

Extended Evolutionary Synthesis as Replacement of Neo-Darwinism

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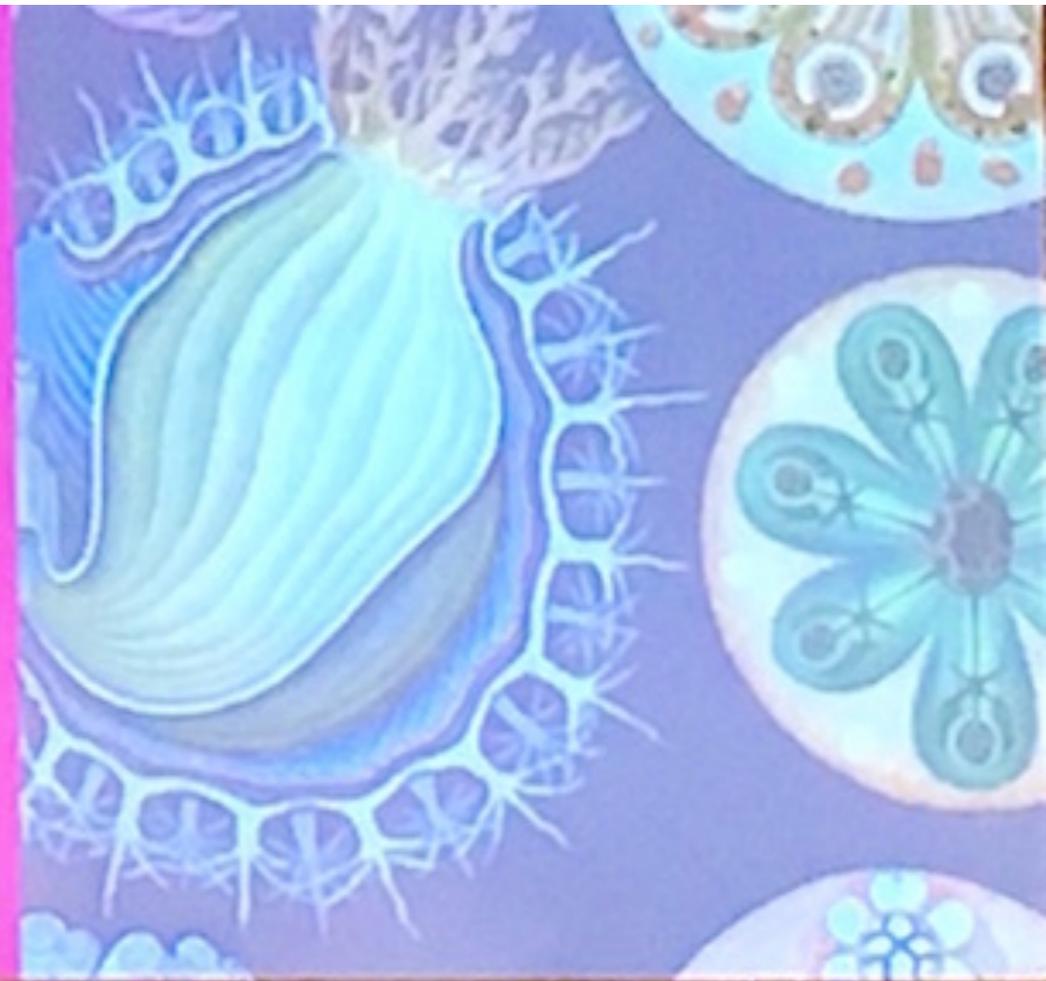


Author, *Evolution 2.0* BenBella 2017
Industrial Ethernet 3rd ed. ISA 2017

New trends in evolutionary biology: biological, philosophical and social science perspectives

Scientific Discussion Meeting organised in partnership with the British Academy by Professor Denis Noble CBE FMedSci FRS, Professor Nancy Cartwright FBA, Professor Sir Patrick Bateson FRS, Professor John Dupré and Professor Kevin Laland

THE ROYAL SOCIETY



Neo-Darwinism

Definition from dictionary.com:

The theory of evolution as expounded by later students of Charles Darwin, especially Weismann, holding that natural selection accounts for evolution and denying the inheritance of acquired characters.

U. of California Berkeley Evolution 101 Web Page:

“Mutations are Random. The mechanisms of evolution—like natural selection and genetic drift—work with the random variation generated by mutation”

Daniel Dennett, from *Darwin's Dangerous Idea*

“Evolution occurs whenever the following conditions exist:

(1) variation

(2) heredity or replication

(3) differential fitness” (Dennett, 1996)

“If this is true... why don't
they teach this in
engineering school?”

Random Mutation + Natural Selection + Time = Evolution?

No such principle is found anywhere in...

- Electrical Engineering
- Software Development
- Analog & Digital Signal Processing
- Networking
- Computation
- Control Systems Theory
- Communication Theory

There is no model in probability
or statistics that favors a
random mutation theory

Fundamental Problems

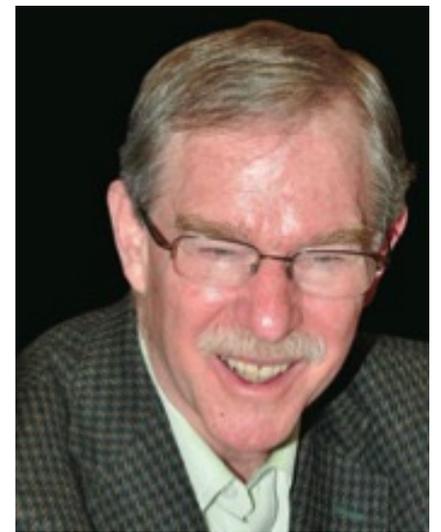
- Replication, random variation & selection alone are **insufficient** for evolution to occur
- In engineering, no system is ever optimized this way
- Violates information entropy (Shannon 1948)
- All *observable* evolutionary changes in biology, genetic algorithms, engineering, business & culture evolve via highly structured, coordinated ergodic patterns

Any theory of evolution is
a theory about
engineering

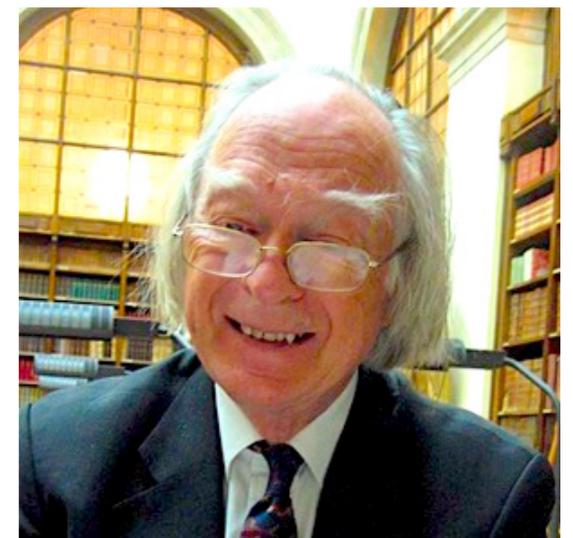
“Can Neo-Darwinism be repaired, or does it have to be rubbished entirely?”

Enter **Strong** Extended Evolutionary Synthesis

- Replaces randomness with **Natural Genetic Engineering** mediated by the cell (Shapiro 2011)
- Organisms **actively harness stochasticity**, rather than being **passive** victims of it (Noble 2017)
- “Negentropy” (Schrödinger 1944)
- Systems biology (Noble 2006)



James Shapiro



Denis Noble

“Swiss Army Knife” of the Extended Evolutionary Synthesis



1. Epigenetics

Eva Jablonka



Photo: Center for Contextual Science

EPIGENETICS

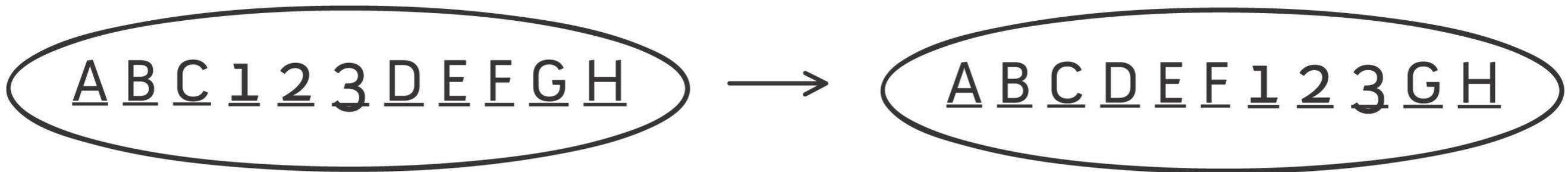


2. Transposition

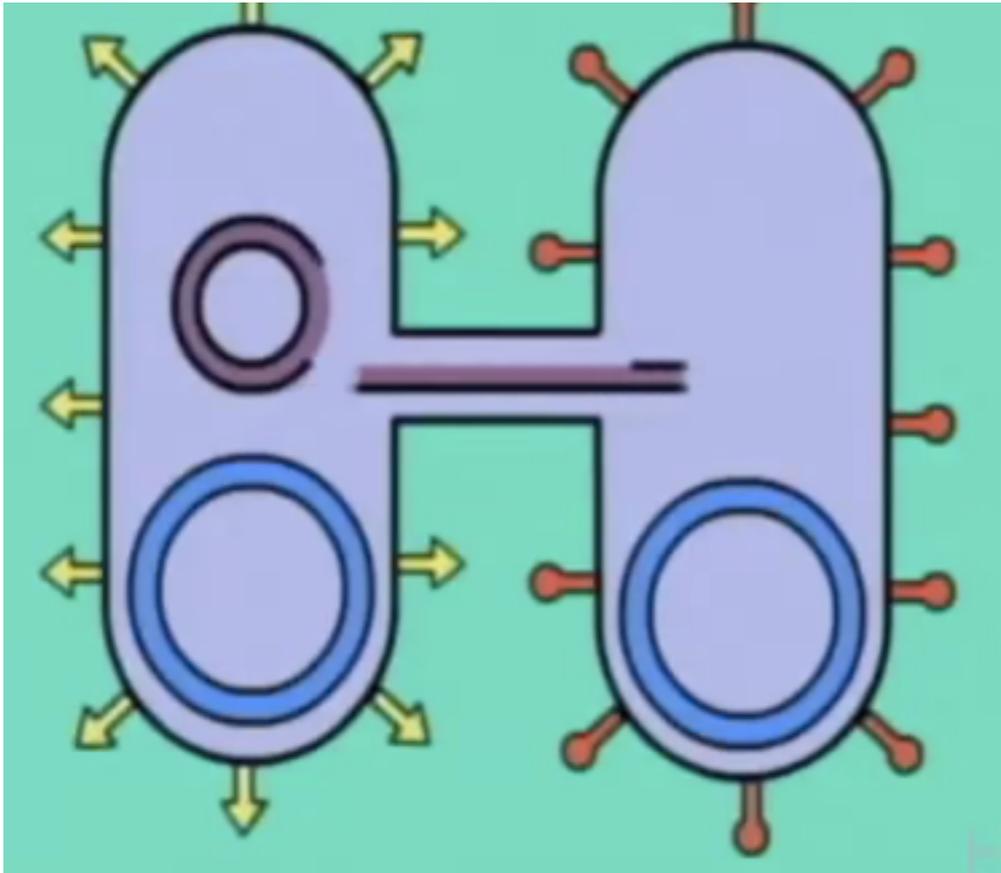


Barbara McClintock
Nobel Prize 1983

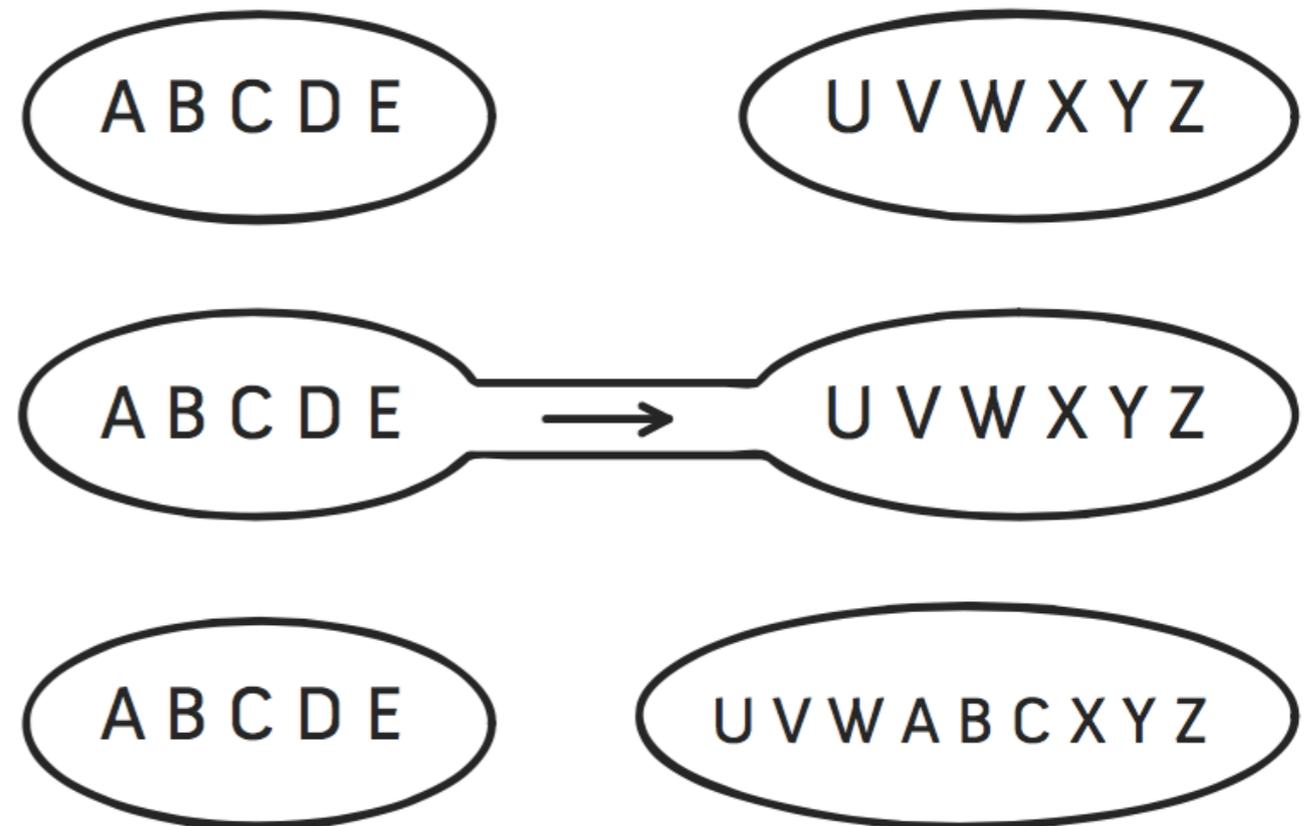
TRANSPOSITION



3. Horizontal Gene Transfer



HORIZONTAL GENE TRANSFER

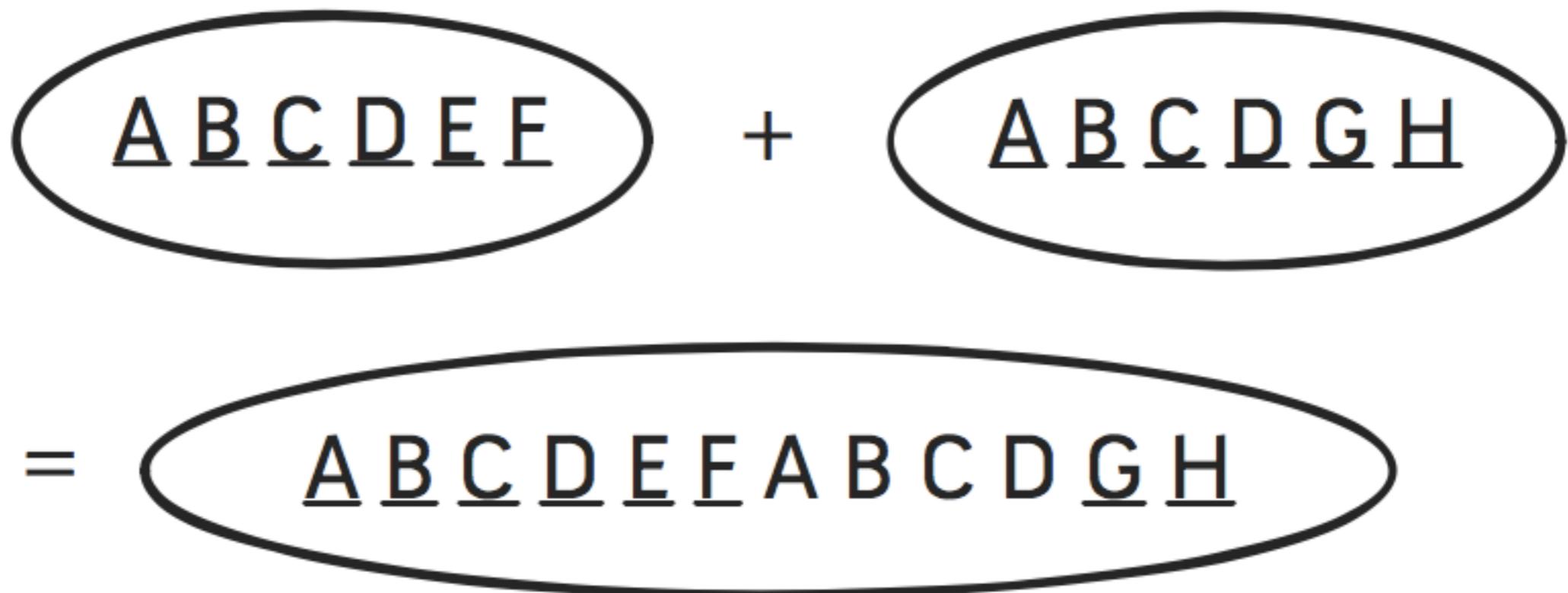


4. Inter-Species Hybridization

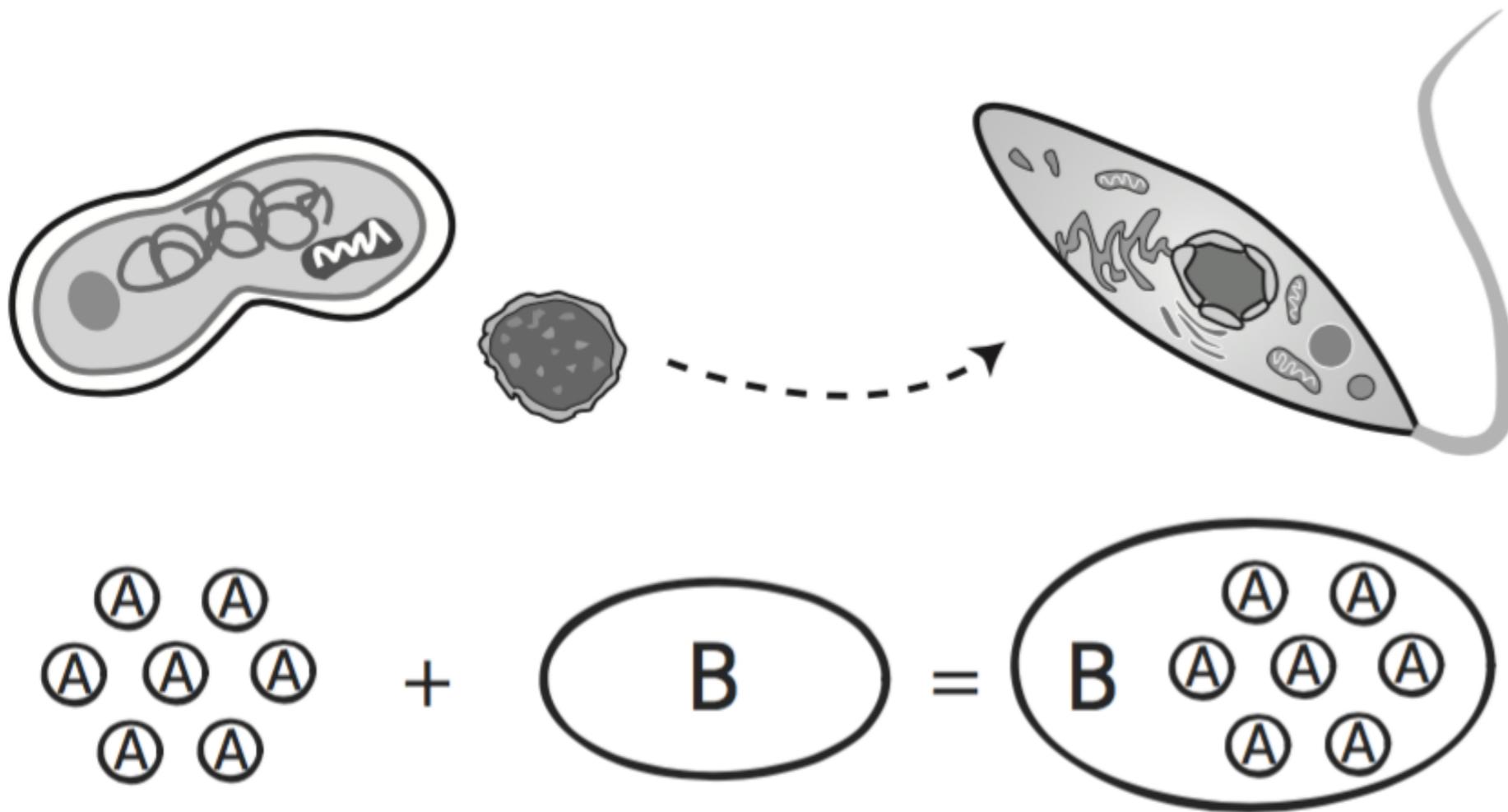
i.e. Emmer Wheats + Goat Grass = Modern Wheat

Donkey + Horse = Mule

HYBRIDIZATION

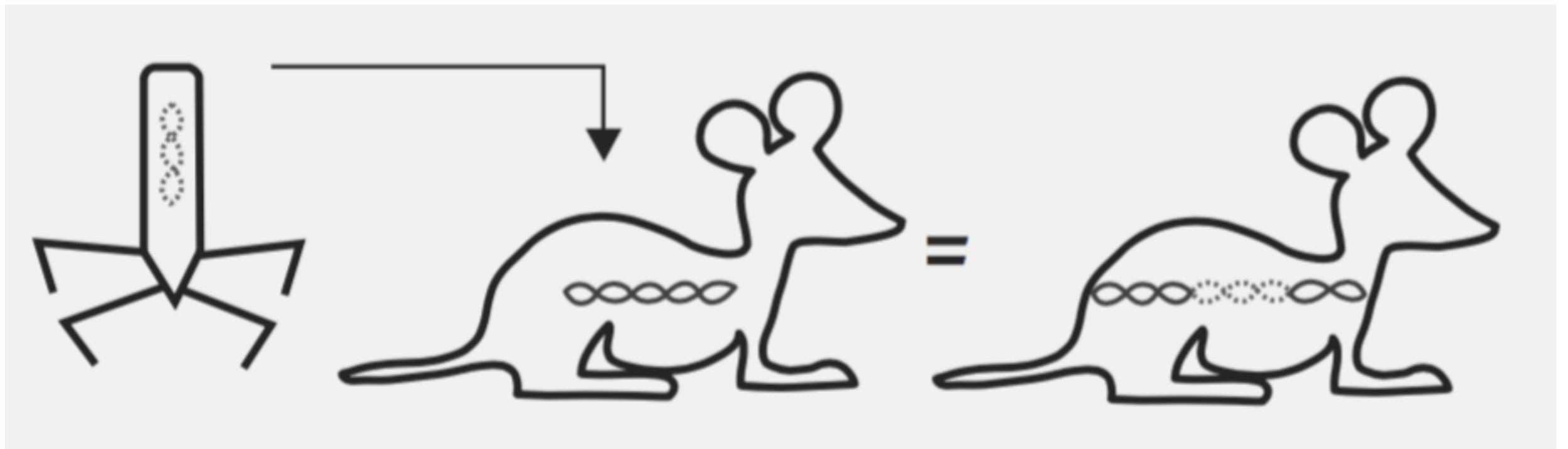


5. Symbiogenesis



Lynn Margulis

6. Viruses & Retroviruses



7. Niche Construction





Dawkins and
friends turned
blind,
purposeless
Neo-Darwinian
evolution into
a dogmatic
pop religion

Neo-Darwinism was a step
backwards from Darwin's
original theory

Random Mutations = Biggest
mistake in the history of
science

Extended Synthesis fixes
many of the major
problems with evolution

Extended Synthesis
focuses on **empirical,**
real-time evidence

Extended Synthesis is
teleological and
integrative, rather than
materialistic and **reductive**

Extended Synthesis
answers many legitimate
objections raised by ID
theorists

Extended Synthesis is
compatible with the religious
view that **life is purposeful**

Extended Synthesis Raises MANY MORE Questions

- “What does a cell know about itself”?
(McClintock Nobel Prize paper 1984)
- How do cells “know” how to evolve?
- How *directional* is evolution?

Extended Synthesis Raises MANY Questions

- How can we design systems that self-evolve?
- What's the difference between biology and computation?
- Where does information come from?
- Where did life come from?

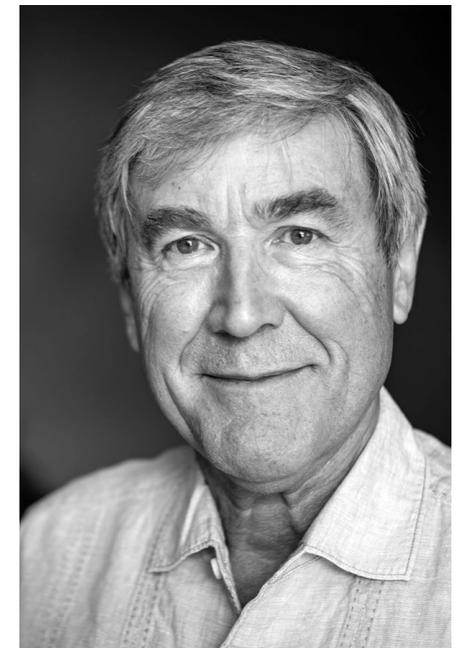
You're Invited:

August 28, 2017, Tempe Arizona, 3pm

**Arizona State University BEYOND Center
for Fundamental Concepts in Science**

Official Announcement of Evolution 2.0 Prize

Origin of Information = "Chemicals to Code"



Paul Davies

