

# A Question of Snowflakes:

-or-

How the Universe allows  
Things to Create Themselves



# **Evolution, Self-organization, and Auto-creation**



# Motivation


- Evolution is obvious – why is there controversy?
- Manipulating public school curriculum to take an anti-science stance – evil, or misguided?
- Why do so many think evolution is not valid?
- Facts don't matter
- What are the emotional barriers to accepting evolution?
- Why does intuition cause misunderstanding?



# Motivation

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- Why does intuition cause misunderstanding?



A close-up photograph of a man with a dark beard and mustache, smiling slightly. He is wearing a dark jacket over a light-colored collared shirt. He is holding a white spiral-bound notebook in front of his chest. The notebook has a handwritten question in black ink. The background is blurred, showing what appears to be a library or a room with bookshelves.

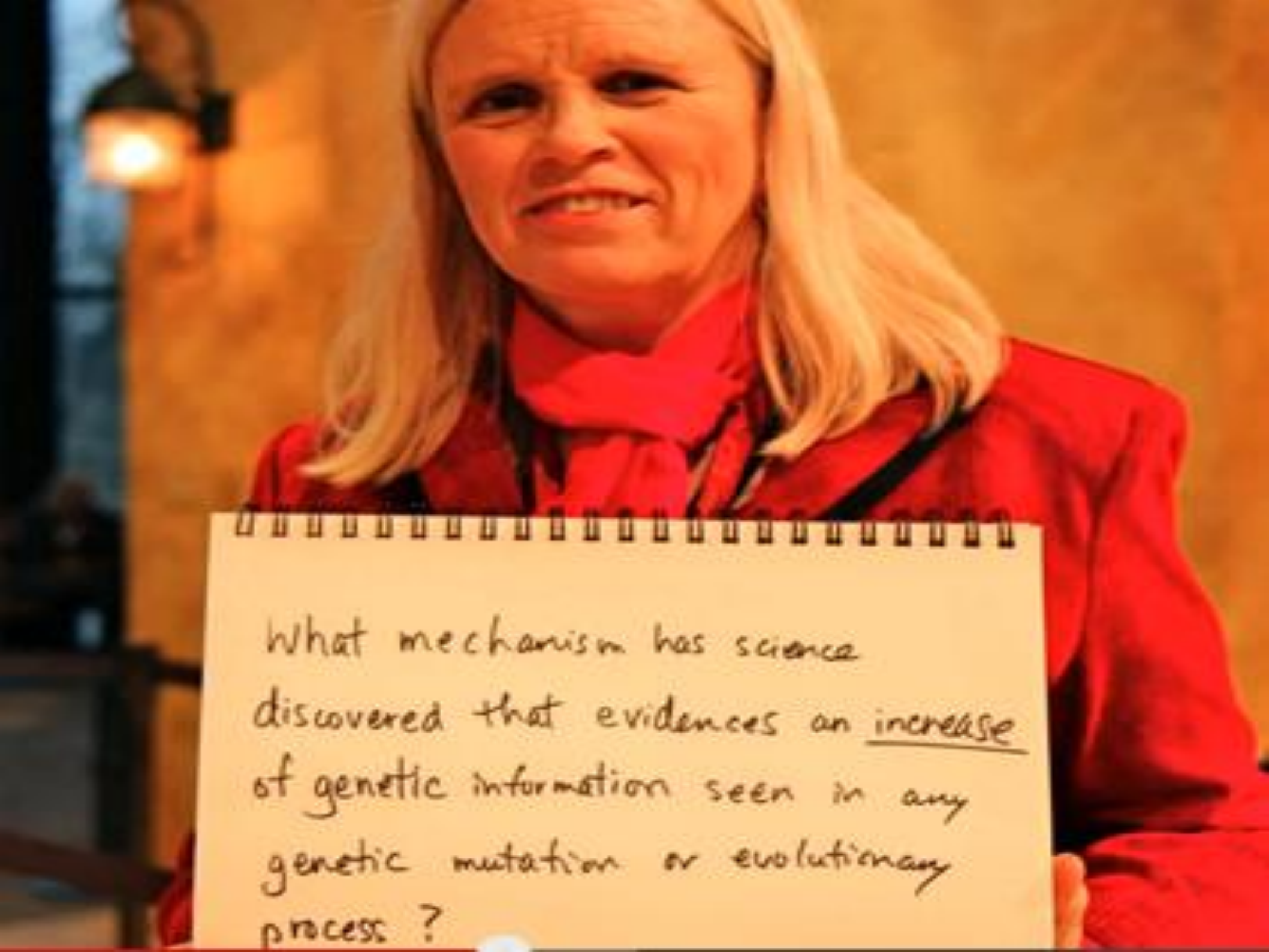
Does not the Second law of  
thermodynamics disprove Evolution?

(The earth is not a closed system)

- In a closed system, entropy always increases
- Entropy is a measure of how disordered a system is.
- Increase entropy == decrease order
- It says that entropy never decreases,  
==> order can never increase







What mechanism has science  
discovered that evidences an increase  
of genetic information seen in any  
genetic mutation or evolutionary  
process ?

“Genetic information” here is referring to the  
“amount of different encoded useful sequences”

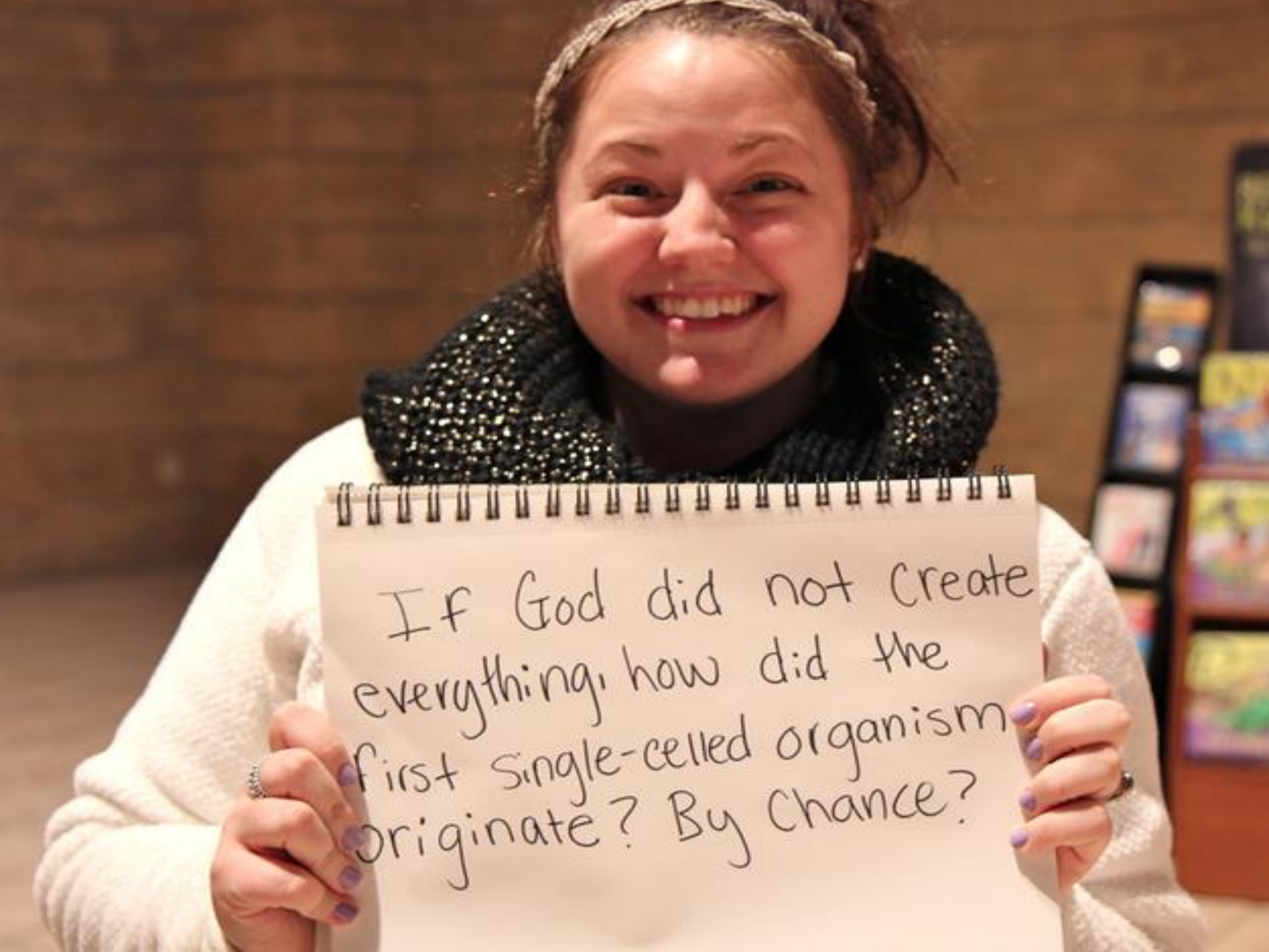
The total amount of “order”

Higher life forms == more organized

So in this talk: information == order





A young woman with brown hair tied back, wearing a white sweater and a black sequined scarf, is smiling and holding a spiral-bound notebook. The notebook has a handwritten question in black ink. The background is a brick wall, and to the right, there is a rack of colorful items, possibly comic books or pamphlets.

If God did not create everything, how did the first single-celled organism originate? By chance?

# Five Major Misconceptions about Evolution

- 1) Evolution has never been observed.
- 2) Evolution violates the 2nd law of thermodynamics.
- 3) There are no transitional fossils.
- 4) The theory of evolution says that life originated, and evolution proceeds, by random chance.
- 5) Evolution is only a theory; it hasn't been proved.



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**A watch demands a watchmaker...**

**... or does it?**



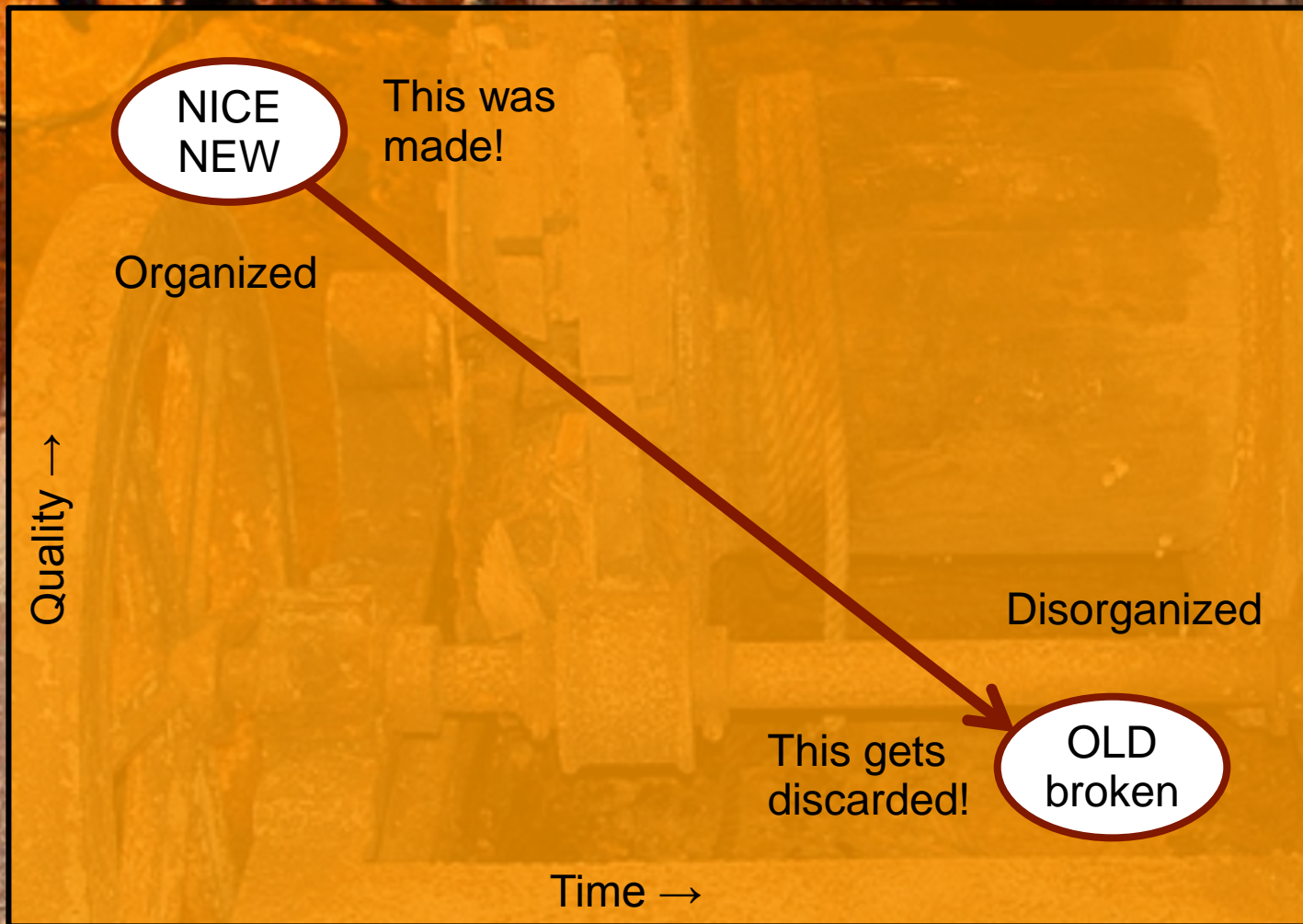


**Because things wear down ...**

**... at least things that people make**



# Because things wear down ...



## ... at least things that people make

# The Law Of Decay

- *“The 2nd Law of Thermodynamics describes basic principles familiar in everyday life. It is partially a universal law of decay; the ultimate cause of why everything ultimately falls apart and disintegrates over time. Material things are not eternal. Everything appears to change eventually, and chaos increases. Nothing stays as fresh as the day one buys it; clothing becomes faded, threadbare, and ultimately returns to dust.”*

– *christiananswers.net*



- At atomic scale, nothing wears out

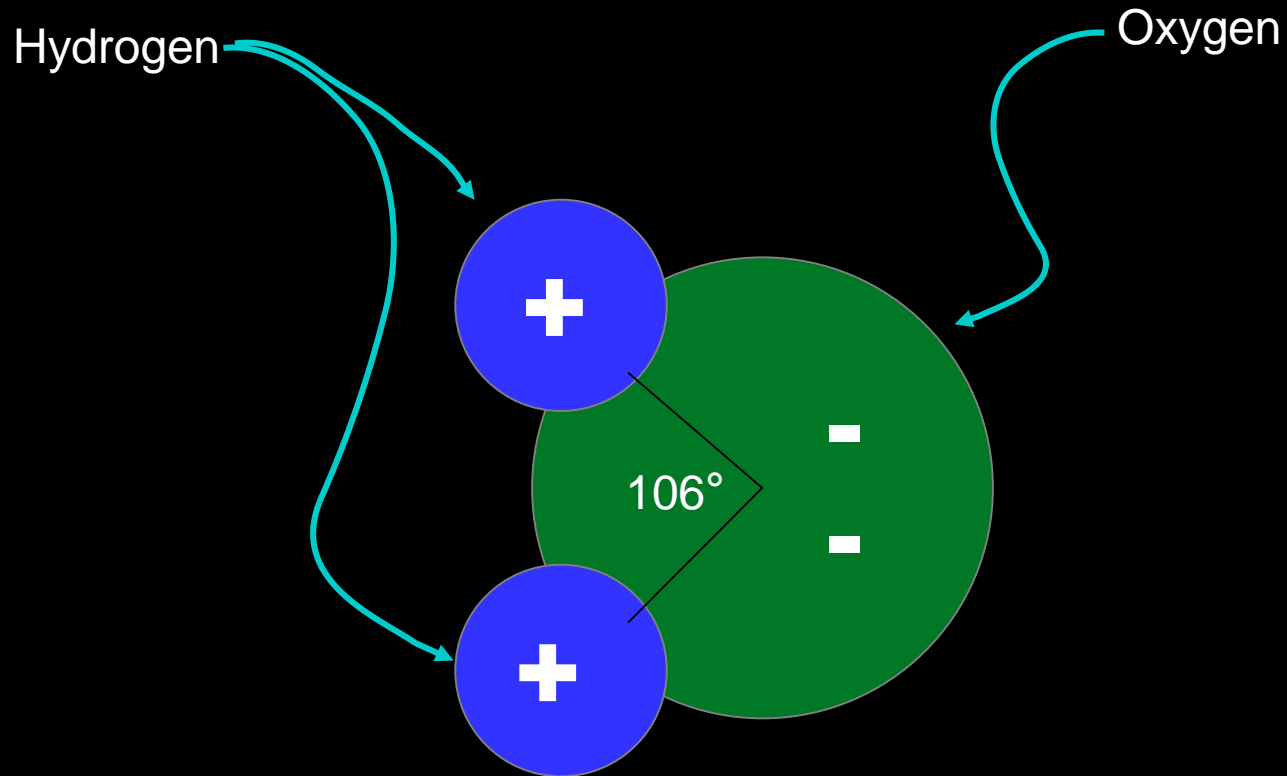




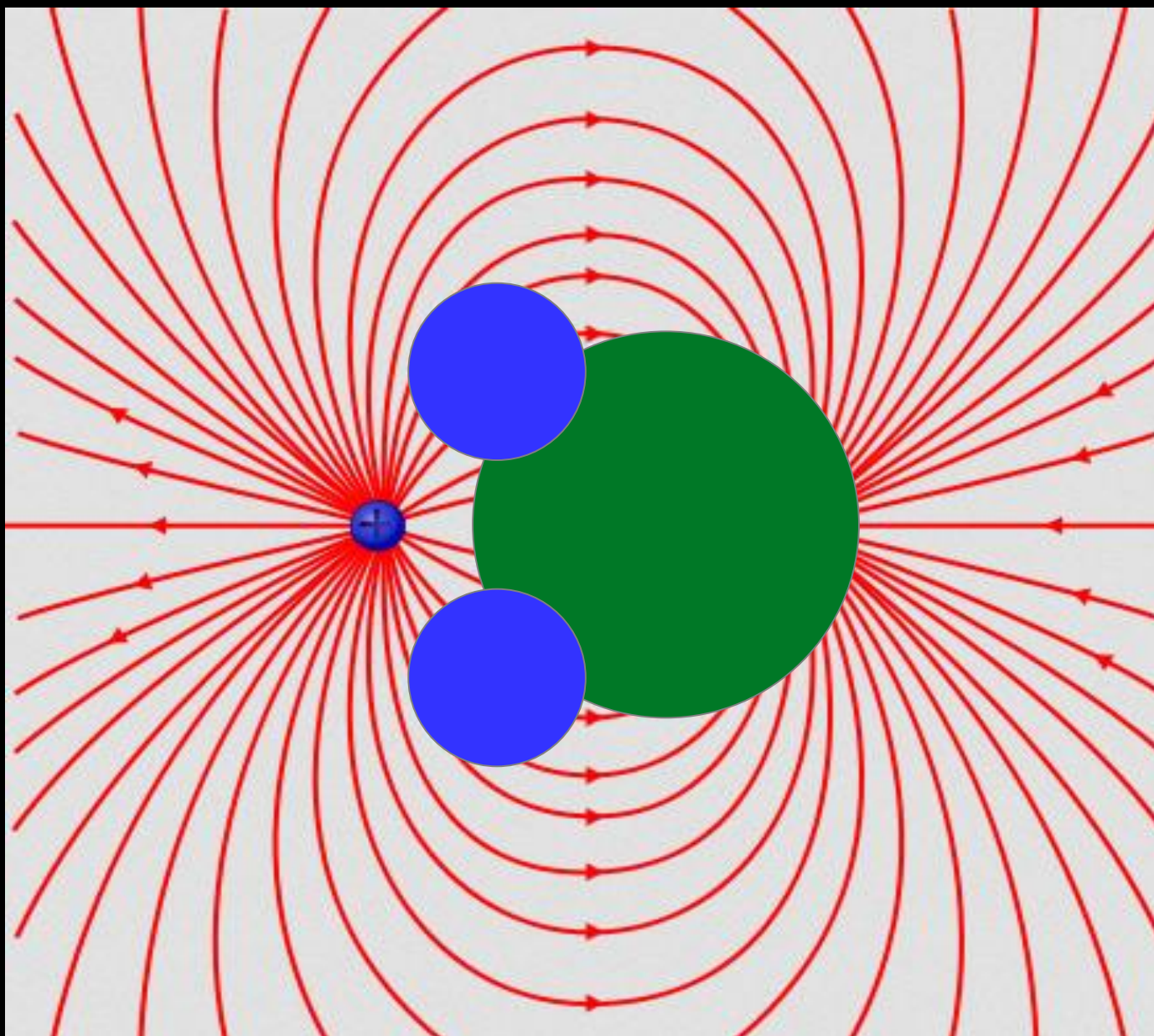




# Behold: the Water Molecule









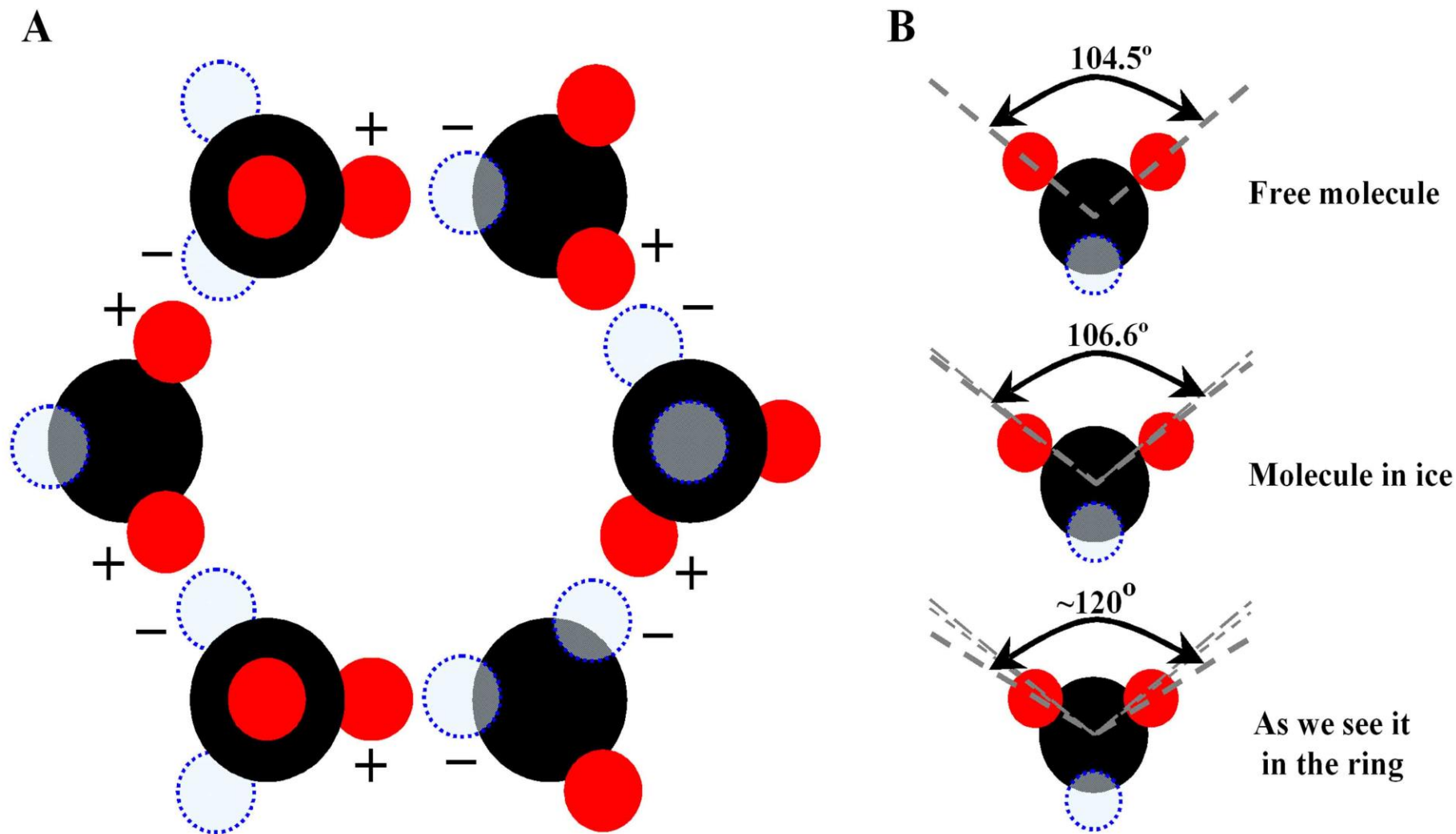
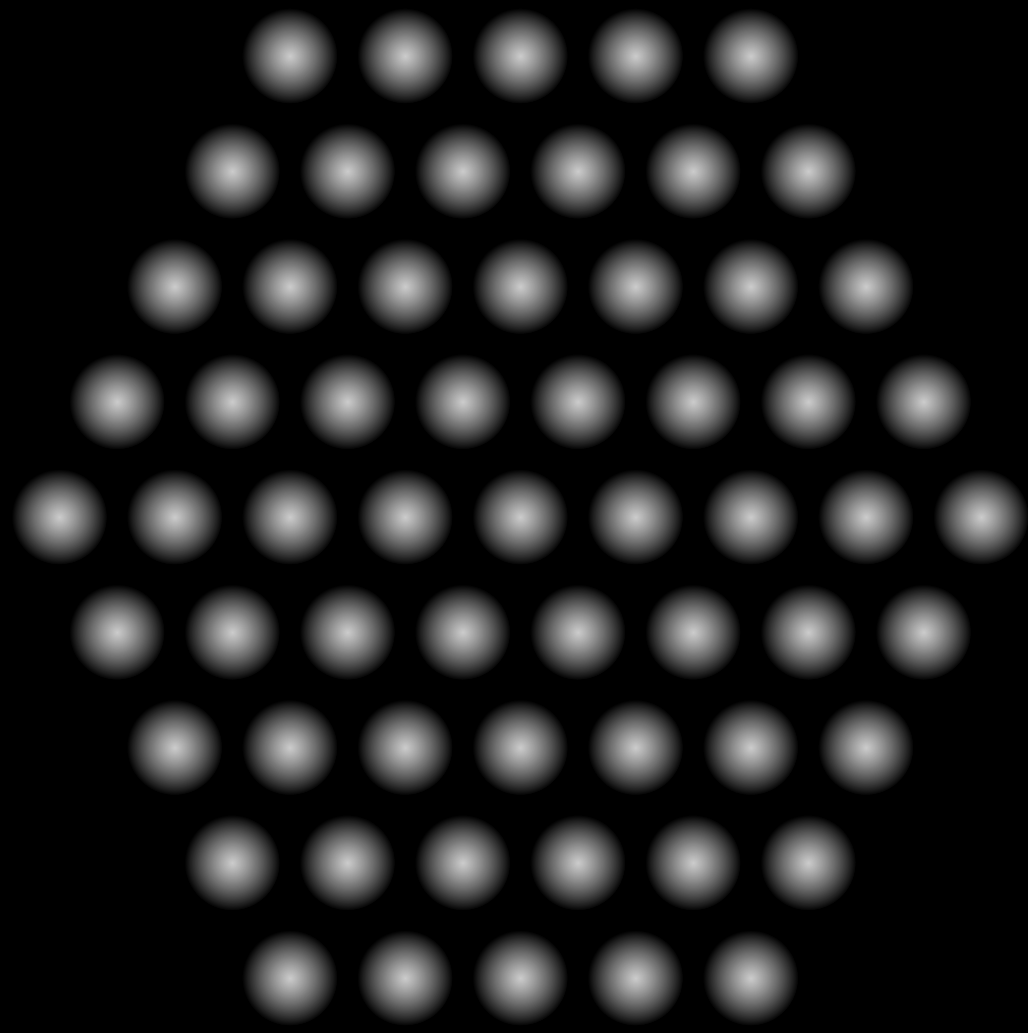
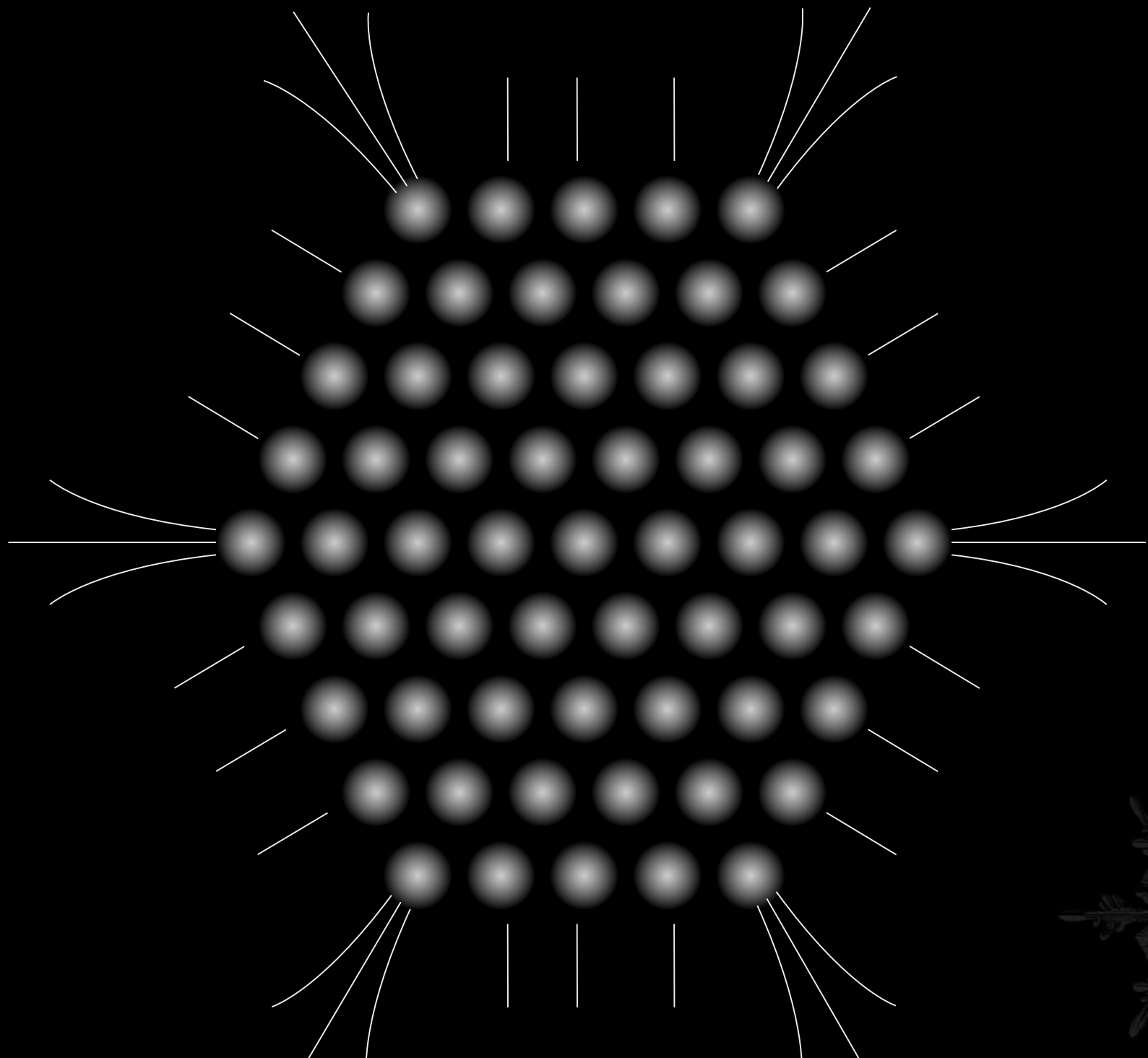
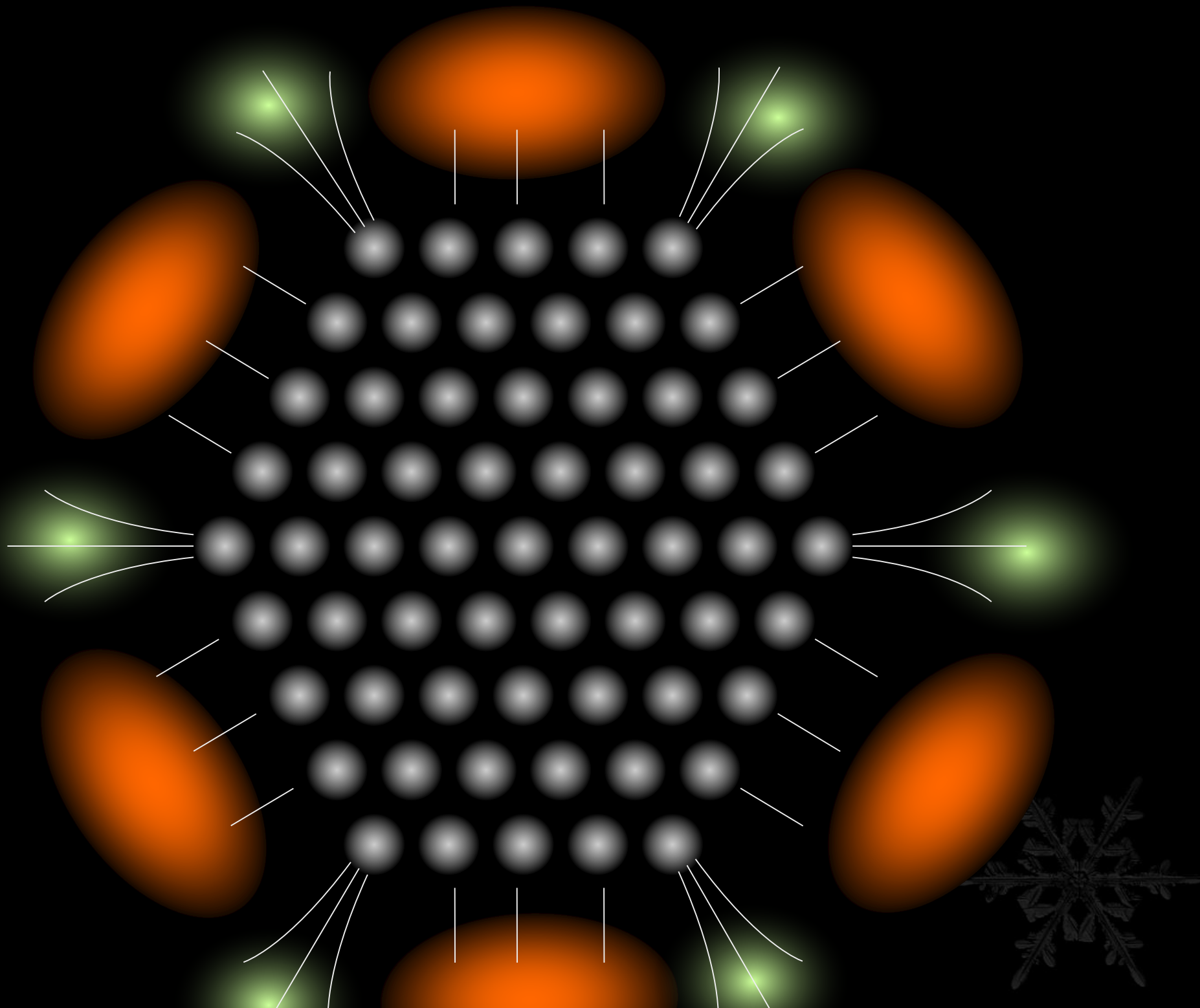


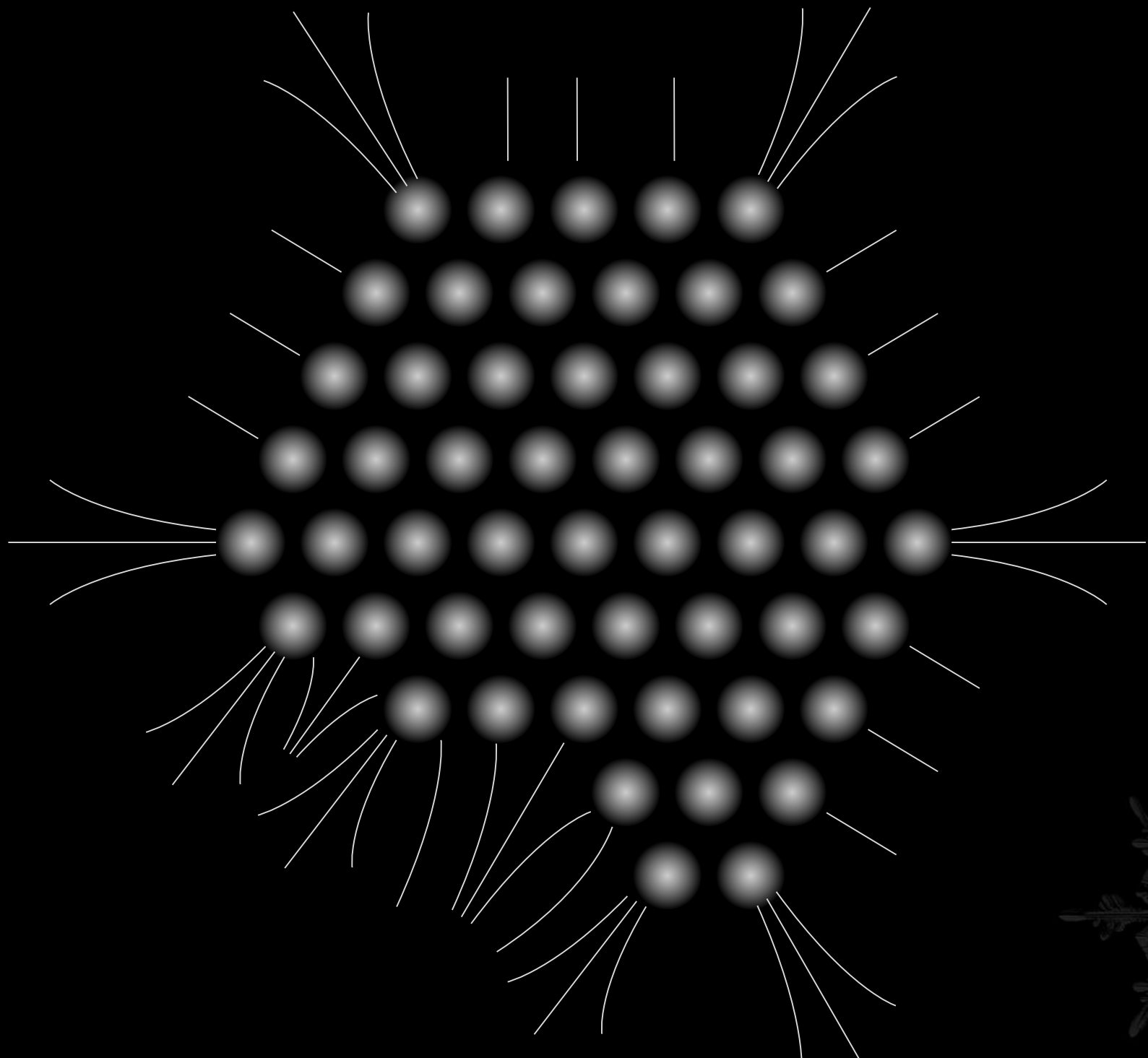
Fig. 3. Electrical forces between the hydrogens and lone-pairs (dashed blue) force the water into a hexagonal ring A) and slightly widen the opening angle of the water molecule to  $106.6^\circ$  (a perfect tetrahedron would have  $109.5^\circ$ ) B). At the bottom of B), the molecule has rotated up towards us such that the angle now appears to be about  $120^\circ$ .

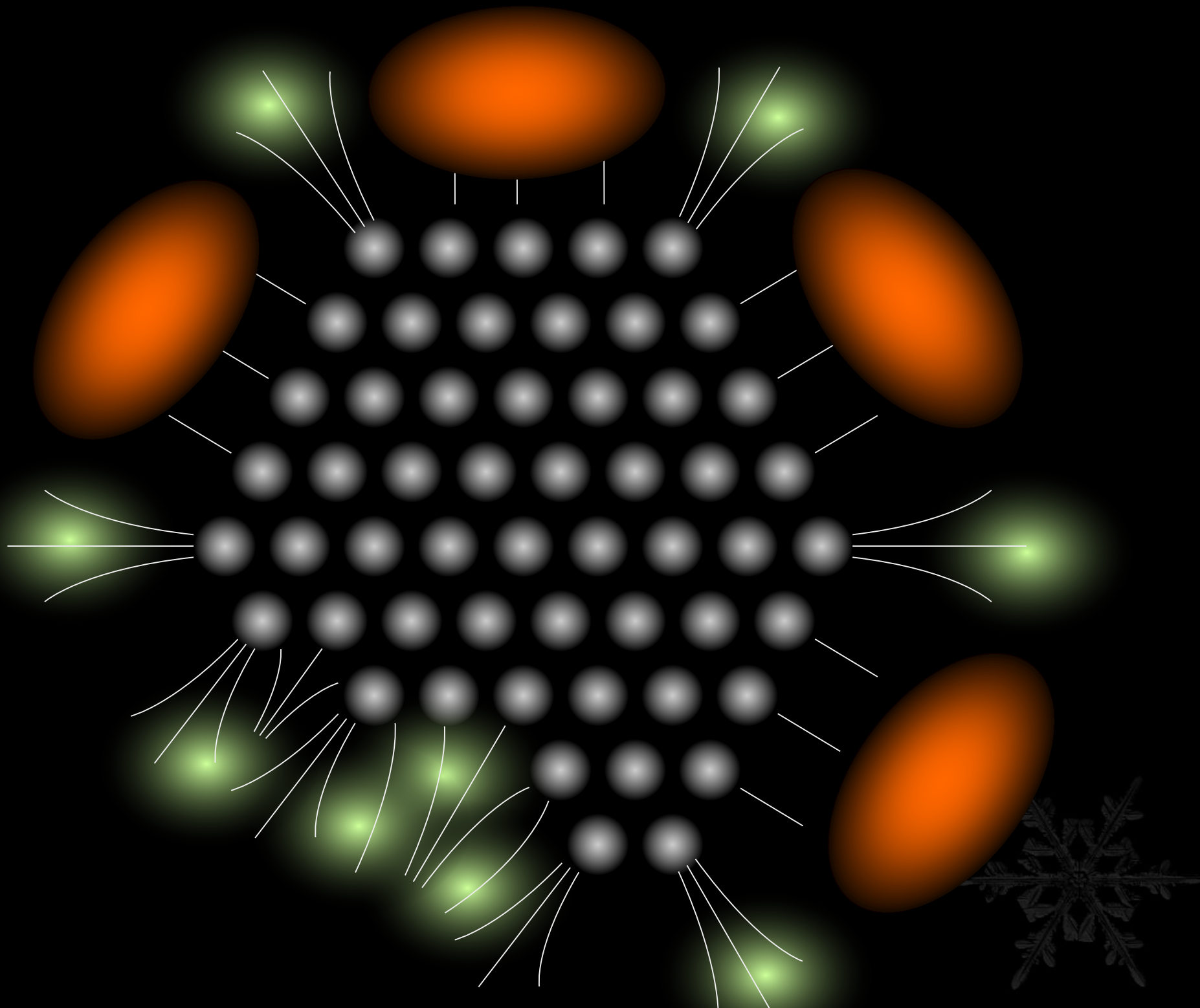


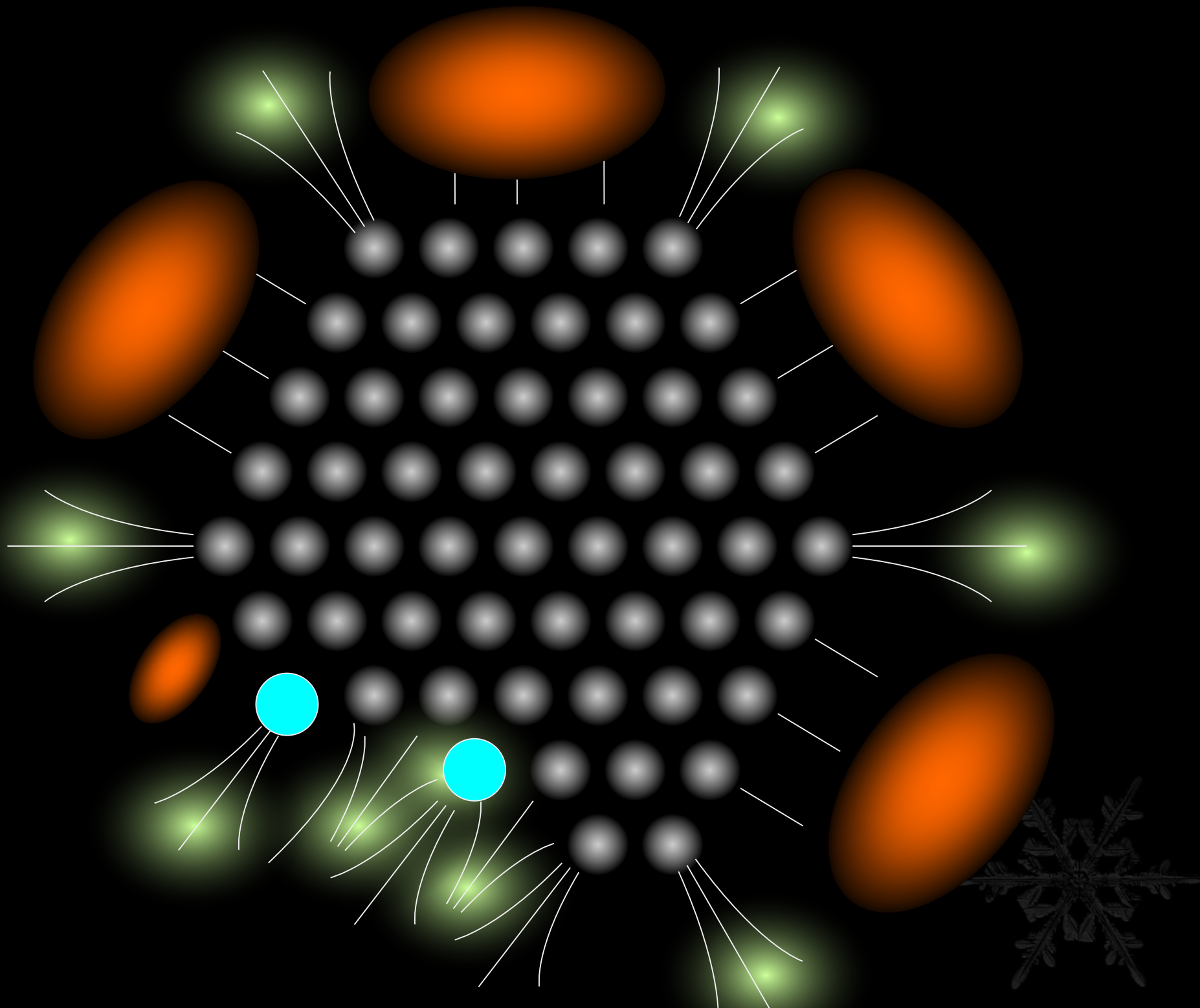




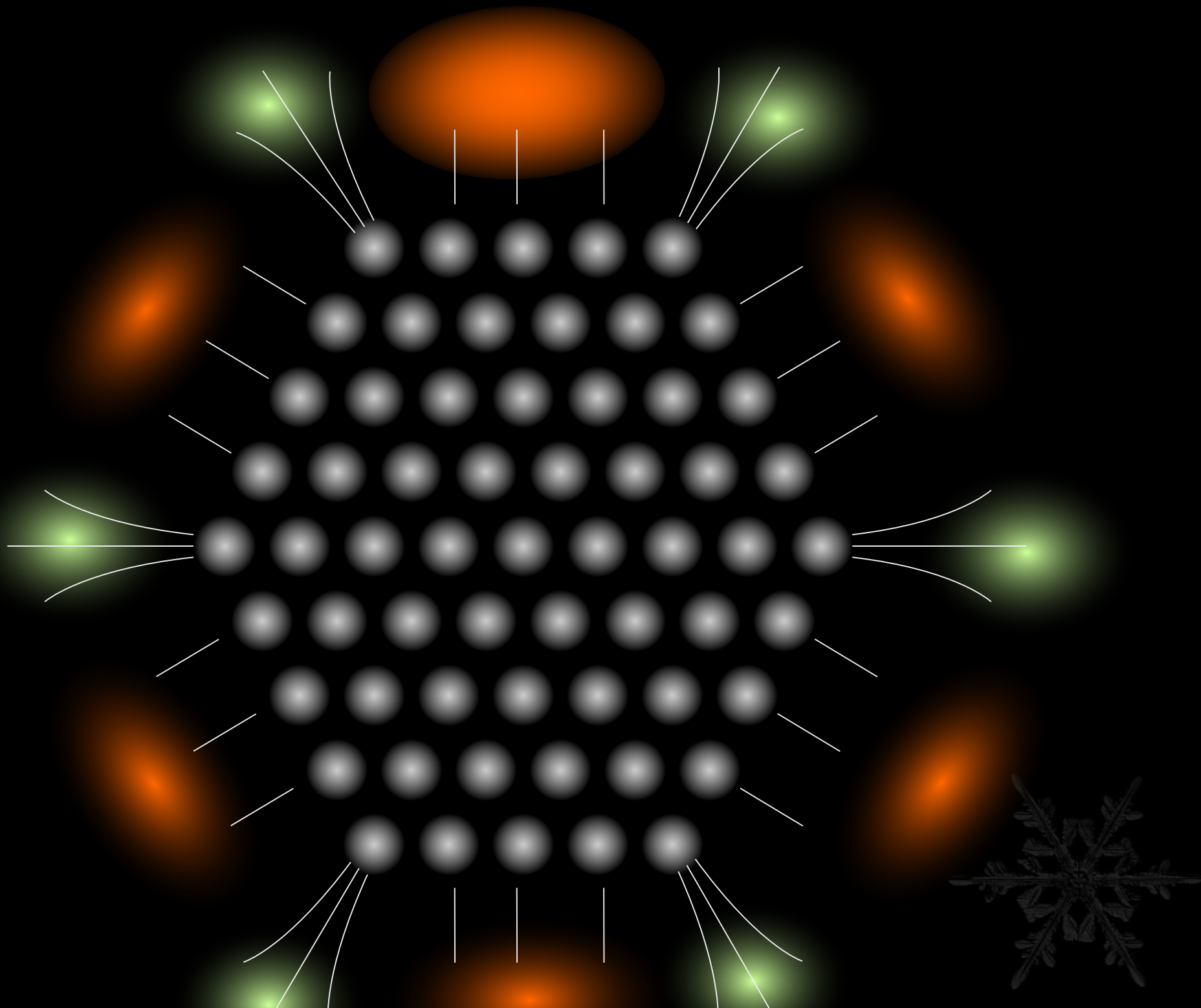


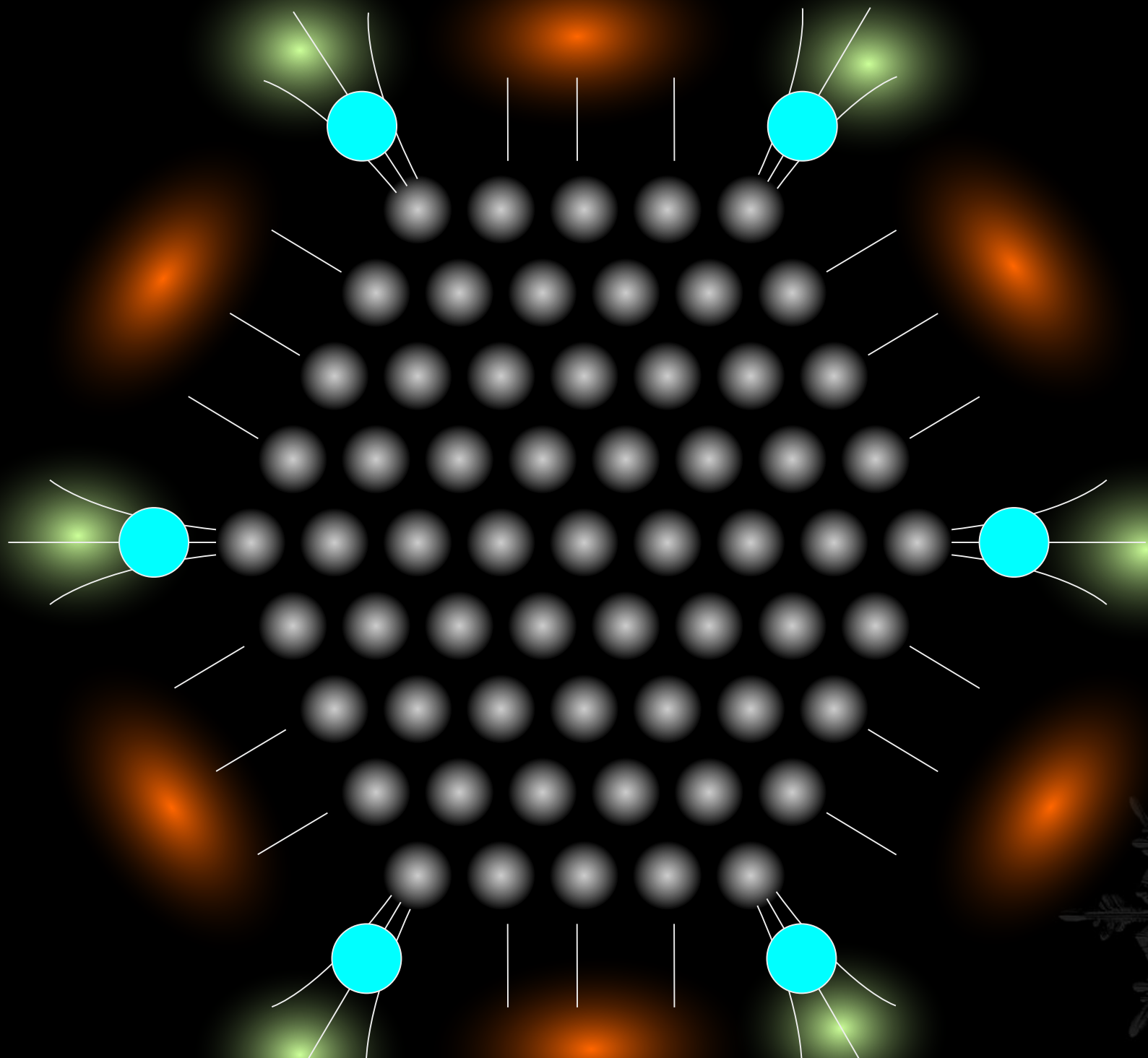






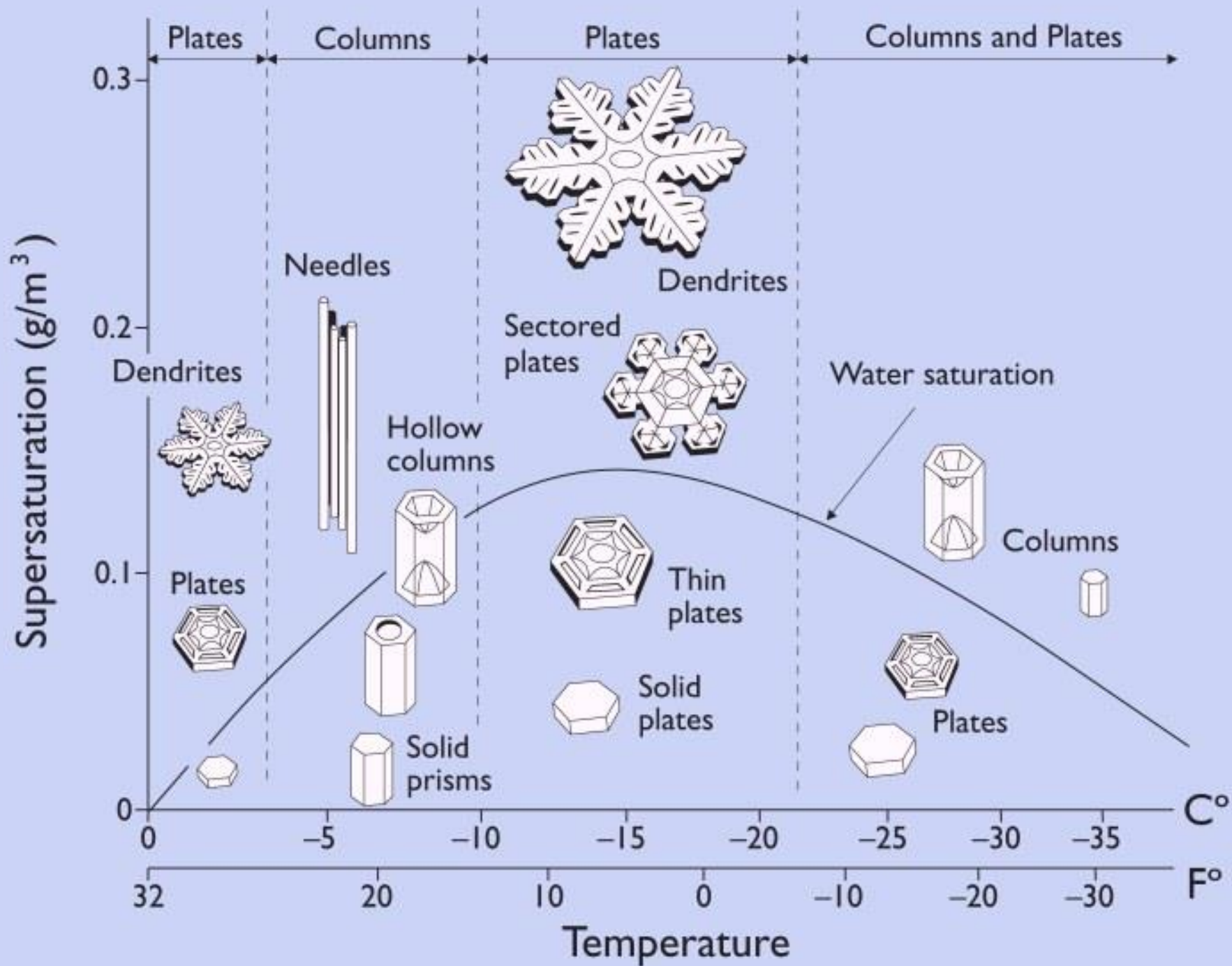
















SO MUCH FOR THAT ARGUMENT





# What is the Probability?

- A typical small snowflake has  $10^{18}$  molecules
- Can a snowflake be assembled by a random action?
- Snowflakes are not random assemblies.



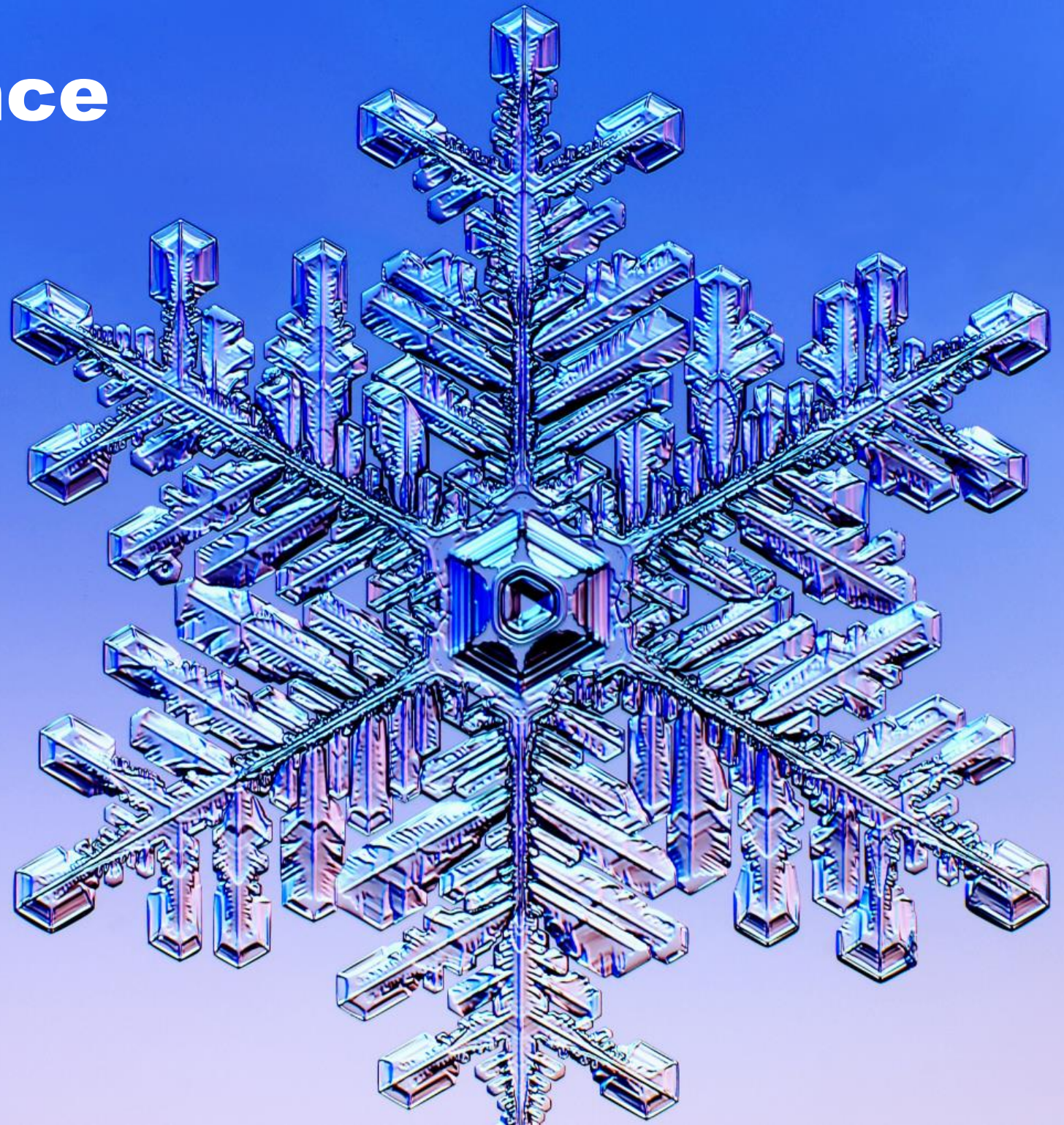
# Random Motion *together* with a Process

- Molecules in a gas move randomly
- The process selects when the molecule find the right niche location

Randomness remains essential but not that the crystal forms purely randomly



# Existence





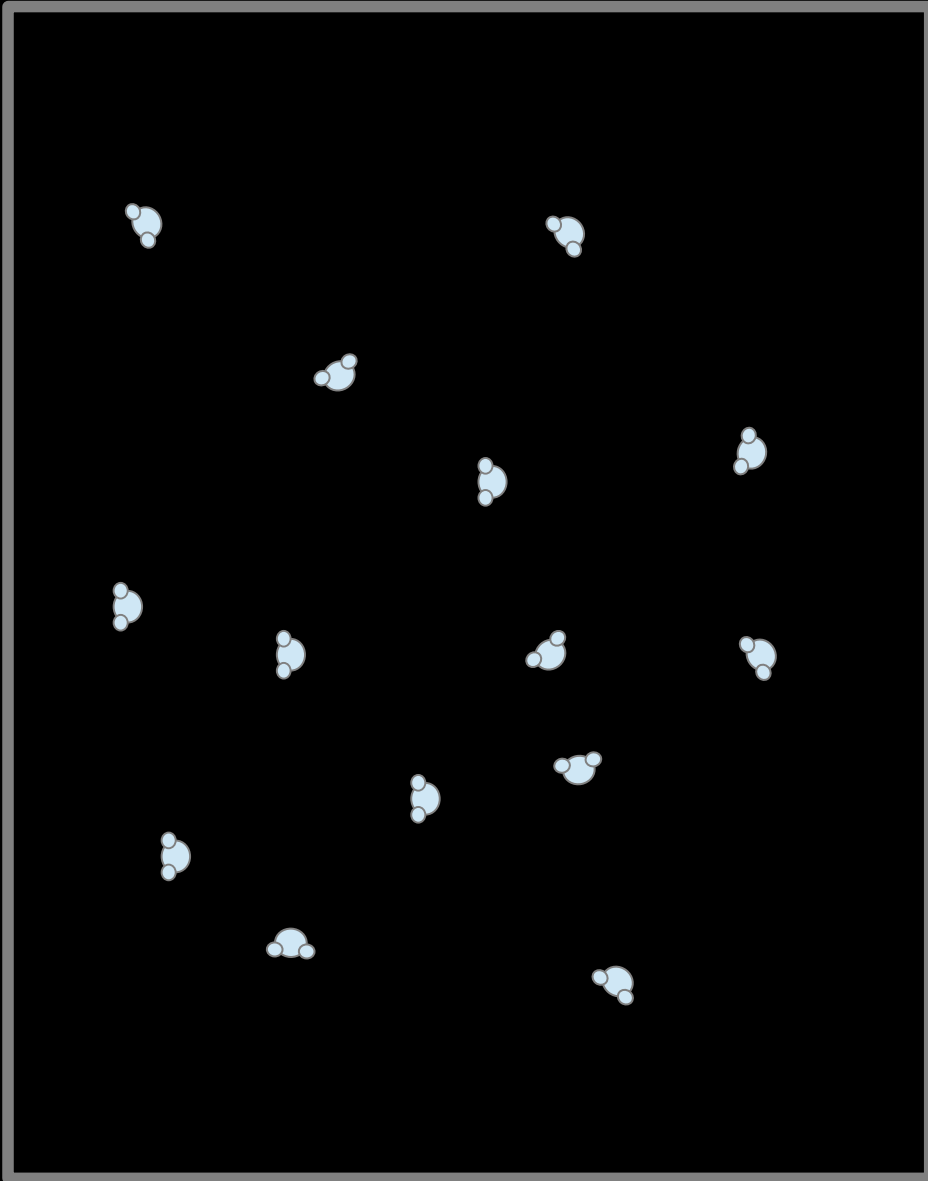
# For a Given Snowflake:

- Time<sub>1</sub>: there was no snowflake
  - Time<sub>2</sub>: the snowflake exists
  - Time<sub>3</sub>: the snowflake is gone
- creation
- destruction

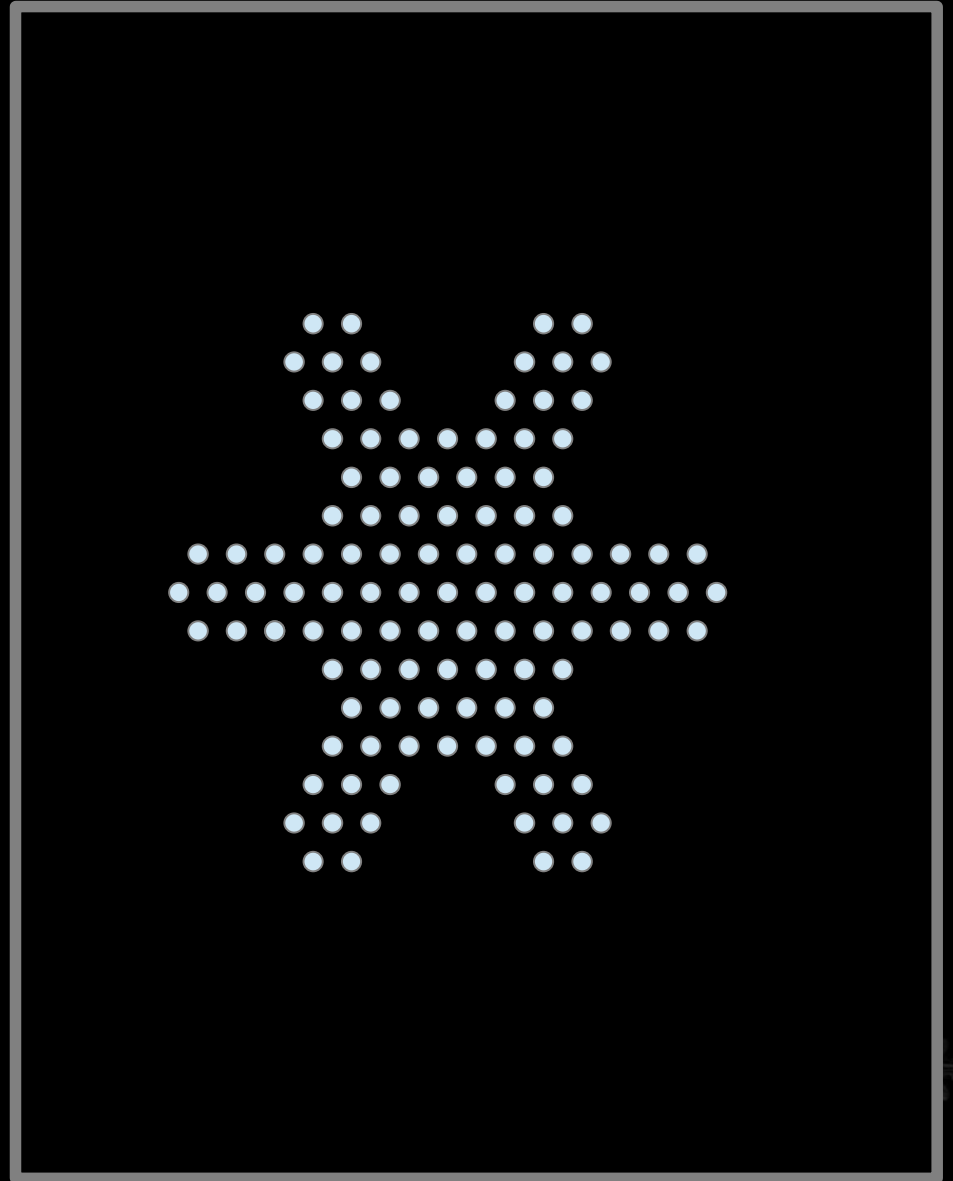
- What does it mean to Exist?



Not Existing:  
Water Vapor



Existing:  
Snowflake



- What is created when a snowflake forms?
- The molecules were already there.
- The only thing that was created was the form, the organization of the molecules.
- Persistence of the form ... is existence.





# What created the snowflake?

- The right conditions have to exist, but those conditions don't act on the snowflake
- Clouds, and cold winds are important to making the right conditions, but don't directly build snowflakes.
- Often triggered by a speck of dust, but the dust plays no role beyond triggering.
- The electrostatic field is critical to the shape, but does not actively act on the crystal.

*The molecules and their motions build the snowflake, the very same molecules that are the snowflake.*





# Self-organization is Unsettling

The idea that something might

“ create itself ”

is very hard to accept

Intuitively: this seems impossible





**You can't just  
shake a bunch of LEGO pieces  
to assemble a building....**



# Selbstorganisation

## *Self-organization*



Top-Down oder Bottom-Up? Wie komplexen Systeme entstehen  
Top-Down or Bottom-Up? The evolution of complex systems

In der Natur bilden sich durch natürliche Selektion

hierarchische Strukturen, die durch die

Effizienz der Organisation und die Fähigkeit zu lernen

geprägt sind. Diese Strukturen sind jedoch nicht

unverwundbar und können durch Veränderungen

in der Umgebung oder durch interne Faktoren

beeinträchtigt werden.

Die Frage ist, ob diese Strukturen durch

natürliche Selektion entstehen oder durch

intentionale Gestaltung.

Die Antwort hängt von der Art der

Organisation und der Art der

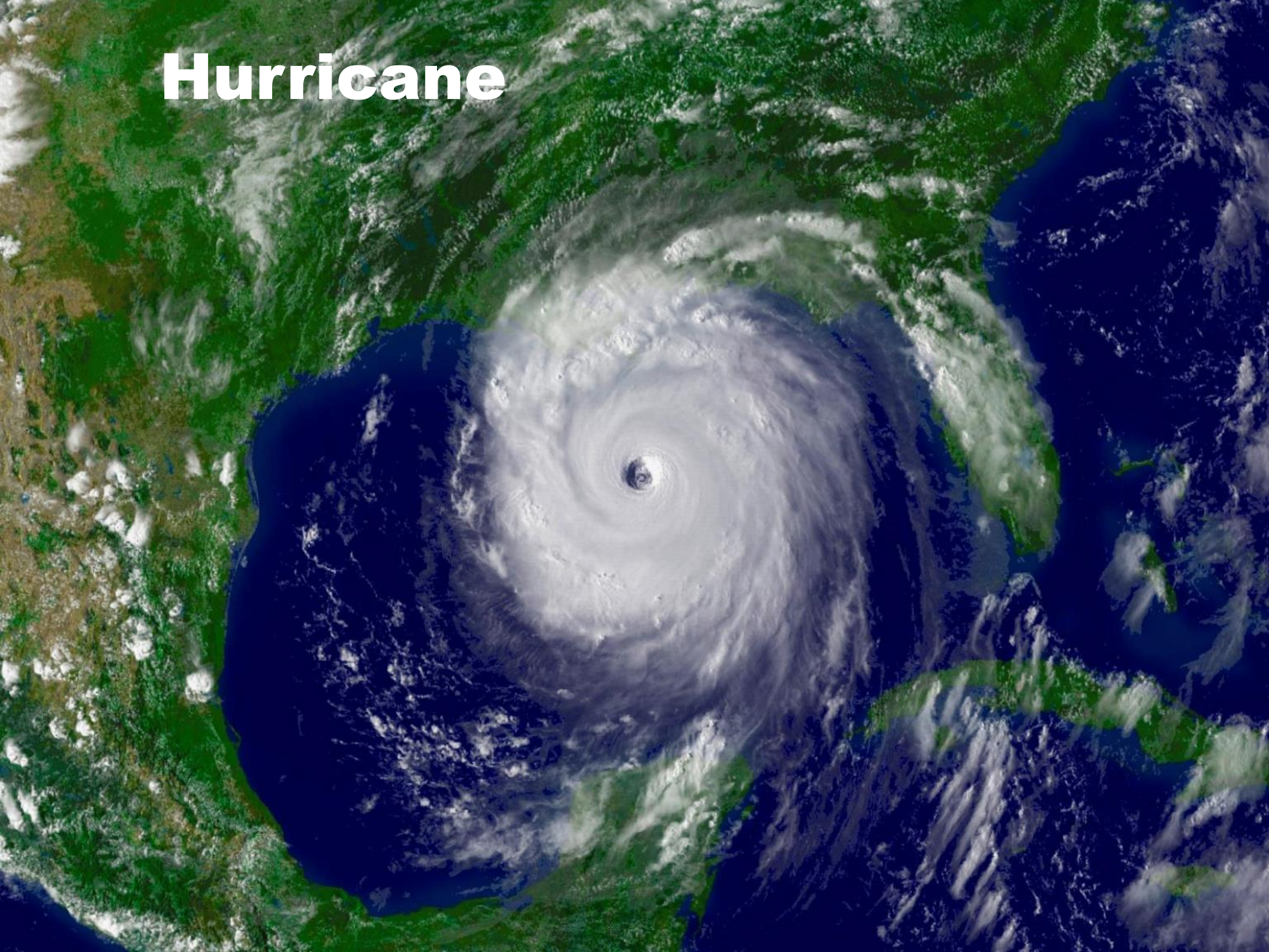
Veränderung ab.





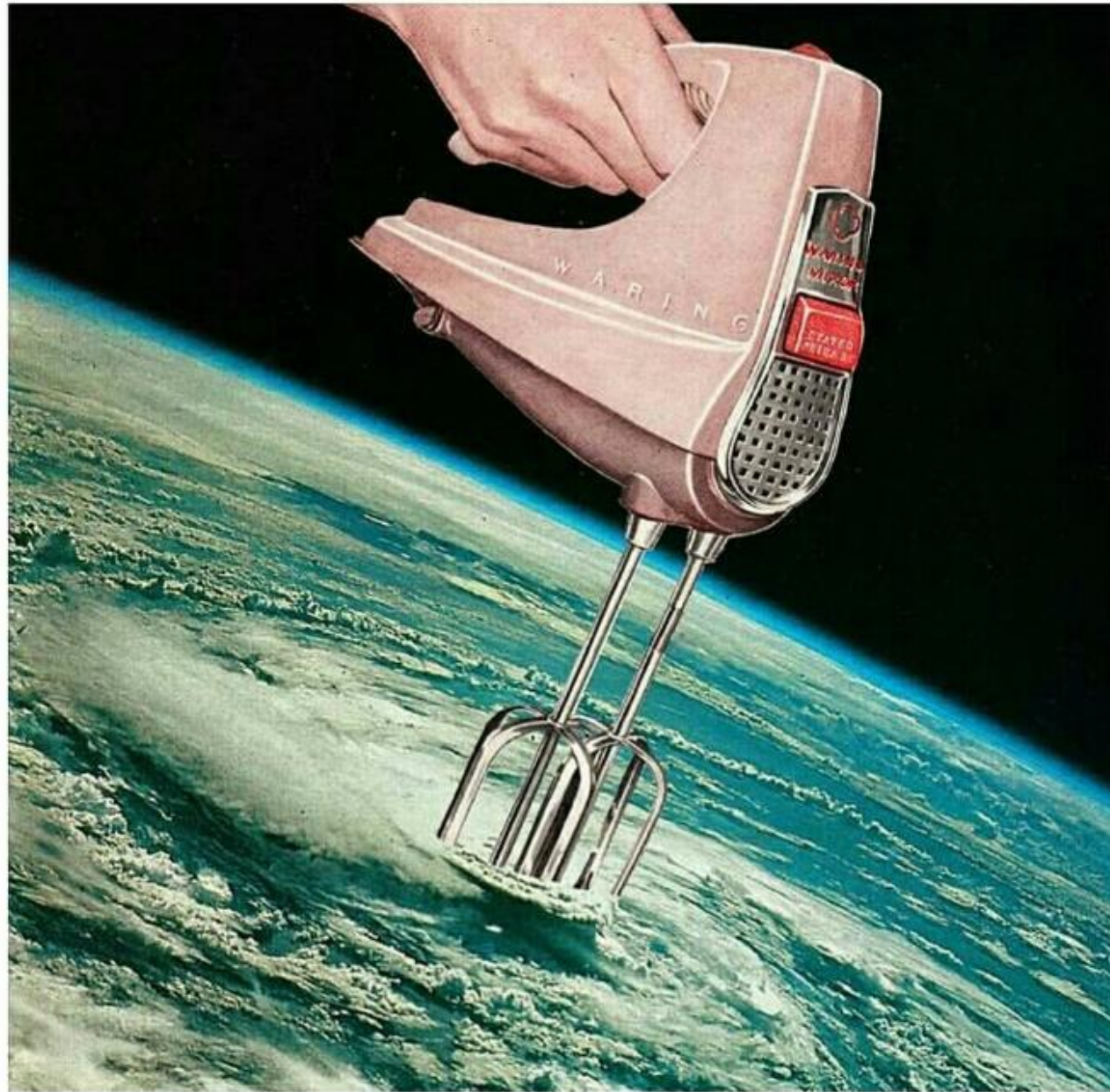


# Hurricane





Hey atheists if God doesn't exist then explain this

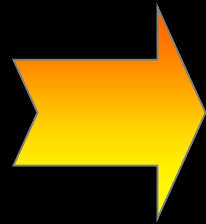






**Consciousness**







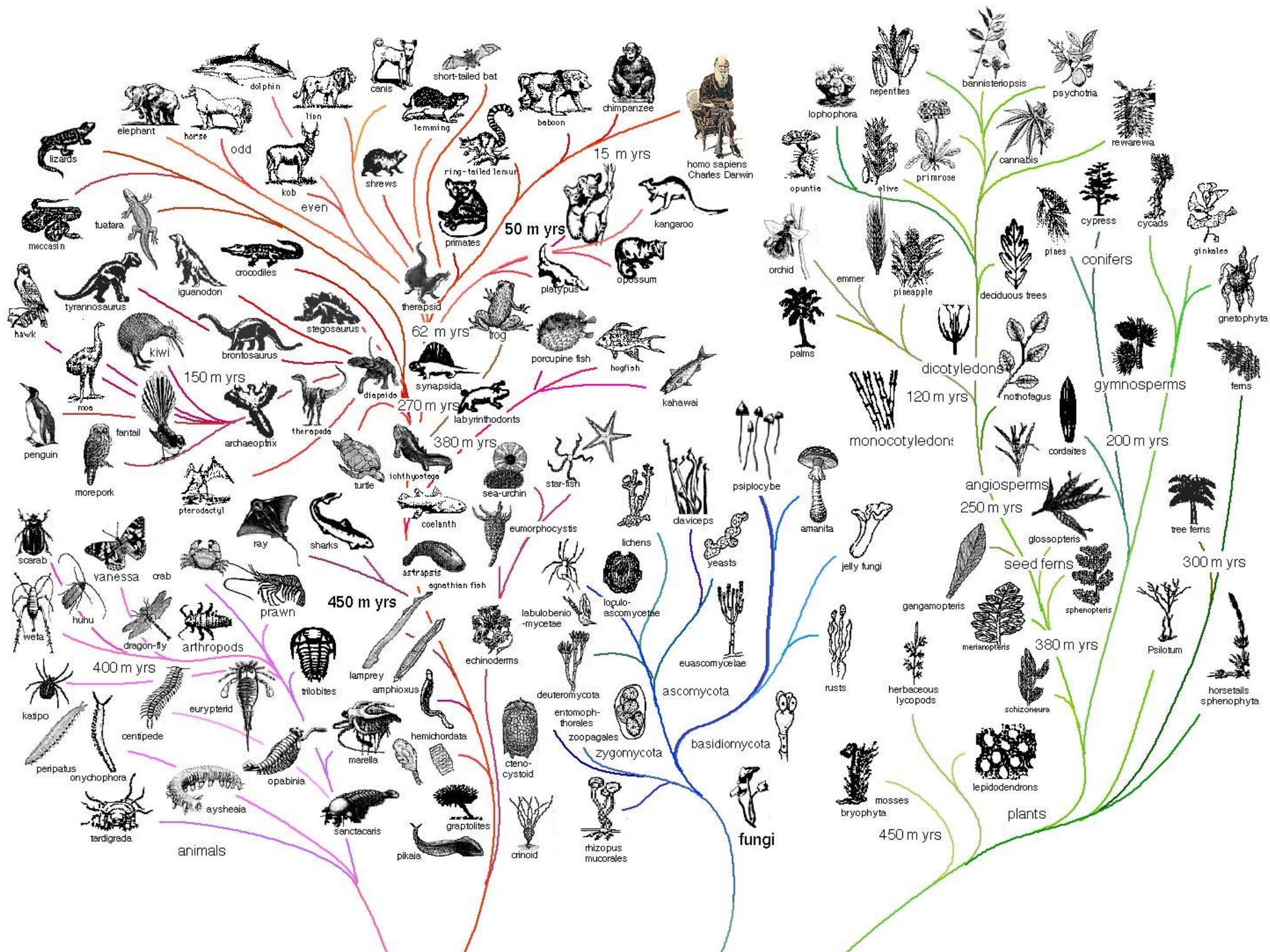
**Self  
Replicating**



**Self  
Organizing**









# New Mathematical Basis

- “Statistical physics of self-replication”
- Dr. Jeremy England, MIT Professor
- Journal of Chemical Physics, August 2013
  
- “A New Physics Theory of Life”
- Scientific American, January 28, 2014



- “This means clumps of atoms surrounded by a bath at some temperature, like the atmosphere or the ocean, should tend over time to arrange themselves to resonate better and better with the sources of mechanical, electromagnetic or chemical work in their environments”
- “Thus, England argues that under certain conditions, matter will spontaneously self-organize. This tendency could account for the internal order of living things and of many inanimate structures as well.”
- “You start with a random clump of atoms, and if you shine light on it for long enough, it should not be so surprising that you get a plant”



# Everything Wears Out.

- ❄ Not on a molecular scale they don't. Atomic and molecular interactions can happen billions of times without any wearing down.
- ❄ There is not even any friction at that level
- ❄ Molecules can break, but they never wear out.





**A watch demands  
a watchmaker.**

**A painting demands  
a painter.**

- ❄ Of course they do!
- ❄ But these are man-made things
- ❄ They are not molecular level things
- ❄ They are not complex systems
- ❄ Natural phenomena are far grander than this



**Things don't  
just appear  
on their own.**

- ❄ Yes they do.
- ❄ Snowflakes do
- ❄ Hurricanes do
- ❄ Whirlpools do

❄ No pixies, elves, fairies, or any other intelligent agent is needed to bring these into existence.



**Things don't organize  
themselves without an external  
intelligent agent acting on them.**

❄ Which Intelligent agent:

- ❄ Creates snowflakes? Frost on the window?
- ❄ Spins hurricanes?
- ❄ Makes leaves appear on a tree?
- ❄ Causes a valley to form in just the right way to deliver water to the ocean?





# The Universal Law of Decay

❄ There is  
no such thing.

❄ The tendency toward net-disorder (increased entropy) is not decay as experienced in human-sized man-made things.

❄ Don't confuse man-made with natural phenomena



# Every system left to its own devices always tends to move from order to disorder

- ❄ It is only the NET entropy that increases (closed system)
- ❄ Parts of systems can become spontaneously organized – like snowflakes.
- ❄ Disorder is not smoothly and equally distributed
  - ❄ some parts spontaneously organize
  - ❄ other parts become more disorganized



# **Evolution is contrary to God**

- ❄ Evolution not proof for non-existence of God.
- ❄ Evolution is a fact about how new species appear and says nothing about whether or not God exists.

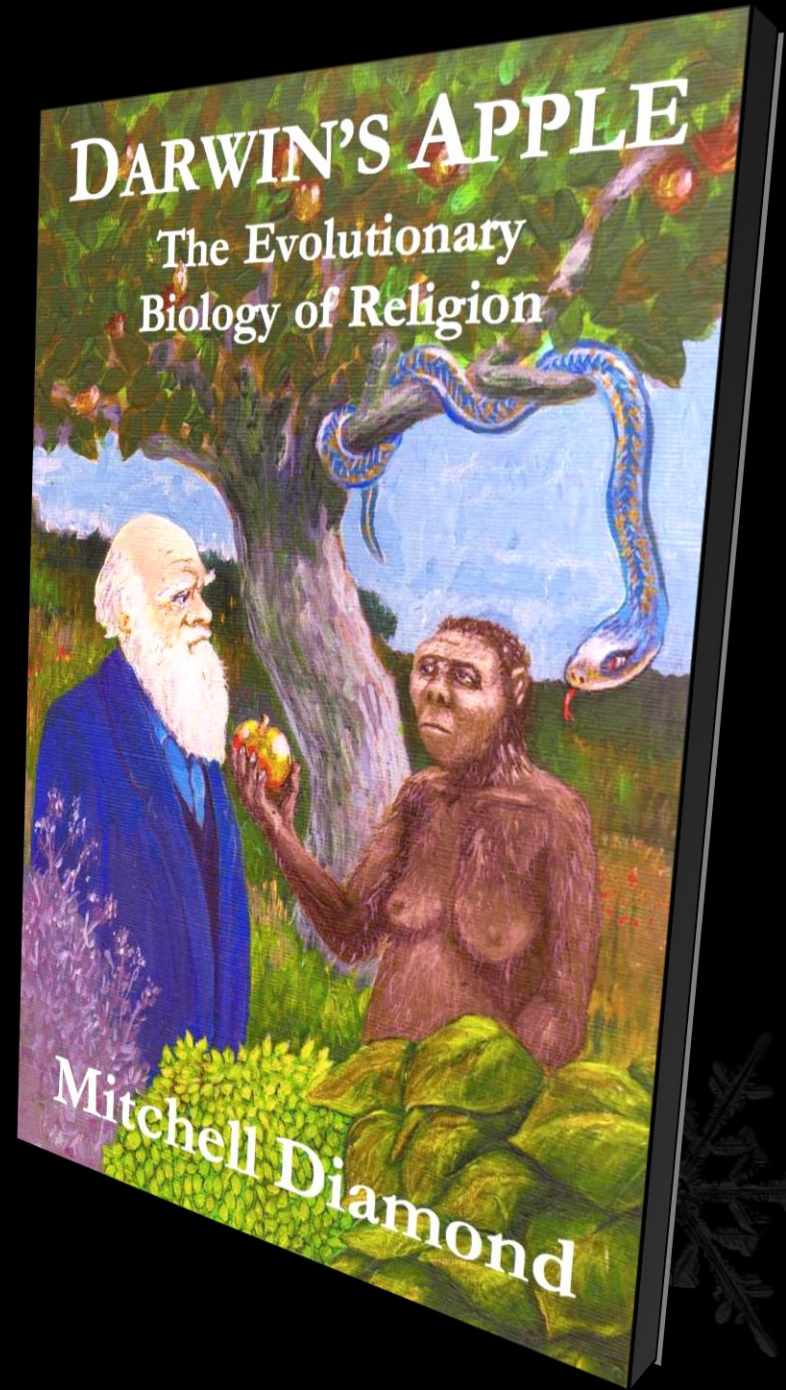
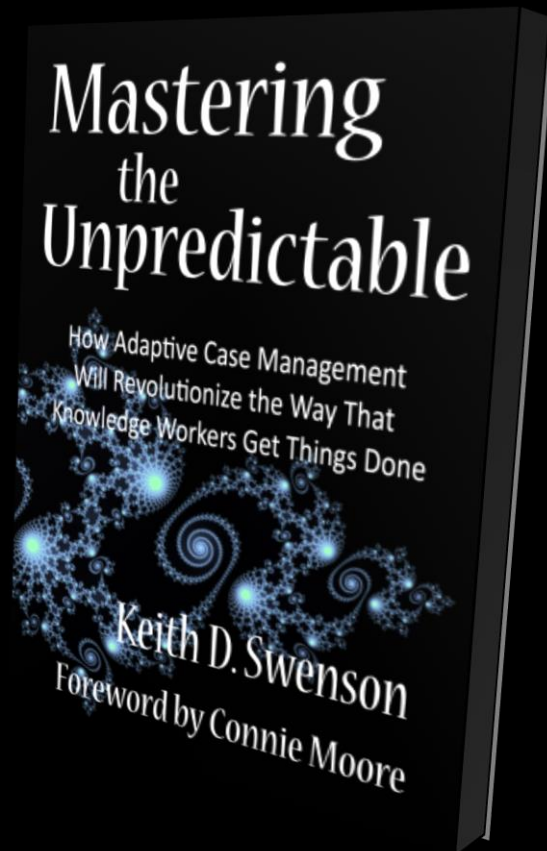
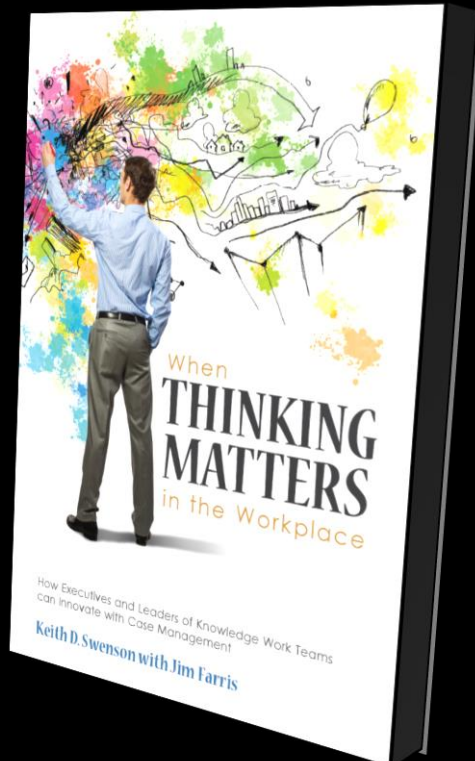




- ❄ Some emotional reactions to evolution.
- ❄ The Law of Decay is intuitive, but false.
- ❄ Detailed how snowflakes form.
- ❄ What is existence? What is creation?
- ❄ These thing really do “self-organize”
- ❄ Other examples that self organize.
- ❄ Life, and replicating structures.
- ❄ Common questions and answers.



<http://PurpleHillsBooks.com>





A microscopic image of snowflakes, showing various hexagonal and dendritic structures in shades of blue and white. The snowflakes are intricate and complex, with many small details visible. A semi-transparent dark green banner is at the top, and a semi-transparent light blue callout box is at the bottom right.

# A Question of Snowflakes: How the Universe allows Things to Create Themselves

**Questions?**