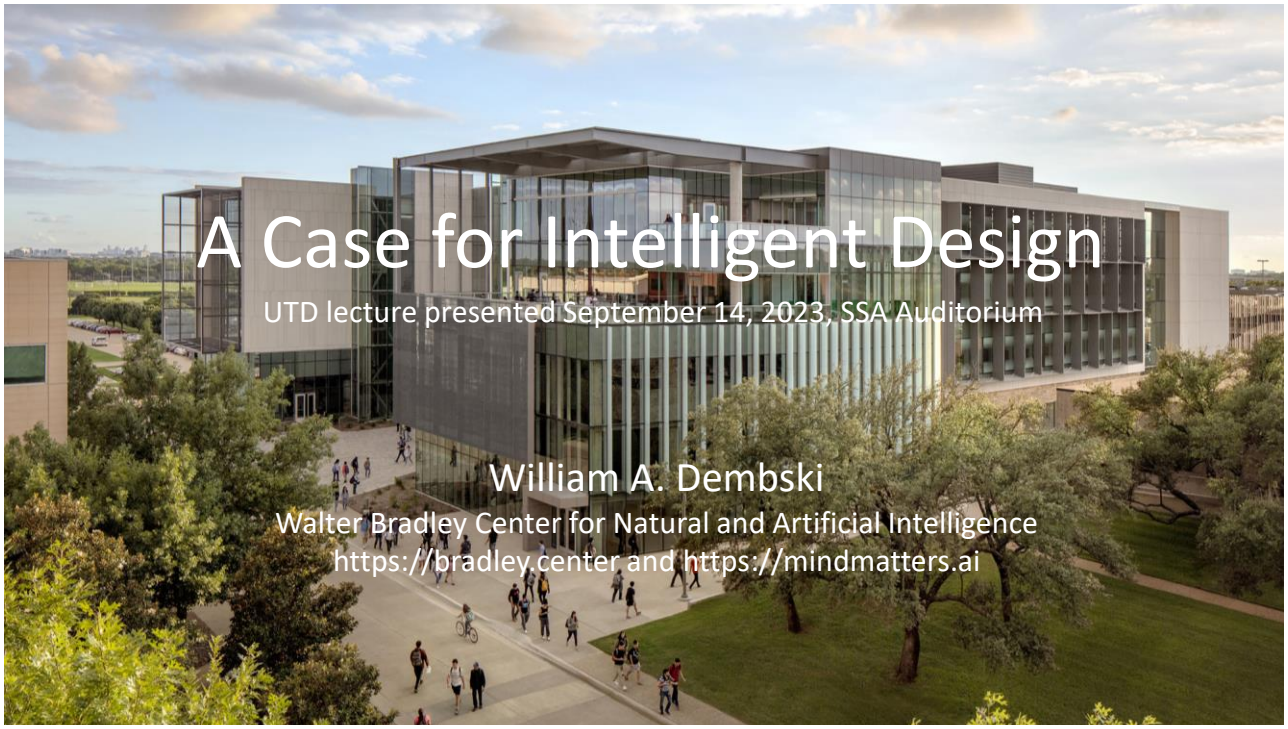

A Case for Intelligent Design

UTD lecture presented September 14, 2023, SSA Auditorium

William A. Dembski
Walter Bradley Center for Natural and Artificial Intelligence
https://bradley.center and https://mindmatters.ai

Outline of Lecture

- Define intelligent design and motivate it.
- Overview a few special sciences that fall under intelligent design.
- Spotlight how intelligent design looms large over biology.
- Show why Darwin cannot rule out intelligent design from biology.
- Challenge that Darwin provided a better explanation of biological origins than intelligent design.
- Sketch how we detect and infer design/intelligent agency.
- Define the key intelligence metric: specified complexity.
- Why is all this important, and what can you do about it?

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What Is Intelligent Design?

Intelligent design is the study of patterns in nature that are best explained as the product of intelligence.

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Pattern best explained by intelligence?

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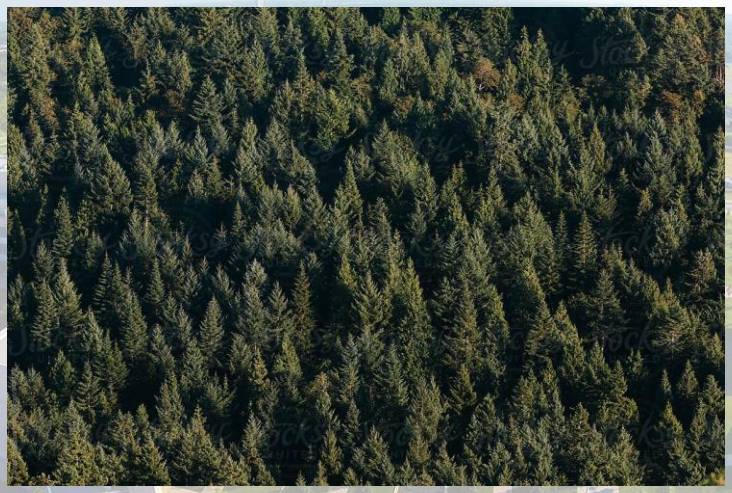
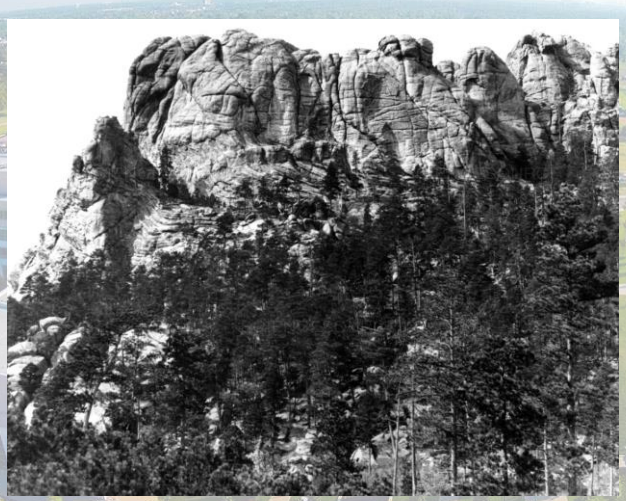
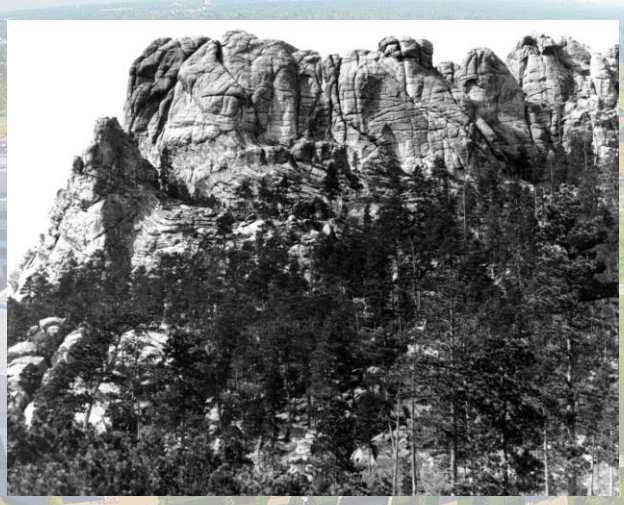


Pattern best explained by intelligence?

Pattern best explained by intelligence?

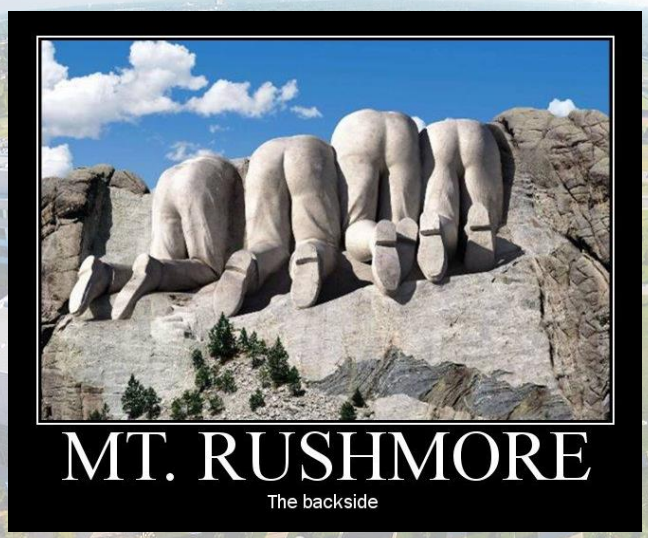


Mount Rushmore before it was carved



Mount Rushmore after it was carved

Little known fact about Mount Rushmore



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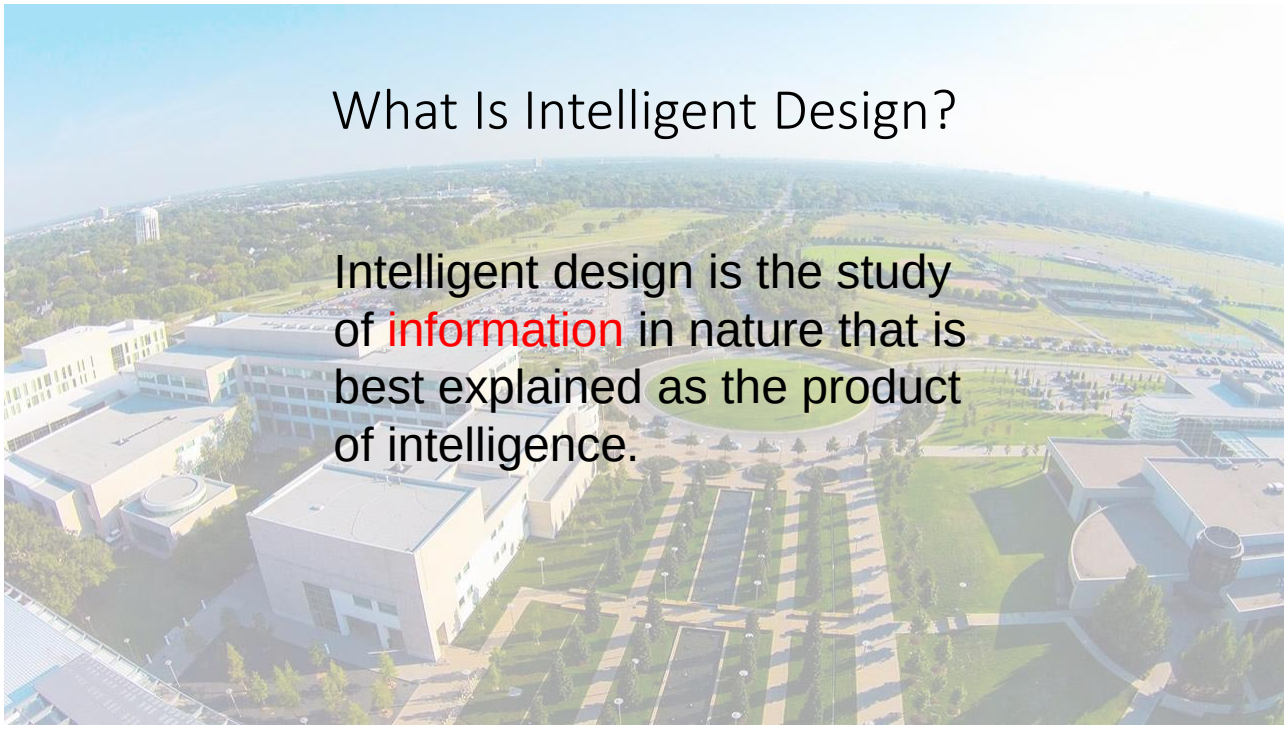
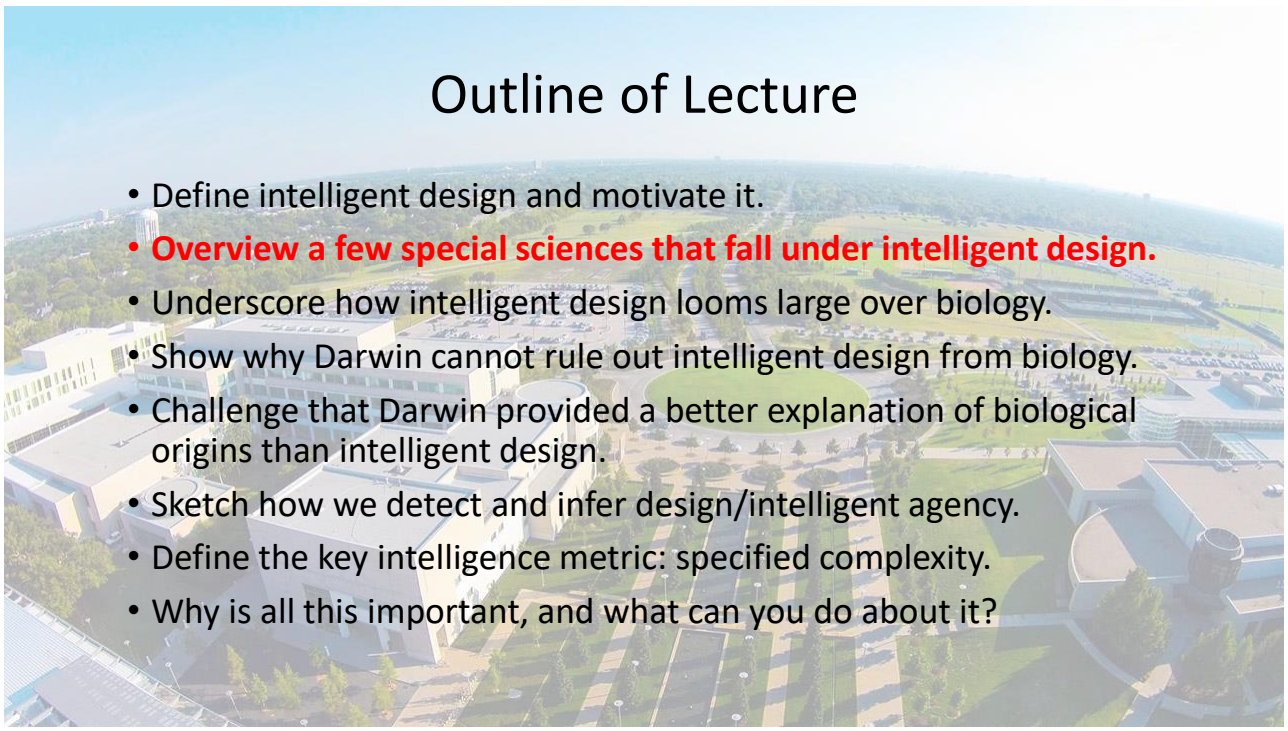


What Is Intelligent Design?

Intelligent design is the study of information in nature that is best explained as the product of intelligence.



Outline of Lecture

- Define intelligent design and motivate it.
- **Overview a few special sciences that fall under intelligent design.**
- Underscore how intelligent design looms large over biology.
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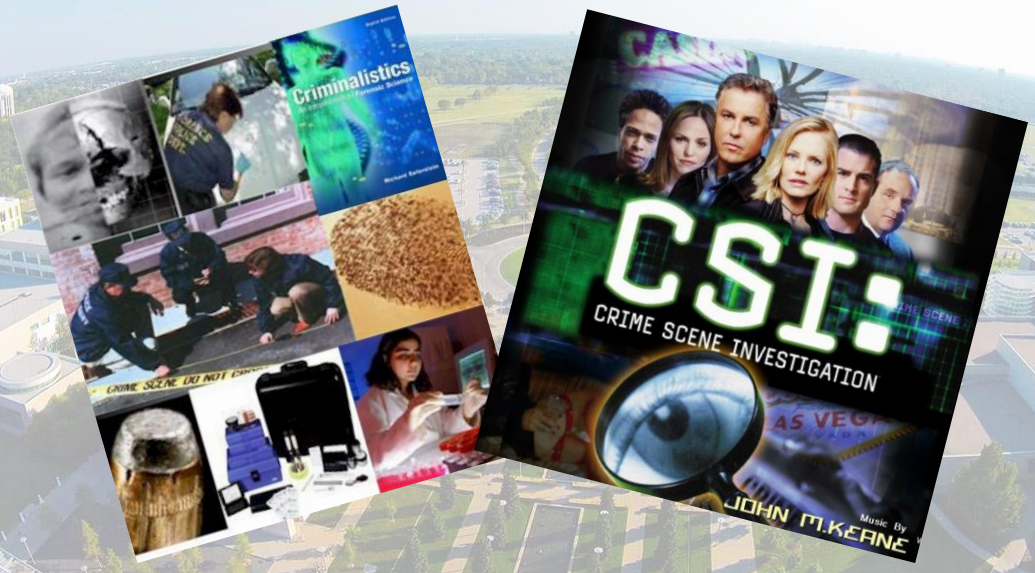
Forensic Science



Data Falsification in Science

Marc Tessier-Levigne

In 2022, the Stanford board of trustees opened an investigation into allegations that Tessier-Lavigne might have been involved in fabricating results in articles published between 2001 and 2008, when he was working at Genentech. In July 2023, the trustees' report was released, finding that in several papers he co-authored "there was apparent manipulation of research data by others." Tessier-Lavigne then announced that he would be stepping down as president of Stanford, effective August 31, 2023.

—Wikipedia article on MTL

Data Falsification in Science

KIRKLAND & ELLIS LLP
AND AFFILIATED PARTNERSHIPS

Mark Filip, P.C.

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United States

+1 312 862 2000

www.kirkland.com

Facsimile:
+1 312 862 2200

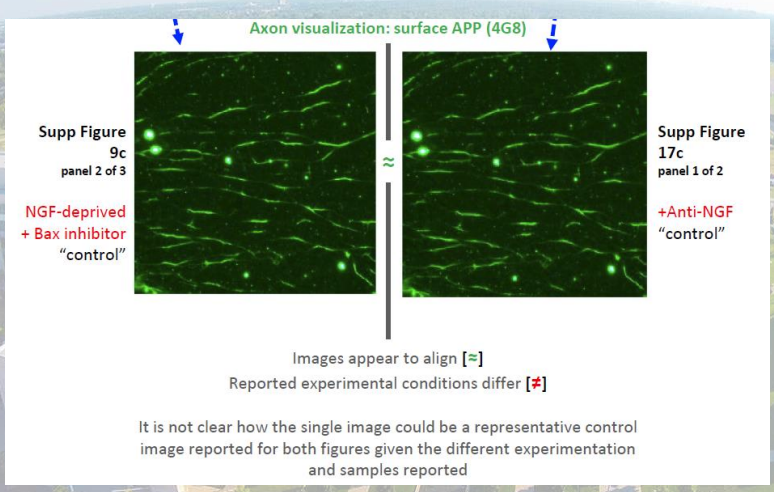
July 17, 2023

Special Committee
The Board of Trustees
of the Leland Stanford Junior University
Office of the Board of Trustees
Littlefield Center
365 Lasuen Street
Stanford, CA 94305

Special Committee Chair Lam, Board Chair Yang, and Trustees Coulter and Stone:

In late November 2022, various public allegations of scientific misconduct were raised regarding certain papers on which Stanford University President Dr. Marc Tessier-Lavigne is a co-author. In response, the Stanford University Board of Trustees, the governing body responsible for overseeing the university's president, formed a Special Committee of the Board to examine the facts underlying the allegations. This structure was consistent with what is often seen as best

Forensic Image Analysis



Theo Baker: Stanford Freshman Who Exposed Marc Tessier-Levigne's Fraud

https://www.youtube.com/watch?v=vnhdffULoQ0

Archeology

SETI

Outline of Lecture

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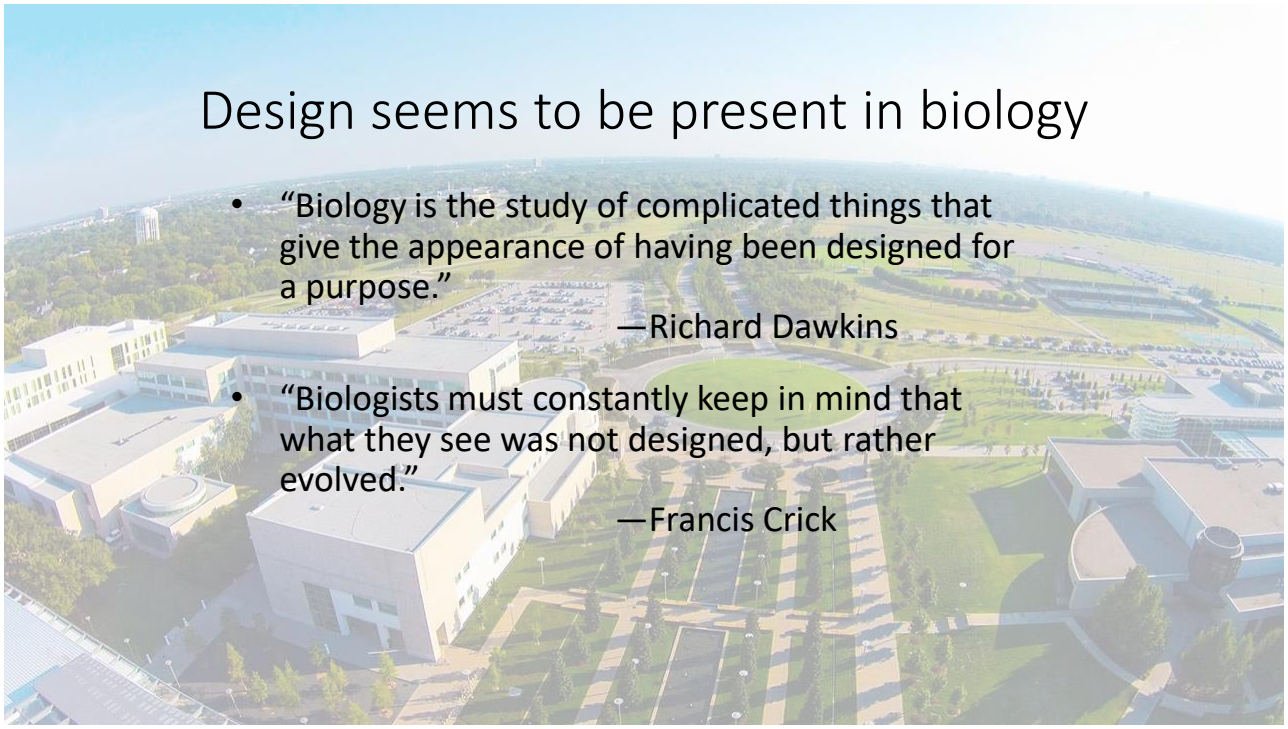


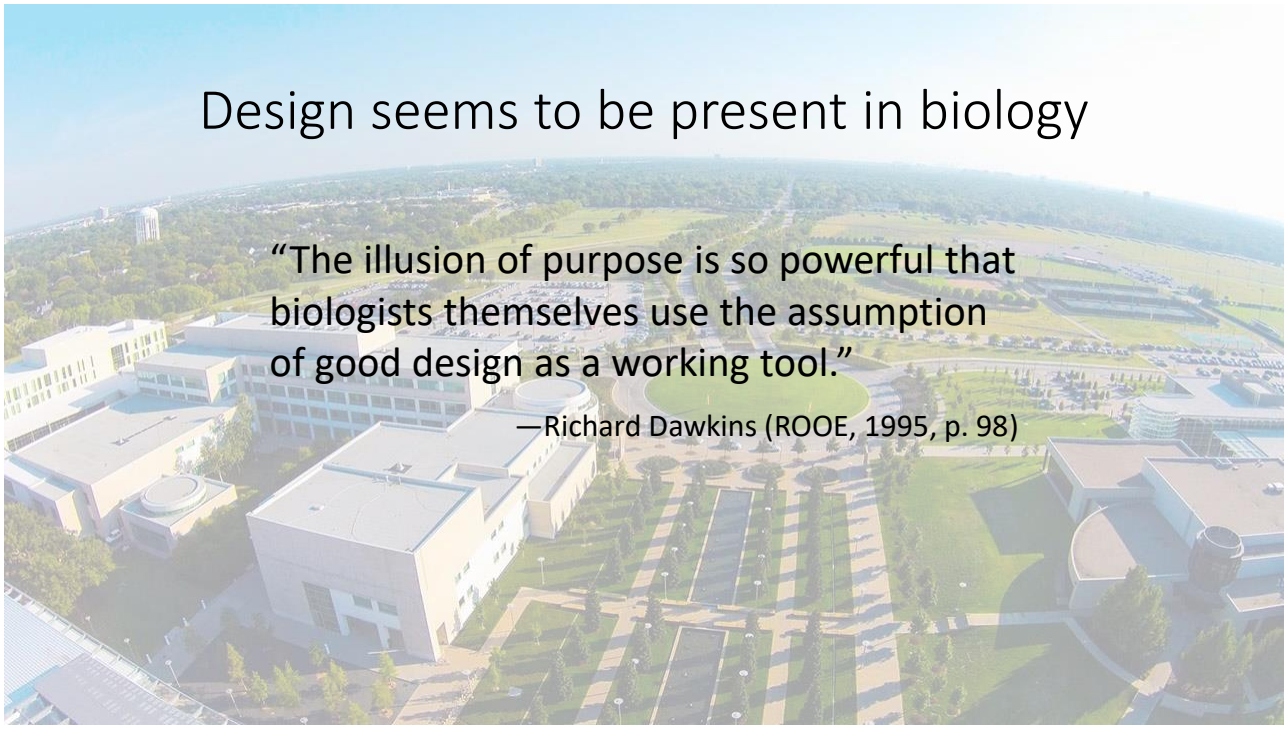
Design seems to be present in biology

- "Biology is the study of complicated things that give the appearance of having been designed for a purpose."

—Richard Dawkins

- "Biologists must constantly keep in mind that what they see was not designed, but rather evolved."

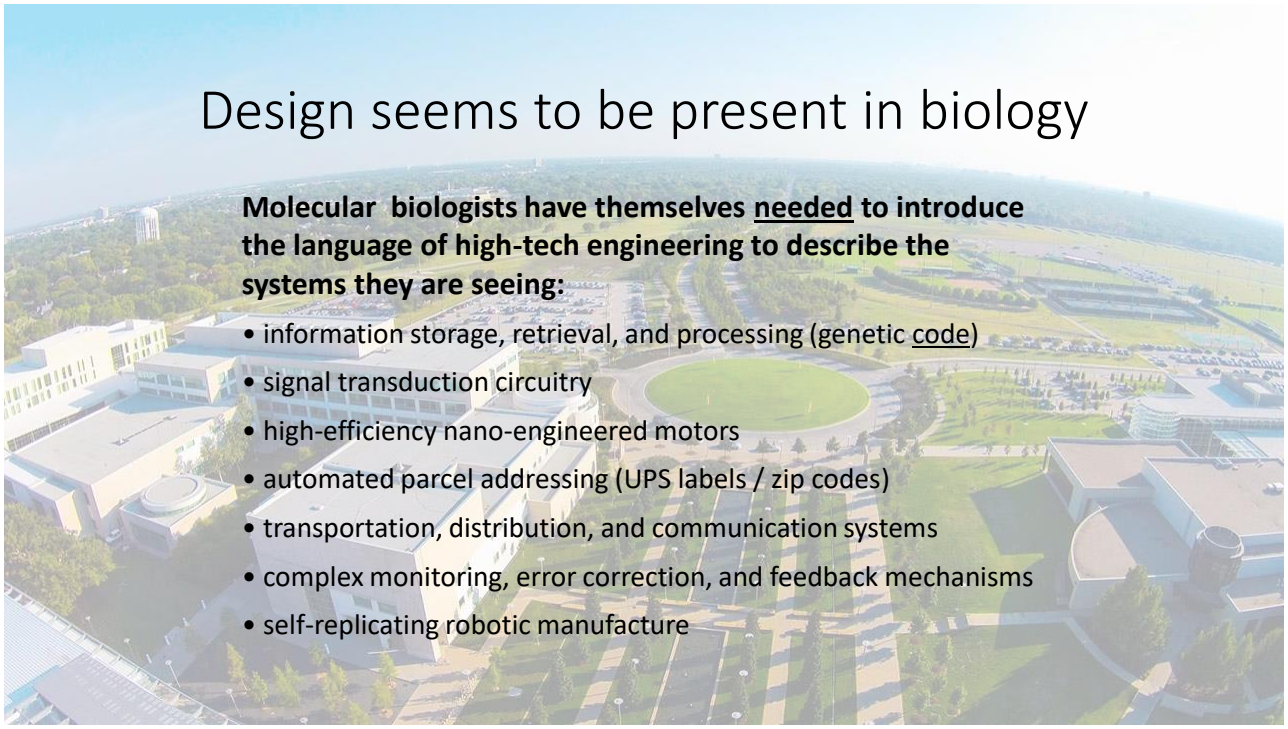
—Francis Crick



Design seems to be present in biology

"The illusion of purpose is so powerful that biologists themselves use the assumption of good design as a working tool."

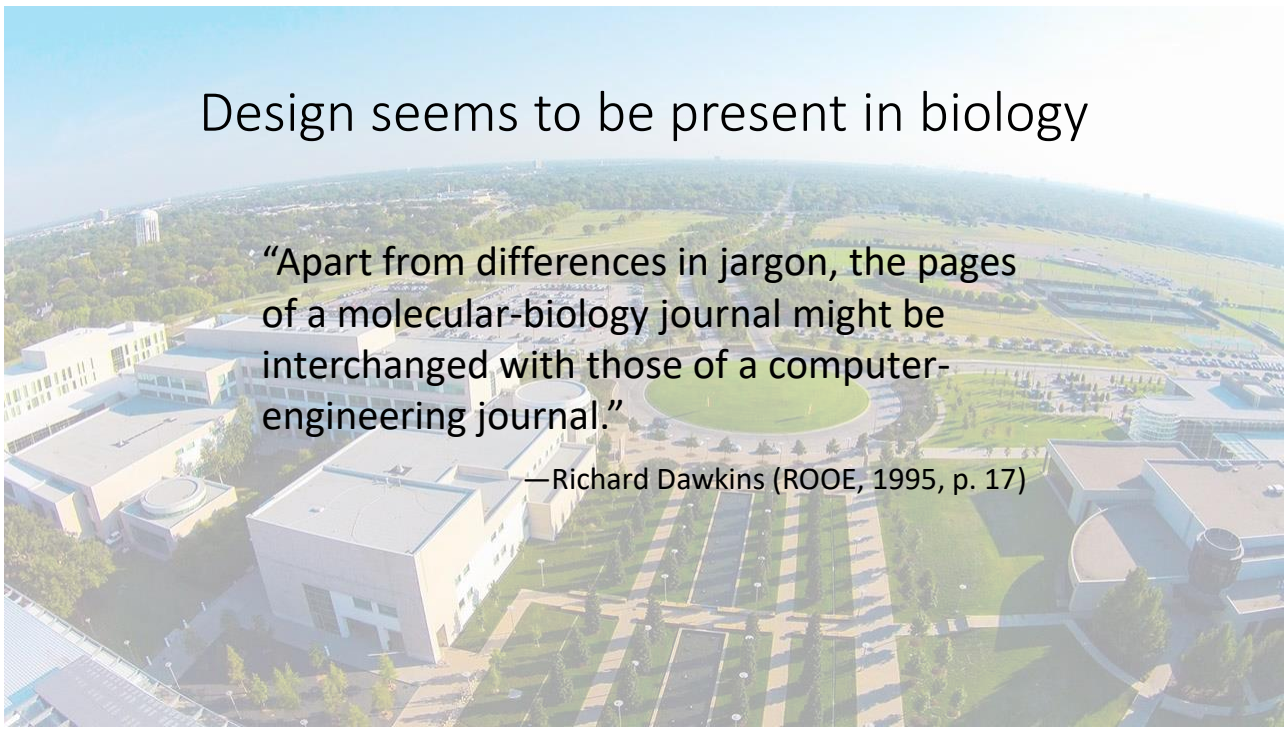
—Richard Dawkins (ROOE, 1995, p. 98)



Design seems to be present in biology

Molecular biologists have themselves needed to introduce the language of high-tech engineering to describe the systems they are seeing:

- information storage, retrieval, and processing (genetic code)
- signal transduction circuitry
- high-efficiency nano-engineered motors
- automated parcel addressing (UPS labels / zip codes)
- transportation, distribution, and communication systems
- complex monitoring, error correction, and feedback mechanisms
- self-replicating robotic manufacture

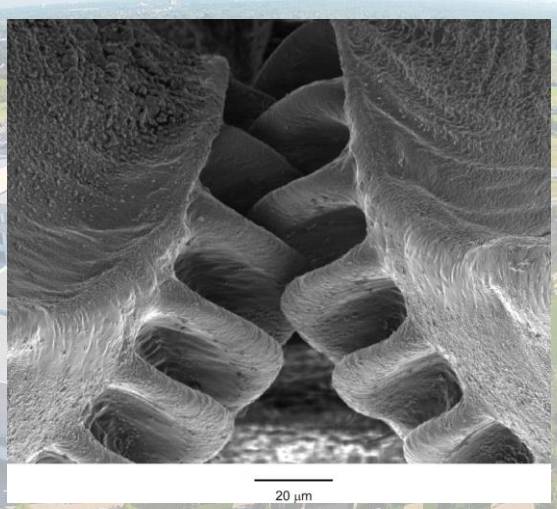


Design seems to be present in biology

"Apart from differences in jargon, the pages of a molecular-biology journal might be interchanged with those of a computer-engineering journal."

—Richard Dawkins (ROOE, 1995, p. 17)

Intelligent design in biology?



Intelligent design in biology?

Intelligent design in biology?

Mexican blue morpho uses Distributed Bragg Reflector (DBR)

The DBR get used in high-tech human design

A DBR reflects particular wavelengths of light while transmitting others. It is based on the Lawrence Bragg's law of diffraction. DBRs are often found in optoelectronic devices:

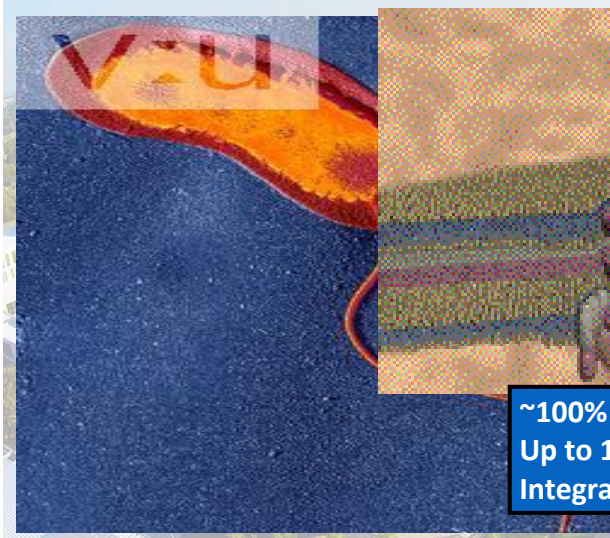
1.Semiconductor Lasers (or Diode Lasers): In semiconductor lasers, DBRs can be used to select a single wavelength, ensuring that the laser operates at a specific desired frequency. Vertical Cavity Surface Emitting Lasers (VCSELs) often incorporate DBRs.
2.Fiber Bragg Gratings (FBGs): In optical fiber technology, a periodic change in the refractive index of the fiber core can act as a DBR. Such structures can be used for filtering specific wavelengths of light, useful in applications like optical communication systems and sensors.
3.Optical Filters: DBRs are used in tunable optical filters to select specific wavelengths from a broader spectrum.
4.Optical Sensors: The reflection spectrum of a DBR can be influenced by external factors, making it useful in sensing applications. For instance, Fiber Bragg Gratings (a type of DBR) can be used to detect strain, temperature, and other physical changes.
5.Photonic Crystal Structures: These are often used in manipulating and controlling the flow of light. DBRs can be seen as a one-dimensional type of photonic crystal.
6.Waveguide DBRs: In integrated photonics, DBRs can be incorporated into waveguides to create filters or specific wavelength reflectors.

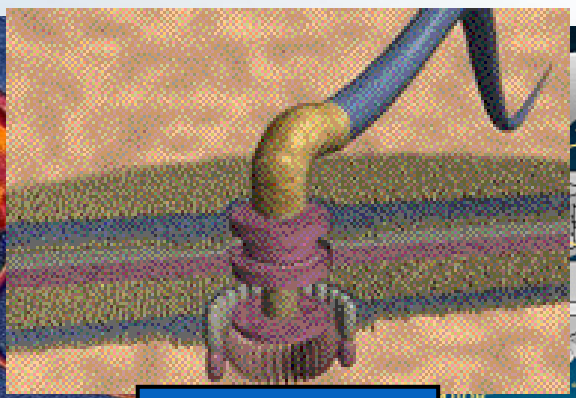
The precise and controlled reflection properties of DBRs make them valuable in many areas of photonics and optoelectronics.

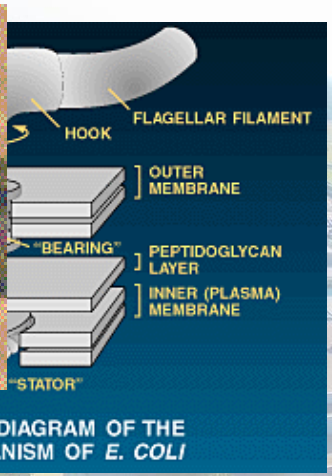
Intelligent design in biology?

"The so-called leaf butterfly, *Kallima limborgi* ***not*** pretending to be a leaf! Malaysai, 1992." — Bernard D'Abrera

Intelligent design in biology?



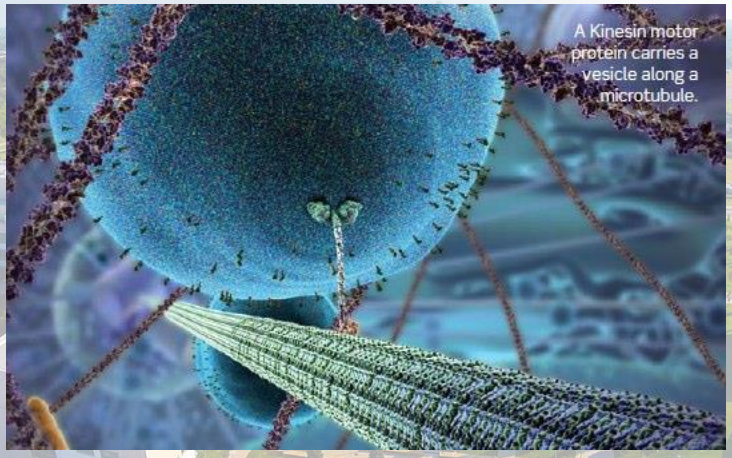




NCEPTUAL DIAGRAM OF THE
'OR MECHANISM OF *E. COLI*

~100% Efficiency
Up to 100,000 rpm
Integrated Steering

Intelligent design in biology?



BioVisions, Harvard University, XVIVO Scientific Animation, 2006

BioVisions: *The Inner Life of the Cell*

- information storage, retrieval, and processing (genetic code)
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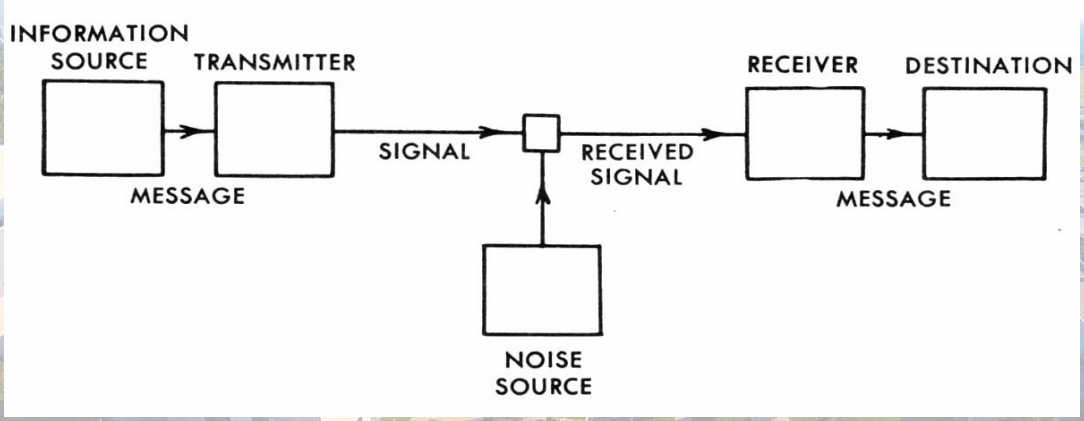
BioVisions: *The Inner Life of the Cell*

Full Video

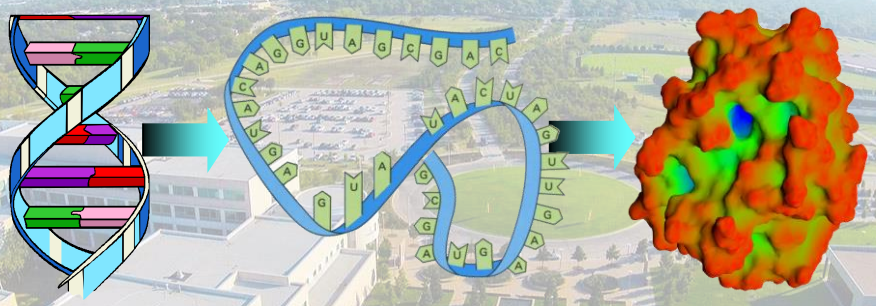
Abridged Video

Intelligent design in biology?



Claude Shannon's Information Theory: *The Mathematical Theory of Communication*, 1949

Intelligent design in biology?



DNA (Gene) → mRNA (Gene message) → Protein (Gene product)

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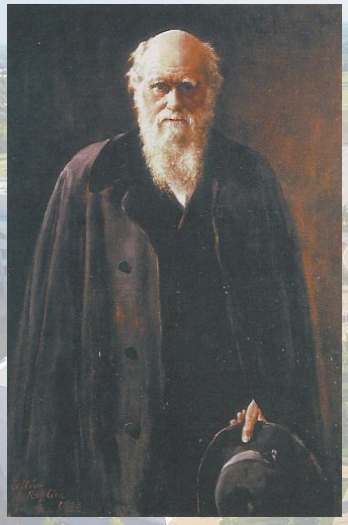
Darwin's Challenge to Intelligent Design



Natural selection and random variation can explain the emergence of biological information.

The Received Wisdom

"By attributing the diversity of life to natural causes rather than to supernatural creation, Darwin gave biology a sound scientific basis."

— Campbell's BIOLOGY, 5th ed.

The Received Wisdom

"He [Darwin] dismissed it [design] not because it was an incorrect scientific explanation, but because it was not a proper scientific explanation at all."

– David Hull

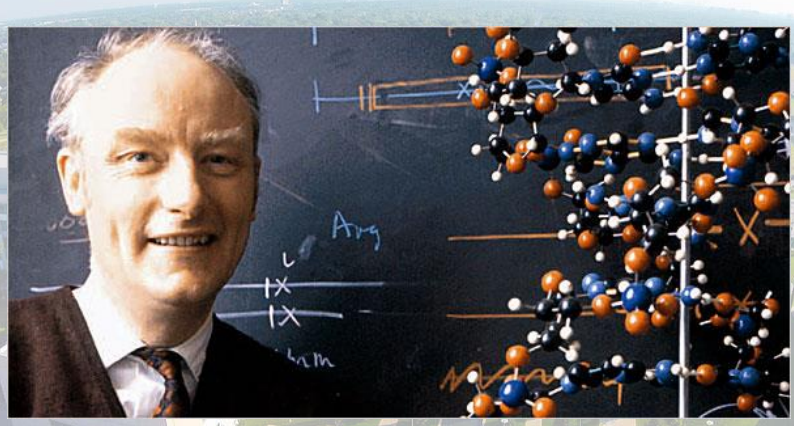
The Received Wisdom

Intelligent design is not science because it cannot be science.

And we can credit Darwin for removing intelligent design from science.

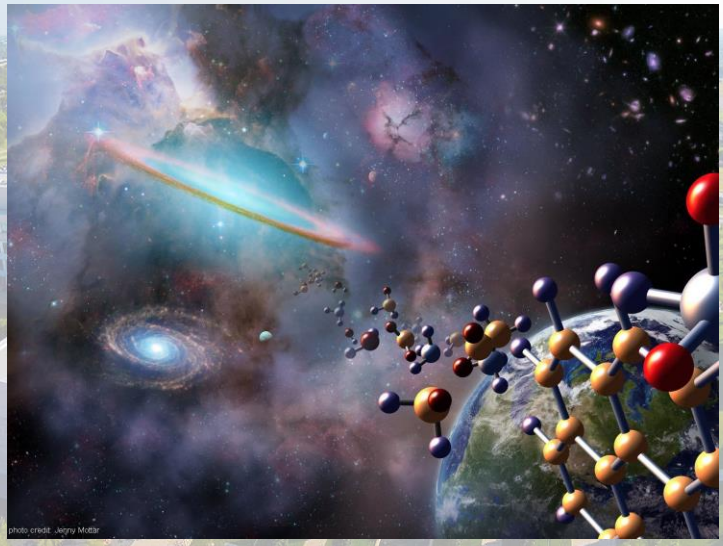
It's a science vs. religion controversy, not a science vs. science controversy.

Design Theorist?

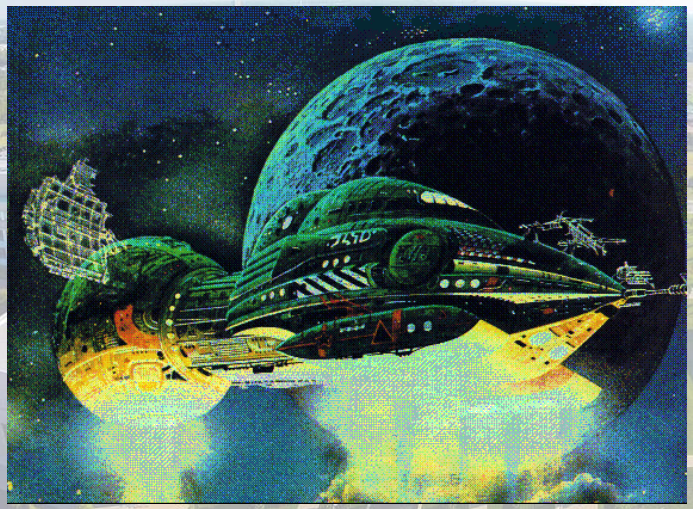


Directed Panspermia

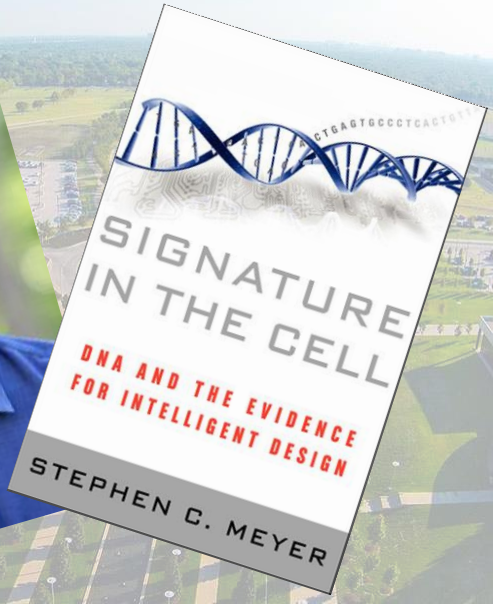
Panspermia



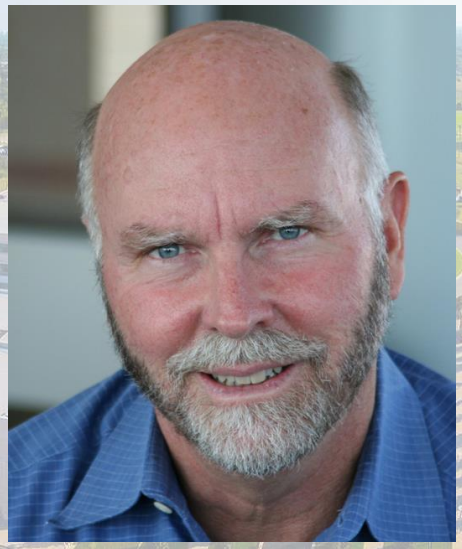
Directed Panspermia



Signature in the Cell



Craig Venter



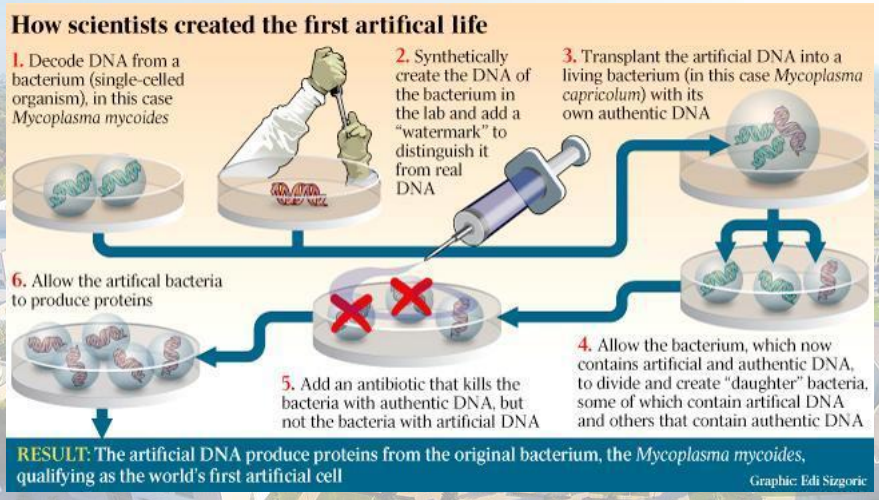
Venter's DNA Watermarks

The five coded messages embedded in the first synthetic genome :

VENTERINSTITVTE
CRAIGVENTER
HAMSMITH
CINDIANDCLYDE
GLASSANDCLYDE

--*Wired, 28jan08*

Venter's Artificial Life



What can we conclude?

Biology has no way of ruling out intelligent design on first principles. Design in biology could be real, as demonstrated by Venter, and it could be detectable, as through his watermarking.

Outline of Lecture

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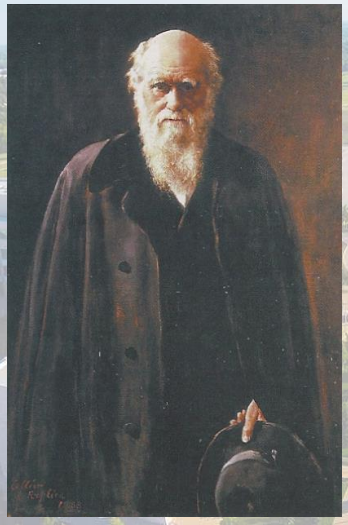
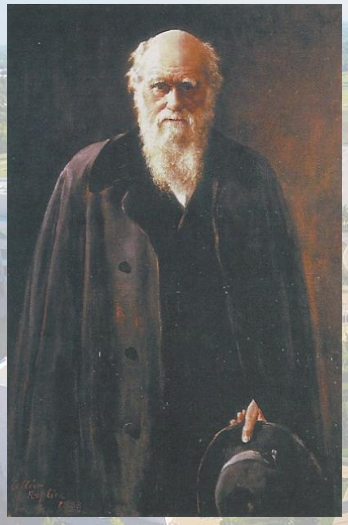
Darwin Didn't Rule Out Intelligent Design



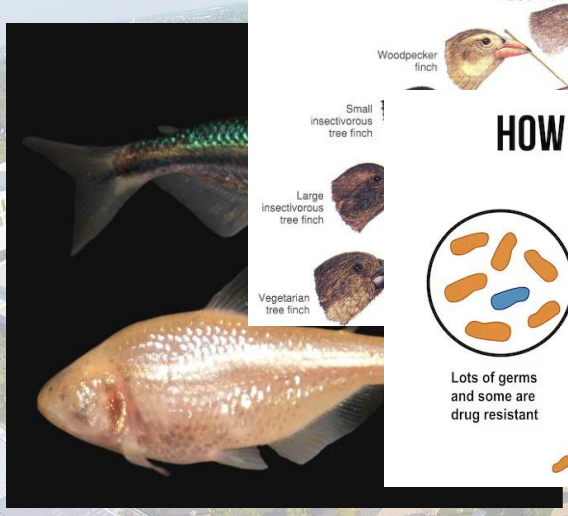
Natural selection and random variation can explain the emergence of biological information.

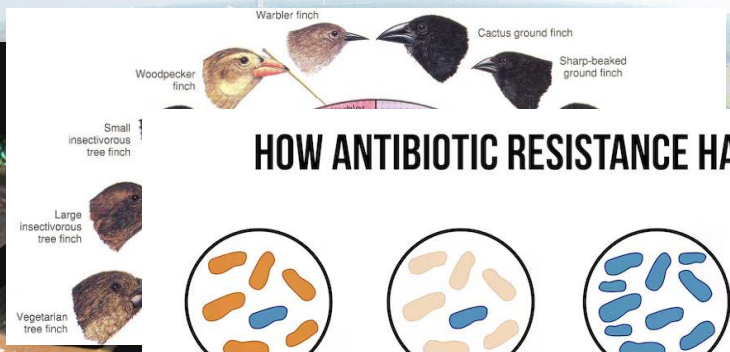
But Darwin Did Claim to Offer a Better Explanation



Natural selection and random variation can explain the emergence of biological information.

Where Darwin Works

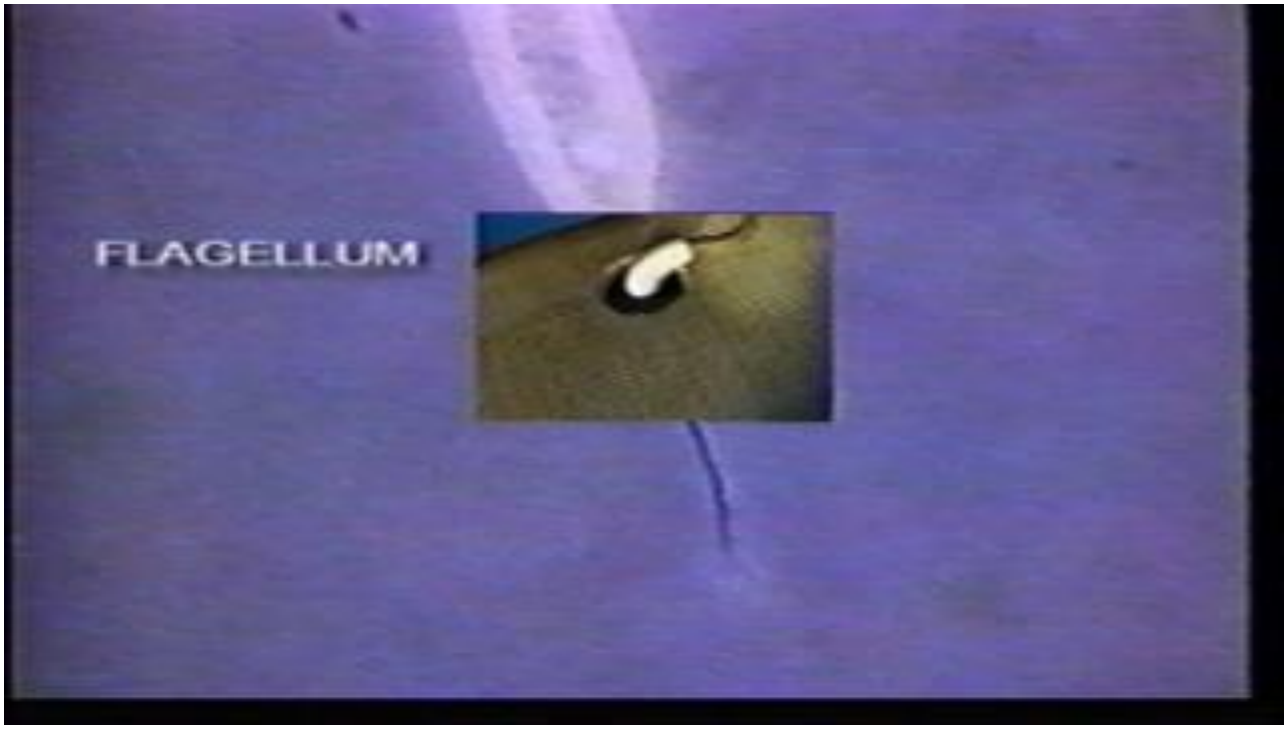


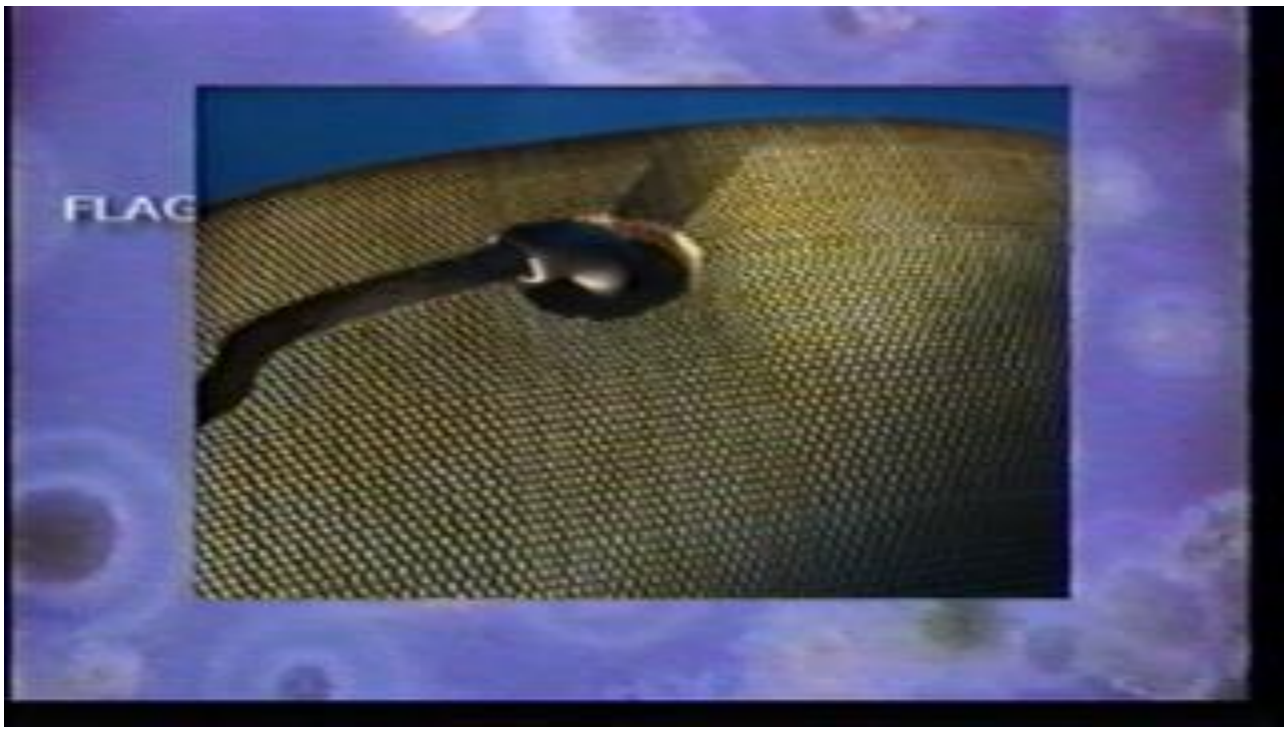


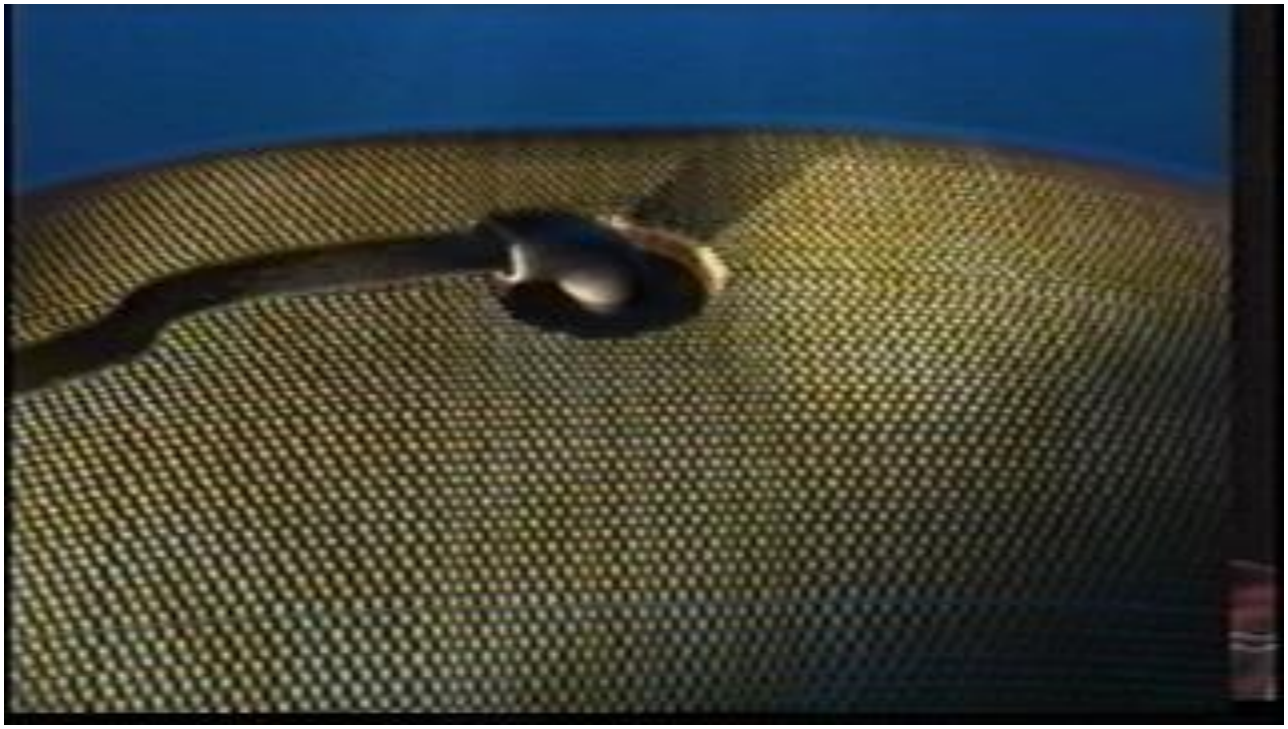
Where Doesn't Darwin Work?

High-Tech Nano-Engineering Inside the Cell


FLAGELLUM


FLAGELLUM

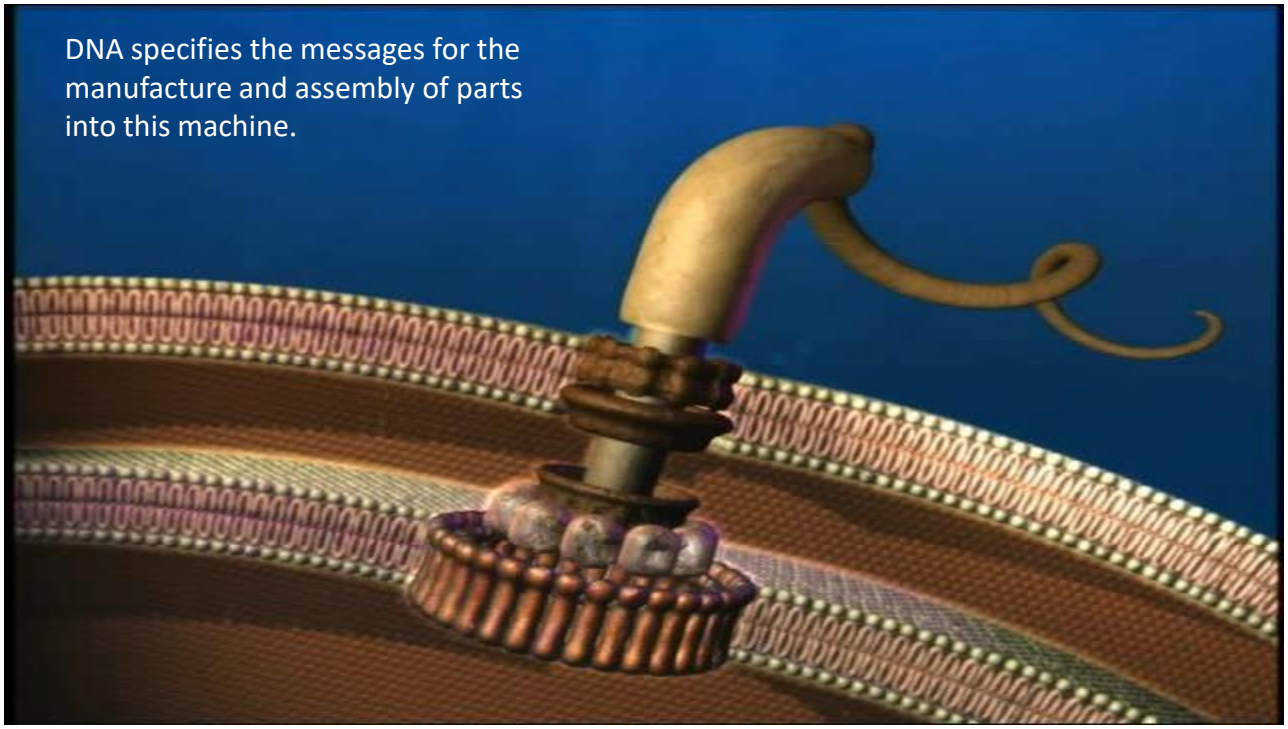

FLAG

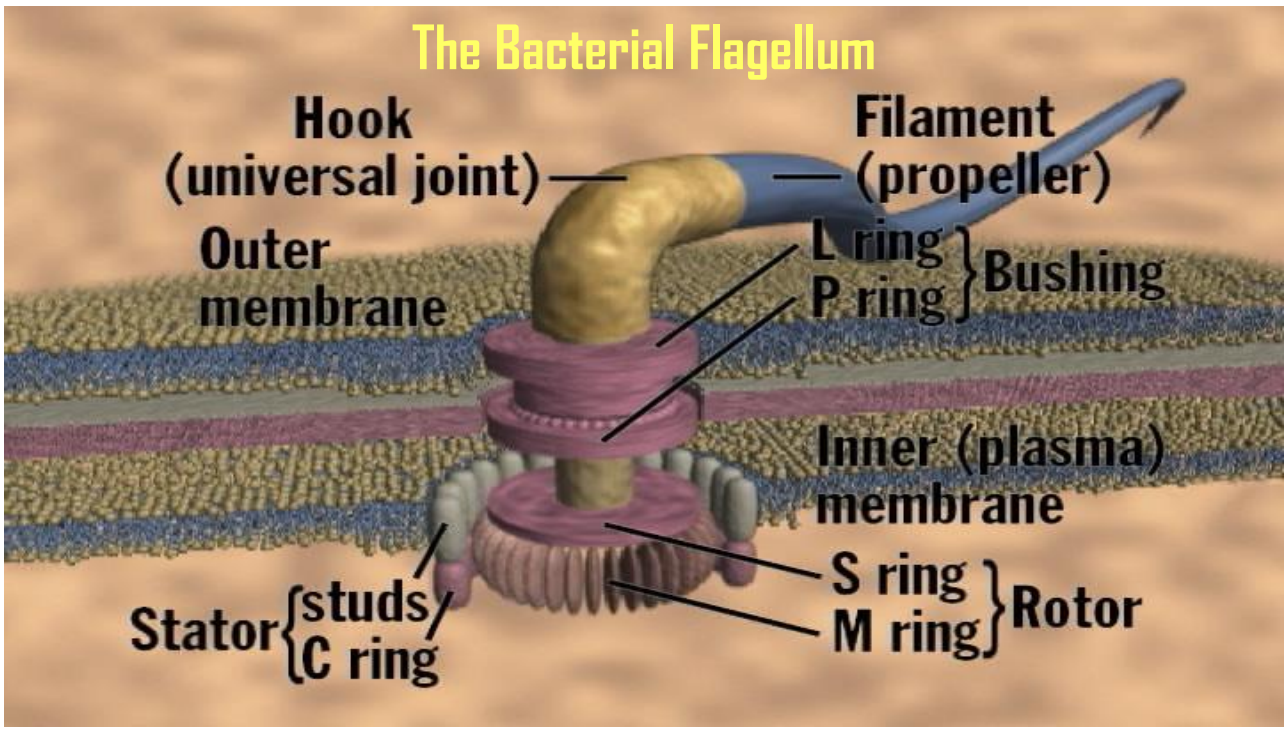


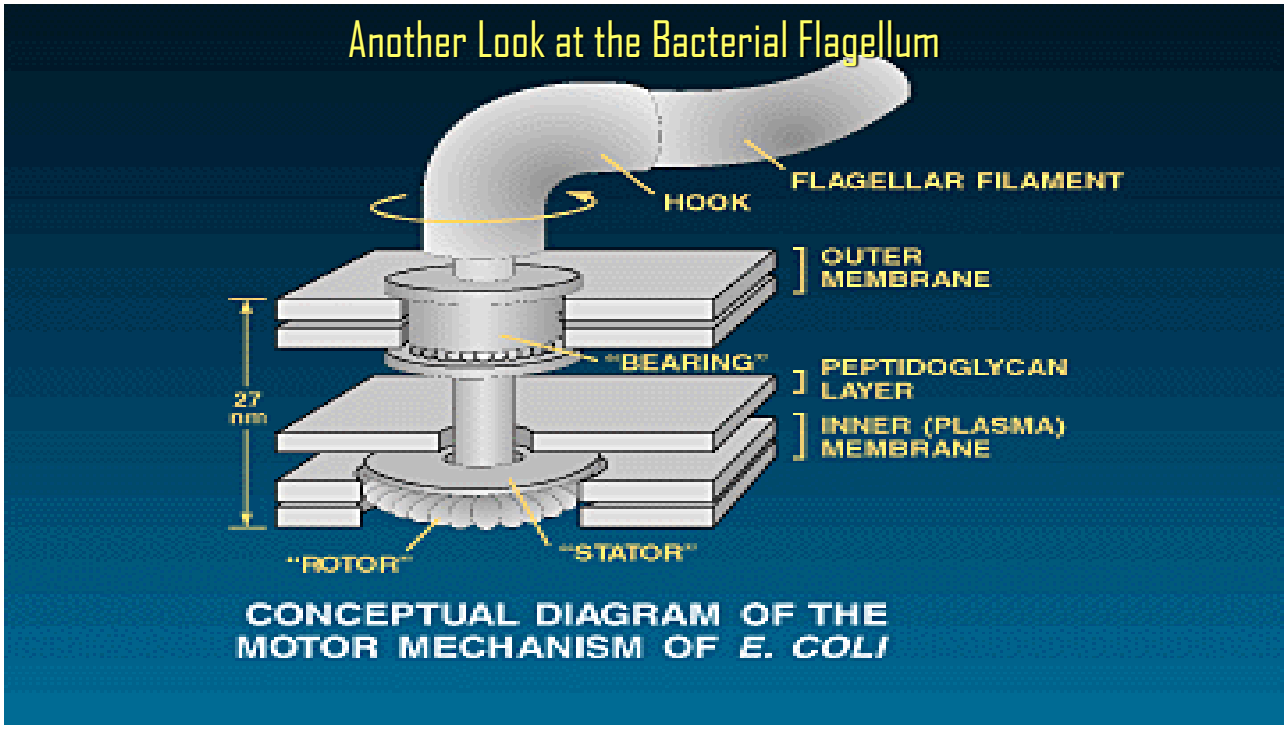

7,000 RPM

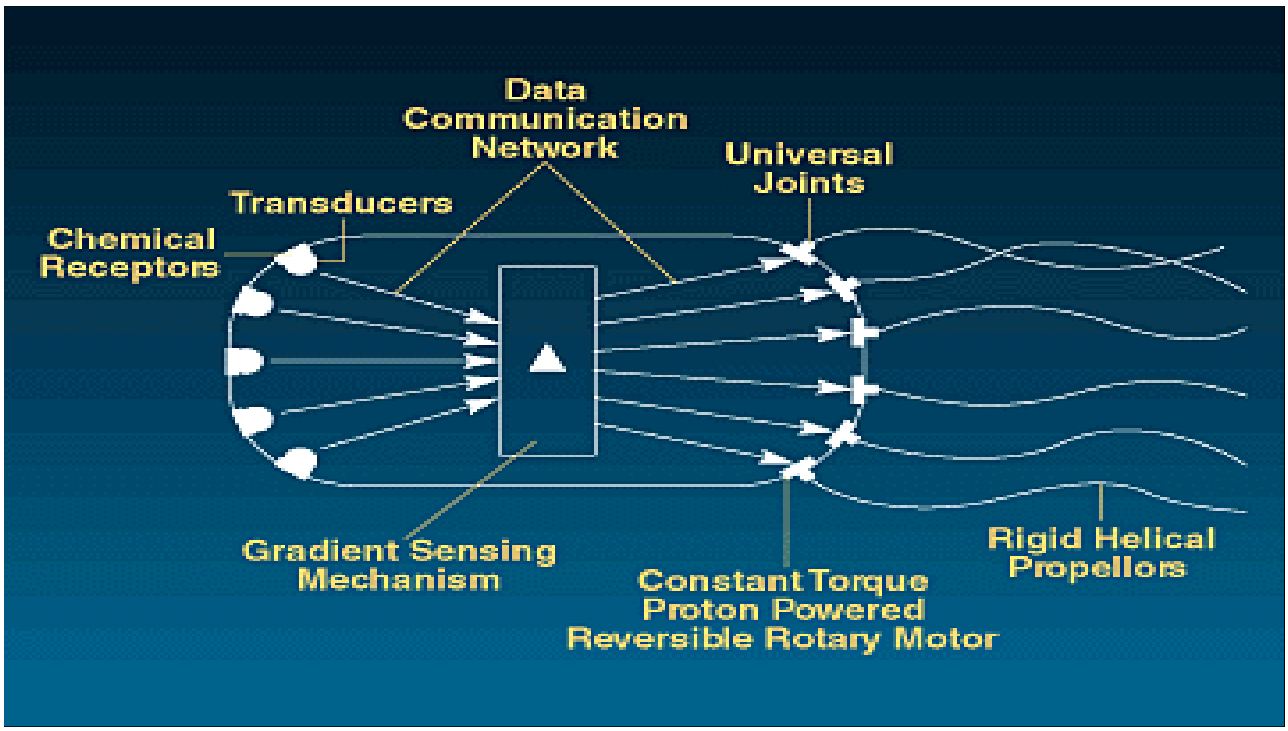

LIQUID COOLED

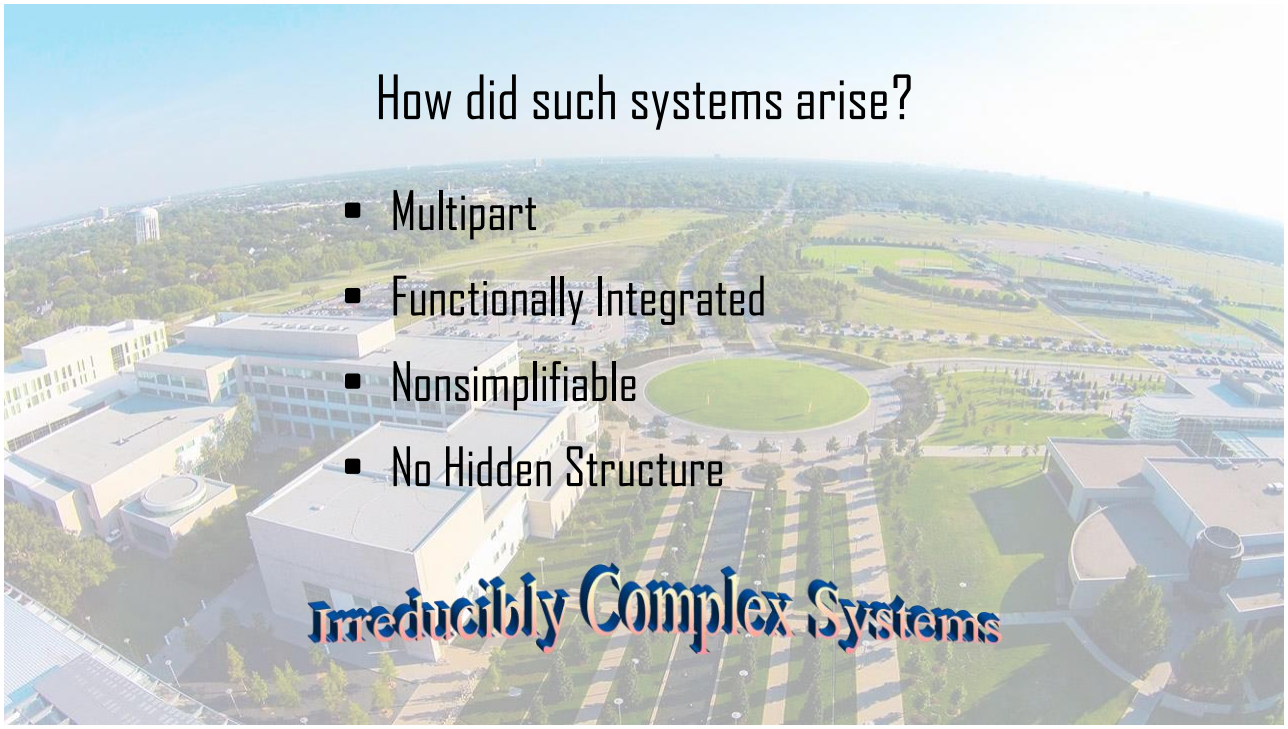

ACID DRIVE

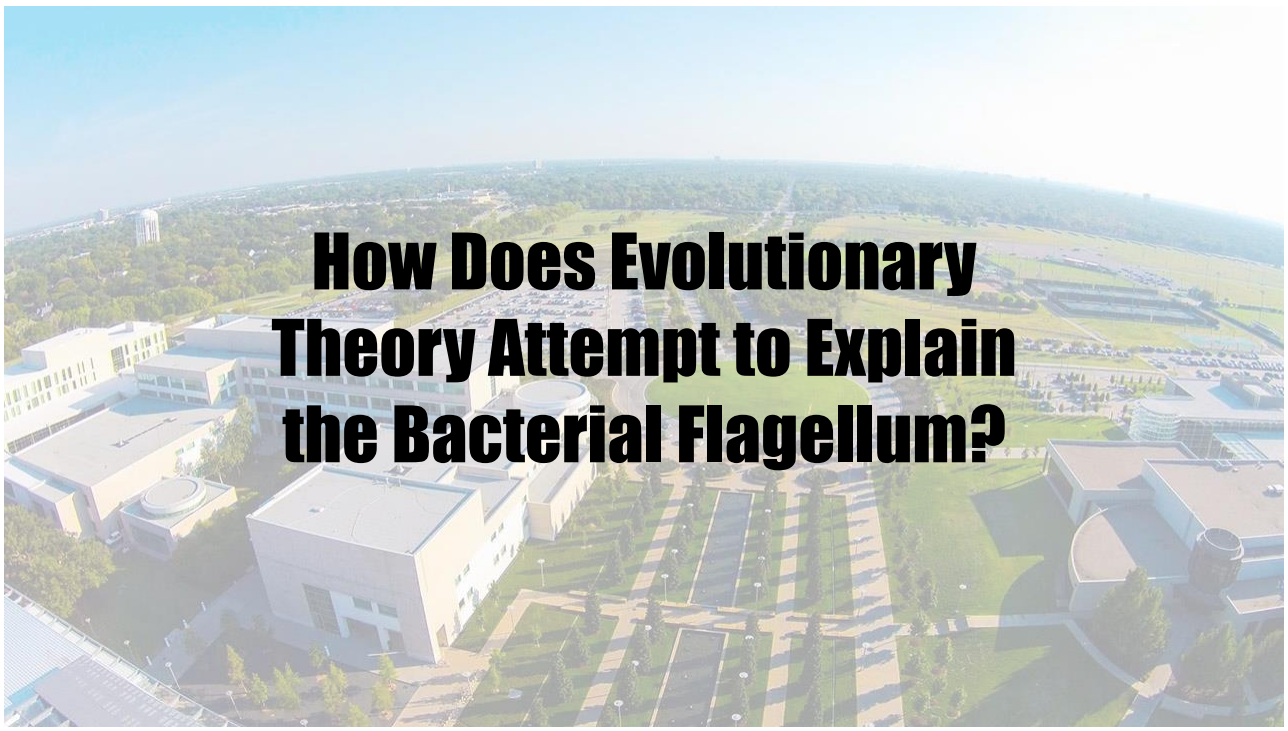

DNA specifies the messages for the manufacture and assembly of parts into this machine.


The Bacterial Flagellum
Hook
(universal joint)
Filament
(propeller)
Outer
membrane
L ring
P ring
Bushing
Inner (plasma)
membrane
S ring
M ring
Rotor
Stator
studs
C ring


Another Look at the Bacterial Flagellum
FLAGELLAR FILAMENT
HOOK
OUTER MEMBRANE
"BEARING"
PEPTIDOGLYCAN LAYER
INNER (PLASMA) MEMBRANE
27 nm
"ROTOR"
"STATOR"
CONCEPTUAL DIAGRAM OF THE MOTOR MECHANISM OF E. COLI


Data Communication Network
Universal Joints
Transducers
Chemical Receptors
Gradient Sensing Mechanism
Constant Torque Proton Powered Reversible Rotary Motor
Rigid Helical Propellors

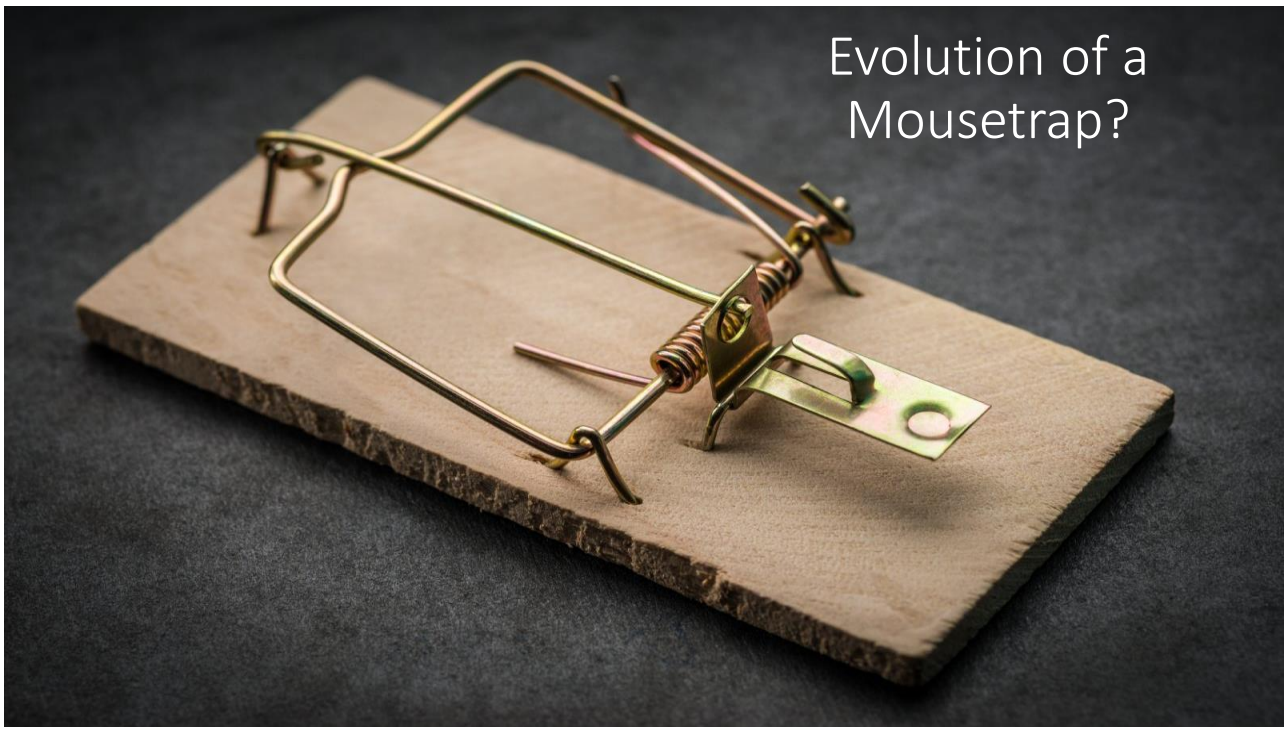

How did such systems arise?
Multipart
Functionally Integrated
Nonsimplifiable
No Hidden Structure
Irreducibly Complex Systems


How Does Evolutionary Theory Attempt to Explain the Bacterial Flagellum?

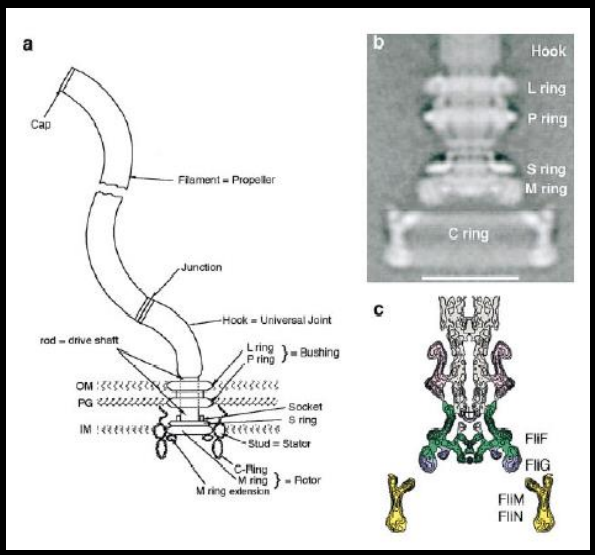
Coevolution and Co-option

Structures and their functions co-evolve, with old structures being co-opted to serve new functions.

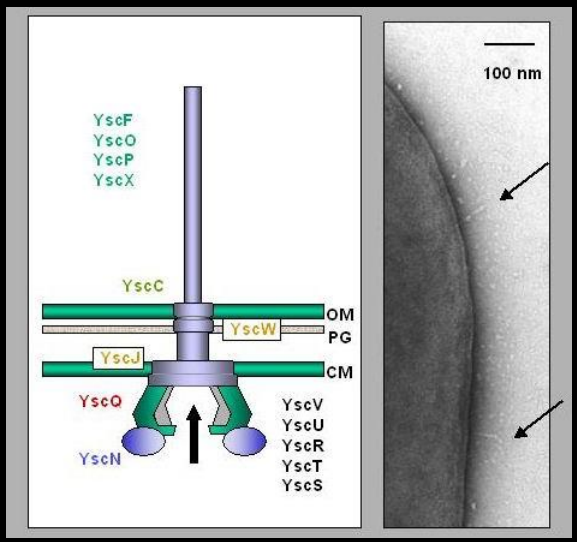
(direct vs. indirect Darwinian paths)



The Bacterial Flagellum

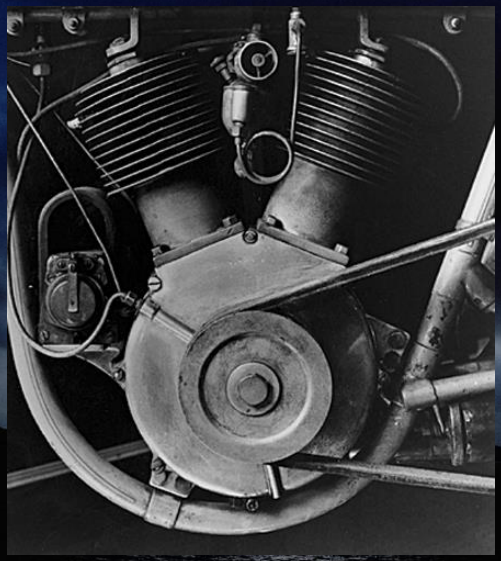


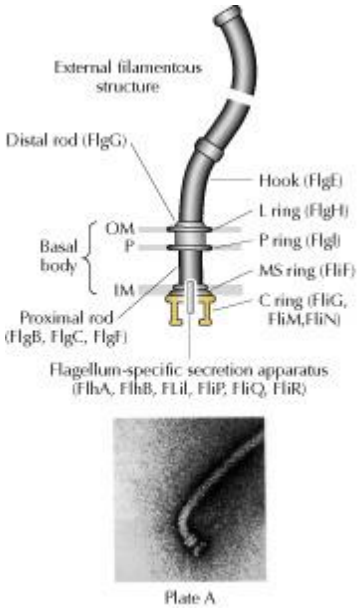
Type III Secretory System (TTSS)

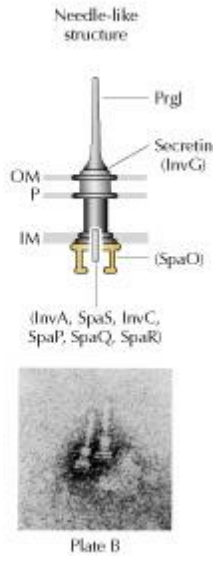


Motorcycle

Motor







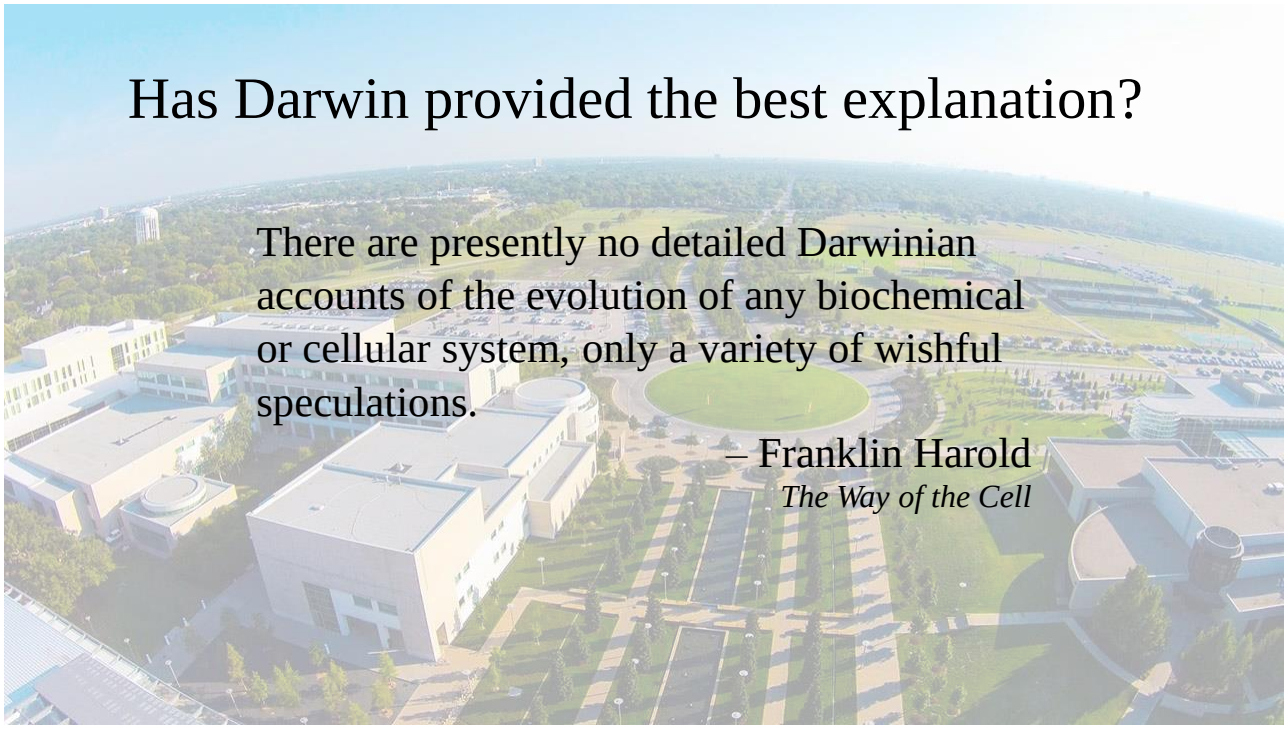
A T3SS will lack at least ten of the proteins found in a bacterial flagellum

Has Darwin provided the best explanation?

There are no detailed Darwinian accounts for the evolution of any fundamental biochemical or cellular system, only a variety of wishful speculations. It is remarkable that Darwinism is accepted as a satisfactory explanation for such a vast subject — evolution — with so little rigorous examination of how well its basic theses work in illuminating specific instances of biological adaptation or diversity.

– James Shapiro, University of Chicago

https://www.thethirdwayofevolution.com



Has Darwin provided the best explanation?

There are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations.

– Franklin Harold
The Way of the Cell

How Darwinists Understand Intelligent Design

Premise: No one has figured out how the flagellum evolved.

Conclusion: Therefore, it must have been designed.

How non-Darwinists Understand Intelligent Design

Premise:	Certain biological systems have a feature, call it IC (irreducible complexity).
Premise:	Darwinian explanations have been spectacularly unsuccessful in explaining these systems.
Premise:	Intelligent agency has the causal power to produce systems that display IC.
Conclusion:	Therefore, biological systems that exhibit IC are likely to be designed.

Outline of Lecture

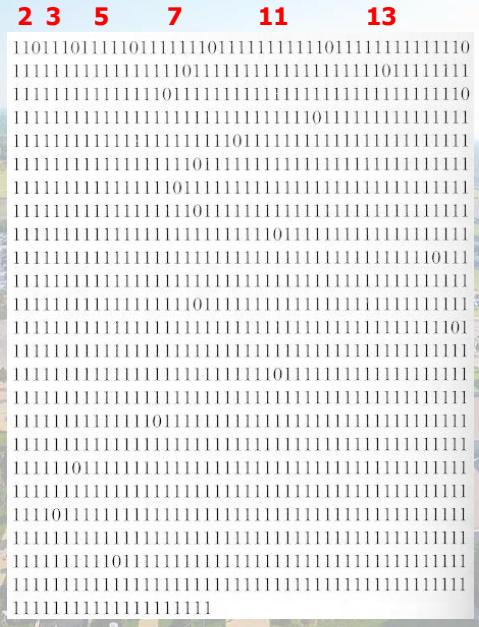
- Define intelligent design and motivate it.
- Overview a few special sciences that fall under intelligent design.
- Spotlight how intelligent design looms large over biology.
- Show why Darwin cannot rule out intelligent design from biology.
- Challenge that Darwin provided a better explanation of biological origins than intelligent design.
- **Sketch how we detect and infer design/intelligent agency.**
- Define the key intelligence metric: specified complexity.
- Why is all this important, and what can you do about it?

SETI: The Search for Extraterrestrial Intelligence

Discerning Design: Jodie Foster as a SETI researcher in *Contact*.

What persuaded the scientists that they had found an extra-terrestrial intelligence?

The detection of a highly improbable or complex specified event!



A Criterion for Detecting Design

What should we be looking for?

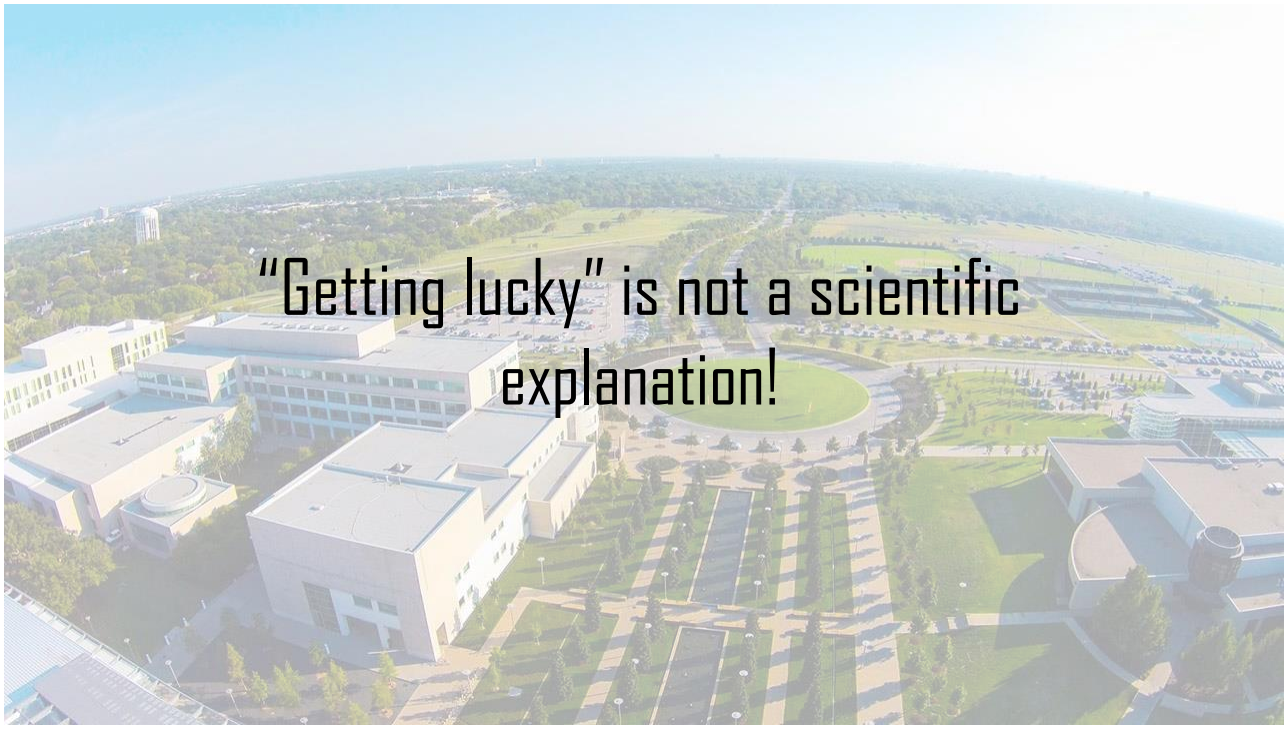
- Complexity (improbability)
- Specification (independent pattern)

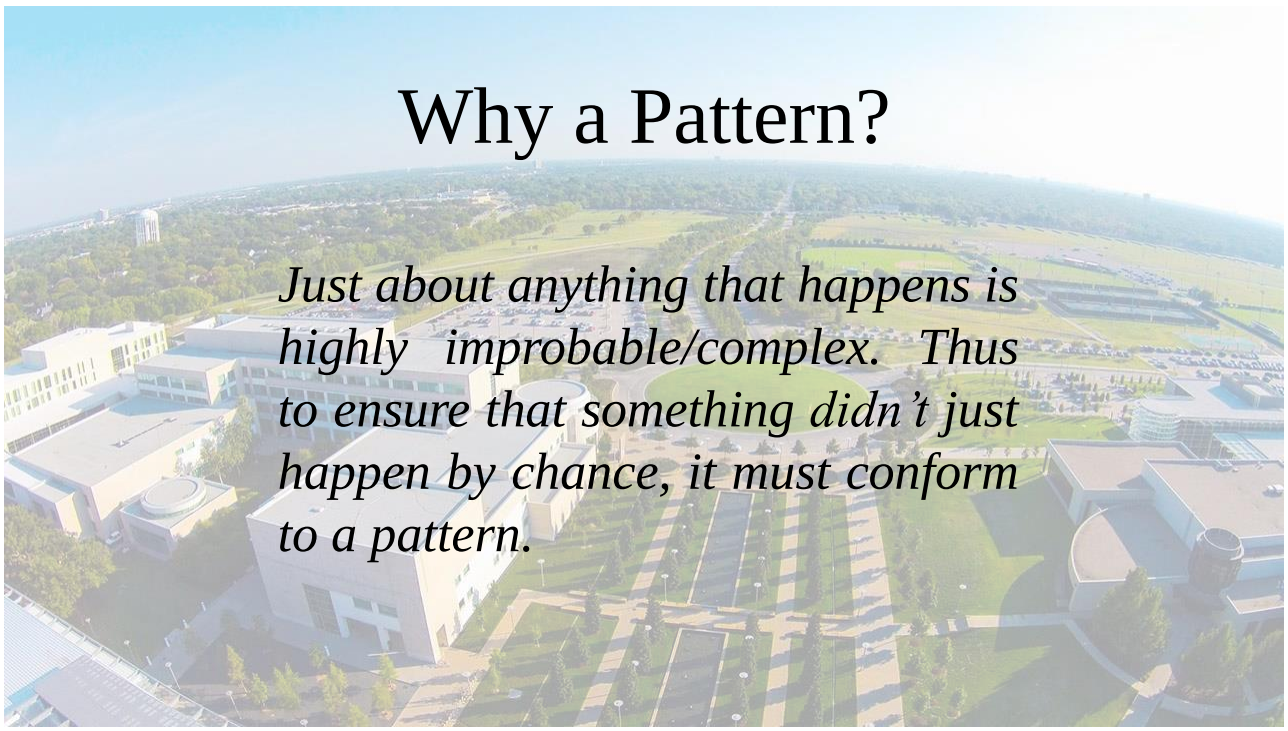
Connection between Complexity and Probability

Why Probability?

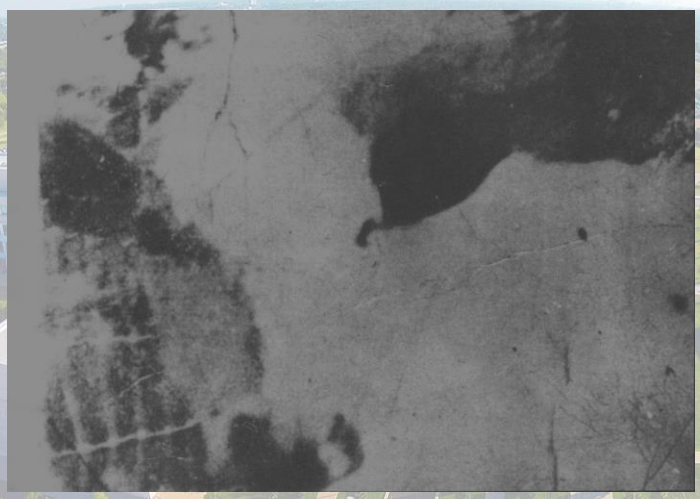
Unless we discipline how we attribute chance, we can explain anything.

This Is Spinal Tap


"Getting lucky" is not a scientific explanation!


Why a Pattern?
Just about anything that happens is highly improbable/complex. Thus to ensure that something didn't just happen by chance, it must conform to a pattern.

What Do You See?



Why a Specification?

The patterns we use to identify design must be objectively given – we need to make sure that we're not just reading the pattern into what we're seeing.

Specifications as Statistical Rejection Regions

The Case of Cryptography

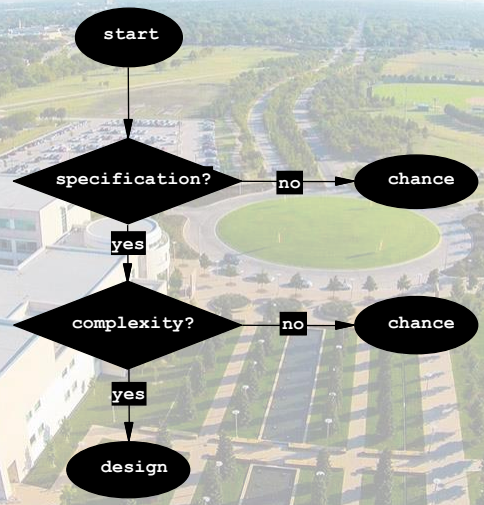
Encrypted Text

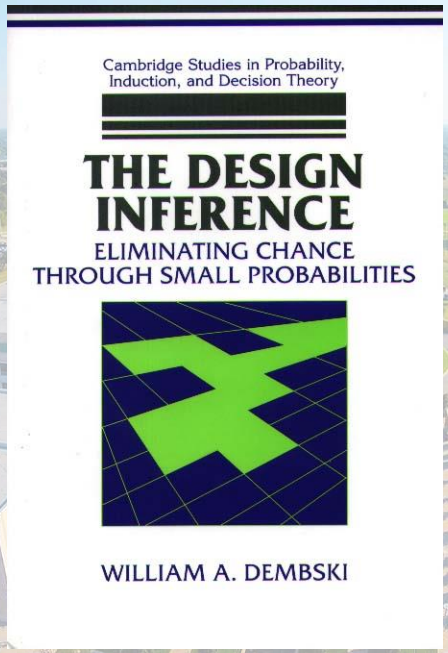
`nfuijolt ju jt mjlf b xfbtfm`

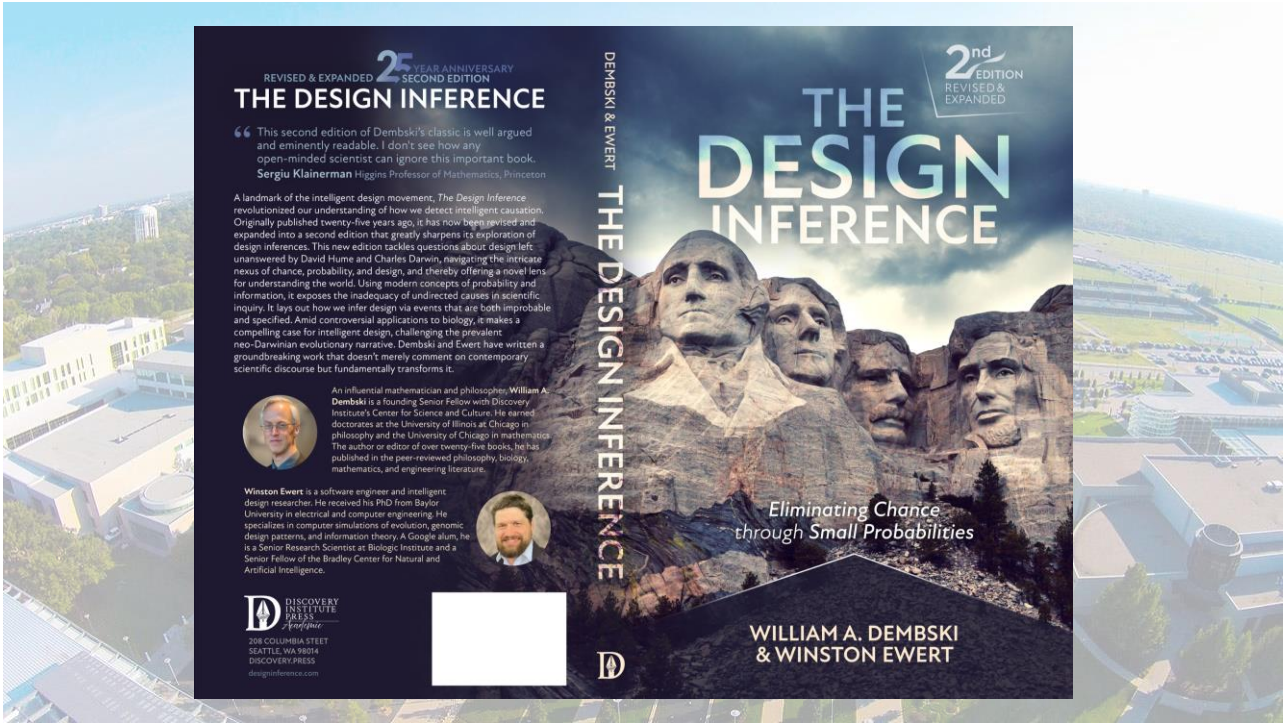
Decrypted Text

`methinks it is like a weasel`

The Explanatory Filter






REVISED & EXPANDED 25 YEAR ANNIVERSARY SECOND EDITION
THE DESIGN INFERENCE
This second edition of Dembski's classic is well argued and eminently readable. I don't see how any open-minded scientist can ignore this important book.
Sergiu Klainerman Higgins Professor of Mathematics, Princeton
A landmark of the intelligent design movement, The Design Inference revolutionized our understanding of how we detect intelligent causation. Originally published twenty-five years ago, it has now been revised and expanded into a second edition that greatly sharpens its exploration of design inferences. This new edition tackles questions about design left unanswered by David Hume and Charles Darwin, navigating the intricate nexus of chance, probability, and design, and thereby offering a novel lens for understanding the world. Using modern concepts of probability and information, it exposes the inadequacy of undirected causes in scientific inquiry. It lays out how we infer design via events that are both improbable and specified. Amid controversial applications to biology, it makes a compelling case for intelligent design, challenging the prevalent neo-Darwinian evolutionary narrative. Dembski and Ewert have written a groundbreaking work that doesn't merely comment on contemporary scientific discourse but fundamentally transforms it.
An influential mathematician and philosopher, William A. Dembski is a founding Senior Fellow with Discovery Institute's Center for Science and Culture. He earned doctorates at the University of Illinois at Chicago in philosophy and the University of Chicago in mathematics. The author or editor of over twenty-five books, he has published in the peer-reviewed philosophy, biology, mathematics, and engineering literature.
Winston Ewert is a software engineer and intelligent design researcher. He received his PhD from Baylor University in electrical and computer engineering. He specializes in computer simulations of evolution, genomic design patterns, and information theory. A Google alum, he is a Senior Research Scientist at Biologic Institute and a Senior Fellow of the Bradley Center for Natural and Artificial Intelligence.
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2nd EDITION REVISED & EXPANDED
THE DESIGN INFERENCE
Eliminating Chance through Small Probabilities
WILLIAM A. DEMBSKI & WINSTON EWERT


What does the filter identify?
Specified Complexity

Outline of Lecture

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- **Define the key intelligence metric: specified complexity.**
- Why is all this important, and what can you do about it?

What is Specified Complexity?

It is the complexity (in bits) corresponding to an event's probability minus the length (in bits) of the shortest description that describes the event.

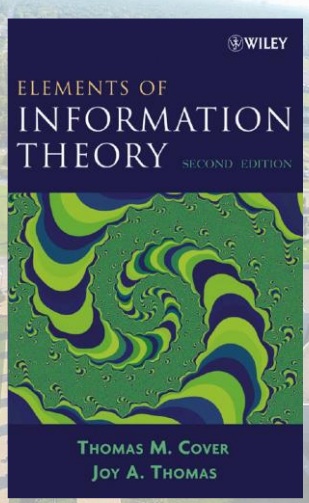
This is a mouthful, but let's now make it precise. In symbols:

$$SC(E|H) = I(E|H) - D(E)$$

Here $I(E|H) = -\log_2 P(E|H)$ and $D(E)$ is the length in bits of the shortest description of E.

What is Specified Complexity?

- Specified complexity combines Shannon and Kolmogorov Information.
- It arises directly out of the design inference.
- In its full technical form, it requires that the underlying descriptive language to be prefix-free, binary, and Turing complete.
- Specified complexity is a unified information measure that measures intelligence.



Illustrating Specified Complexity

- Royal flush vs. two pairs. [Different complexity but same short description]
- Prime numbers vs. truly random numbers. [Same complexity but different description lengths]
- The Champernowne sequence. [Big complexity, short description—lexicographical order]
- The images that undid Marc Tessier-Levigne. [One image removes descriptive complexity of the other]
- Darth Vader vs. Dark Helmet.

1,186 bits as prime numbers

What persuaded the scientists that they had found an extra-terrestrial intelligence?

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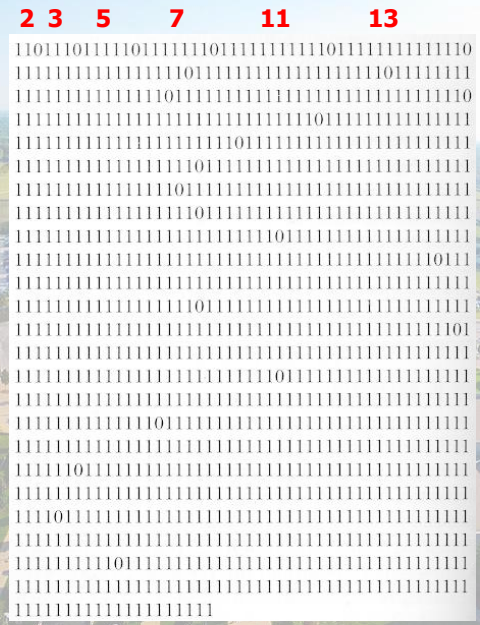


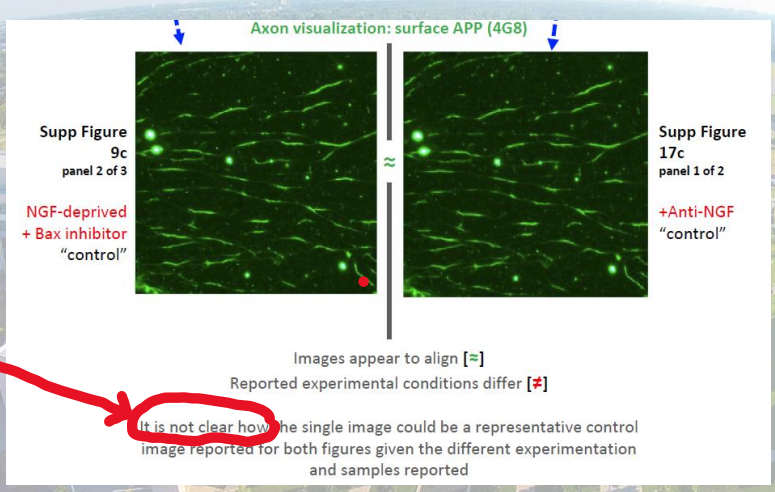
1,186 bits as random numbers

```
00010010110011111111111010010001010011110010100000000001110011000000110011
10101110011110000001101110010111110011011100111100001000100000010111010111
10111101101110101111100000010000101010010101001010111110101100111110111110
00111100001111011001011111110111110111111010011100010111101110011000010101
01011100110010011001010100000010111010011011100110000010001101111001111010
01100100110111101100011100001000110100011000000000110101010111110101110011
00011010110101100101111000100011101101101100011010111101010111110010100011
00001011000101110110101110000000110101110010110101100001111111000000000010000
00000110010011010111010111100110010100011001110011001101000100000001111001011111
10111111000001011001010000001111100011110110101010111110110101000011000110100
01011010101110101000000100110110000010001001110001010010100100100000000000010
11110110111001000001000001010100000110111001011010001000111000111001111110011110
11001111111011100011110010101010010111110010011011110101110000001110100110101
00011100100011011010111110001010101100011101001110010101110001000001001000 1
11010010010100110000010000110100101111000000101001111101101111100101011011101
11011111111001100100011100101100100100110001000100000100000100
```

1,186 bits as Campernowne numbers

```
01000110110000001010011100101110111000000001001000110100010101100111100010011
01010111100110111101111000000000010001000011001000010100110001110100001001011
01001011011000110101110011111000001000110010100111010010101101101011111100011
00111010111011111001110111110111111000000000001000010000011000100000101000110
00011100100000100100101000101100110000110100111000111101000001000101001001 0
01101010001010101011001011101100001100101101001101101110001110101111001111 1
10000010000110001010001110010010010110011010011110100010100110101010101011101
10010111011101110101111110000110001110010110011111010011010111011011101111000
11100111101011101111110011111011111101111110000000000000100000100000011000011
00000010100001100000111000100000010010001010000101100011000001101000111000 0
11110010000001000100100100010011001010000101010010110001011100110000011001 0
01101000110110011100001110100111100011111010000010000101000100100011010010
00100101010011001001110101000010100101010100101011010110001011010101110010 1
11101100000110001011001001100110110100011010101101100110111011100001110010 1
11010011101101111000111101011111001111111000000100000110000101000011100010 0
10001011000110100011110010001001001100101010010111001100100111000100100111
```

Specified Complexity Undid Marc Tessier-Levigne



Specified Complexity Undid Marc Tessier-Levigne

What this is really saying is that it is wildly improbable that these two images from two separate experiments could have matched. Moreover, the match constitutes a **prespecification** that eliminates the need to subtract the description length. With prespecifications, $D(E) = 0$, and so the definition of specified complexity as

$$SC(E|H) = I(E|H) - D(E)$$

can be simplified to

$$SC(E|H) = I(E|H).$$

Darth Vader to Luke Skywalker in *The Empire Strikes Back*

Darth to Luke: "No, I am your father."

Dark Helmet to Lone Starr in *Spaceballs*

I am your father's brother's nephew's cousin's former roommate.

What's the lesson?

The point of the joke is that the relationship is so complicated and contrived, and requires such a long description, that it evokes no suspicion and calls for no special explanation. With everybody on the planet connected by no more than "six degrees of separation," some long description like this is bound to identify anyone.

—TDI2, p. 132

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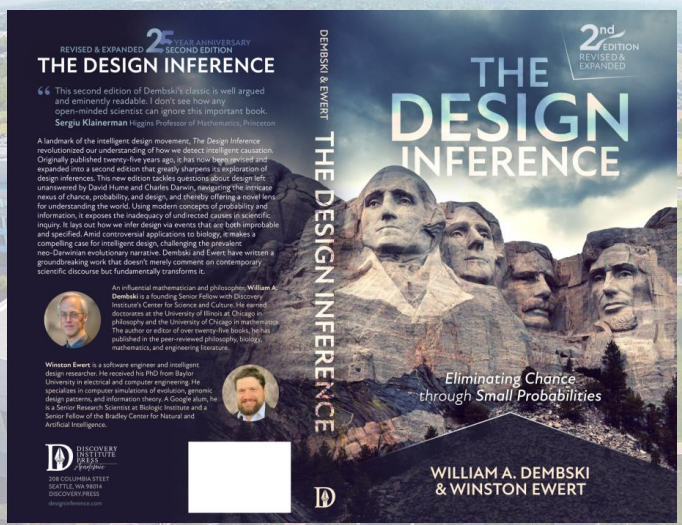
Why Is Intelligent Design Important?

- Central to a worldview is our origin story.
- A worldview focuses on where we come from, who we are, what's life's main challenge, and where we're going.
- The Christian worldview sees the origin of the universe and us in an act of creative intelligence.
- The Darwinian or naturalistic or materialistic worldview sees the origin of the universe and us in a blind purposeless process that did not have us in mind.
- Who we are, what's life's main challenge, and where we're going are all downstream from our origin story.

What can you do about it—inform yourself!



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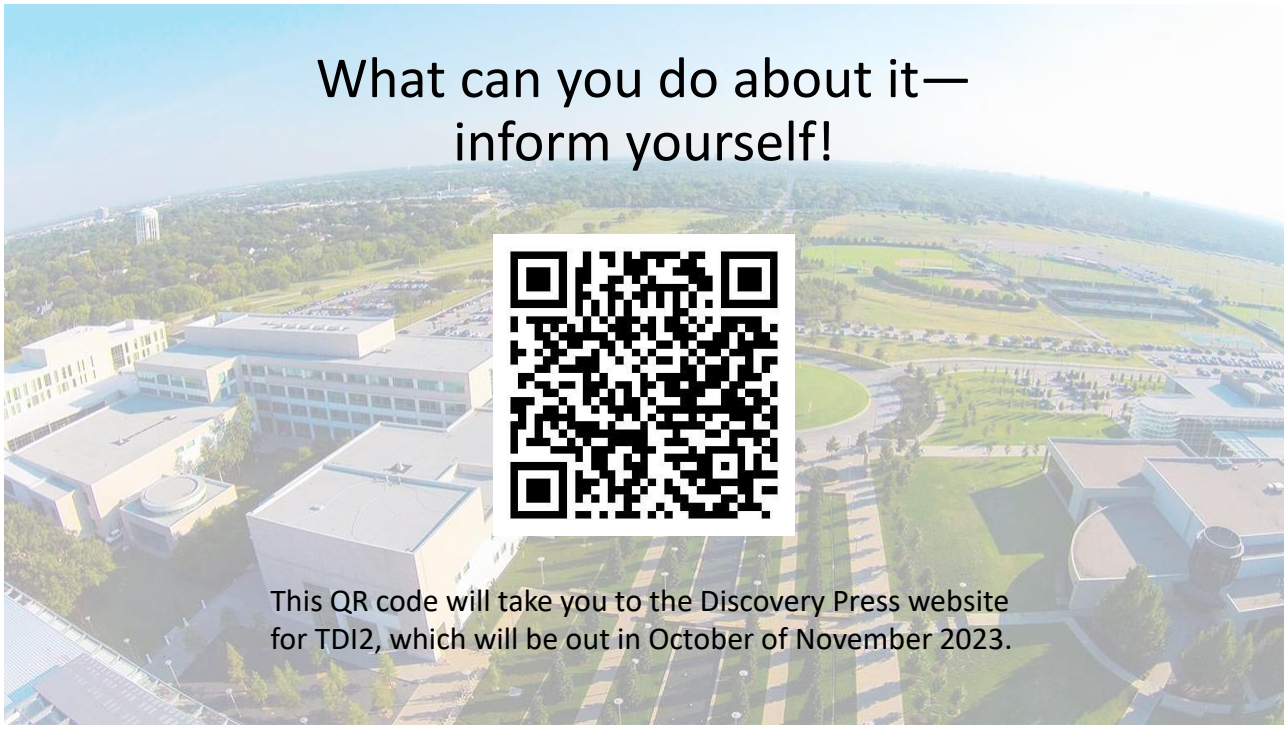

This QR code will take you to the Discovery Press website for TDI2, which will be out in October of November 2023.