جهت خود را تغییر دهد و باکتری را در محیط آبی به پیش برد.
- ساده‌ترین تاژک باکتریایی نیاز به 40 پروتئین برای ترکیب و ایجاد ساختار خود دارد. همه‌ی این پروتئین‌ها برای فعالیت تاژک ضروری‌اند و بنابراین در نبود هر کدام از آنها عمل تاژک نتیجه نخواهد داد.



The Edge of Darwinian Evolution

Darwin's Black Box was concerned to show just that some elegant structures in life are beyond random mutation and natural selection. This book is much more ambitious. Here the focus is on drawing up reasonable, general guidelines to mark the edge of evolution to decide with some precision beyond what point Darwinian explanations are unlikely to be adequate, not just for some particular structures but for general features of life.

Michael J. BEHE, JULY 1, 2007, New York Times



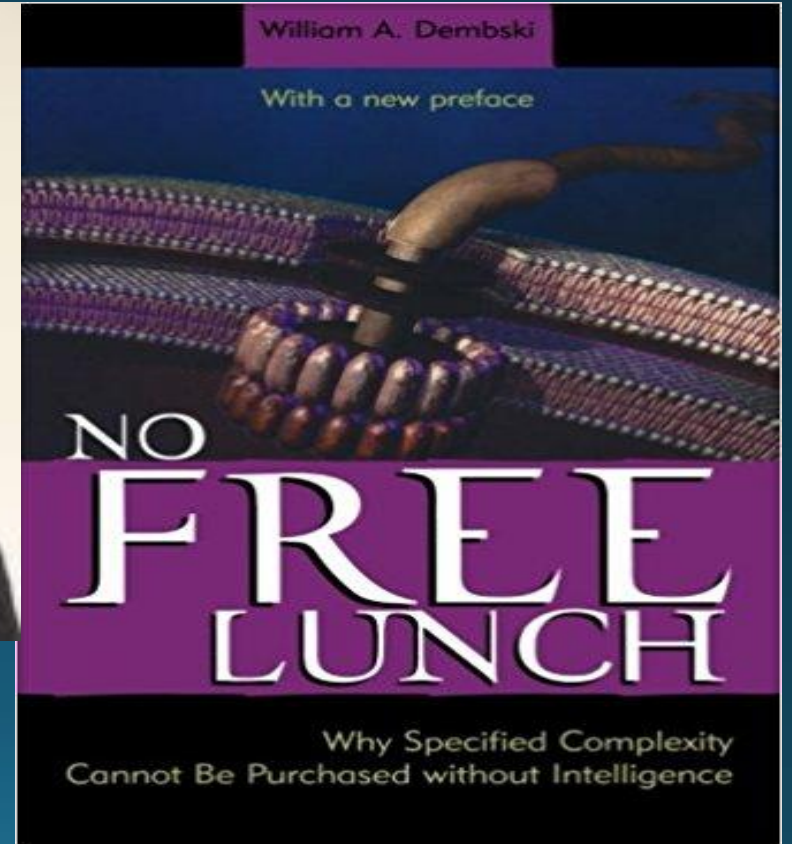
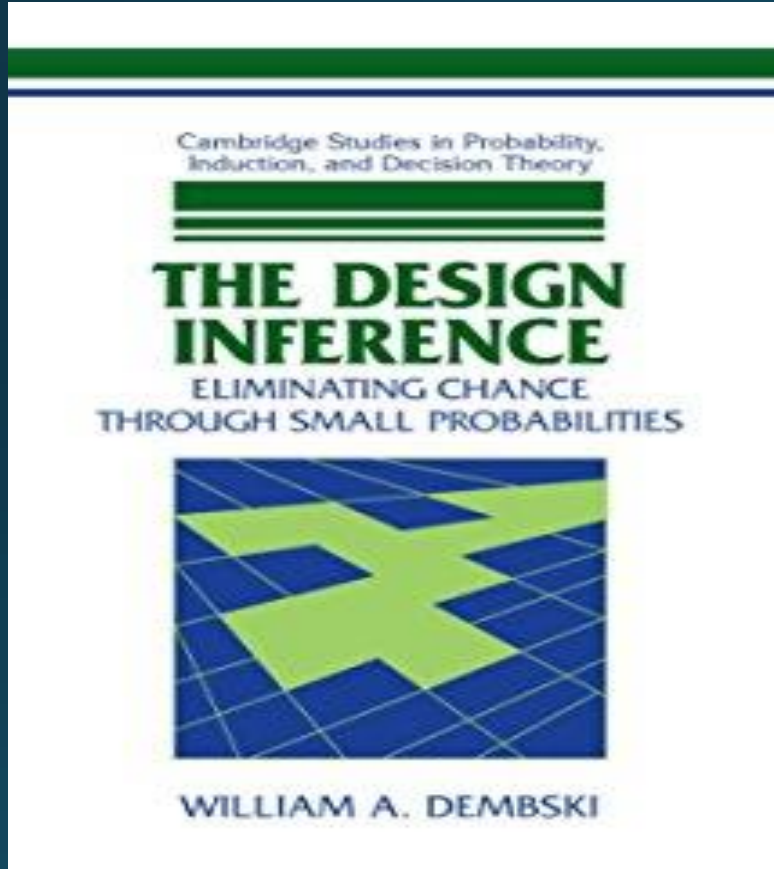
The Tentative Edge of Random Evolution

Contingency in Biology

Laws of nature
Physical constants
Ratios of fundamental constants
Amount of matter in the universe
Speed of expansion in the universe
Properties of elements such as carbon
Properties of chemicals such as water
Location of solar system in the galaxy
Location of planet in the solar system
Origin and properties of Earth/Moon
Properties of biochemicals such as DNA
Origin of life
Cells
Genetic code
Multiprotein complexes
Molecular machines
Biological kingdoms
Developmental genetic programs
Integrated protein networks
Phyla
Cell types
Classes
Orders
Families
Genera
Species
Varieties
Individuals
Random mutations
Environmental accidents

طراحی هوشمند به مثابه برنامه پژوهشی علمی

Intelligent Design as a theory of information



How Information Makes Evolution Possible

EVOLUTIONARY INFORMATICS

THE EVOLUTIONARY INFORMATICS LAB

Investigating
How
Information
Makes
Evolution
Possible

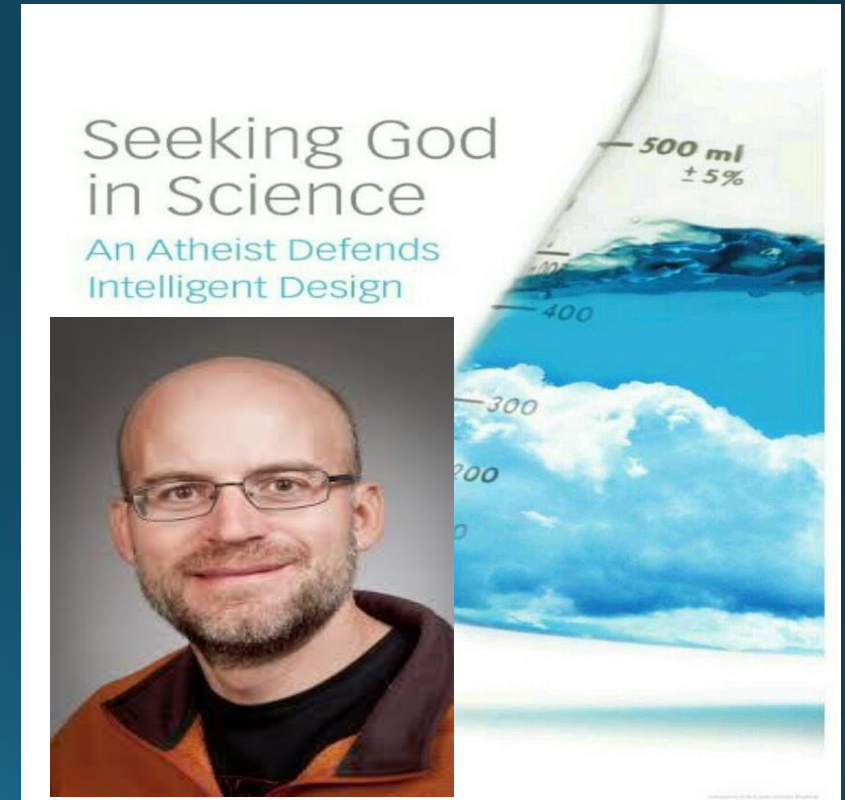
BIOLOGICAL INFORMATION
NEW PERSPECTIVES

Robert J. Marks II • Michael J. Behe • William A. Dembski
Bruce L. Gordon • John C. Sanford (Editors)

World Scientific

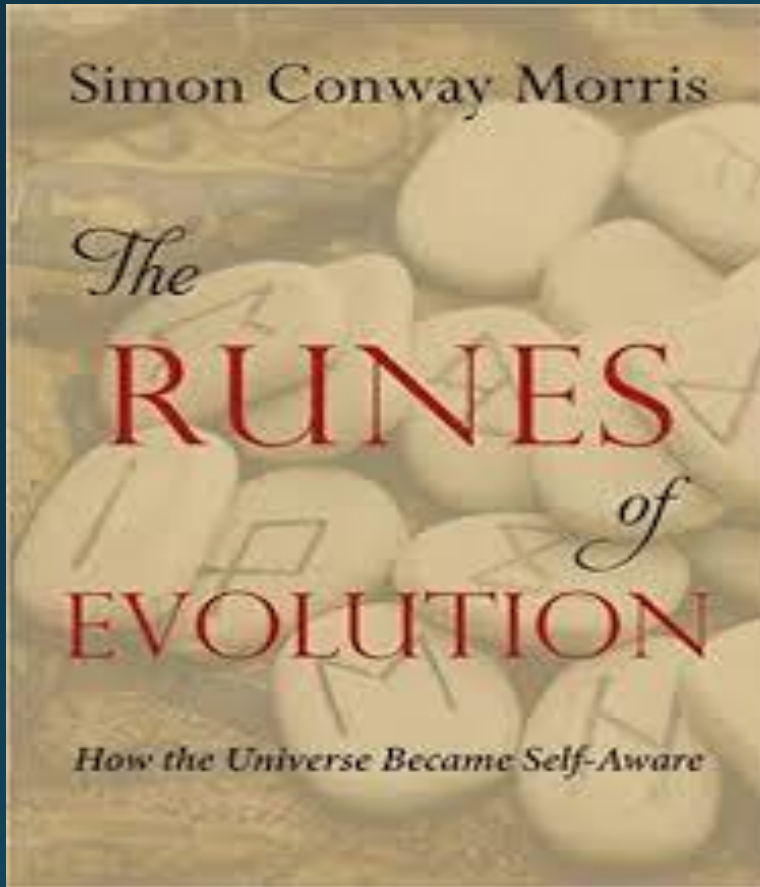
Expelled: No Intelligence Allowed

- A prominent intelligent design opponent to whom I sent an early draft of this book responded as follows: “Unfortunately in this debate a position between two sides, which you seem to adapt, is hardly tenable. It is **cultural war** whose outcome will have immense consequences...”(Bradley Monton, 2009, p. 9).

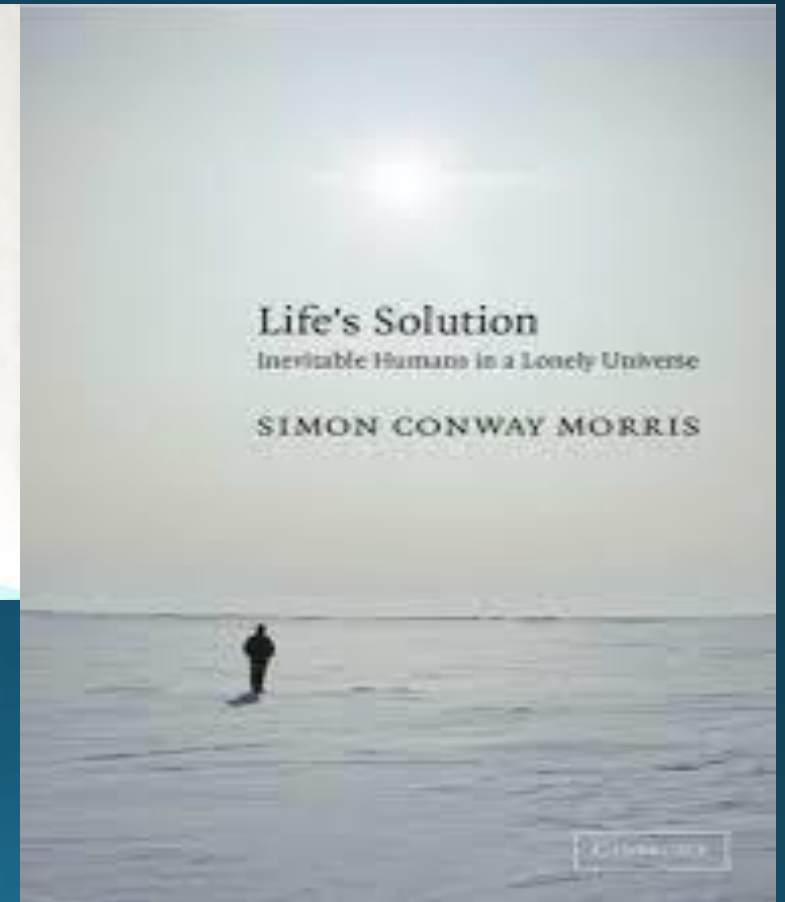


3. Third Way Evolution

Convergent Evolution



Professor of Evolutionary
Palaeobiology
University of Cambridge



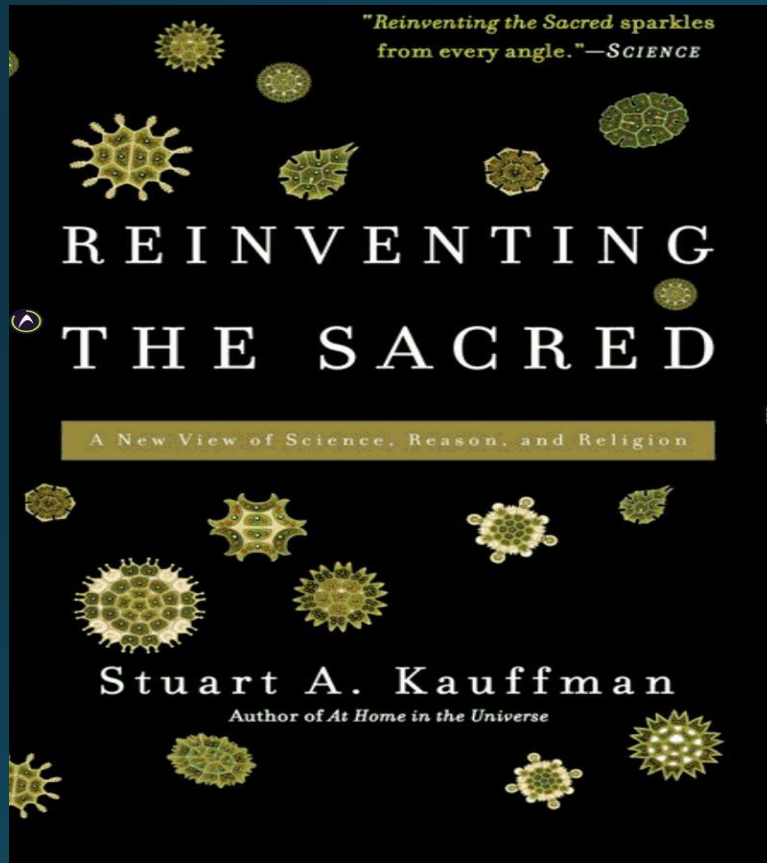
Same 'Solution' to a Particular 'Need'

- John Maynard Smith, one of Britain's greatest biologists, remarked 'If one was able to re-play the whole evolution of animals, there is no guarantee – indeed no likelihood – that the result would be the same. The central theme of this book depends on the realities of evolutionary convergence: the recurrent tendency of biological organization to arrive at the same 'solution' to a particular 'need'.
- Its main, but not ultimate, aim is to argue that, contrary to received wisdom, the emergence of human intelligence is a near-inevitability (Life's Solution, xi-xii)

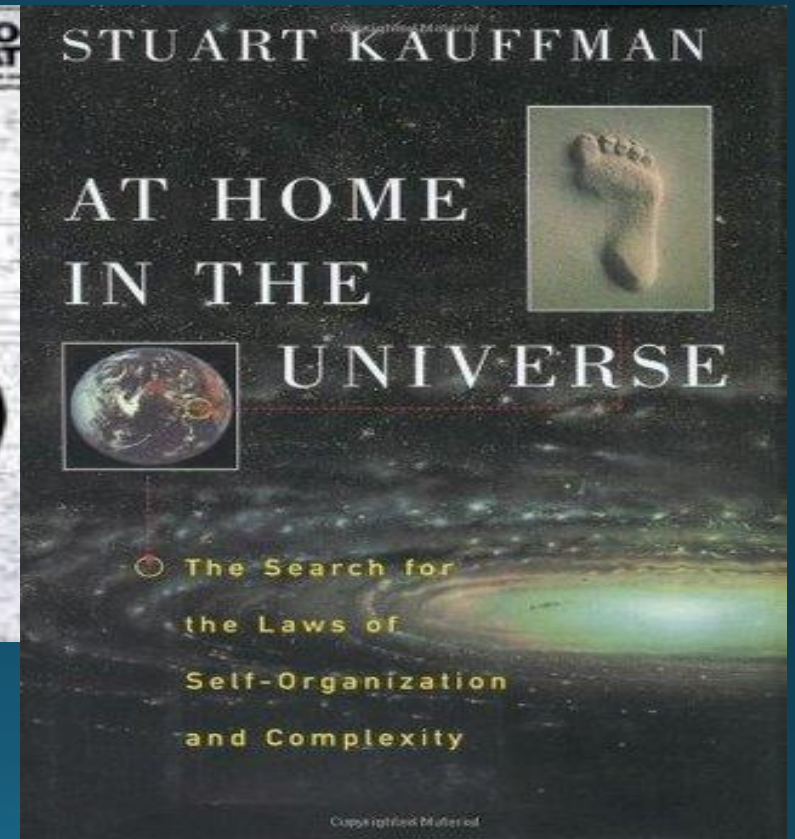
Beyond The Darwinian Formulation

- It is the otherwise uncontroversial observation that from very different starting points in the Tree of Life very much the same solution has evolved multiple times (The Runes of Evolution, Introduction)
- They point to a biology that will move far beyond the Darwinian formulation... despite the immensity of the Tree of Life, the divergences that delineate its shape are unlikely to be random... I would further suggest that one consequence is that much of this Tree may have what is effectively a pre-determined shape (The Predictability of Evolution: Glimpses into a post-Darwinian World)

Reinventing The Sacred



Professor of Biochemistry
University of Pennsylvania



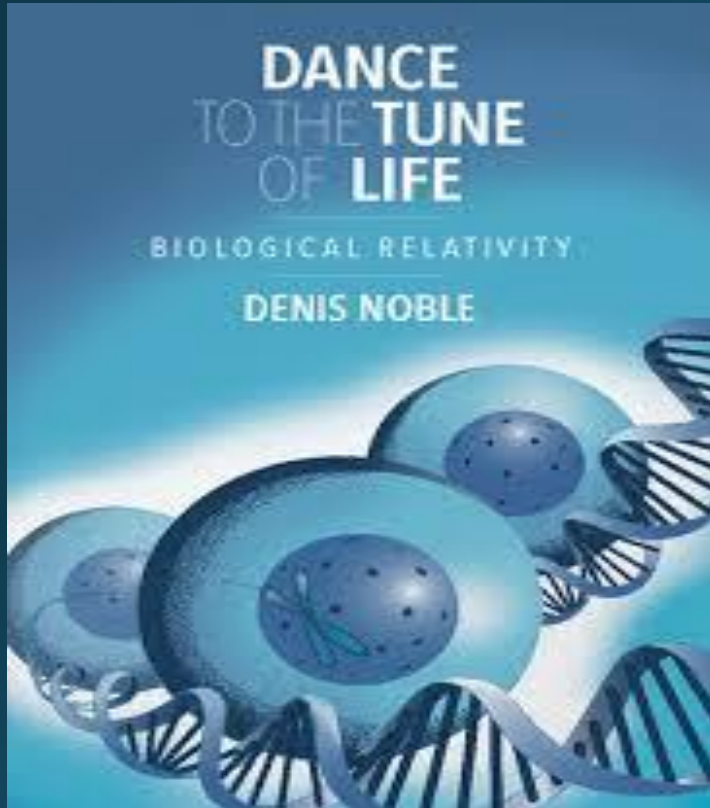
Agency is Emergent and Real

- Teleological language has long been a contentious issue among scientists and philosophers, many of whom consider it unscientific. I strongly disagree. Agency is emergent and real, but not reducible to physics, I shall argue, because biology is not reducible to physics. (Reinventing The Sacred, 12).

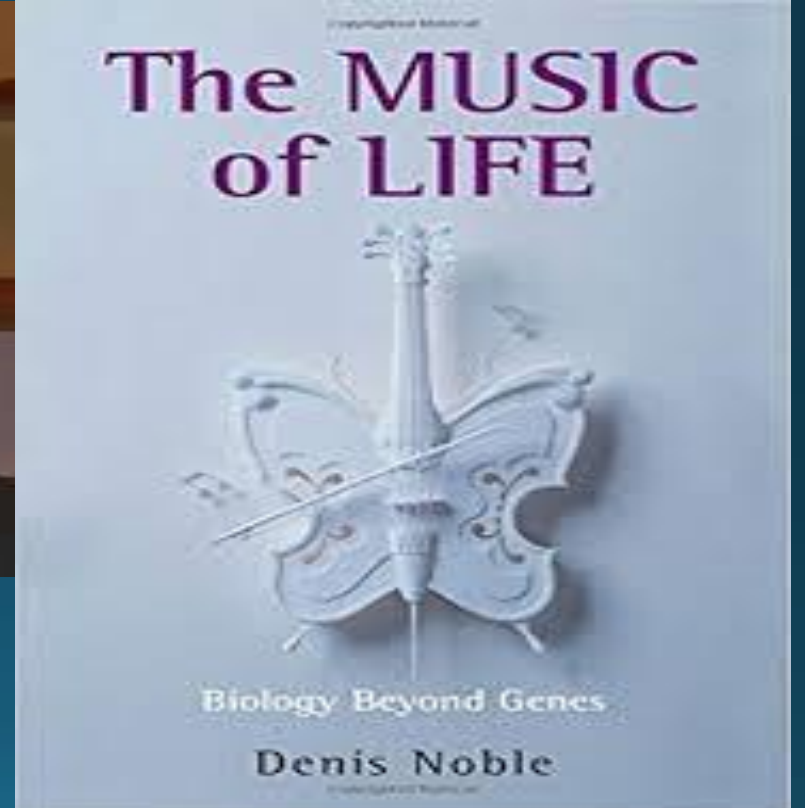
It Is Ontological Emergence

- Biology is both epistemologically and ontologically emergent(Kauffman, 39).
- Self-organization may require that we rethink all of evolutionary theory, for the order seen in evolution may not be the sole result of natural selection but of some new marriage of contingency, selection, and self-organization(Kauffman, 60).

Dance to the Tune of Life



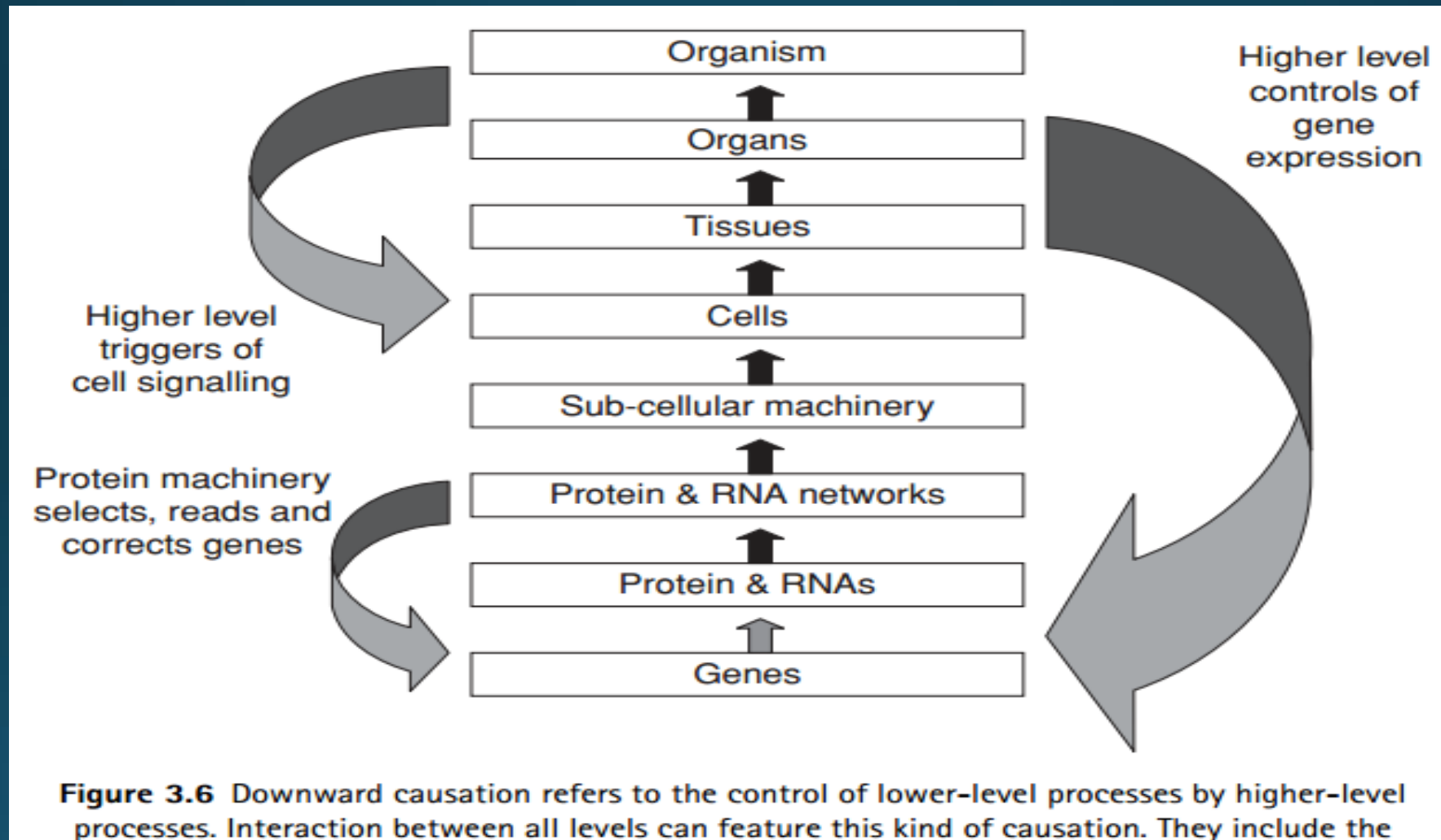
Professor of Physiology
and System Biology
Oxford University



Against Reductionism

- Western medical science has been strongly reductionist in its approach (Noble, 63).
- Networks in the sense I will use in this chapter can also involve interactions between different levels. As we will see, this leads to concepts like downward causation, circular causation and multi-level interactions of all kinds. Surprising as it may seem, the lowest molecular levels are controlled by the higher levels. Even DNA is controlled by the organism as a whole (Noble, 73).

Downward Causation



Co-operation

- Co-operation of this kind between species is widespread. Nature is not always, nor even usually, 'red in tooth and claw'...What we call symbiosis: two species co-operating. As I have already noted, all eukaryotic cells owe their origin to symbiogenesis (Noble, 51).

Miracle of Co-operation

- It became impossible to think of cells – any cells, in any species – without seeing them as the miracle of co-operation that they represent... It is what made possible the evolution of highly organised organisms, plants and the whole of the animal kingdom. Yet it is impossible to explain such a critical step as simply the outcome of chance mutations in the genomes of prokaryotes followed by natural selection(204).

Teleology

- Teleology as purpose in the context of a particular organism–environment interaction makes perfectly good scientific sense; it is verifiable (Noble, 45).
- The concept of a functional goal is an essential part of the concept of an organ(Noble, 54)
- Yet, teleology is alive and well because there is what we may call natural purposiveness, but it belongs to the organism not its DNA(Noble, 190).

It Is A Complete Break (Noble, 233)

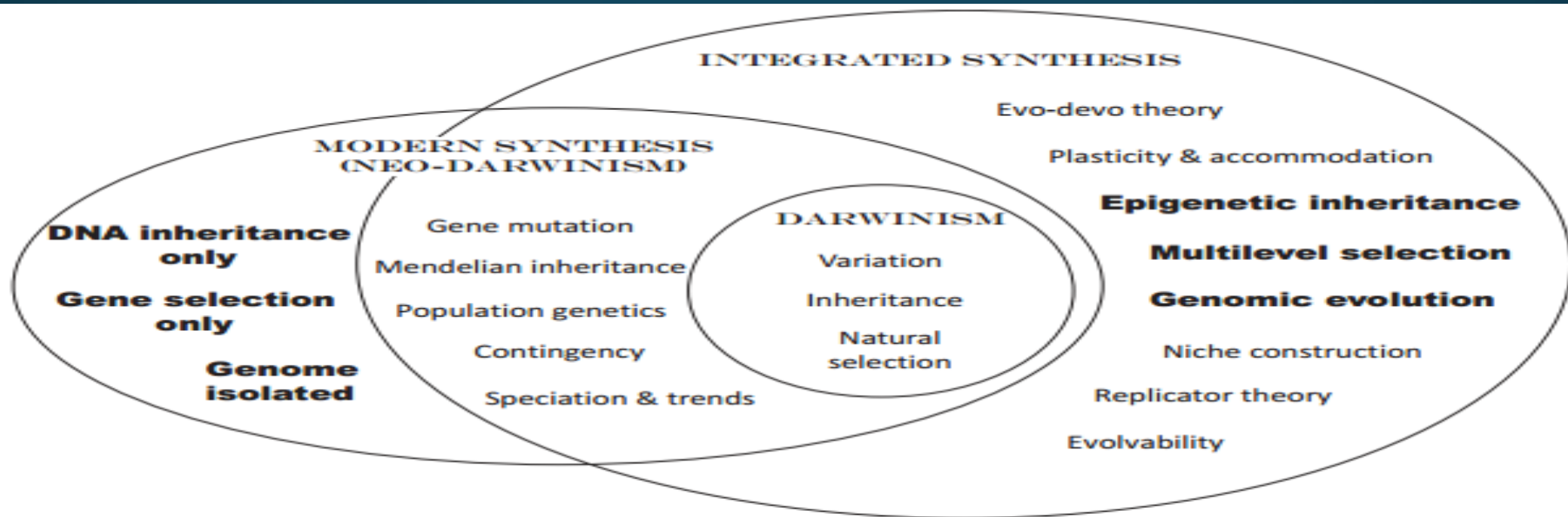


Figure 8.4 Diagram illustrating definitions of Darwinism, Modern Synthesis (Neo-Darwinism) and Integrated Synthesis. The diagram is derived from Pigliucci and Müller's (2010) presentation of an Extended Synthesis, shown in [Figure 8.3](#). All the elements are also present in their diagram.

The differences are: (1) the elements that are incompatible with the Modern Synthesis are shown in bold on the right (as they also are in [Figure 8.3](#)); (2) the reasons for the incompatibility are shown in the three corresponding bold elements on the left. These three assumptions of the Modern Synthesis lie beyond the range of what needs to extend or replace the Modern Synthesis; (3) in consequence, the Modern Synthesis is shown as an oval extending outside the range of the Extended Synthesis, which therefore becomes a replacement (from Noble 2015).⁵⁰

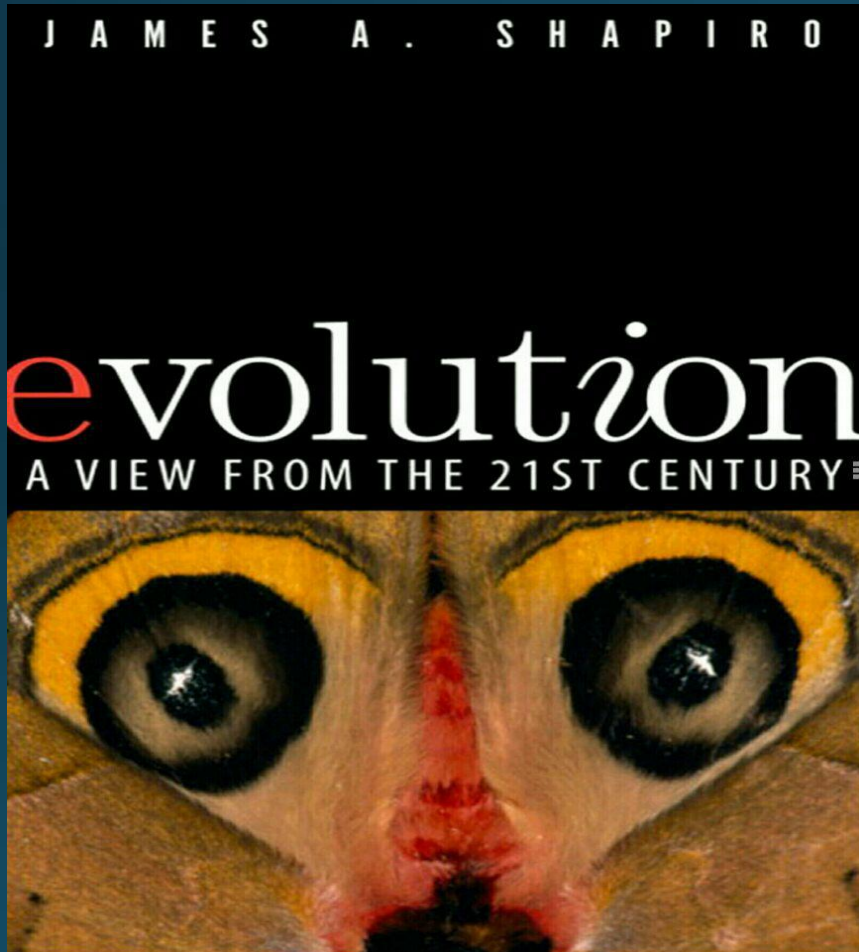
Against God

- The objection raised by many scientists is that teleology must entail belief in an overall purpose in nature and therefore belief in an ultimate intelligence, or god (Noble, 45).
- In fact, I suspect that for many scientists, defending reductionism, including particularly Neo-Darwinism, was a necessity in order to counter the claims of creationist religions or supernatural intelligent design(Noble, 248).

The Statement of Faith

- The elimination of teleology is often presented as a virtue. It expresses the metaphysical view that teleology should be avoided in scientific explanations(Noble, 249).
- It is in this context that we can understand why many prominent Neo-Darwinists are also prominent atheists. That also is a statement of faith(Noble, 251).

21th Century Evolution



Professor of Molecular Biology
University of Chicago

We Currently See Only The Tip Of The Iceberg

- We have learned enough about the diversity of existing life.. to recognize that we currently see only the tip of the iceberg. But even our incomplete knowledge of the evolutionary iceberg's tip contains clues to exciting processes that were long thought (and long taught) to be impossible(Shapiro, 5).

Shift From A Mechanistic To Informatic View

- The contemporary concept of life forms as self-modifying beings coincides with the shift in biology from a mechanistic to informatic view of living organisms(Shapiro, 4).
- Little evidence fits unequivocally with the theory that evolution occurs through the gradual accumulation of “numerous, successive, slight modifications”. On the contrary, clear evidence exists for abrupt events of specific kinds at all levels of genome organization (Shapiro, 128).

Natural Genetic Engineering

- The various natural genetic engineering operators are the molecular agents of active genome change. What characteristics do these operators display that fit them into the new systems perspective? The brief answer is that they have the capacities needed for a process similar to the kind of engineering humans undertake when we want to develop novel products or carry out established functions in a more efficient or responsive manner(Shapiro, 129).

The Opposition Is Deeply Philosophical

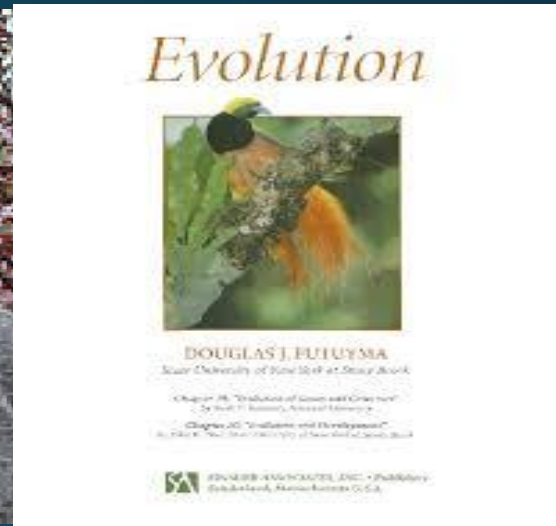
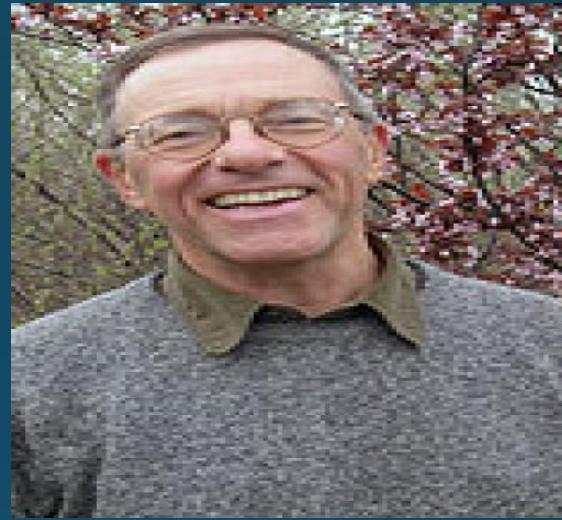
- There is a convincing (perhaps overwhelming) case for the role of basic engineering principles in genome evolution(Shapiro, 134).
- If the ideas of cell cognition, decision-making, and goal-oriented function are within contemporary biological perspectives—and if the natural genetic engineering concept is subject to empirical investigation—we can legitimately ask why the idea has been so fiercely resisted by mainstream biologists, and evolutionists in particular. My personal opinion is that the opposition is deeply philosophical(Shapiro, 138).

Violate The Principles Of Naturalism

- Nonetheless, the phrase natural genetic engineering has proven troublesome to many scientists because they believe it supports the Intelligent Design argument. As one Nobel Laureate put it after a seminar, “If there is natural genetic engineering, that means there has to be an engineer.” This empirically derived concept seems to many scientists to violate the principles of naturalism that exclude any role for a guiding intelligence outside of nature (Shapiro, 134)

Methodological Naturalism

- Science first therefore adopt the position that natural causes are responsible for whatever we wish to explain about the natural world. this is not necessarily a commitment to *metaphysical naturalism* (the assumption that everything truly has natural rather than supernatural causes), but it is a commitment to *methodological naturalism* (the working principle that we can entertain only natural causes when we seek scientific explanations)(Evolution, 2005, 527)



Douglas Futuyma, Distinguished Professor in the Department of Ecology and Evolution at Stony Brook University

مهمترین ویژگی علم



- موافق طبیعت‌گرای روش شناختی تنها تاکید دارد که، هنگامیکه فعالیت علمی انجام می‌دهد، باید از هرگونه ارجاع به امر الهیاتی و دینی پرهیز نماید. به طور خاص، طبیعت‌گرایی روش شناختی، منکر آنست که خداوند نقشی در آفرینش داشته است. این بدان معنا نیست که خداوند (در واقع) نقشی در خلقت نداشته است، بلکه علم از آنجا که علم است و متعهد به طبیعت‌گرایی روشی جایی برای سخن گفتن از خداوند نخواهد گذاشت (Ruse, 2005, p. 46).
- "به باور من اولین و مهمترین ویژگی علم آنست که آن کاملاً بر پایه قوانین و فرآیندهای کور و بی هدف طبیعی قرار دارد. مهمترین ویژگی علم جدید آنست که آن کاملاً وابسته به عملکرد انتظام‌های کور و بی‌تغییر در جهان است. ما به این انتظام‌ها قوانین طبیعی می‌گوییم" (Piotr Bylica, 2008, p. 623).

- Piotr Bylica, D. S. (2008). God, Design, And Naturalism: Implications Of Methodological Naturalism In Science For Science-Religion Relation. *PENSAMIENTO*, 64(242)
- Ruse, M. (2005). Methodological Naturalism Under Attack. *South African Journal of Philosophy*, 24(1)

We Are Forced By Our A Priori Adherence

- We take the side of science in spite of the patent absurdity of some of its constructs, in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment, a commitment to materialism..
- we are forced by our *a priori* adherence to material causes to create an apparatus of investigation,... no matter how counter-intuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door. (January 9, 1997 *New York Review of Books*)



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University

متشکرم!