

Big History Project

Gatsby Tea Talk
Ben Huh?

Big History

- History of everything - 13.8 Billion years
- Life, the universe, everything
- Broader historical questions by zooming out
- Merge of cosmology, geology, biology, social science, literature, physics
- How did we get here?
- How does order arise from disorder?
- Growing Complexities
- Requires Goldilocks Condition



WHAT IS BIG HISTORY?

A social studies course covering 13.8 billion years of shared history.

Big History weaves evidence and insights from many disciplines across 13.8 billion years into a single, cohesive, science-based origin story. The concept arose from a desire to go beyond specialized and self-contained fields of study to grasp history as a whole. Big History explores how we are connected to everything around us and where we may be heading. It provides a foundation for thinking about the future and the changes that are reshaping our world.



WHAT IS THE BIG HISTORY PROJECT?

A collaborative effort to create a Big History course for teachers everywhere.

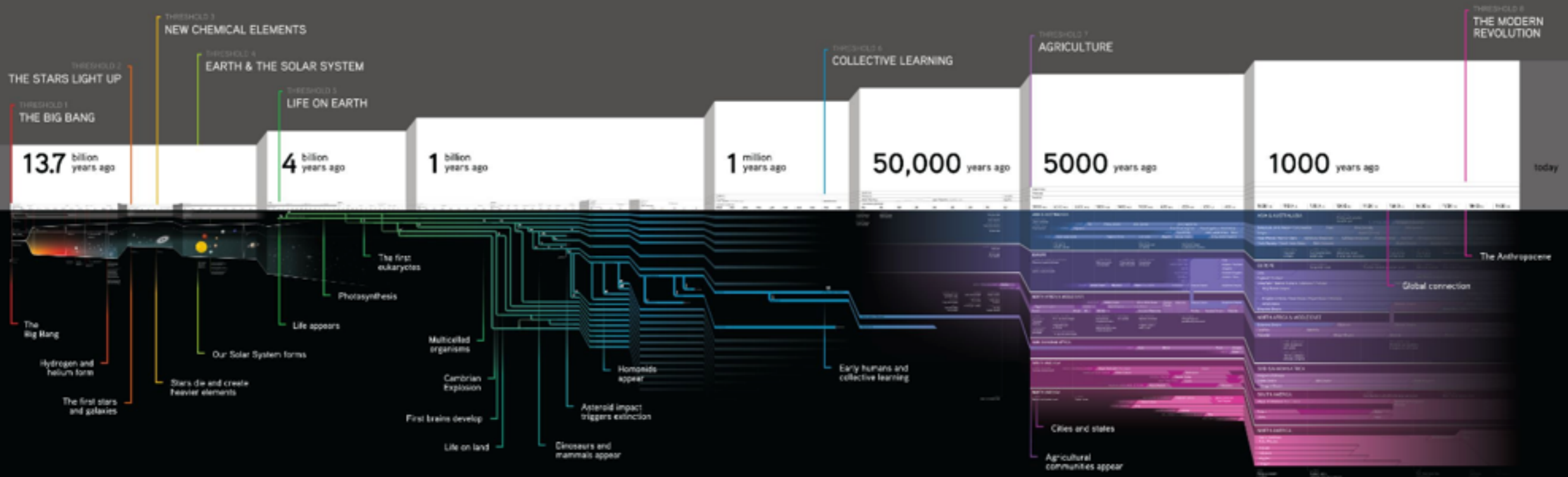
- Complete, free curriculum including assessments, lessons, and hundreds of diverse content items.
- A website that provides easy access to course materials for educators and students.
- Training and professional development opportunities.
- Active community of “Big Historians” to keep the course fresh, impactful, and connected.
- Advocacy organization to support schools and districts seeking to deploy the course.



Threshold events

- Big bang
- Stars light up
- New Chemical Elements
- Earth & the Solar system
- Life on Earth
- Human Race
- Agriculture
- The Modern Revolution

Threshold events



Threshold events



Threshold events

THRESHOLDS OF INCREASING COMPLEXITY

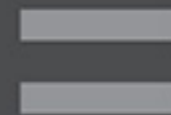
INGREDIENTS

All new forms of complexity build upon previous forms. This section identifies the main components that had to exist at a particular threshold in order to create something entirely new.



GOLDBLOCKS CONDITIONS

Having the right ingredients isn't enough to create new forms of complexity. Conditions also need to be "just right" to trigger the change. This section identifies what those conditions were.



NEW COMPLEXITY

Each threshold results in entirely new things that are more complex than anything before. This section identifies what those are. They'll always have more diverse components that, when arranged in precise ways, contain "emergent" properties unlike any others in existence.

Big History

- Divide Big History into eight *thresholds* — Major events
- creates something completely new
- Requires Goldilocks Condition



Big Bang

THRESHOLD

THE BIG BANG

The Big Bang remains a mystery in many ways. We have a lot of evidence for what happened just after the event but can only guess what existed before it, if anything, and what conditions made it possible. Even so, we know the Big Bang is an important threshold because it created time, space, and the “building blocks” for everything in the known Universe.

13.7 BILLION YEARS AGO

13.6



Big Bang

THRESHOLD

THE BIG BANG

INGREDIENTS

We can only speculate



GOLDILOCKS CONDITIONS

We can only speculate



NEW COMPLEXITY

The Universe

Time and space

Different forms of energy
(including gravity and
electromagnetism)

Different forms of matter
(including quarks and
electrons)

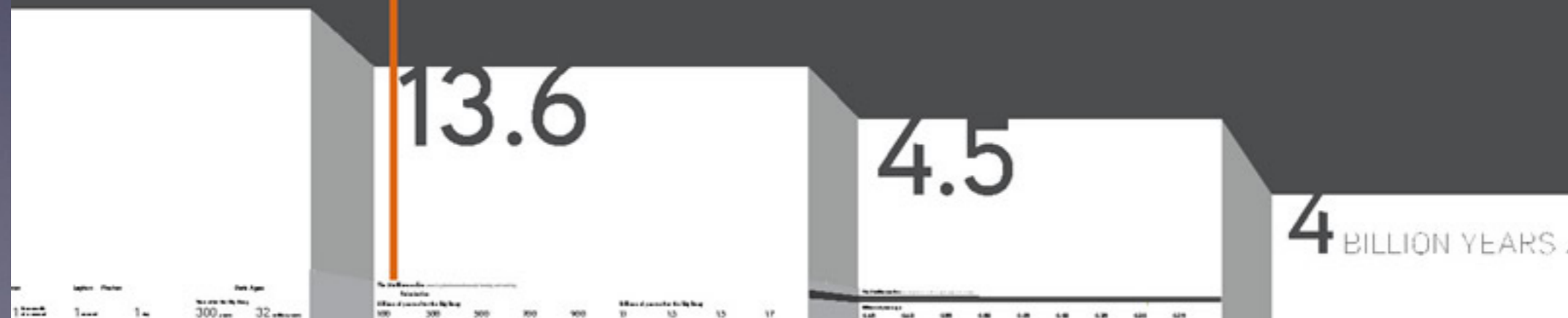
Stars Light up

THRESHOLD

2

STARS LIGHT UP

Before stars existed, the Universe was relatively cool and uniform. The first stars formed within huge clouds of gas that were the building blocks of galaxies, galaxy clusters, and superclusters. Stars were an important new form of complexity because they introduced long-lasting "hot spots" where even more complex things could develop.



Stars Light up

THRESHOLD

2

STARS LIGHT UP

INGREDIENTS

Hydrogen
and helium

Gravity



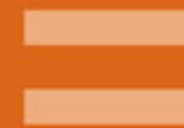
GOLDBLOCKS CONDITIONS

Tiny variations in the density
of matter throughout the
Universe

Enable gravity to pull matter together
into increasingly dense clouds, which
grow hotter as they form

**Temperatures > 10 million
degrees Celsius**

Are hot enough for the strong nuclear
force to fuse protons and release huge
amounts of energy



NEW COMPLEXITY

"Hot spots"

Places in the Universe
where there is enough
energy and matter to
create entirely new
Goldilocks Conditions

New structures

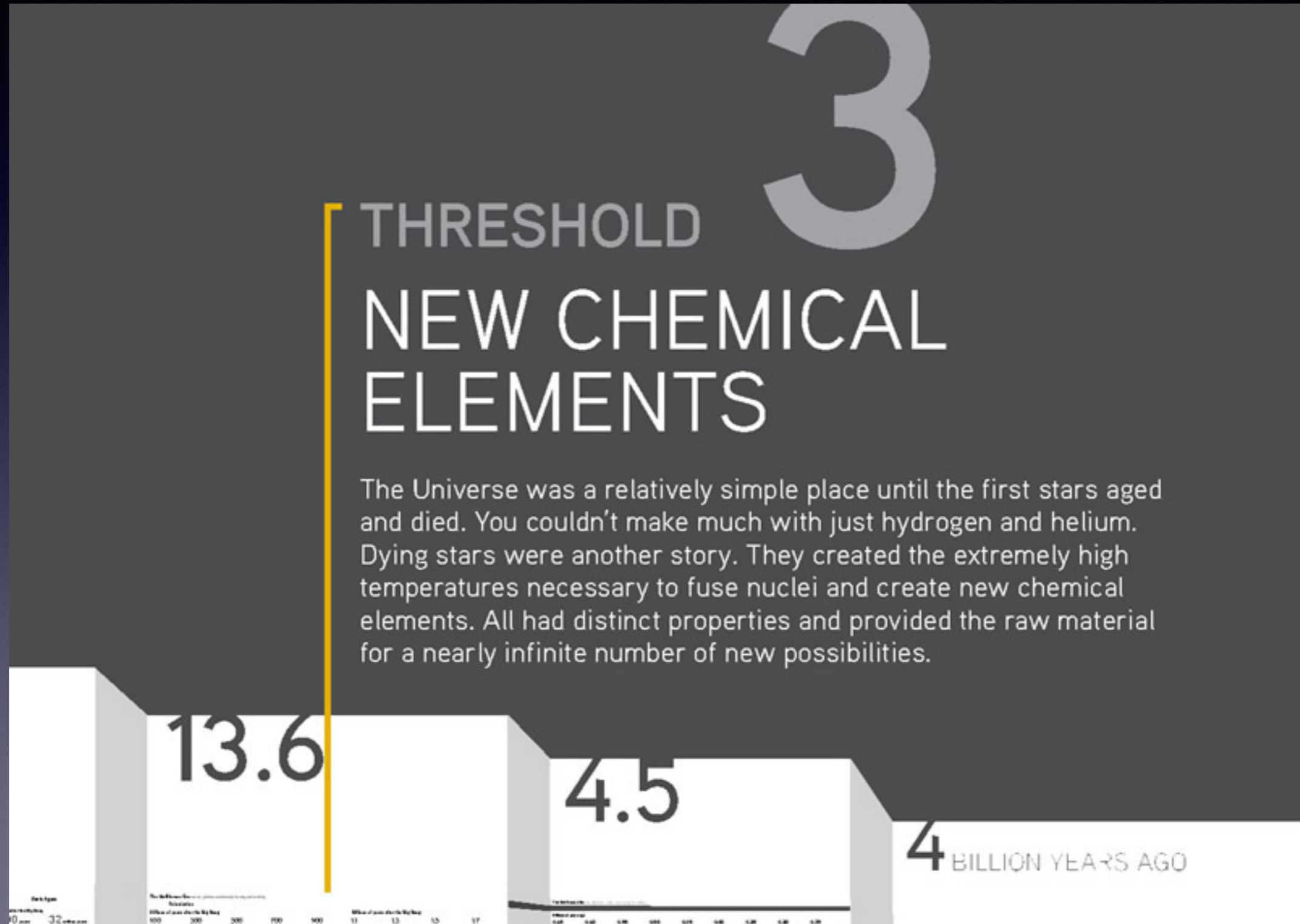
Stars

Galaxies

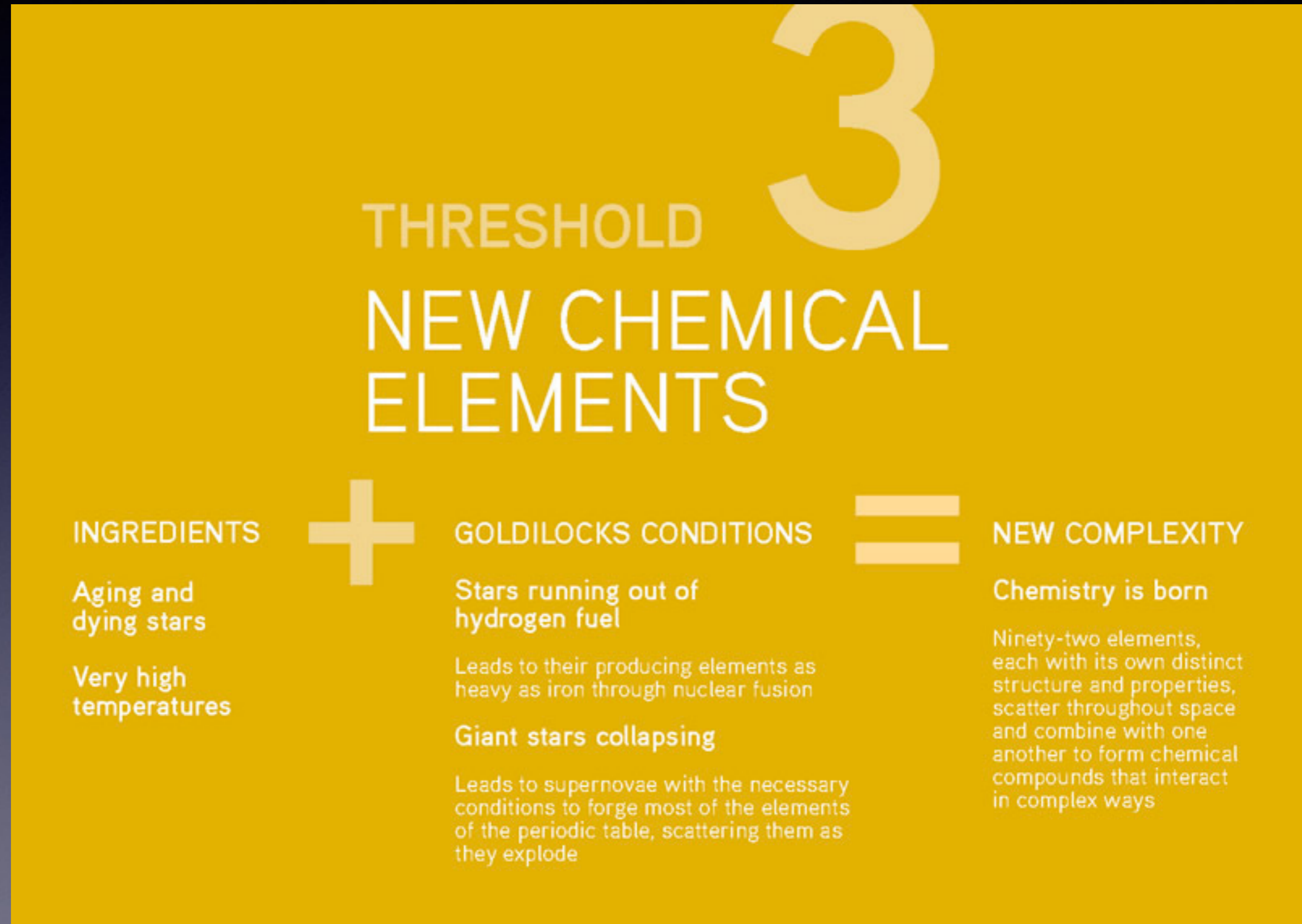
Clusters

Superclusters

New Chemical Elements



New Chemical Elements



Earth & Solar system

4

THRESHOLD

EARTH & THE SOLAR SYSTEM

Even after millions of supernovae exploded to create new elements, most of the Universe still consisted of hydrogen, helium, and empty space. Planets, which formed from leftover debris around newborn stars, contained much greater chemical complexity than anything else in the Universe. On rocky planets like our Earth, even more remarkable things could happen.

4.5

4 BILLION YEARS AGO

Earth & Solar system

4

THRESHOLD

EARTH & THE SOLAR SYSTEM

INGREDIENTS

New chemical elements

Clouds of chemically rich matter

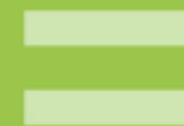
Newly forming stars



GOLDBLOCKS CONDITIONS

Gravity, accretion, and random collisions

Create environments where elements gather, combine, and form chemical bonds



NEW COMPLEXITY

Astronomical bodies more chemically rich than stars

Planets

Planetesimals

Comets / asteroids

More complex structures

Our Solar System

Life on Earth

5

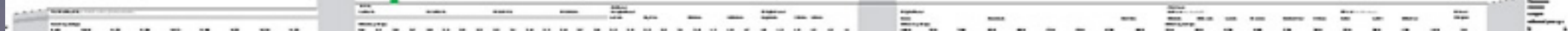
THRESHOLD

LIFE ON EARTH

The appearance of life on Earth marked a major arrival: organisms with the capacity to harness energy and materials from their environments to adapt to changing conditions and reproduce themselves. This introduced a new level of creativity, diversity, and complexity to the Universe.

4 BILLION YEARS AGO

1 BILLION YEARS AGO



Life on Earth

5 THRESHOLD LIFE ON EARTH

INGREDIENTS

Complex chemical compounds (including RNA and DNA)



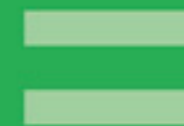
GOLDBLOCKS CONDITIONS

Just the right amount of energy

Enables diverse and stable chemical reactions

Liquid water

Makes it easy for atoms and molecules to combine and recombine



NEW COMPLEXITY

New organisms with the ability to

Maintain and fuel themselves (metabolism)

Adjust to changes around them (homeostasis)

Copy themselves (reproduction)

Gain new characteristics over time (adaptation)

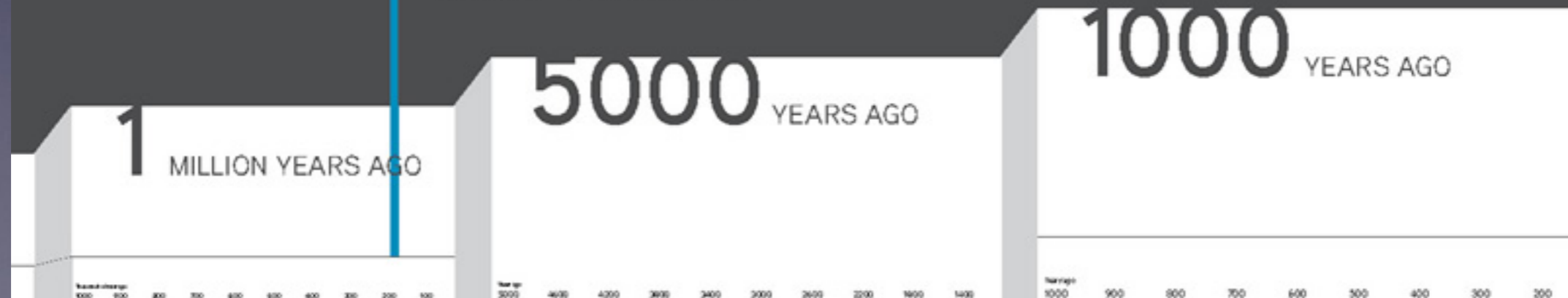
Collective Learning

6

THRESHOLD

COLLECTIVE
LEARNING

Many creatures can learn. Some can share what they learn. Only humans can share ideas so efficiently that we learn collectively as a species. We are uniquely powerful because we use symbolic language to store and circulate information that would otherwise disappear when individuals die. This enables us to manipulate and react to our environments like no other species on the planet.



Collective Learning

6

THRESHOLD

COLLECTIVE
LEARNING

INGREDIENTS

Powerful brains

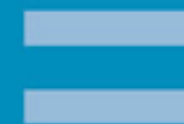
Precise and versatile
symbolic language



GOLDBLOCKS CONDITIONS

Interactions between individuals
and between communities

Enable the transfer and storage
of information



NEW COMPLEXITY

A new species, *Homo sapiens*, that uses
collective learning to

Connect with each other in
new ways

Adapt to their environment
without changing genetically

Pass information from
generation to generation

Agriculture

7

THRESHOLD

AGRICULTURE

Up until about 11,000 years ago, humans—who had spread throughout the world—survived by foraging for food. Everything changed when certain groups of humans began to farm. Populations exploded. Societies became more diverse. Collective learning accelerated.



Agriculture

7 THRESHOLD AGRICULTURE

INGREDIENTS

Increasingly dense human communities

Knowledge about the environment

Accumulated through collective learning over many generations



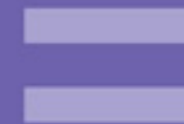
GOLDBLOCKS CONDITIONS

Warmer climates after the last ice age

Enable the proliferation of plants and animals in many regions

Increasing competition for resources

Forces foragers to find ways to increase production from their environments



NEW COMPLEXITY

Domestication of plants and animals

Increases access to food and energy sources

Villages, cities, and agrarian civilizations

Generate new social systems and complex infrastructures

Enable rapid acceleration of collective learning and even greater innovation

Modern Revolution

THRESHOLD

8

THE MODERN REVOLUTION

Over a mere 200,000 years, humans have developed a complex and versatile exchange network. Today we are 7 billion people interacting as one interconnected global community. This society is so powerful that it impacts the fate of the entire biosphere. We have yet to experience the full implications of crossing this most recent threshold.



Modern Revolution

8

THRESHOLD

THE MODERN REVOLUTION

INGREDIENTS

Increasingly large
exchange networks

With vast accumulated
information

New energy
resources



GOLDBLOCKS CONDITIONS

Globalization

Promotes commercialization
and accelerates innovation



NEW COMPLEXITY

A globally connected
human society

Enables increased control
over and consumption of
resources

Leads to rapid population
growth

WHO IS BEHIND THE BIG HISTORY PROJECT?

- 1 Teachers and Schools**
The engine behind BHP: The course is built in conjunction with a core set of pilot schools, both public and independent
- 2 University of Michigan**
Research partner: Manages student data (always anonymous!) and drives course strategy
- 3 Experts / Guest Lecturers**
Broad range of experts on cutting edge of their fields – Walter Alvarez, Janna Levin, Skip Gates, John Green, and many more share their perspectives throughout the course
- 4 David Christian and Bill Gates**
David Christian was one of the pioneers of Big History, and his college-level course inspired Bill Gates to explore a collaboration designed to bring Big History to high school students everywhere.



- <https://www.bighistoryproject.com/home>