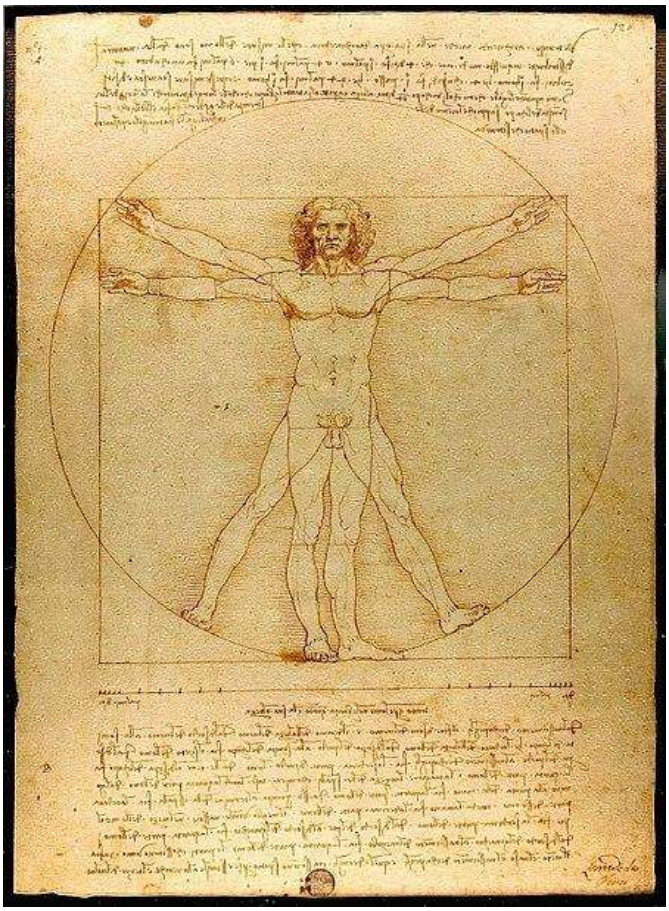
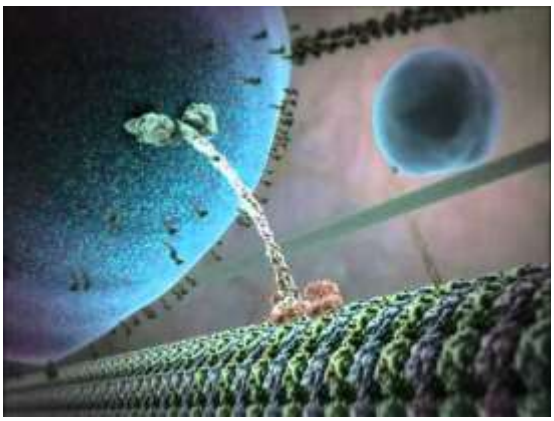
1.



17.

2. [video]



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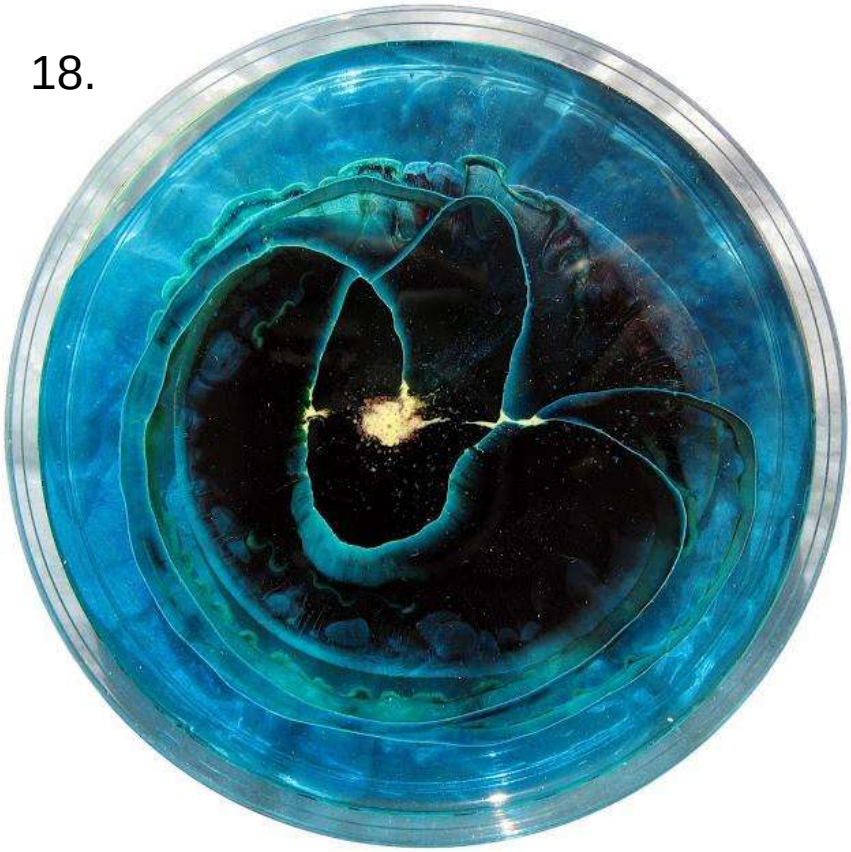
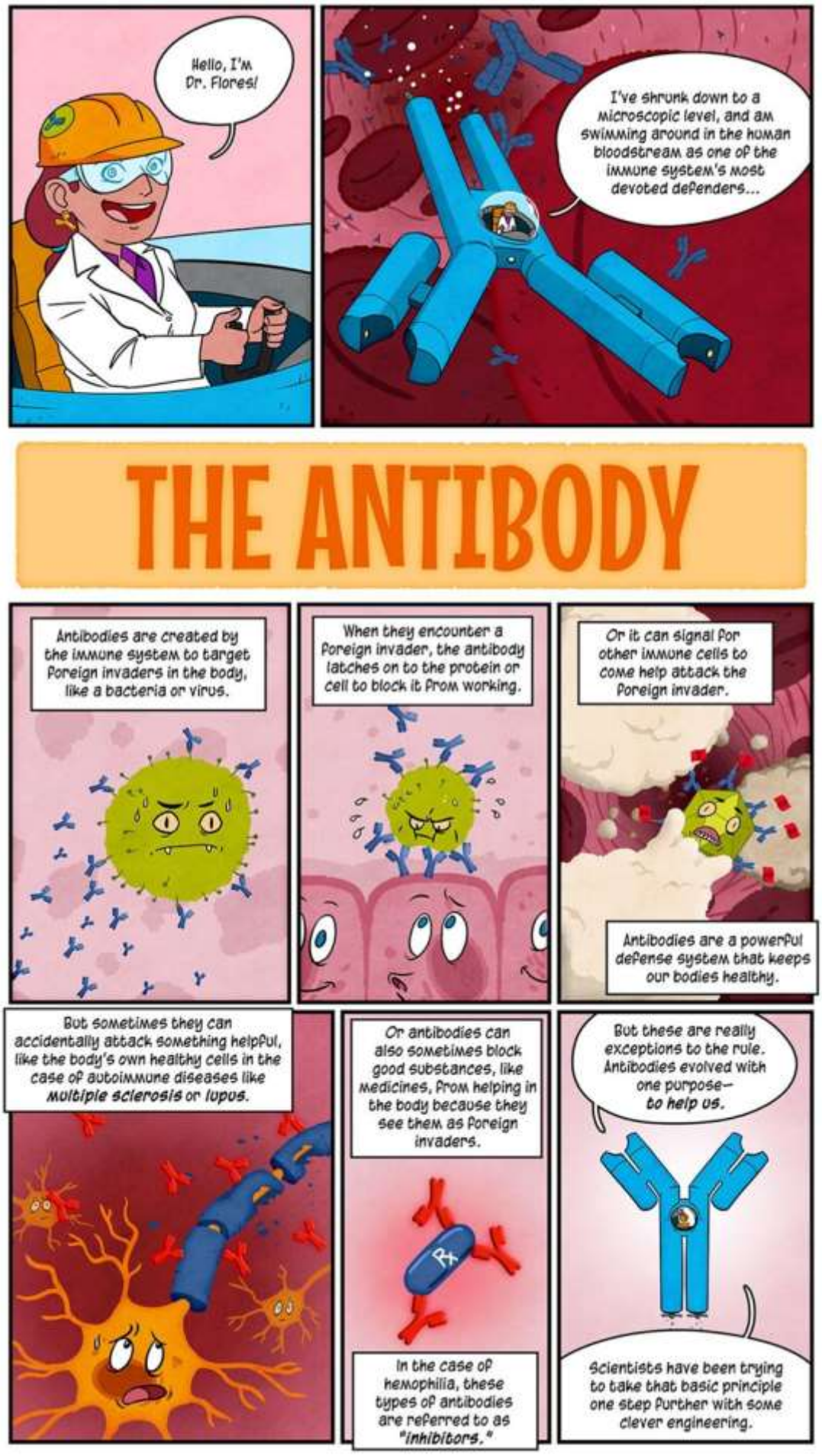
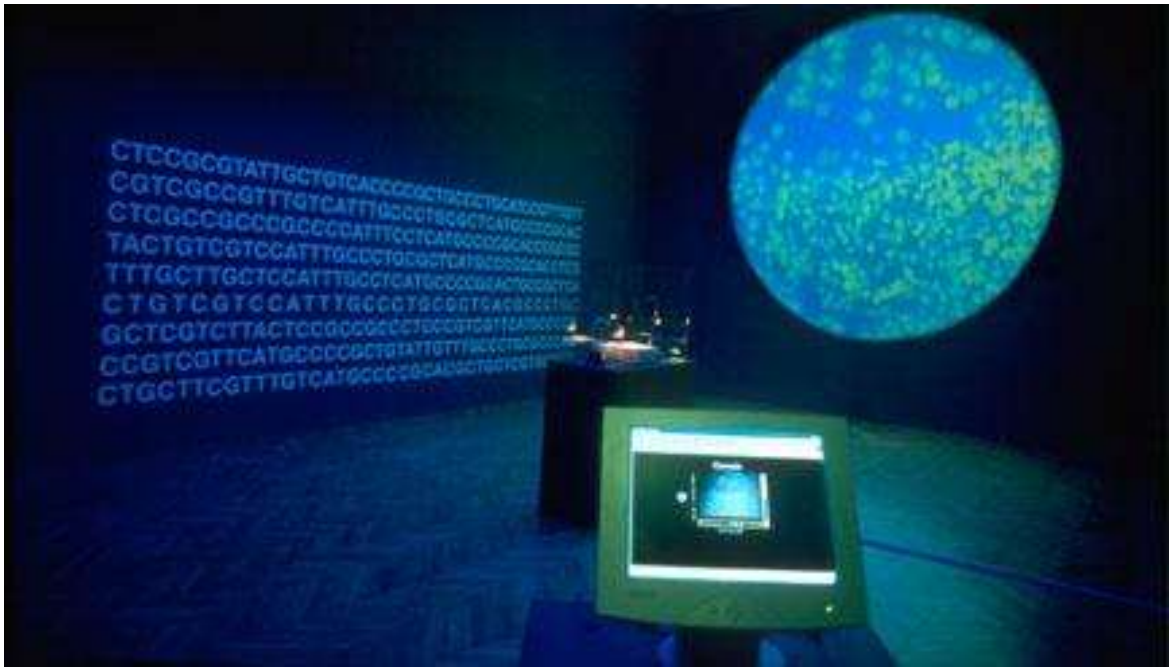


32.


Hello, I'm Dr. Flores!
I've shrunk down to a microscopic level, and am swimming around in the human bloodstream as one of the immune system's most devoted defenders...
THE ANTIBODY
Antibodies are created by the immune system to target foreign invaders in the body, like a bacteria or virus.
When they encounter a foreign invader, the antibody latches on to the protein or cell to block it from working.
Or it can signal for other immune cells to come help attack the foreign invader.
Antibodies are a powerful defense system that keeps our bodies healthy.
But sometimes they can accidentally attack something helpful, like the body's own healthy cells in the case of autoimmune diseases like *multiple sclerosis* or *lupus*.
Or antibodies can also sometimes block good substances, like medicines, from helping in the body because they see them as foreign invaders.
Rx
In the case of hemophilia, these types of antibodies are referred to as *"inhibitors."*
But these are really exceptions to the rule. Antibodies evolved with one purpose– *to help us.*
Scientists have been trying to take that basic principle one step further with some clever engineering.

27.

21.


CTCCGCGTATTGCTGTCACCCGCTGCCCTGCATCCTTTTT
CGTCGCCGTTTGTCATTTGCCCTGCGTCATGCCCCGCAC
CTCGCCGCCCGCCCCATTTCCTCATGCCCCGCACCCGCCC
TACTGTCGTCCATTTGCCCTGCGCTCATGCCCCGCACCCGCCC
TTTGCTTGCTCCATTTGCCTCATGCCCCGCACTCCCATTC
CTGTCGTCCATTTGCCCTGCGCTGACGCCCTCC
GCTCGTCTTACTCCGCCCCCCTCCCGTCGTTCATGCCCCG
CCGTCGTTCATGCCCCGCTGTATTGTTTGCCCTGCCCCCC
CTGCTTCGTTTGTCATGCCCCGCACGCTGCTCCCCC

39.

MANUFACTURING BRAIN PARTS

Grow Your Own

The technology that coaxes stem cells to develop into different types of biological tissue has now been used to grow a part of the brain that contains the cortex and other structures and is responsible for such higher mental functions as processing information from the outside world, forming memories and making decisions. To create such a mini brain, researchers give a tiny ball of cells nutrients and a bed on which to grow; then the cells recapitulate much of the developmental process that occurs in the early embryo.

1 The procedure begins with embryonic stem cells or induced pluripotent stem cells capable of turning into any cell type in the body. The latter cells can be derived from adult skin or blood cells that have been genetically altered.

Embryonic stem cell

Reprogramming of adult cell

Adult skin cell

2 Days 0–5: The cells divide and aggregate into balls called embryoid bodies. Within three days, those cells start forming three distinct layers: ectoderm, mesoderm and endoderm.

Different cell types

Embryoid bodies

3 Days 6–10: Embryoid bodies, after being placed in a liquid containing the nutrients for the part of the fetus that forms the nervous system (the neuroectoderm), begin to cluster into layers that form the embryonic tissues that give rise to the human brain.

4 Days 11–15: Tiny balls of neuroectoderm are embedded in Matrigel—a medium rich in chemicals that stimulate cells to divide, prevent them from dying and provide an environment that supports growth of budlike appendages, a prelude to development of fully formed brain structures.

Matrigel droplet

Neuroectoderm tissue

Budlike appendage

Maturing cells

5 Days 15–30: Matrigel droplets are transferred to a spinning bioreactor or a device known as an orbital shaker. In the gel, the embryoid bodies grow into brain organoids—three-dimensional, white balls of tissue that resemble the forebrain of a growing human fetus. The organoids can be used to study brain development and disorders that occur early in life.

Spinning bioreactor

Brain organoid

Analogue

10-week-old embryo forebrain

Fully formed forebrain

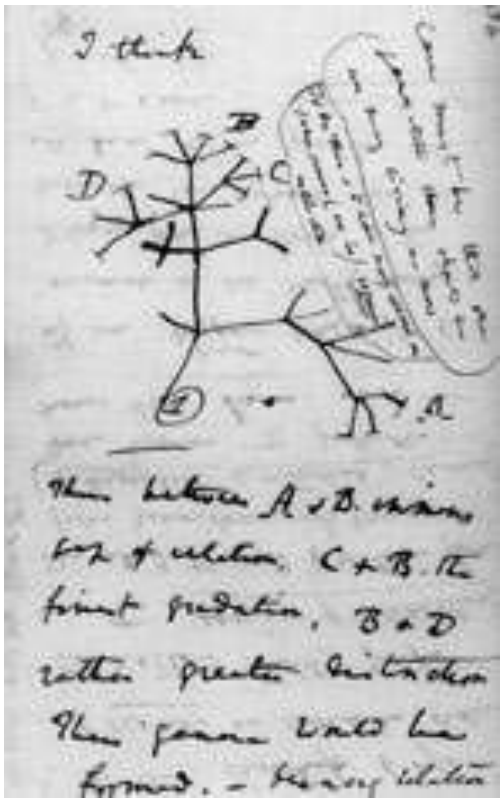
Outcome: After a month of nurturing the stem cell concoction, the cultures are strikingly similar to the forebrain of a 10-week-old embryo. This brain region includes the cortex (the large, folded outer structure) and the choroid plexus (the region that generates cerebrospinal fluid).

SOURCE: "CREATION OF CEREBRAL ORGANOIDS FROM HUMAN PLURIPOTENT STEM CELLS," BY MADELINE A. LANCASTER AND JUERGEN A. KNOBLICH, IN *NATURE PROTOCOLS*, VOL. 9, OCTOBER 2014

Illustration by Tomi Tolpa

4.

7.



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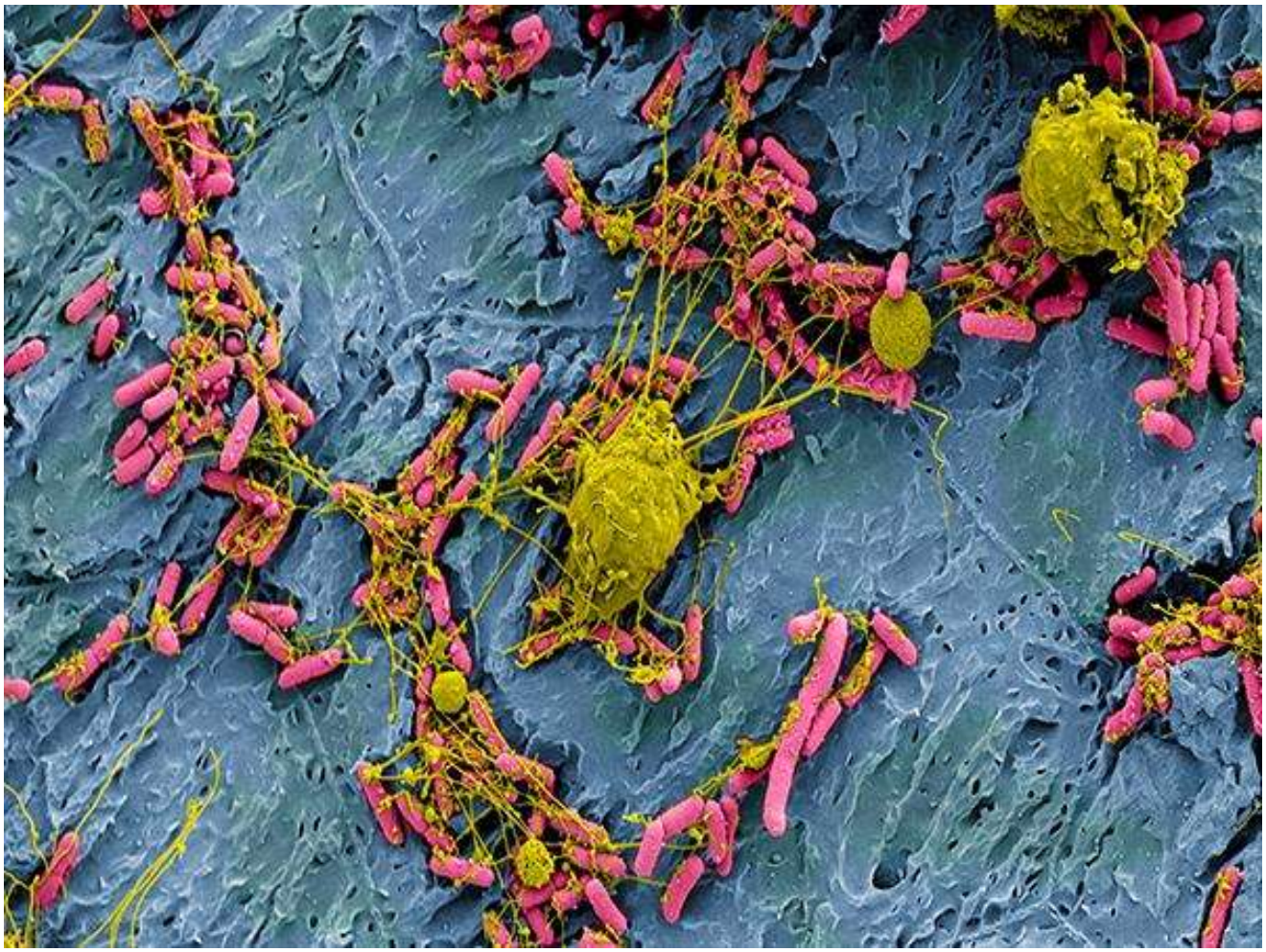

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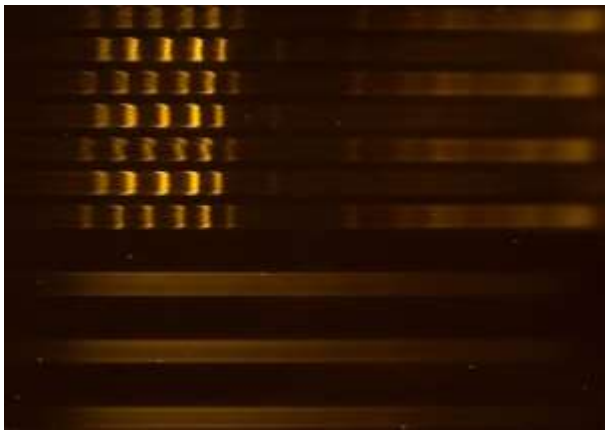


25.

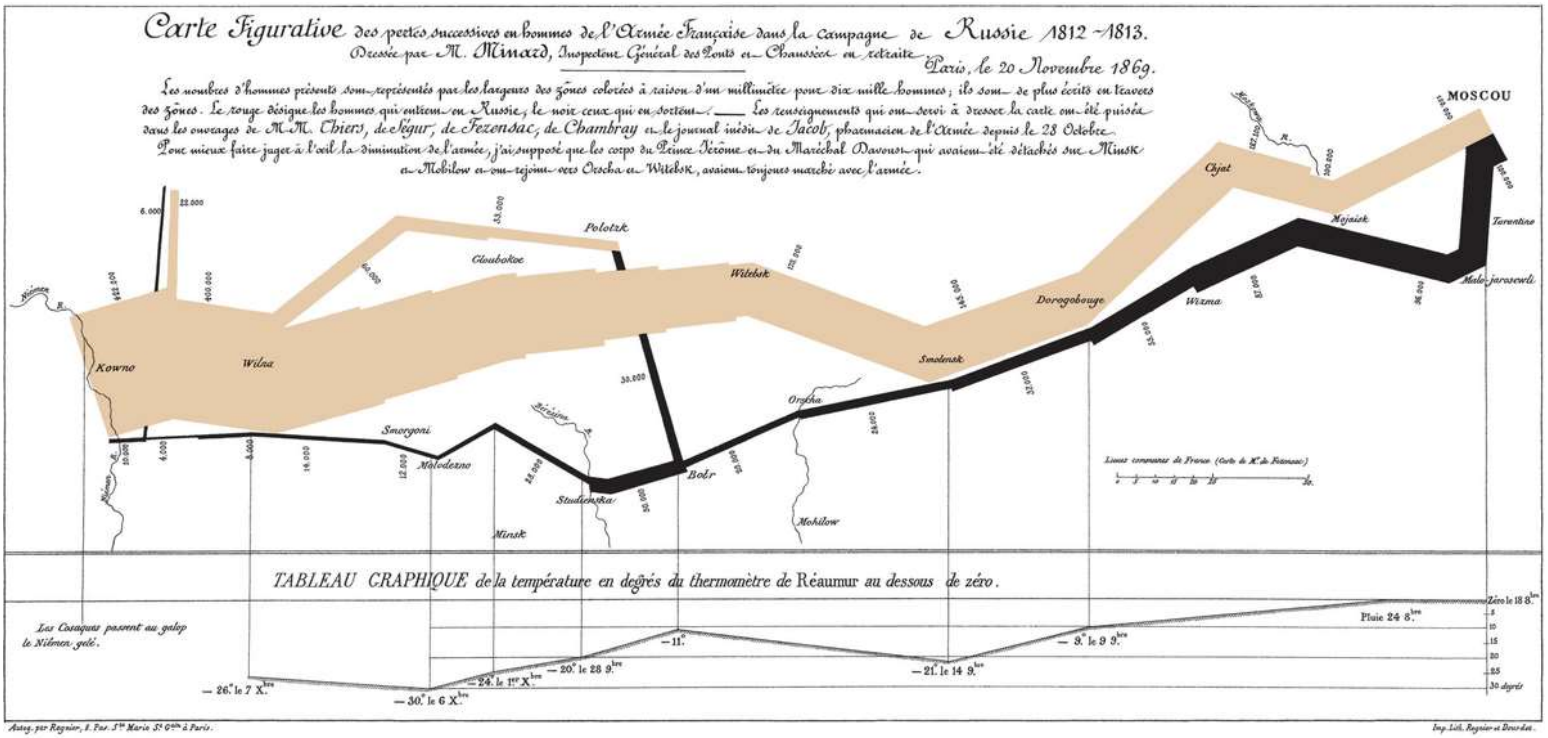
33.


Sweet, sweet, I'm so very Sweet!
Yellow Warbler
I'm so laa-zyyyyy.
Black-throated Blue Warbler
Oh sweet Canada Canada Canada.
White-throated Sparrow
Drink your teeeeea!!
Eastern Towhee
Trees, trees, murmuring trees.
Black-throated Green Warbler
Teacher! Teacher!
Ovenbird
Pleased, pleased, pleased to meet you!
Peep!
Chestnut-sided Warbler
Meow!
me w
Gray Catbird
Where are you? Here I am!
Where are you?
I am here!
Red-eyed Vireo
Bee-buzzzz.
Bzz!
Blue-winged Warbler
Fire! Fire! Where?? Where??
Here! Here!
Indigo Bunting
Teakettle teakettle teakettle.
Carolina Wren
Bird Sound Mnemonics
Songs and Calls of Eastern North American Birds

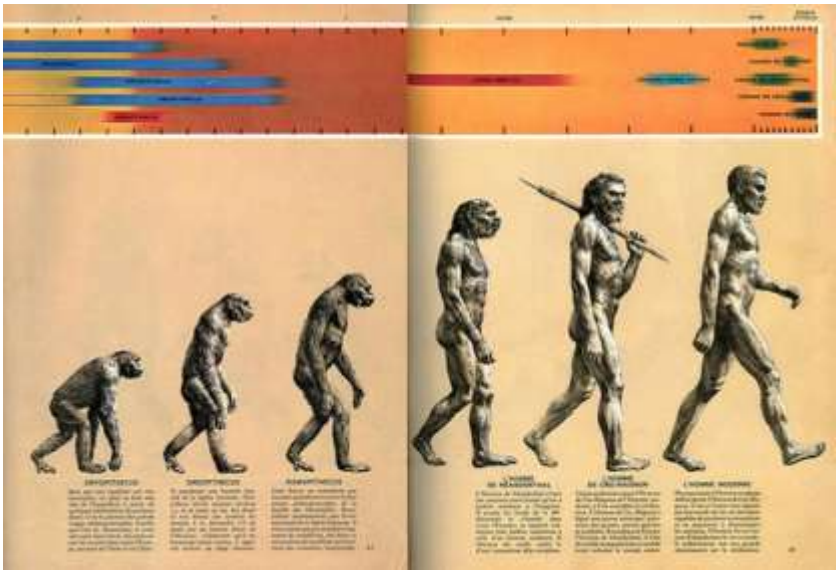
36.


BY THE YEAR
2018
2019
2020
ALL
INFORMATION
ALL
NONE
2019
WILL BE
6 YEARS FROM NOW
(72 MONTHS)
COMMUNICATED
YES!
IN
THIS
CLEAR AND CONCISE
26
0
T
FORMAT

37.


Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.
Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.
Paris, le 20 Novembre 1869.
MOSCOU
Polotzk
Witebsk
Smolensk
Dorogobouge
Wixma
Mojaisk
Tarentino
Malo-jaroswetz
Chjat
Gloubokoe
Kowno
Wilna
Smorgoni
Molodexno
Studienska
Bobr
Minsk
Orscha
Mohilow
TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.
Les Cosaques passent au galop le Niémen gelé.
— 26° le 7 X.bre
— 30° le 6 X.bre
— 24° le 1er X.bre
— 20° le 28 9.bre
— 11°
— 21° le 14 9.bre
— 3° le 9 9.bre
Pluie 24 8.bre
Zéro le 18 8.bre

3.



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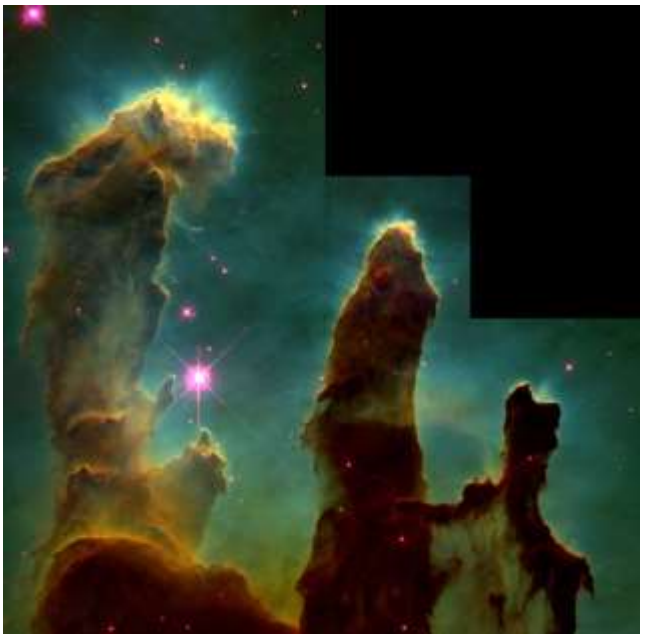

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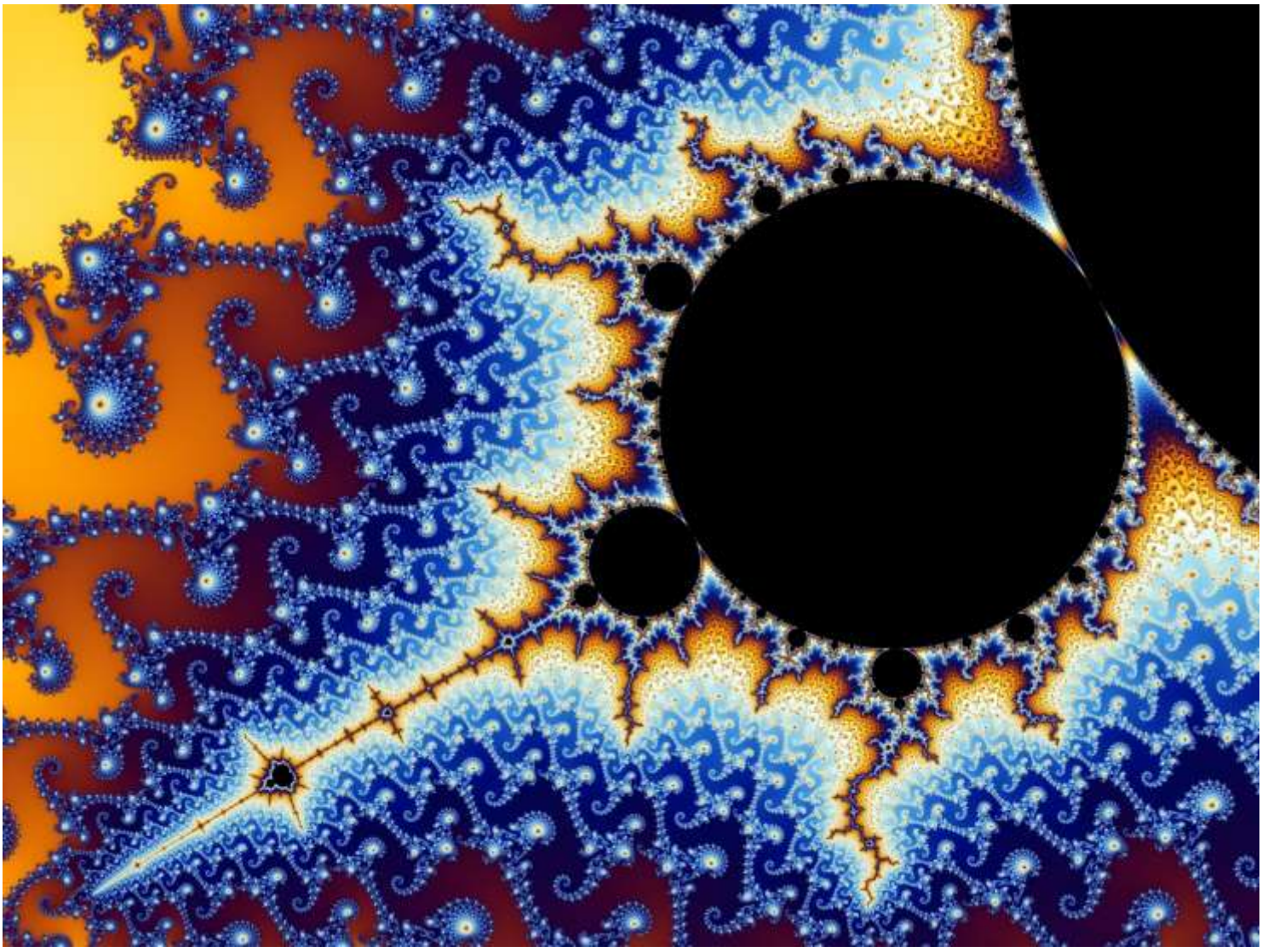
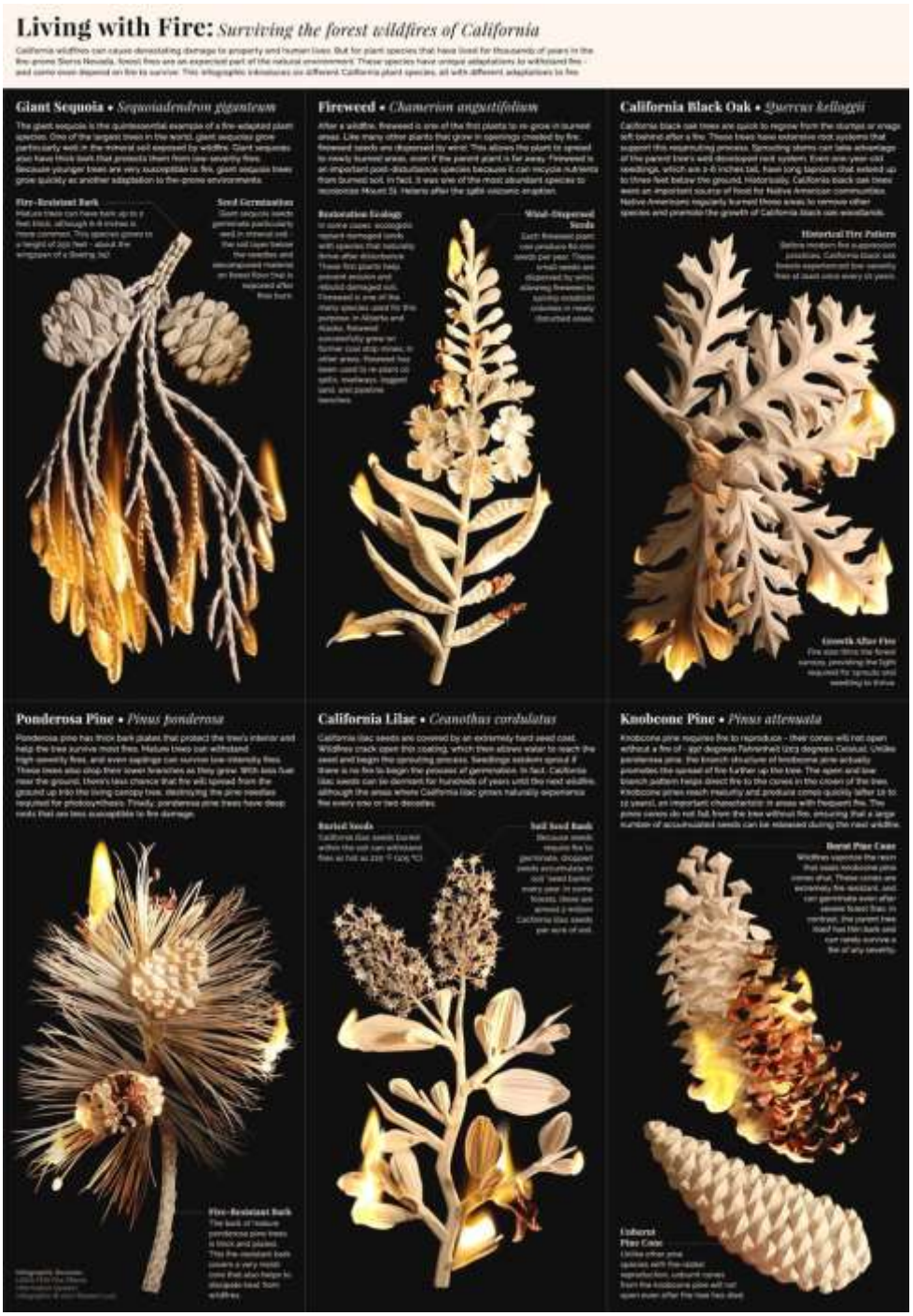
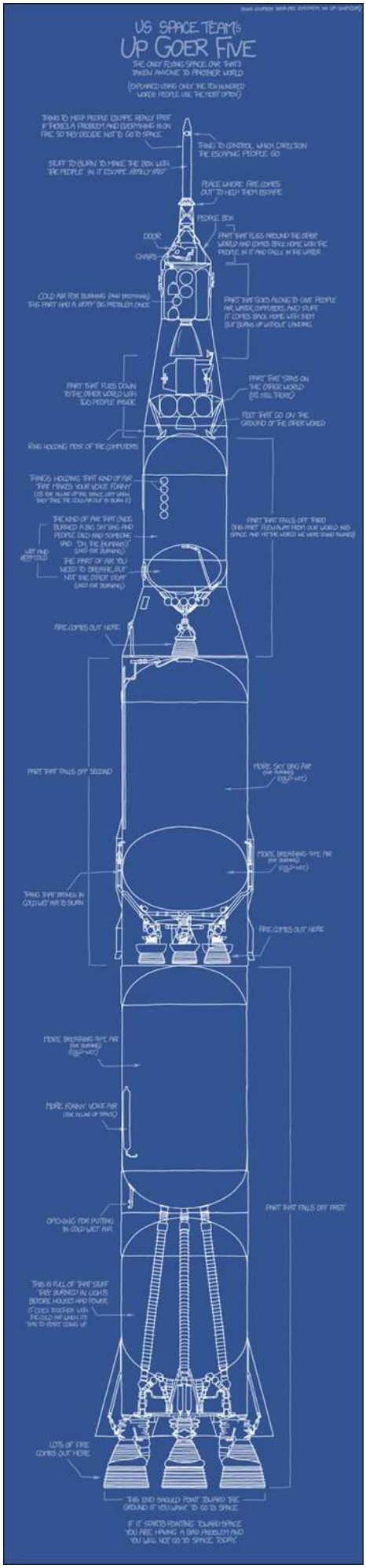


38. [animation]



22.

34.



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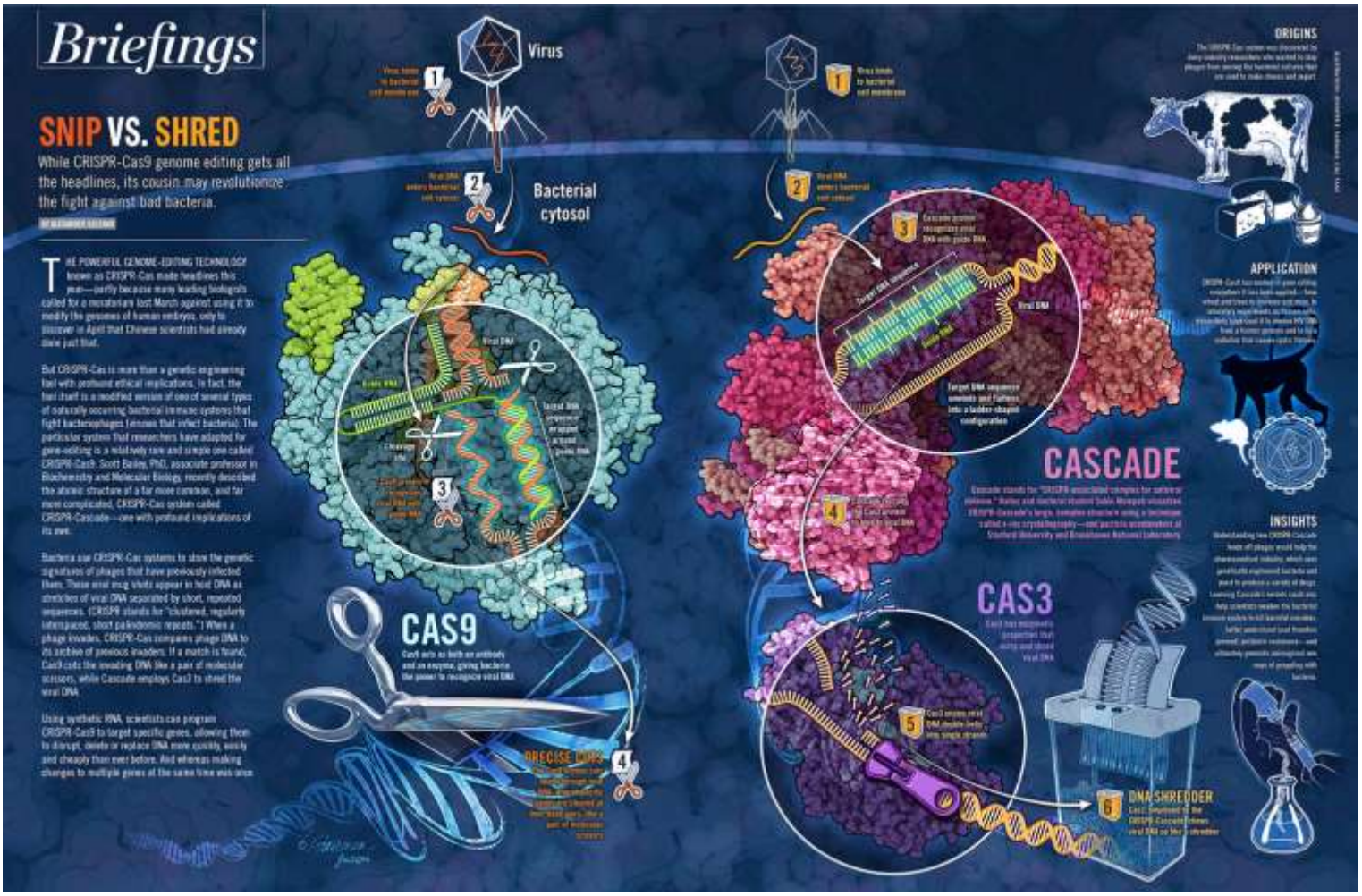

Briefings
SNIP VS. SHRED
While CRISPR-Cas9 genome editing gets all the headlines, its cousin may revolutionize the fight against bad bacteria.
Virus
Bacterial cytosol
CAS9
CASCADE
CAS3
DNA SHREDDER
ORIGINS
APPLICATION
INSIGHTS

23.

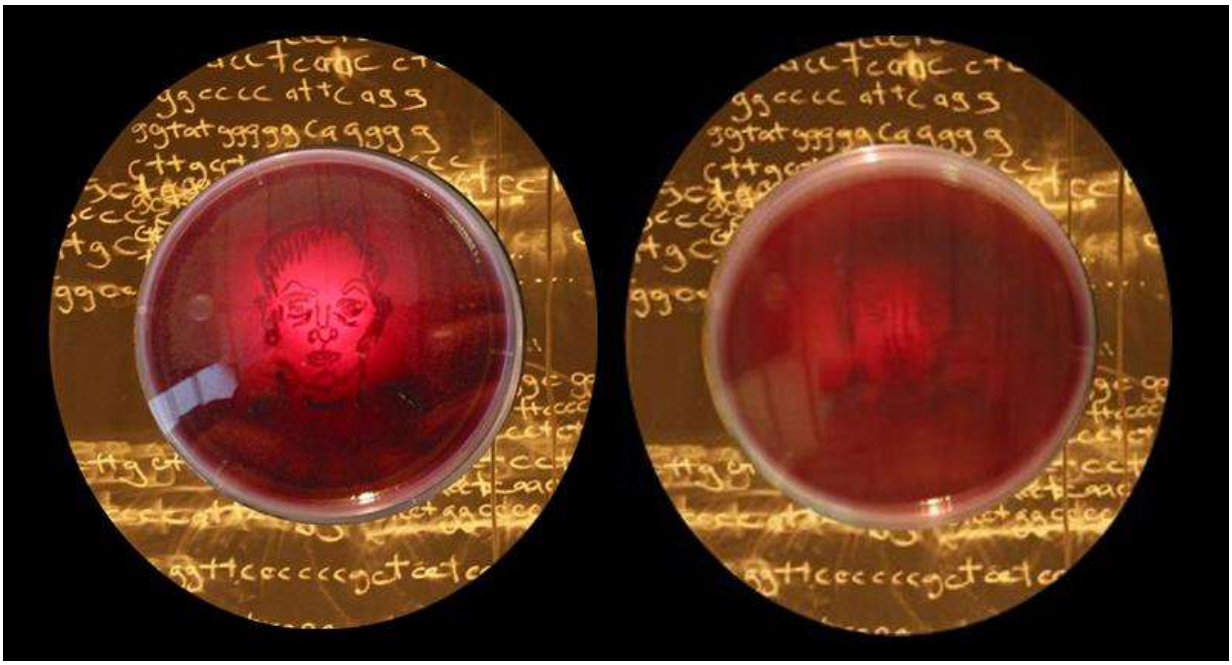
5.


164 ANDREAE VESALII BRUXELLENSIS
QVINTA
MYOLOGIA
HVM TABV-
LA

16.

12.

24.



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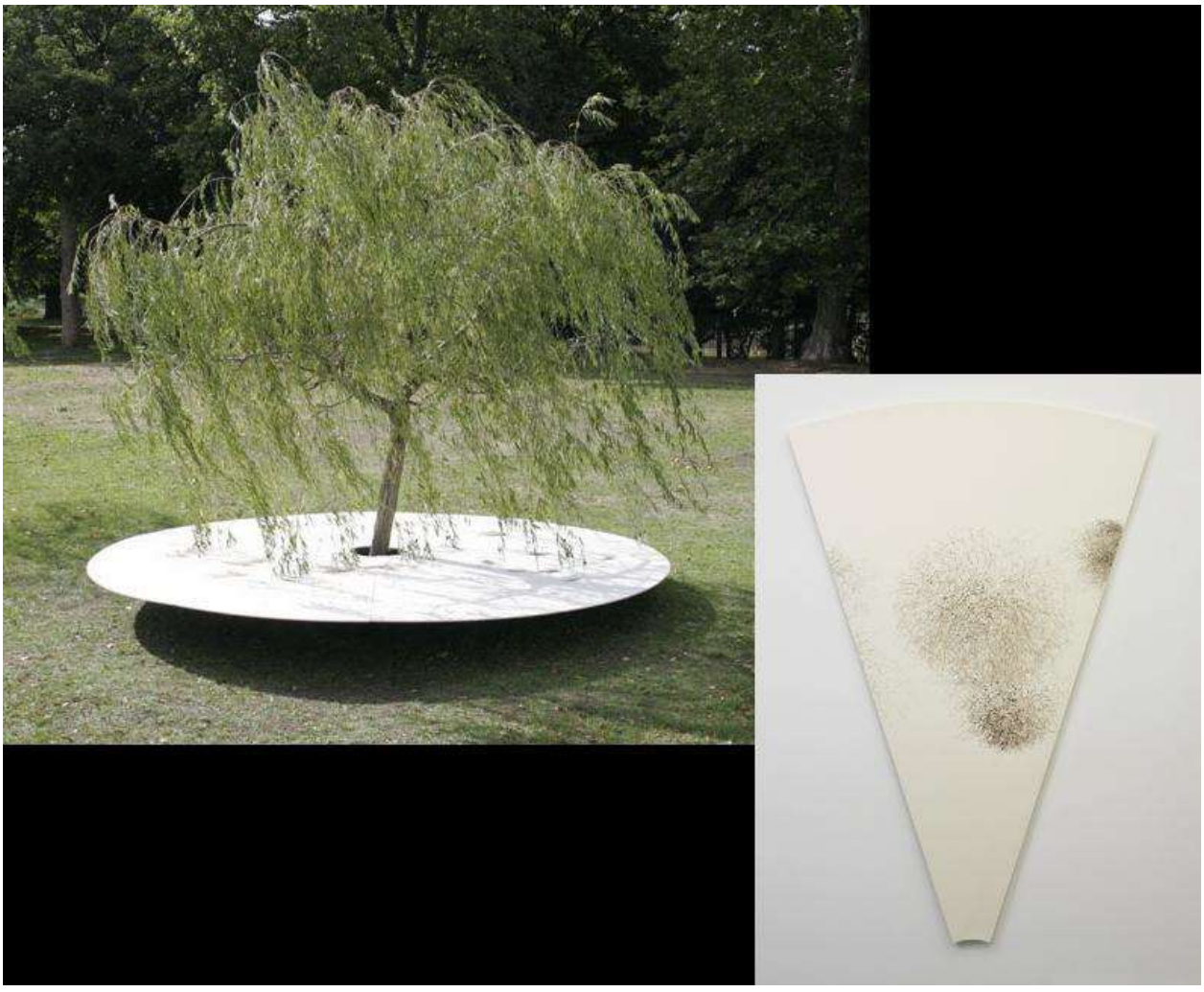

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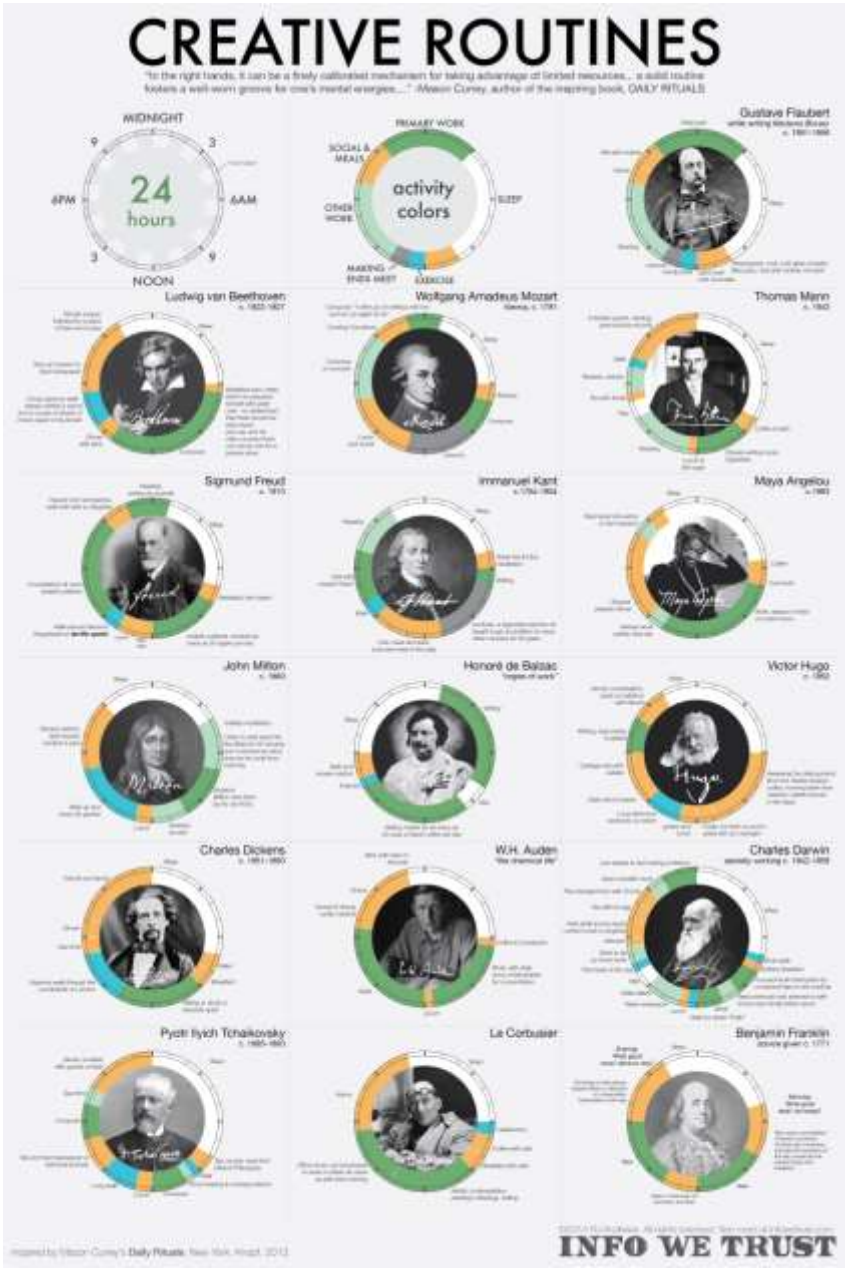
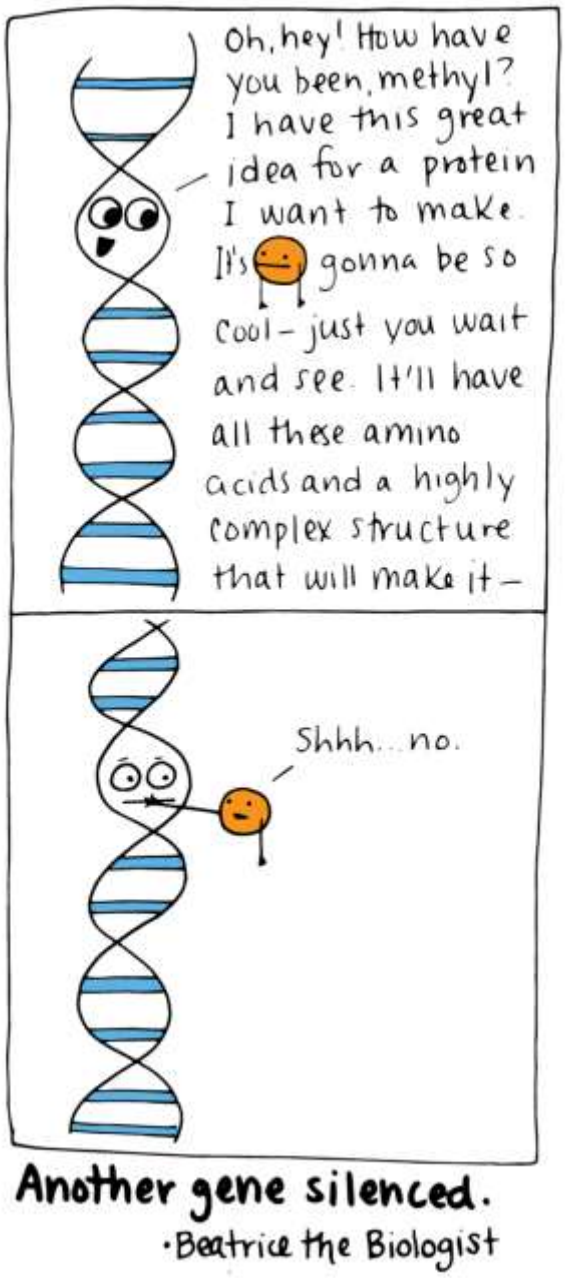

CREATIVE ROUTINES
"In the right hands, it can be a finely calibrated mechanism for taking advantage of limited resources... a solid routine fosters a well-worn groove for one's mental energies..." -Mason Currey, author of the inspiring book, DAILY RITUALS
MIDNIGHT
24 hours
6PM
6AM
NOON
activity colors
PRIMARY WORK
SOCIAL & MEALS
OTHER WORK
SLEEP
MAKING ENDS MEET
EXERCISE
Gustave Flaubert
Ludwig van Beethoven
Wolfgang Amadeus Mozart
Thomas Mann
Sigmund Freud
Immanuel Kant
Maya Angelou
John Milton
Honoré de Balzac
Victor Hugo
Charles Dickens
W.H. Auden
Charles Darwin
Pyotr Ilyich Tchaikovsky
Le Corbusier
Benjamin Franklin
INFO WE TRUST

31.


Oh, hey! How have you been, methyl? I have this great idea for a protein I want to make. It's gonna be so cool - just you wait and see. It'll have all these amino acids and a highly complex structure that will make it -
Shhh.. no.
Another gene silenced.
-Beatrice the Biologist

13.

6.

29.

14. [video]

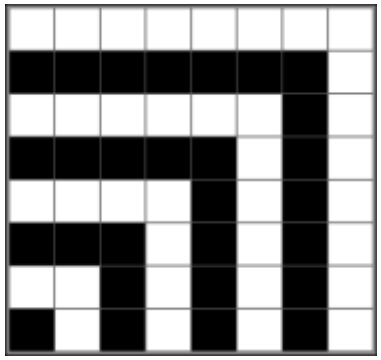
30.

19.

20.

28.

9.



28.