



bluearth NATURALLY INSPIRED BRANDING

OCT
2018



Biomimicry and Innovation

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Biomimicry and Innovation





Agenda

- Challenge
- Biomimicry
- Innovation
- Examples
- Discussion





The Challenge



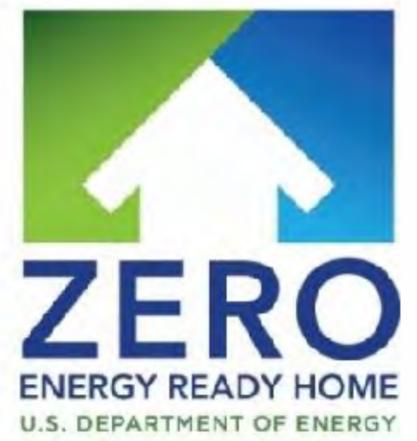
1917



2018



The Challenge



LIVING BUILDING CHALLENGE





The Solution Today





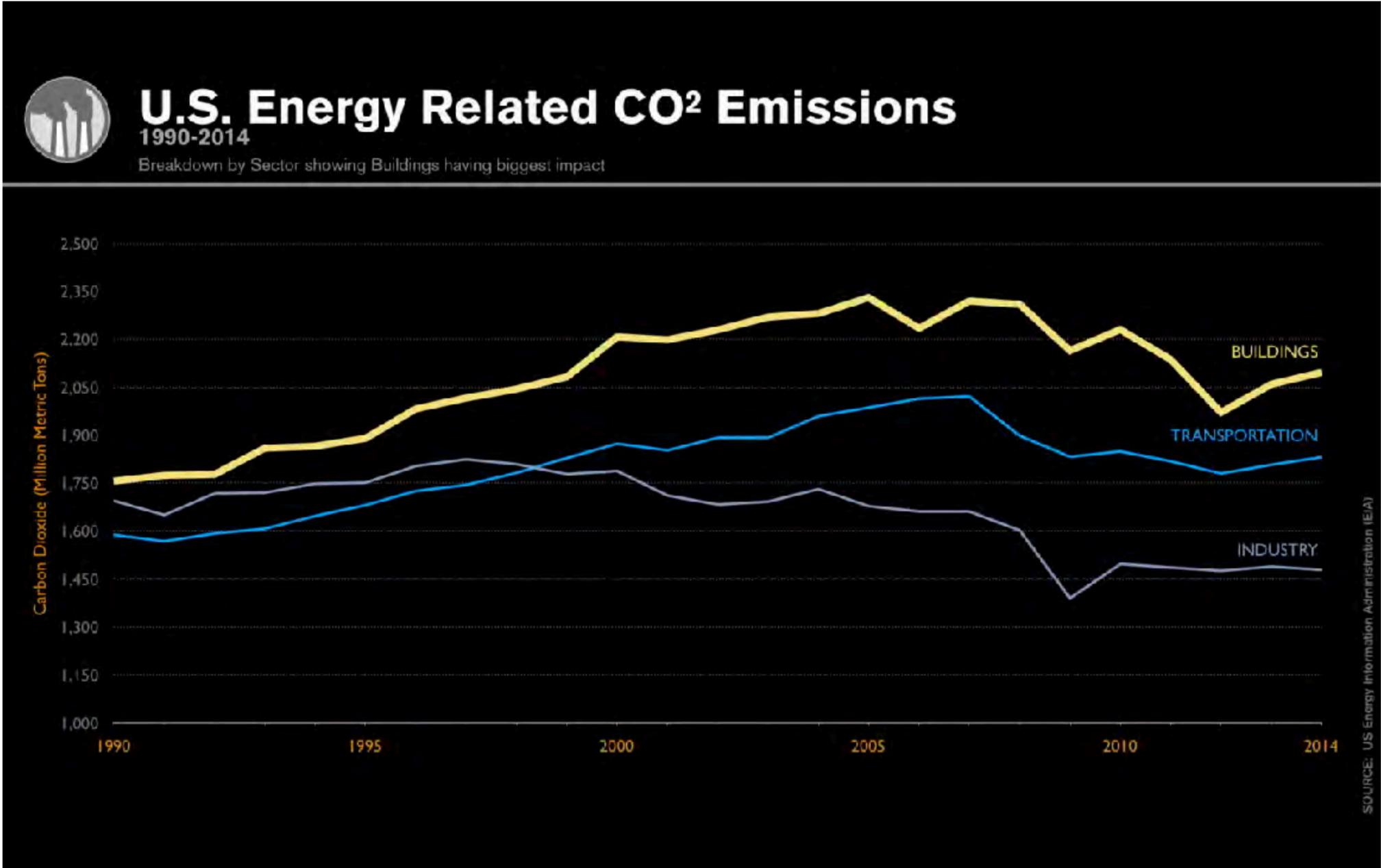
The Solution Today



SLIDE: Eric Corey Freed



The Solution Today











Employees who work in environments with natural elements report a 15% higher level of well-being, are 6% more productive and 15% more creative overall.



Biomimicry

Bios-life

mimesis-imitation



A close-up photograph of a nautilus shell, showing its intricate internal structure and the characteristic pink and white striped pattern on the exterior. The shell is set against a deep blue background. A semi-transparent green rectangular overlay is positioned in the center of the image, containing white text.

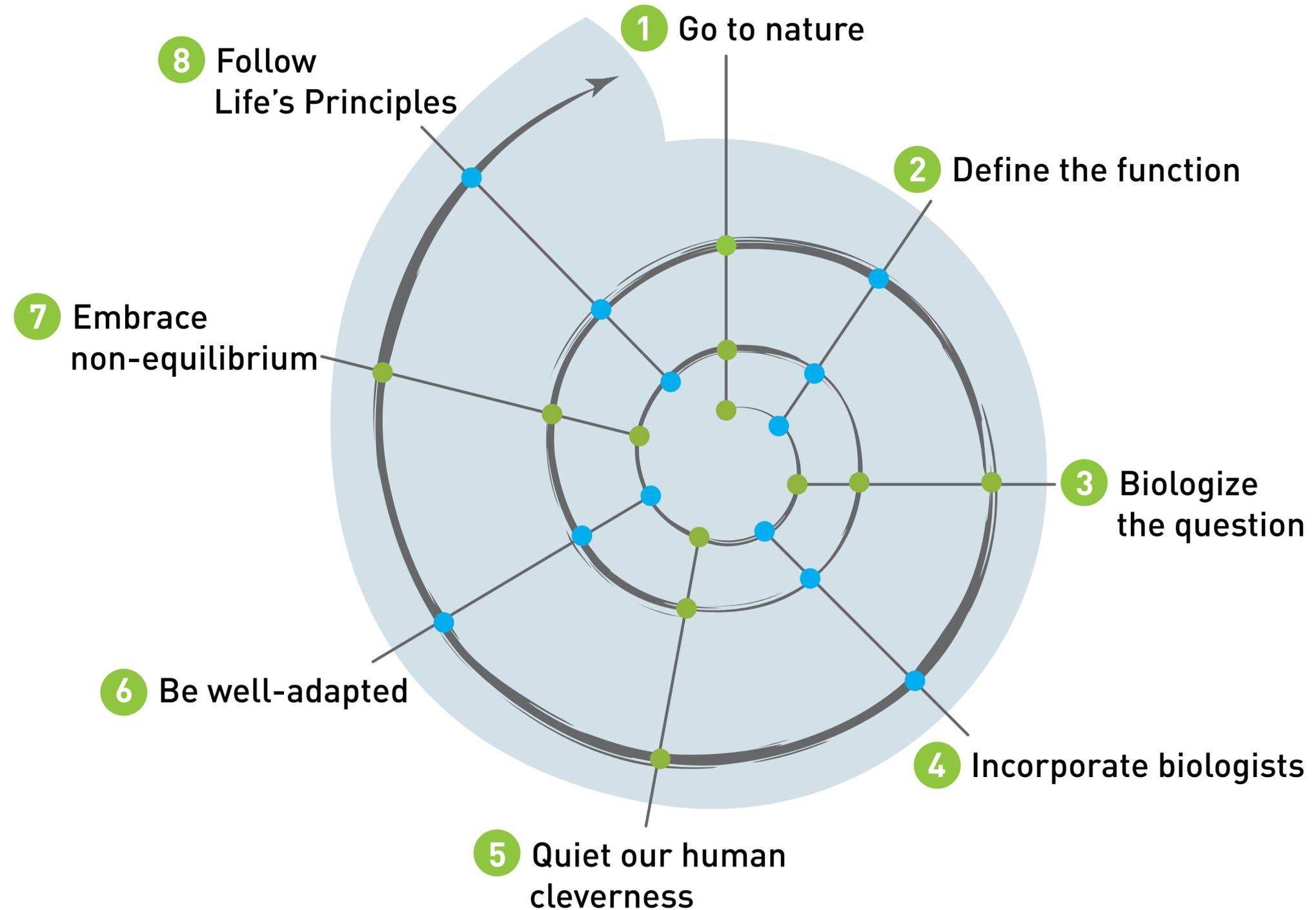
Innovating with Biomimicry

8 Essential Elements of Biomimetic Innovation



Innovating with Biomimicry

8 Essential Elements of Biomimetic Innovation





Element 1

Get Out!

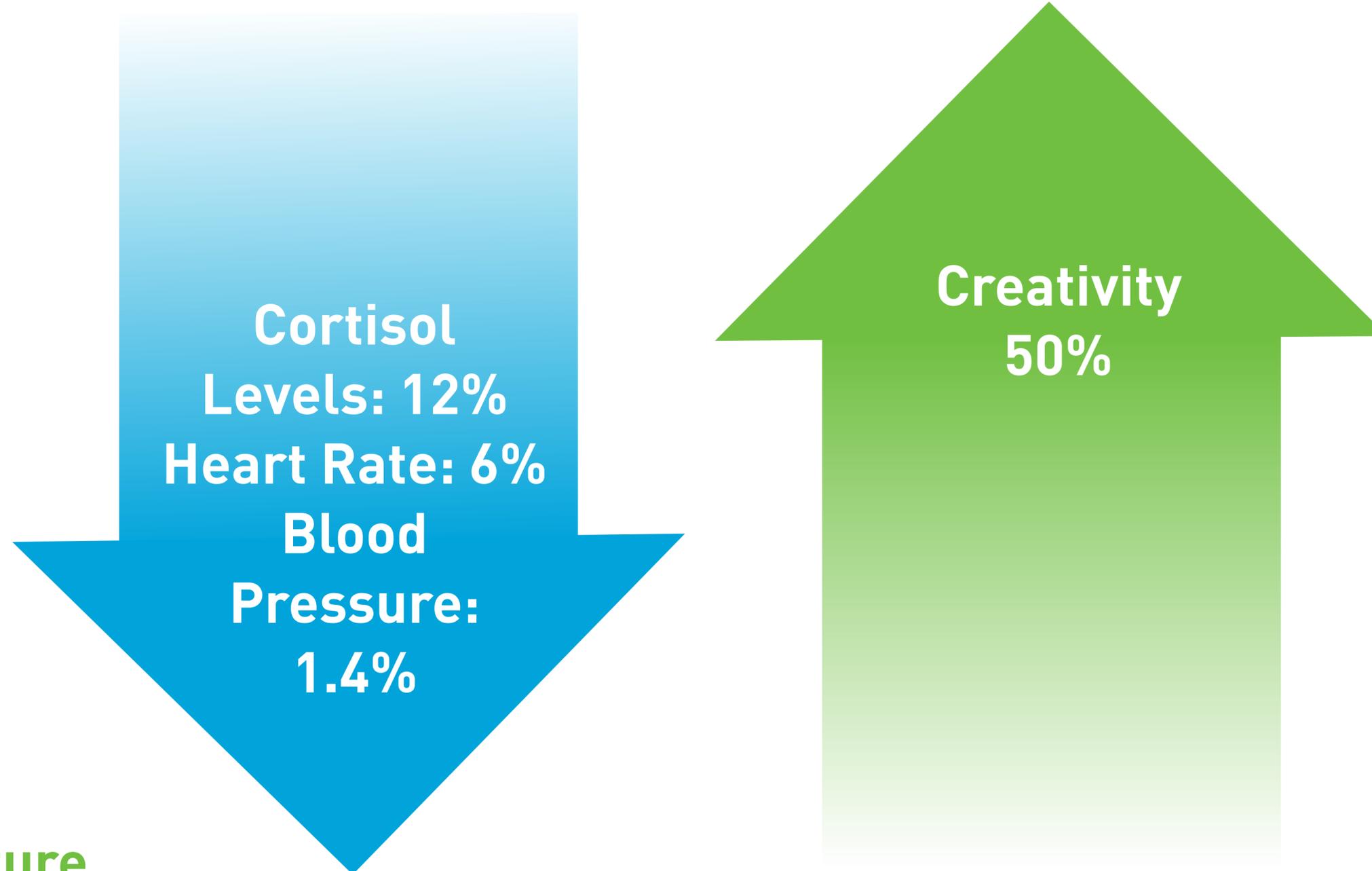


Go to Nature





Getting into Nature



1 Go to Nature



1

Go to Nature

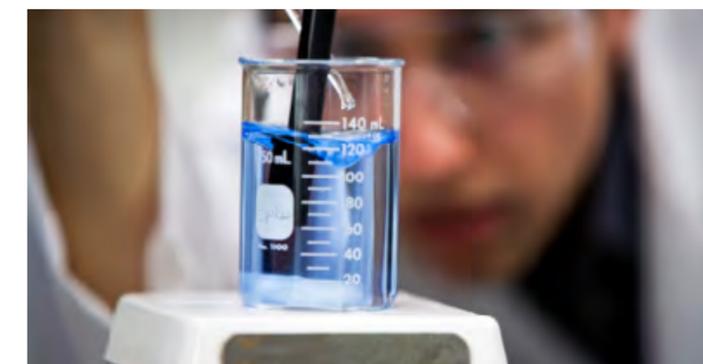


Element 2
Understand the Question
Before You Seek the Answer



Define the Function





2

Define the Function



2

Define the Function

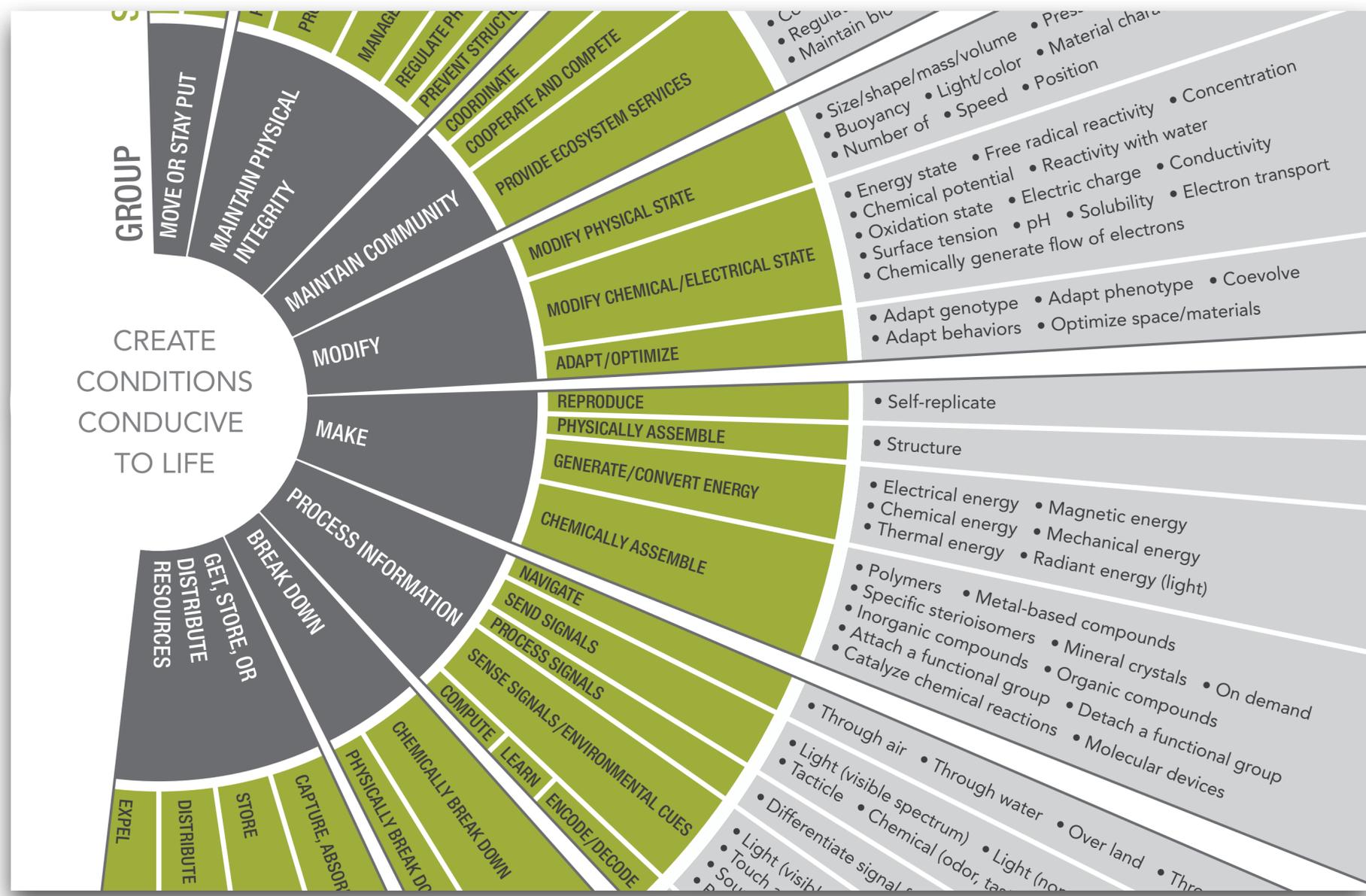


2

Define the Function



Biomimicry Taxonomy



2

Define the Function



2

Define the Function



Element 3
Broaden Your Solution Space
with Biological Research

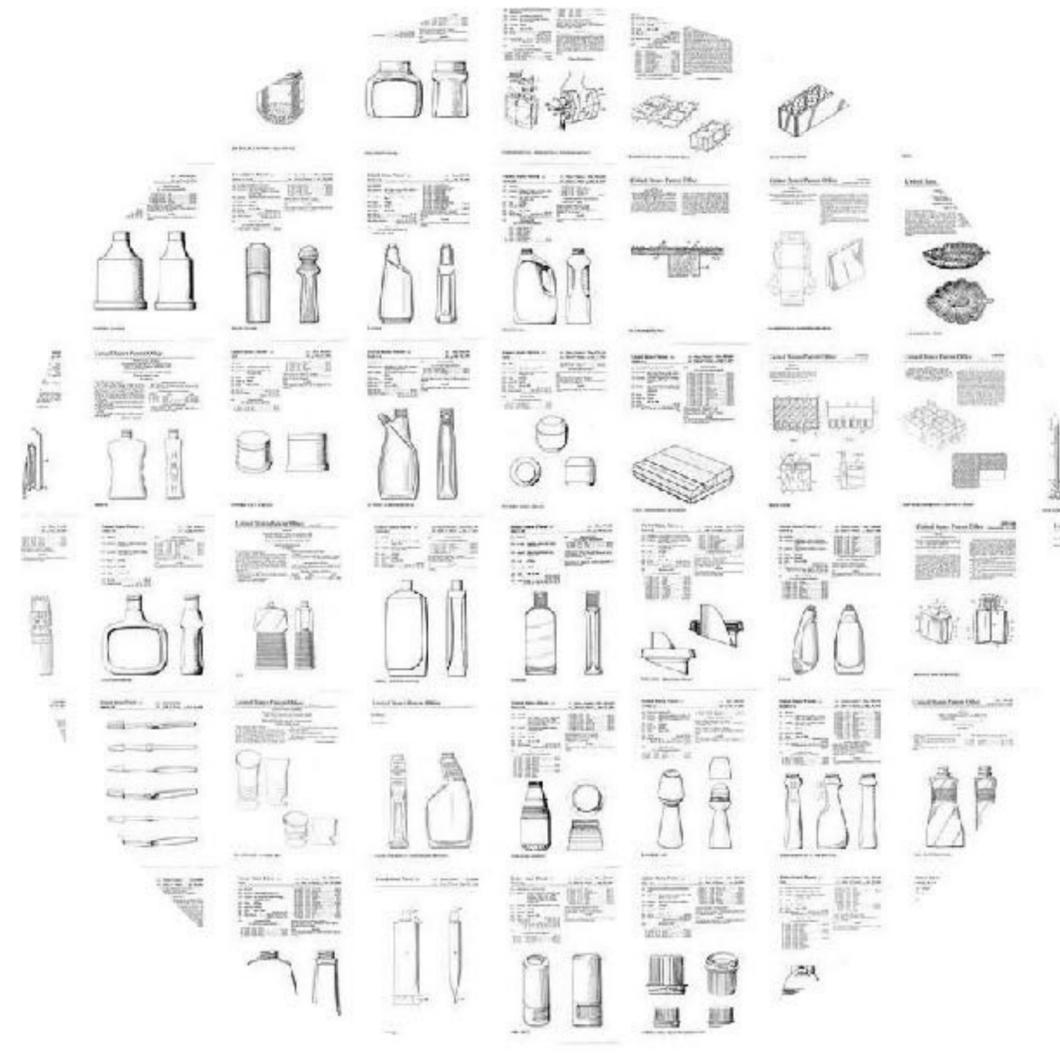


WWND

3 Biologize the Question



Broaden your Solution Space



3

Biologize the Question



Broaden your Solution Space



3

Biologize the Question



Broaden your Solution Space



3

Biologize the Question



Broaden your Solution Space

88%

3

Biologize the Question



asknature.org

The screenshot shows a web browser window with the URL [https://asknature.org/?s=remove particulates from liquid&page=0&hFR\[taxonomies_hierarchy\]](https://asknature.org/?s=remove+particulates+from+liquid&page=0&hFR[taxonomies_hierarchy]). The search bar contains the text "remove particulates from liquid". The page is powered by Algolia and displays search results for the function "Protect from living threats".

Left Sidebar:

- Powered by algolia
- Protect from living threats (Clear all)
- BIOLOGICAL STRATEGIES: 97
- INSPIRED IDEAS: 1
- FUNCTIONS**
How might we ...
- > Break down: 44
- > Get, store, or distribute resources: 255
- > Maintain community: 65
- > Make: 50
- > Modify: 141
- > Move or stay put: 131
- > Process information: 60
- ▼ Protect from physical harm: 325
- > Manage structural forces: 59
- > Prevent structural failure: 15
- ▼ Protect from living threats: 88
 - Protect from animals: 58
 - Protect from fungi: 11

FUNCTION Protect from living threats

Fungi, plants, animals, and microbes can cause physical harm to a living system. Threats include predation, herbivory, parasitism, disease, or one living system...

STRATEGY

Digestive solution removes excess algae
Giant clam

Chemically break down organic compounds | Maintain homeostasis | Modify ...

STRATEGY

Eyes squirt blood
Horned lizard

Expel liquids | Expel solids | Protect from animals

STRATEGY

Sodium concentration controls fluid transport
Mammals : Mammalia

Distribute liquids | Distribute solids | Expel liquids | Expel solids | Protect from ...

STRATEGY

Peptide regenerates tooth growth
Human

Protect from microbes

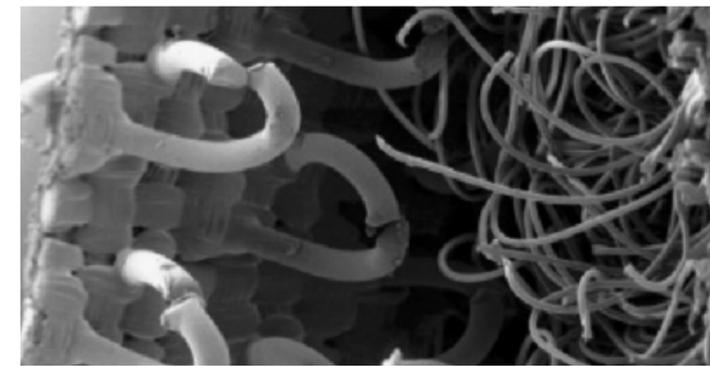
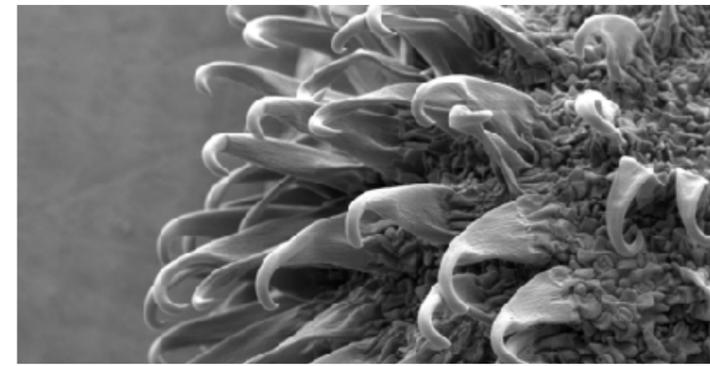
3

Biologize the Question



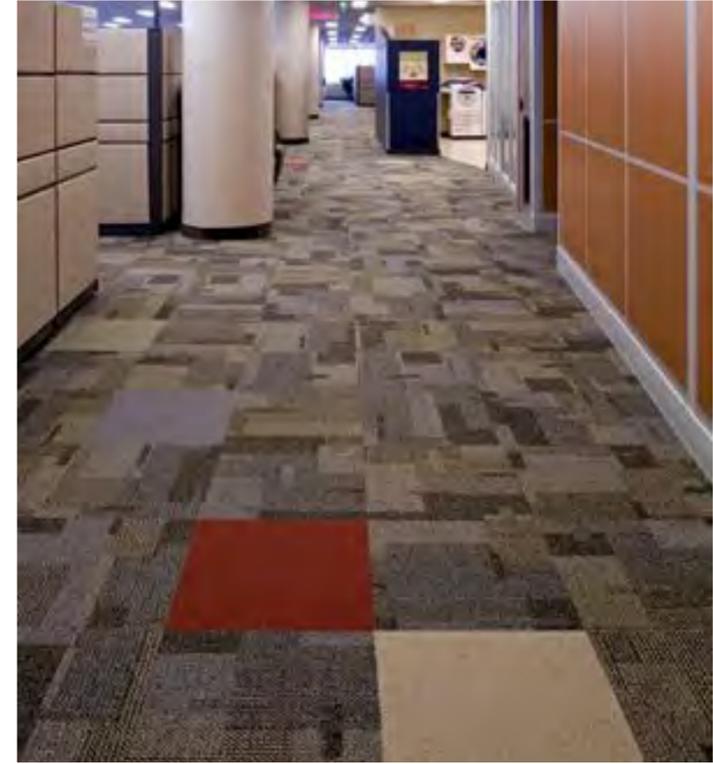
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Biologize the Question



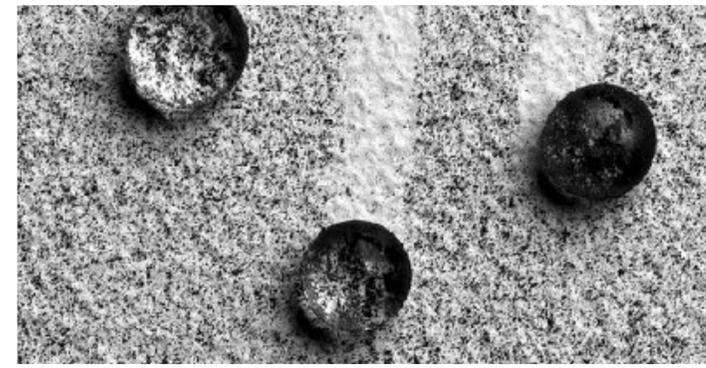
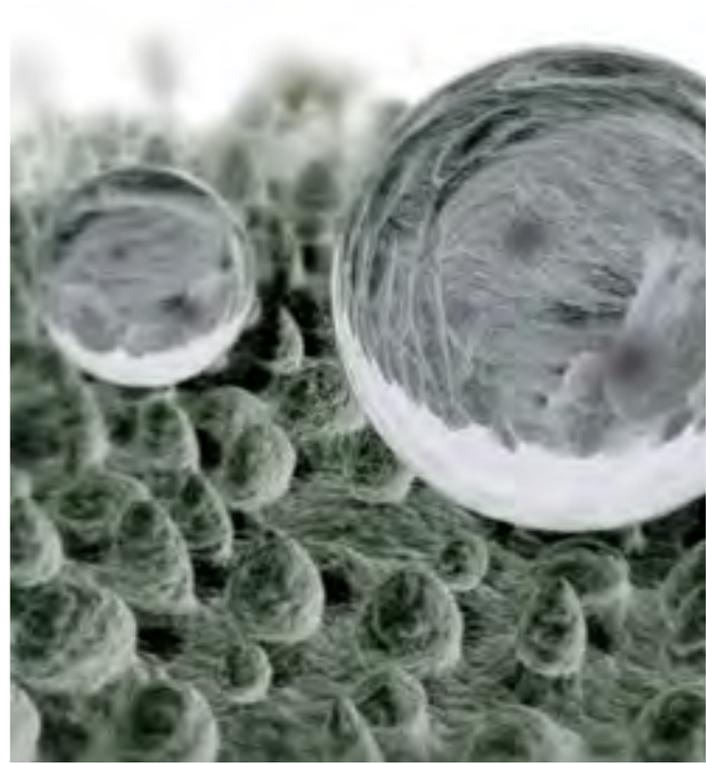
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Biologize the Question



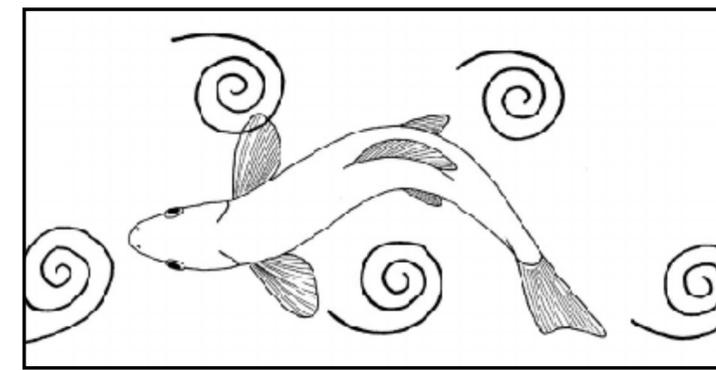
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Biologize the Question



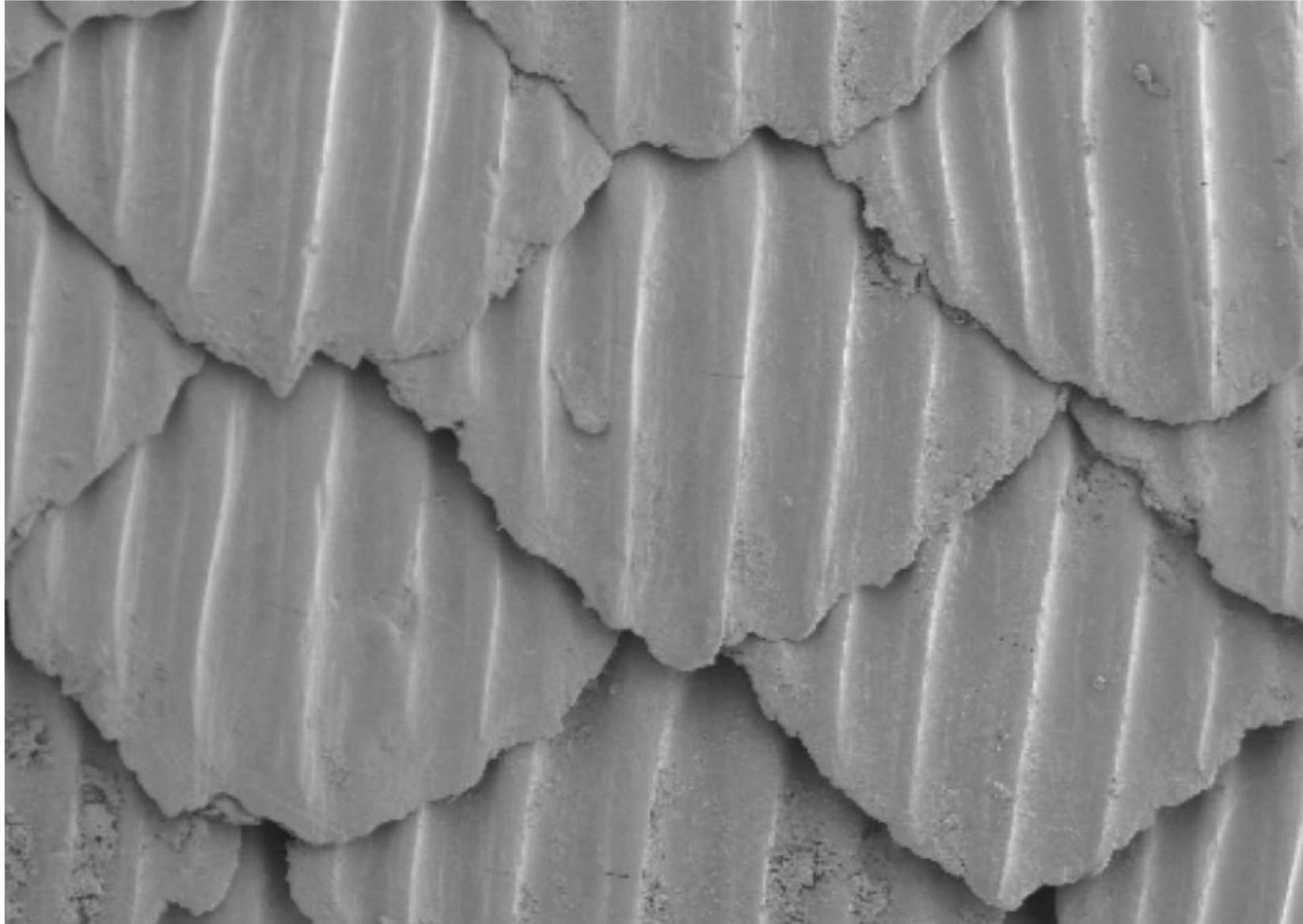
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Biologize the Question



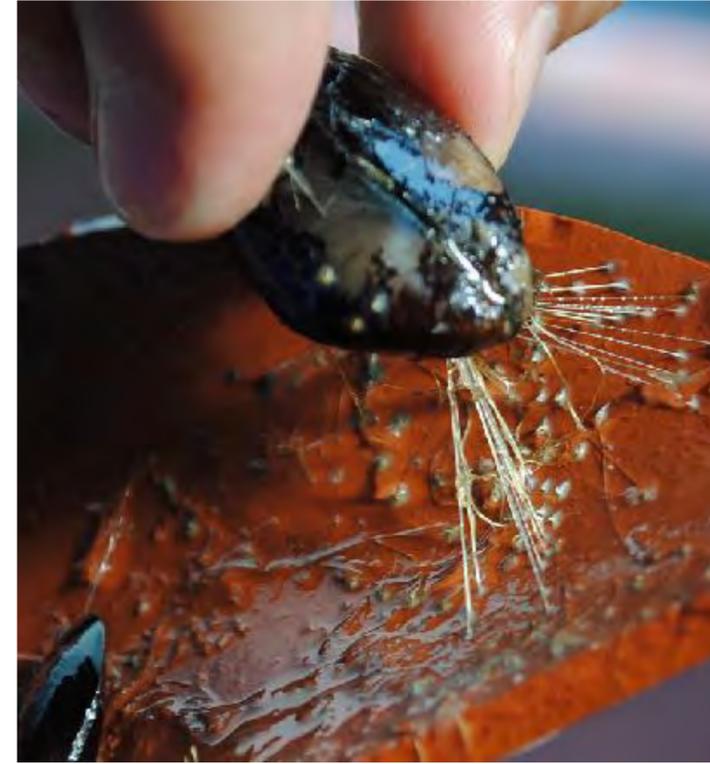
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Biologize the Question



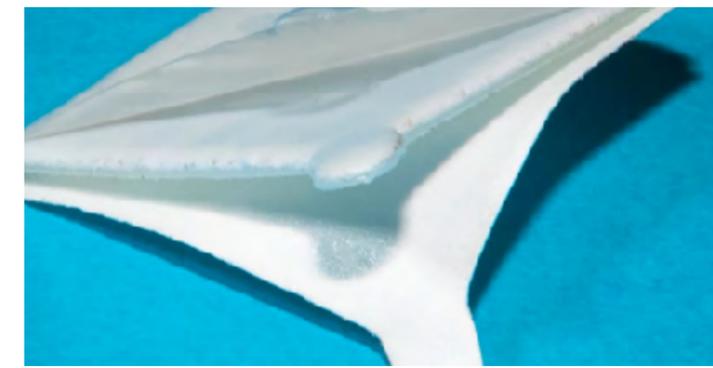
3

Biologize the Question



3

Biologize the Question



3

Biologize the Question



Element 4
Biologists Are
Key Design Team Members



Incorporate Biologists

Biomimicry Thinking
for Design
Oracle, Arizona



Discovering Nature's
Genius for Social
Innovation
Wolf Creek, Montana



Discovering Nature's
Genius
Wolf Creek, Montana



Incorporate Biologists



A close-up photograph of a vibrant green leaf with several clear water droplets resting on its surface. The leaf's veins are visible, and the background is a soft, out-of-focus green.

Element 5

Quieting Human Cleverness



We are Not the First



5

Quiet our Human Cleverness



We are Not the First

3.85b vs 200k

5 Quiet our Human Cleverness



We are Not the First

3.85b



5 Quiet our Human Cleverness



We are Not the First

Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec



We are Not the First

Dec

5

Quiet our Human Cleverness



We are Not the First



5

Quiet our Human Cleverness



We are Not the First

31

5

Quiet our Human Cleverness



We are Not the First

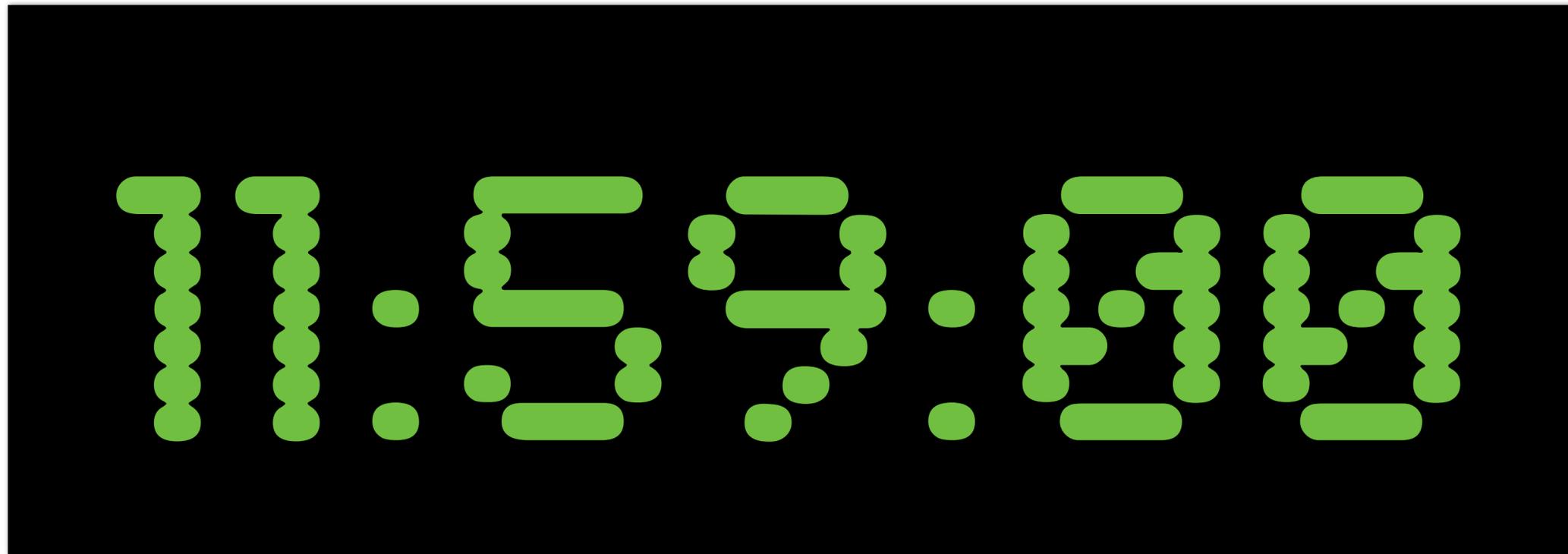


5

Quiet our Human Cleverness



We are Not the First



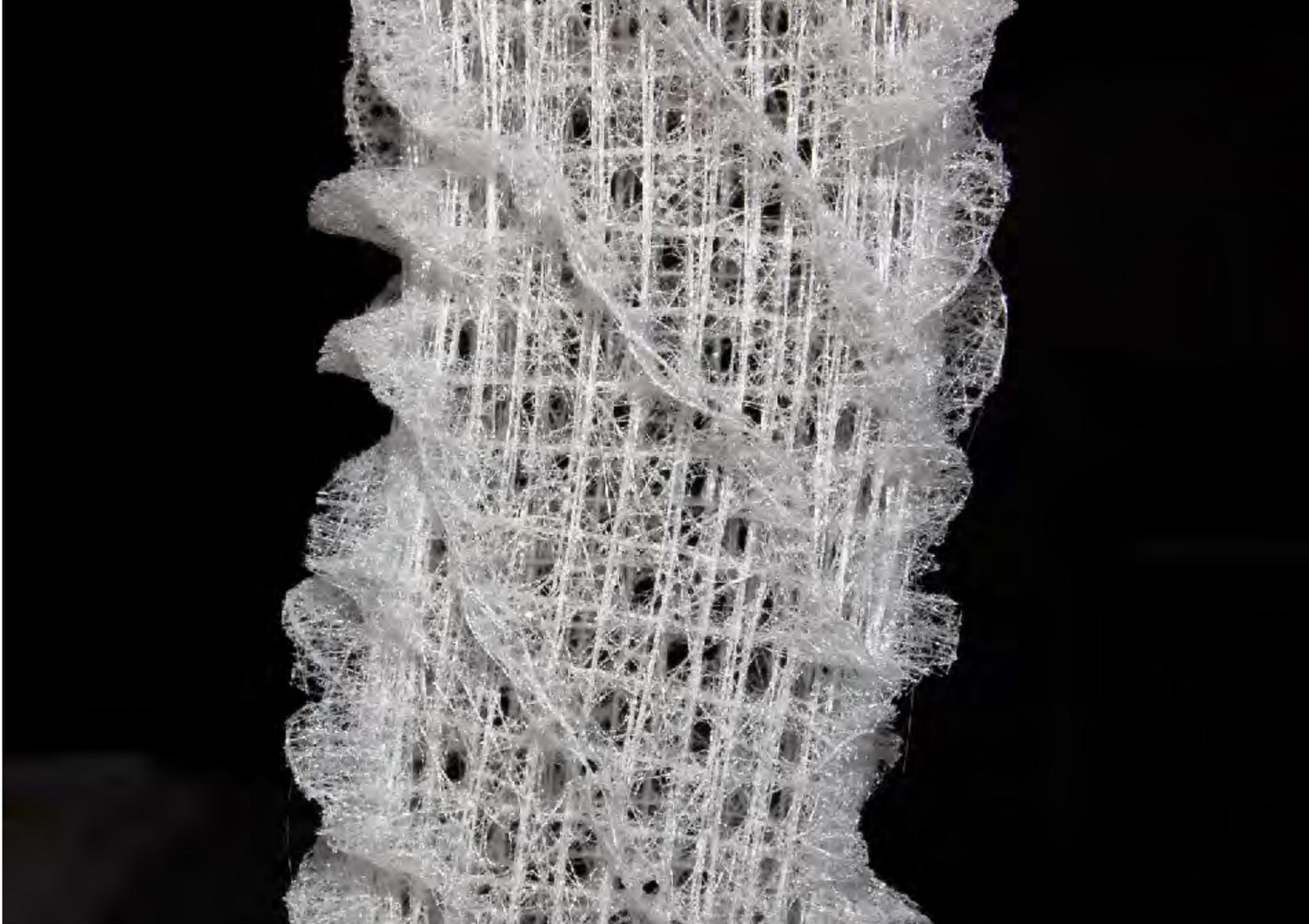


We are Not the First



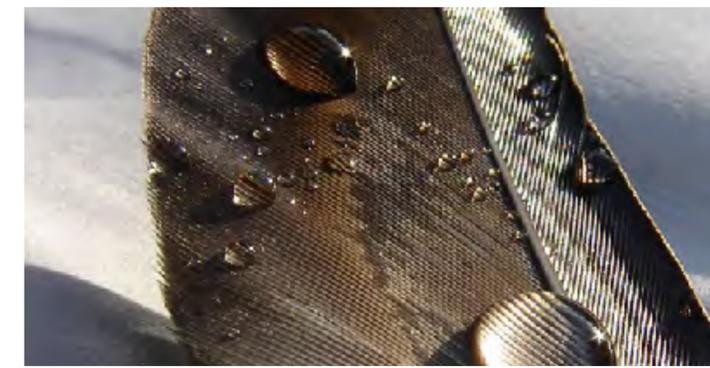
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Quiet our Human Cleverness



5

Quiet our Human Cleverness



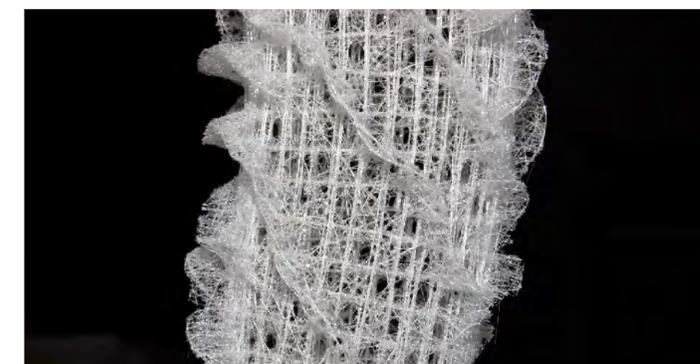
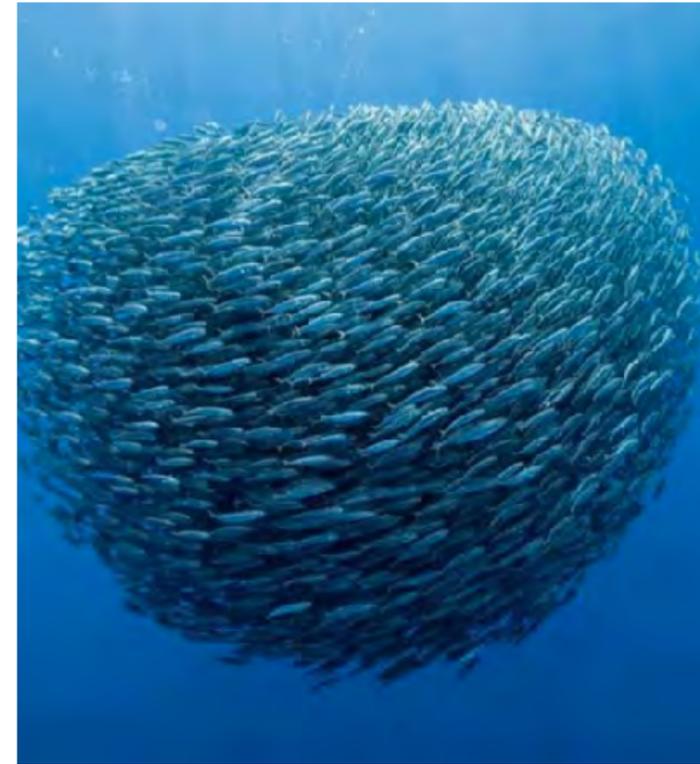
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Quiet our Human Cleverness



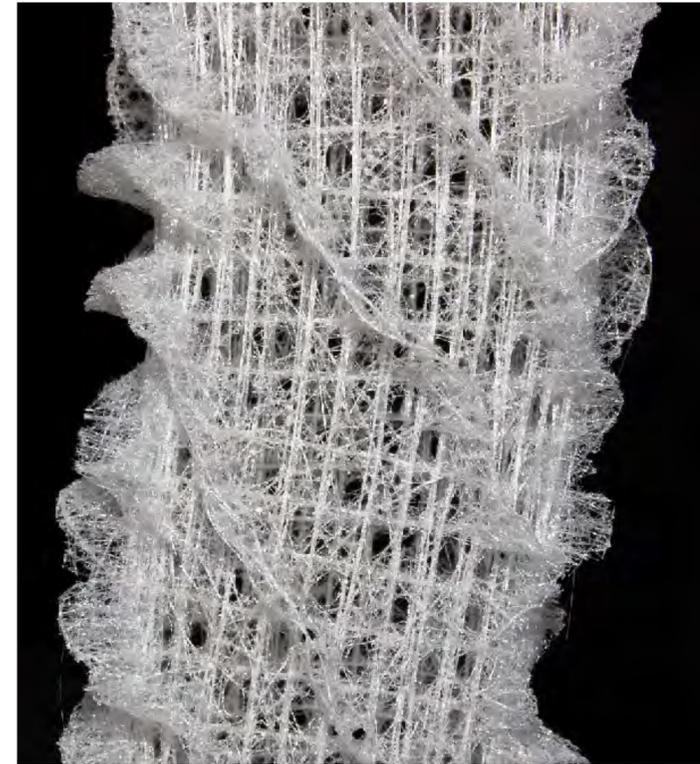
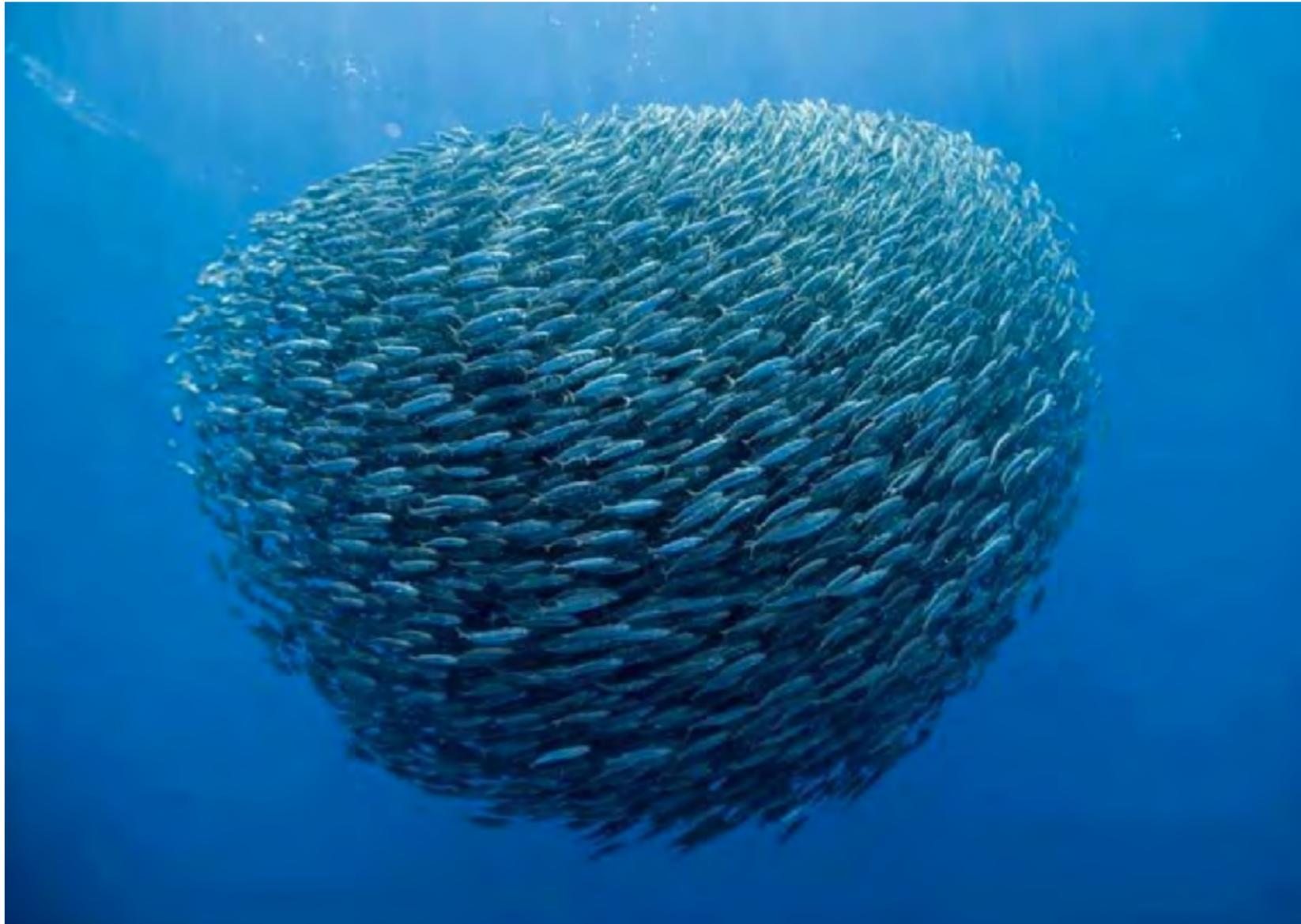
5

Quiet our Human Cleverness



5

Quiet our Human Cleverness



5

Quiet our Human Cleverness



We are Not Alone



5

Quiet our Human Cleverness



We are Not Alone



5

Quiet our Human Cleverness



We are Not Alone

5 Quiet our Human Cleverness

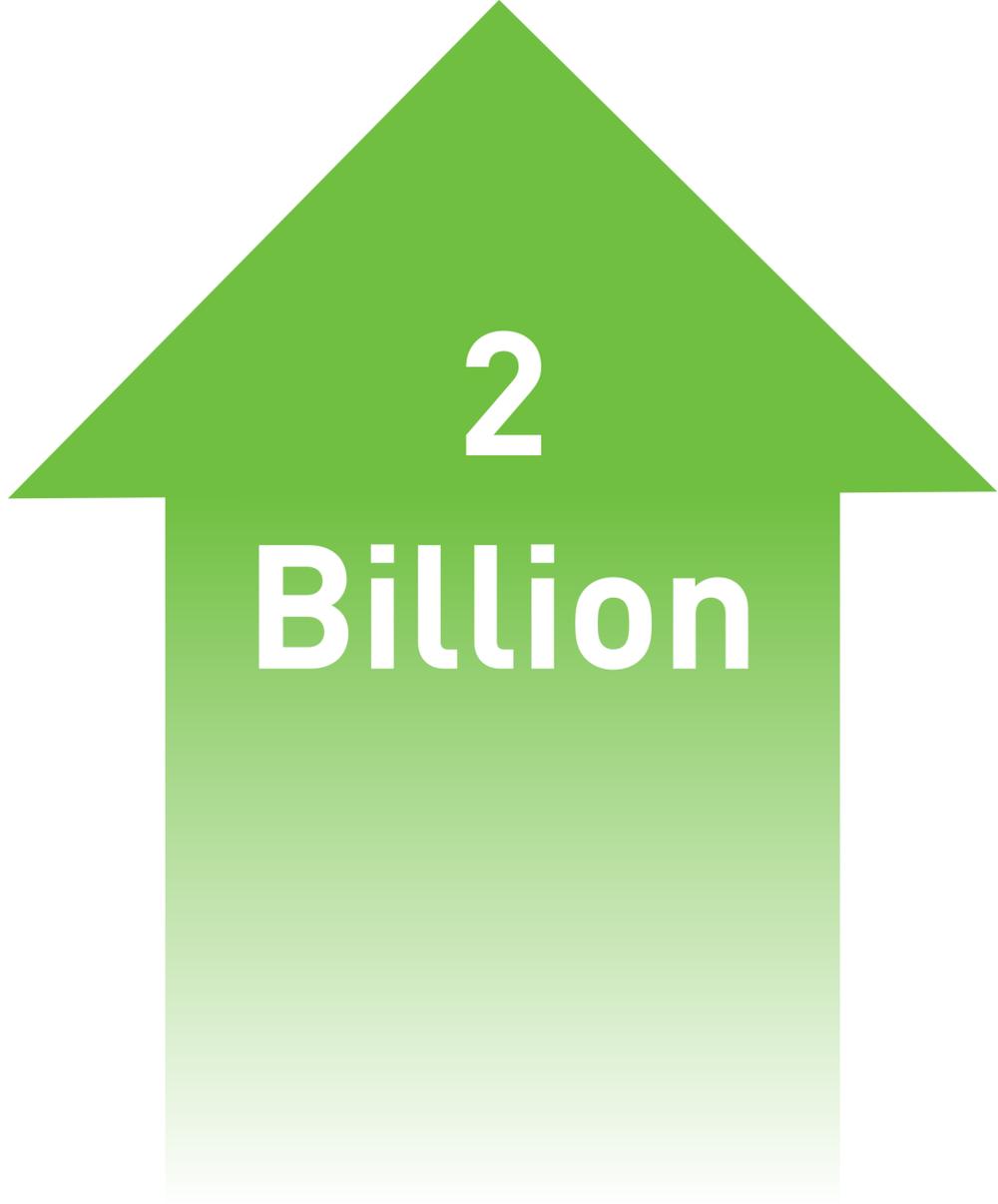


We are Not Alone

5 Quiet our Human Cleverness



We are Not Alone



5

Quiet our Human Cleverness



Nature as Mentor



5

Quiet our Human Cleverness



Childlike Curiosity



5 Quiet our Human Cleverness

A close-up photograph of a green leaf with several clear water droplets on its surface. The leaf's veins are visible, and the background is a soft-focus green.

Element 6

Well-Adapted vs. Mal-Adapted



6 Be Well-adapted



6

Be Well-adapted



Earth's Operating Conditions



Sunlight, Water
and Gravity



Dynamic
Non-Equilibrium



Limits and
Boundaries



Cyclic
Processes

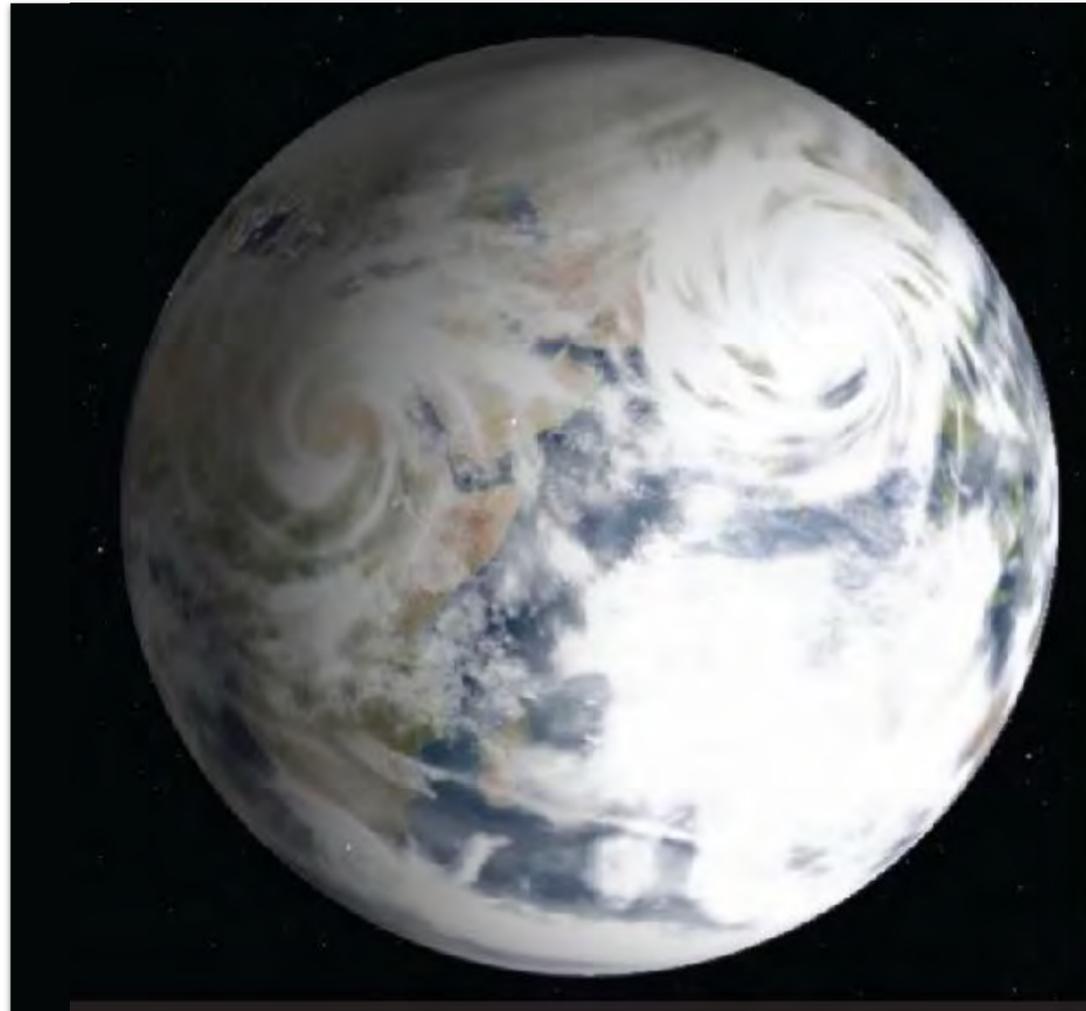


Element 7

Embrace Dynamic Non-Equilibrium



Dynamic Non-Equilibrium



“The planet is not moving towards an ordered state. Conditions on Earth are constantly changing. They are dynamic.”

Dayna Baumeister,
Co-Founder Biomimicry 3.8



5

Embrace Non-Equilibrium

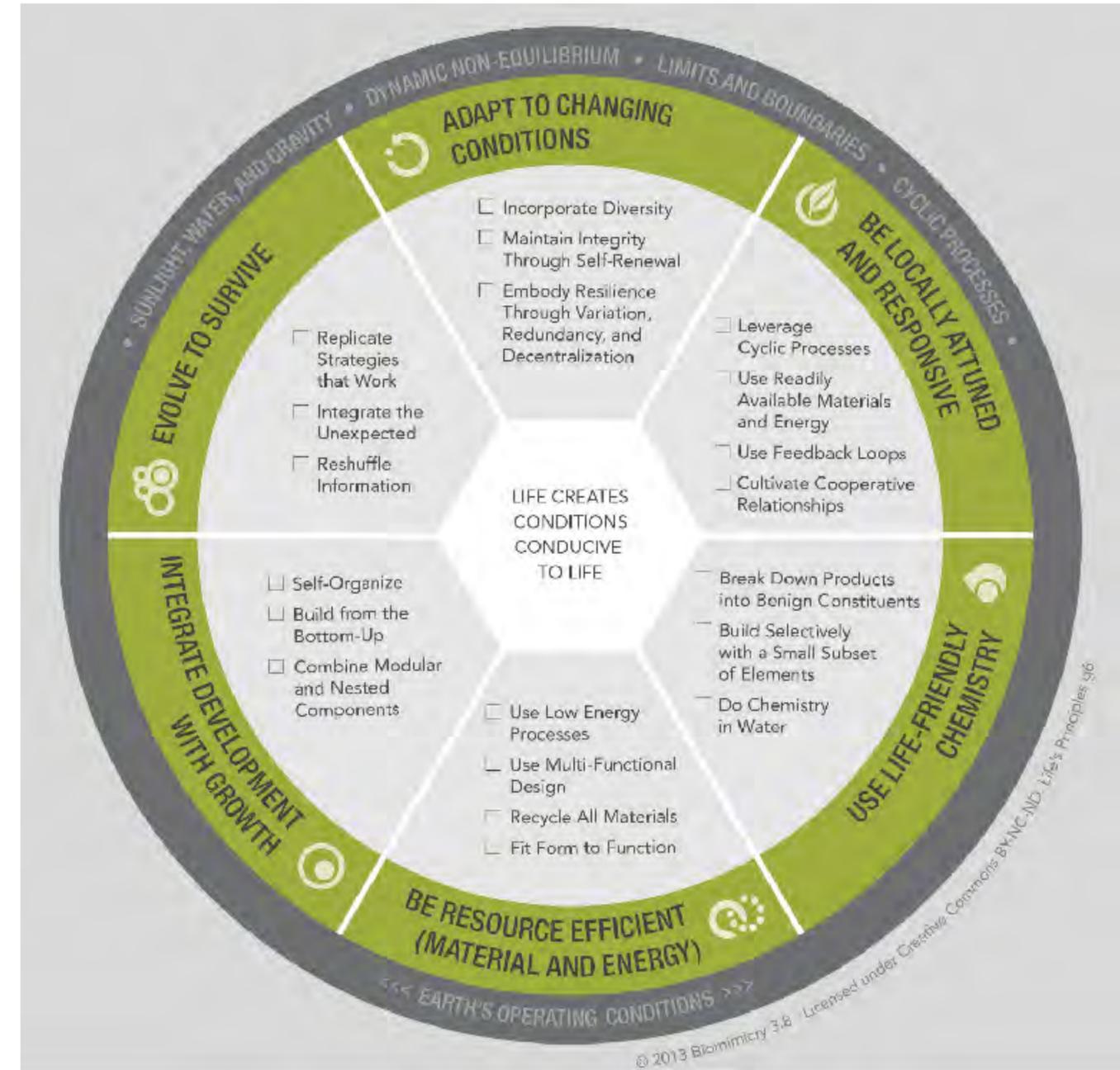


Element 8
Creating Conditions Conducive to
Life Is the Ultimate Goal



Life's Principles

- Evolve to survive
- Adapt to changing conditions
- Be locally attuned and responsive
- Integrate development with growth
- Be resource efficient
- Use life-friendly chemistry





Life's Principles

8

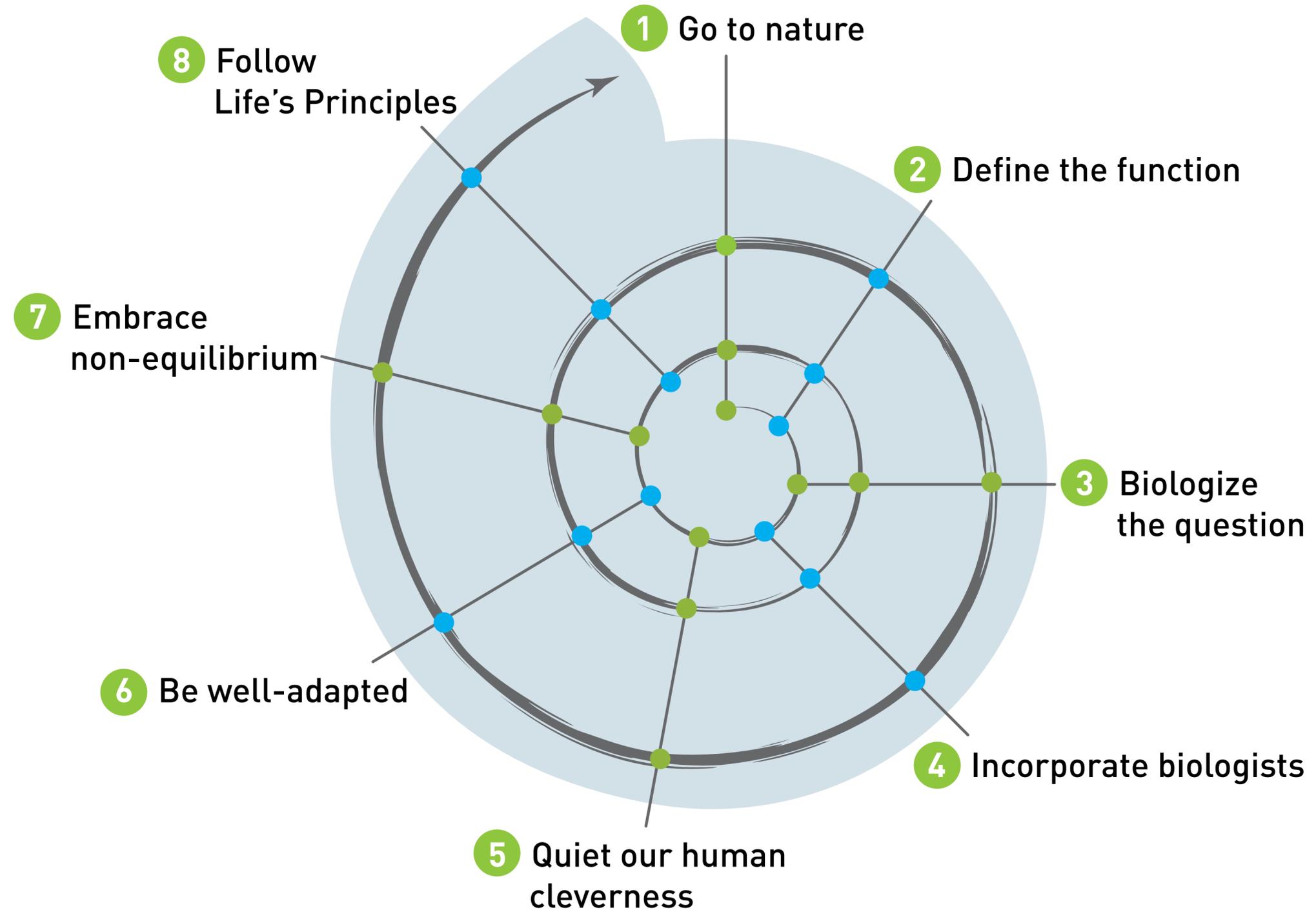
Follow Life's Principles

	Y	N	?	Comments
LIFE'S PRINCIPLES CHECKLIST				
Case Study: Digital Platform Sparks Supply Chain Learning				
Team: Lorraine Antonucci, Doug Studer				
CREATE CONDITIONS CONDUCTIVE TO LIFE				
• all aspects and elements of the design are optimized rather than maximized	✓			
• the design leverages its interdependence in the system	✓		✓	2degrees creates online networks for businesses seeking to improve sustainability throughout their value chains by facilitating con
• the design enhances the system's capacity to support life over the long haul				The digital platform allows for collaboration among thousands of suppliers breaking down silos throughout the supply chain
EVOLVE TO SURVIVE				
• the design's success is based on whether or not it contributes to the continuity of life				It depends on interdependence for its success
• the design builds on what works	✓			Not sure here, it claims to have the ability to improve wage and safety policies for healthy and fair working conditions, so maybe
• there are opportunities for cross-pollination of information and ideas			✓	per the comment above, perhaps it does, but not a direct correlation
• the design receives and incorporates an influx of new information	✓			the design should get more and more efficient as more users tap into the platform
• mistakes are used to encourage continual idea generation	✓			again this is the premise of the design
INTEGRATE DEVELOPMENT WITH GROWTH				
• both development and growth are optimized				It depends on this
• components are modular and nested			✓	I assume this could be true, but not sure yet
• it is built to shape (e.g., no cutting and therefore no waste cuttings)				
• the components of the system are self-organizing	✓			The platform develops as more information is exchanged, enabling growth and efficiency
• the design fosters emergent relationships	✓		✓	don't know
• it creates more opportunities (niches) for life	✓			digitally yes, if you incorporate the necessary hardware this becomes questionable
ADAPT TO CHANGING CONDITIONS				
• the design adapts to temporal and spatial changes				the user community is like crowd sourced information, so I think this is a yes as well
• the design maintains integrity by constantly adding energy, information, matter to improve the system				the system should build relationships
• the design withstands disturbance while maintaining function				don't know, other than the social reference above (line 7)
• it incorporates a variety of different forms				
• it duplicates critical elements				
• its functions are distributed and decentralized	✓			as the platform is used more it should build up it's information, thus adjusting
• the design includes multiple forms, processes, and systems to meet functional needs over time and space	✓			adds information
• the design co-evolves with other parts of the system to increase the rate of adaptation				not sure
BE LOCALLY ATTUNED AND RESPONSIVE				
• the design fits into and integrates with the surrounding environment				not sure
• it is resourceful with opportunities and limitations	✓		✓	not sure
• materials used in the design are local and abundant	✓			not sure
• it harnesses freely available energy	✓			depends on input from entire user base
• it fosters symbiotic, cooperative, community-savvy relationships	✓			not sure
• the design avoids competition by finding a new niche	✓			evolves per the v's in this section
• the design avoids competition by finding a new niche	✓			assume this is true
• the design avoids competition by finding a new niche	✓			not sure
• the design avoids competition by finding a new niche	✓			if by materials we can say information this should be true
• the design avoids competition by finding a new niche	✓			if we can consider information as energy, then yes
• the design avoids competition by finding a new niche	✓			depends on cooperation to succeed
• the design avoids competition by finding a new niche	✓			not sure
• the design avoids competition by finding a new niche	✓			depends on cooperation to succeed
• the design avoids competition by finding a new niche	✓			depends on reciprocal action to succeed
• the design avoids competition by finding a new niche	✓			not sure
• the design avoids competition by finding a new niche	✓			should build on existing information
• the design avoids competition by finding a new niche	✓			depends on feedback to succeed
• the design avoids competition by finding a new niche	✓			depends on feedback to succeed



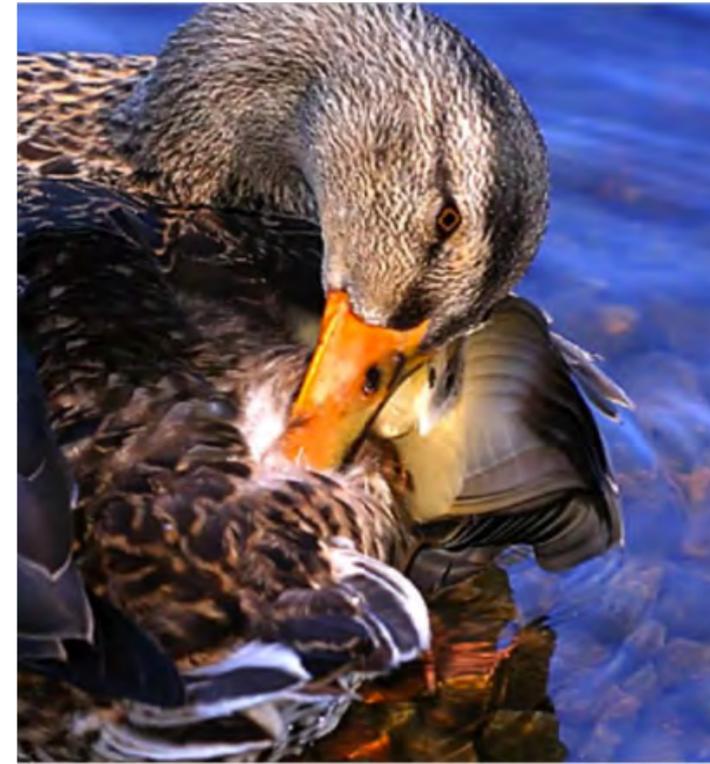
Innovating with Biomimicry

8 Essential Elements of Biomimetic Innovation

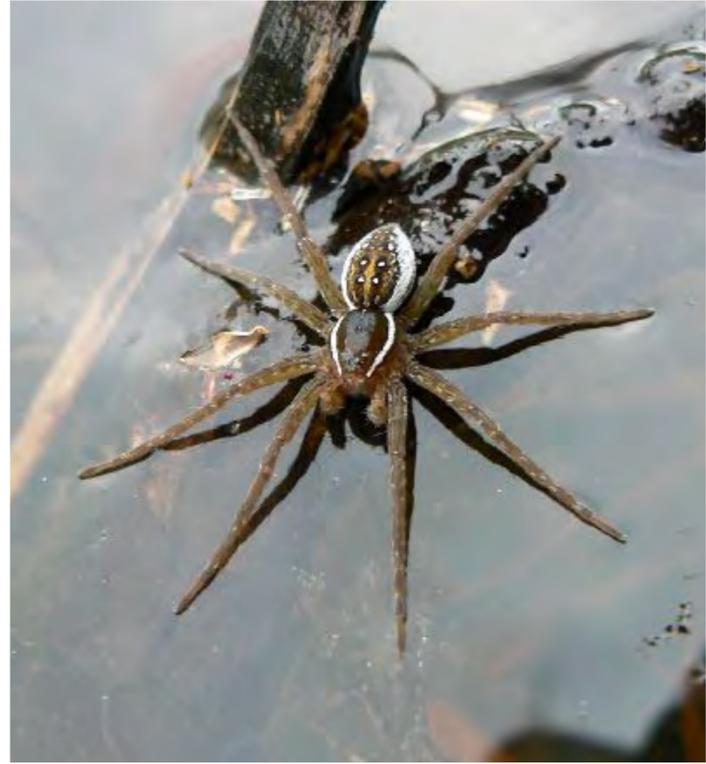
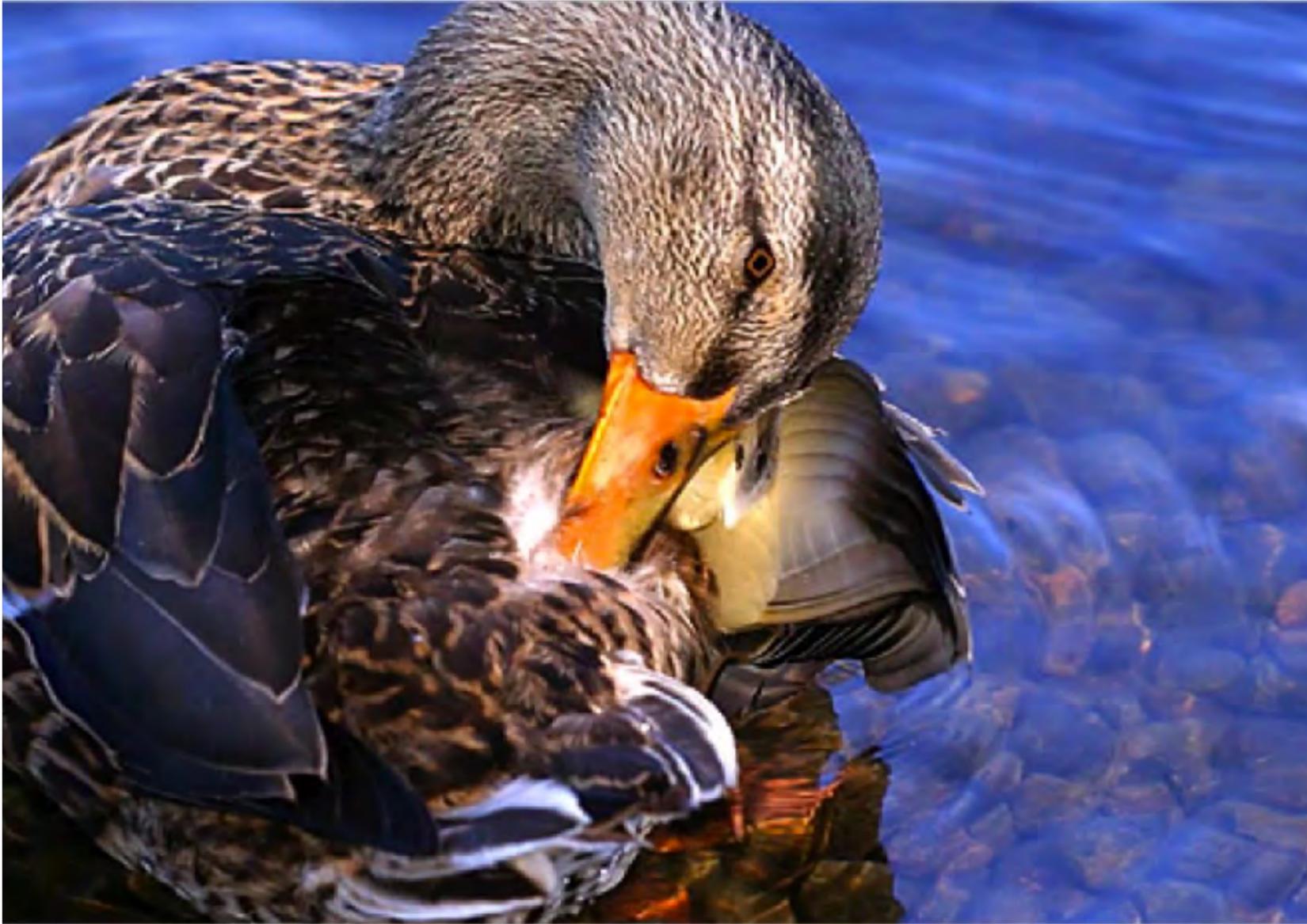




What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



What Can Nature Teach Us?



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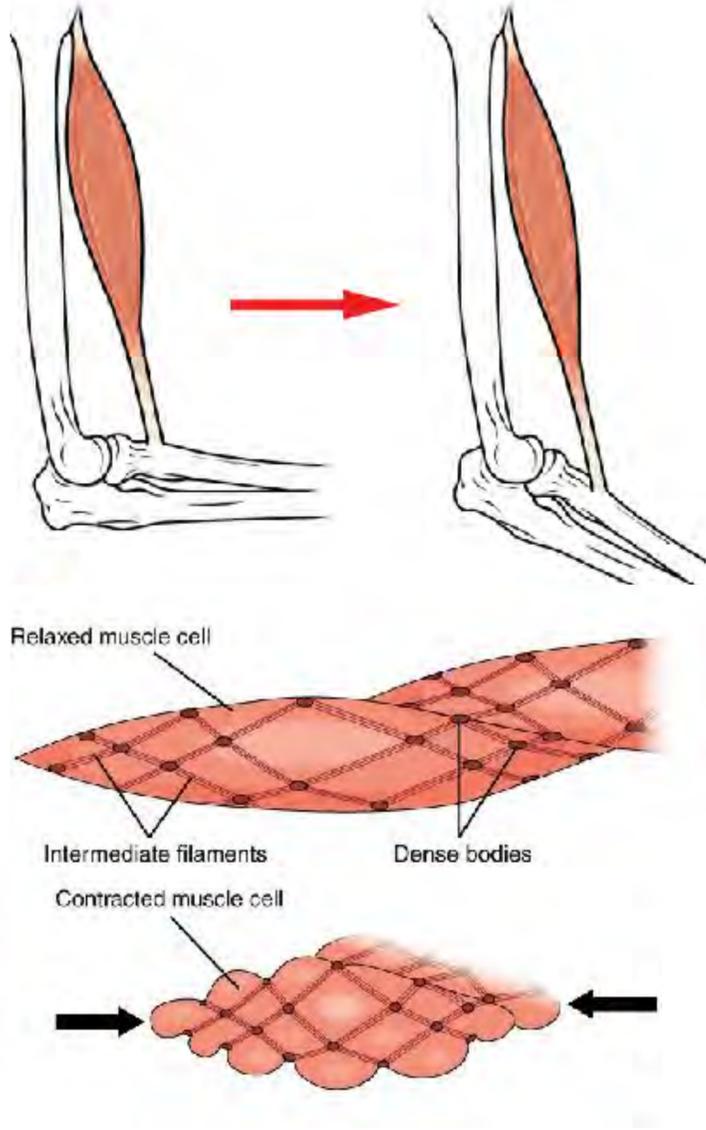
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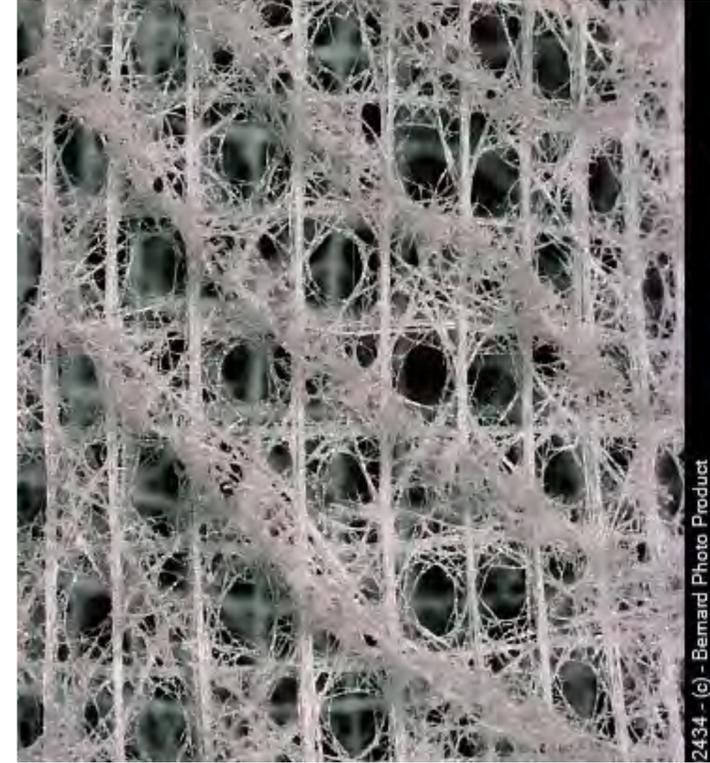
What Have We Learned?



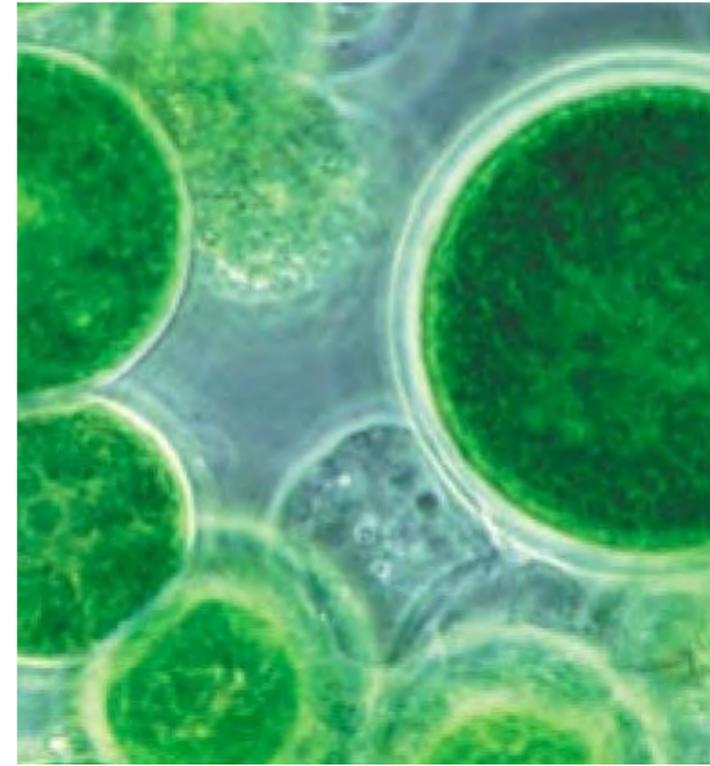
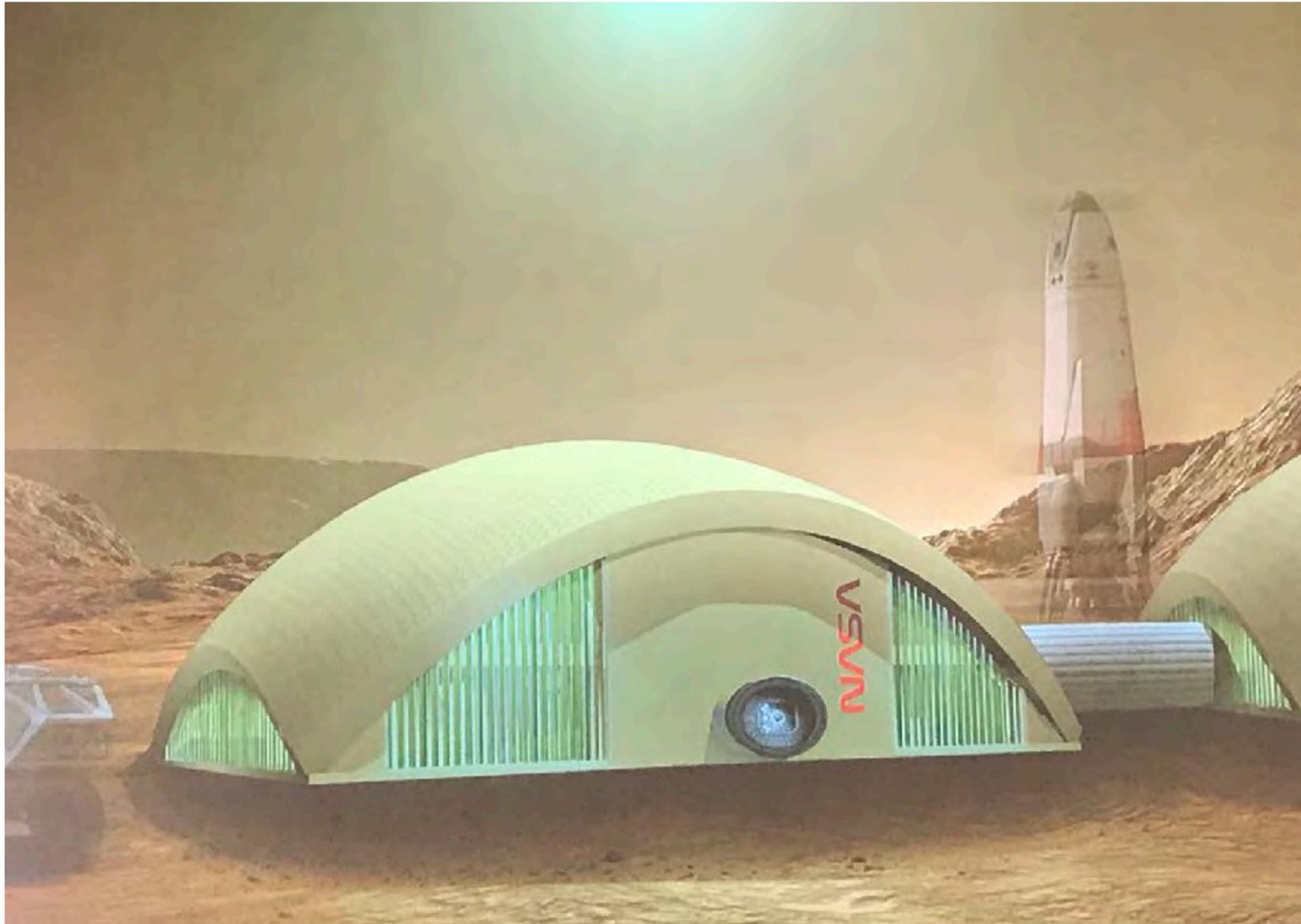
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What Has Nature Taught Us?



What Has Nature Taught Us?



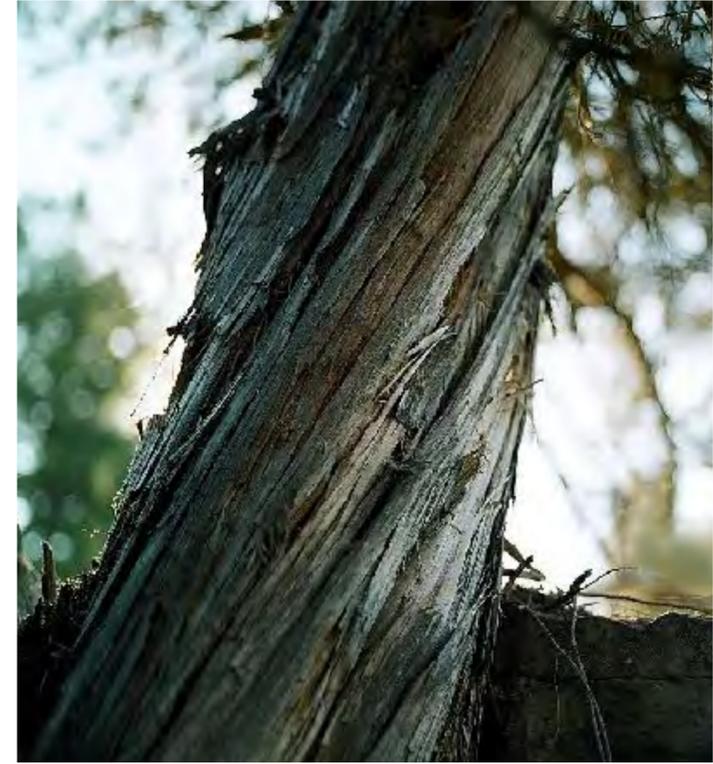
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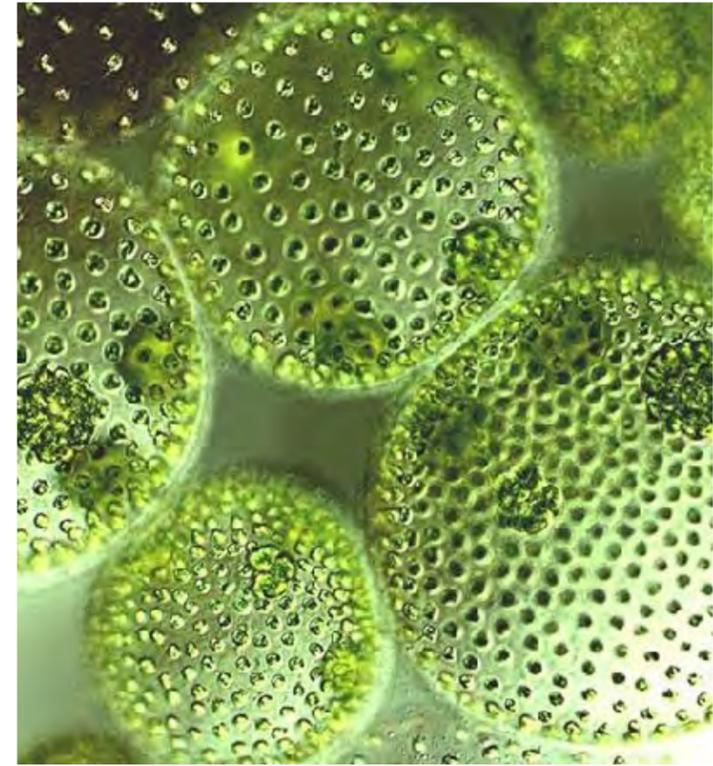
What Has Nature Taught Us?



What Has Nature Taught Us?



What Has Nature Taught Us?



What Has Nature Taught Us?



What Has Nature Taught Us?



What Does the Future Hold?



What's Next?



What's Next?



The Solution Tomorrow



What's Next?



The Solution Tomorrow

XPRIZE
THE PROSTRUCTION XPRIZE

**GROW AN 8' WALL.
MATCH THE PROPERTIES
OF A TYPICAL WALL.
ADD CERTAIN
BIO-FEATURES.
DO IT IN SIX MONTHS.
WIN \$10 MILLION.**

SLIDE: Eric Corey Freed

LOWE'S
HEALTHY HOMES

What's Next?



The Solution Tomorrow

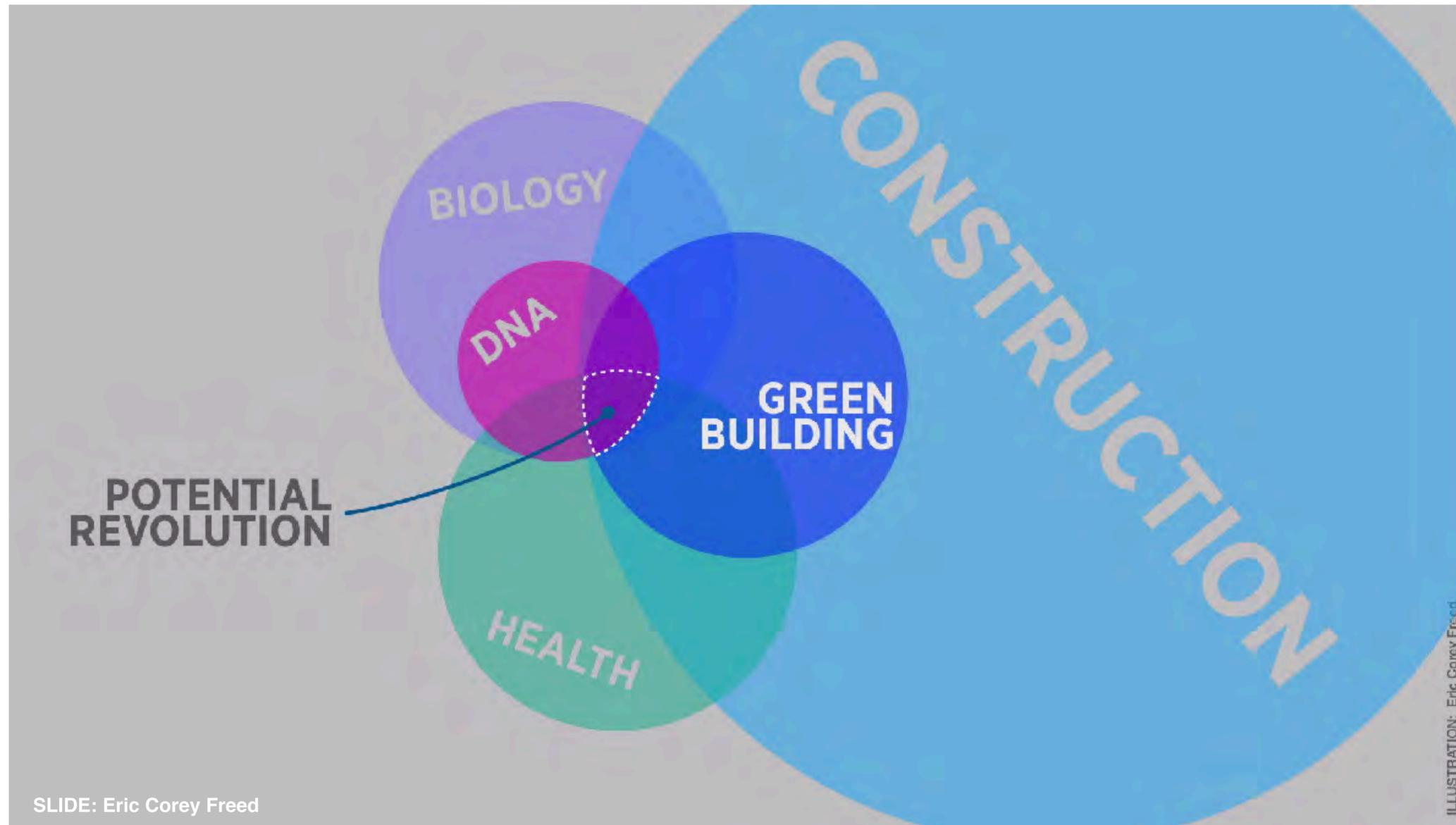
	STRENGTH	300 pounds / linear foot	
	INSULATOR	R 13 thermal STC 30 sound	
	WEIGHT	50 pounds / square foot	
	FIRE	one hour 15 flame spread	

SLIDE: Eric Corey Freed

What's Next?



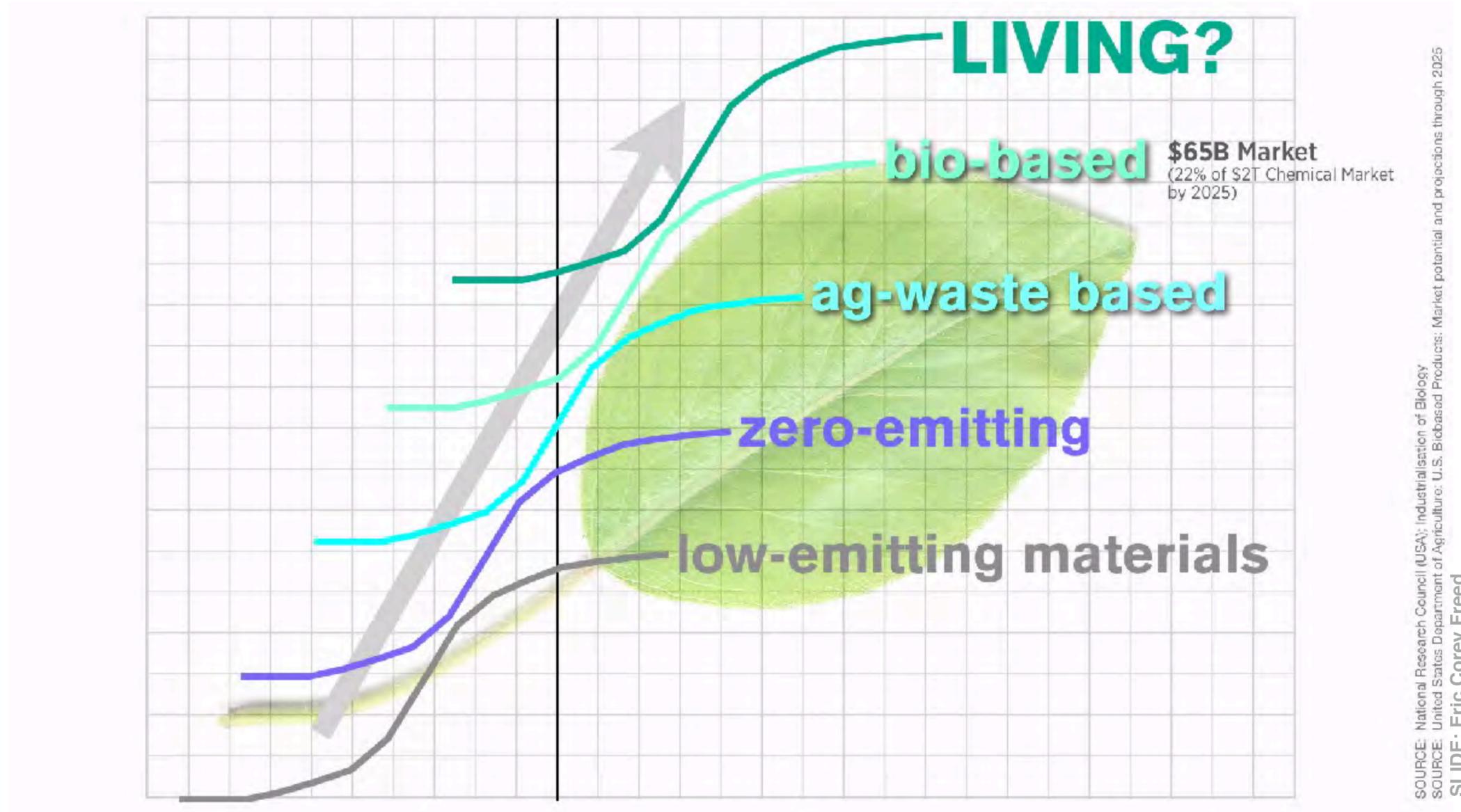
The Solution Tomorrow



What's Next?



The Solution Tomorrow



What's Next?



The Solution Tomorrow



What's Next?



“Human subtlety will never devise an invention more beautiful, more simple or more direct than does nature because in her inventions nothing is lacking, and nothing is superfluous.”

Leonardo da Vinci



Questions/Discussion



Thank you!

