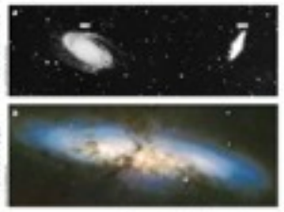
Behind the Scenes at *Scientific American*

George Musser
6 April 2012

Colossal Galactic Explosions

Enormous outpourings of gas from the centers of nearby galaxies may ultimately help explain both star formation and the intergalactic medium

by Sylvain Veilleux, Gerald Cecil and Jonathan Bland-Hawthorn



Black Holes and the Information Paradox

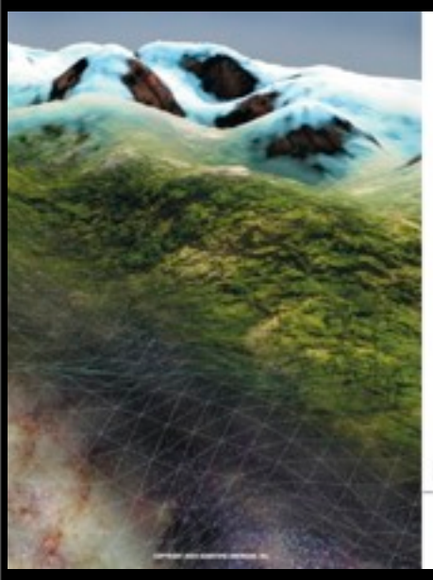
What happens to the information in matter destroyed by a black hole? Searching for that answer, physicists are groping toward a quantum theory of gravity

by Leonard Susskind

By Guinevere Kauffmann and Frank van den Bosch

Astronomers are on the verge of explaining the enigmatic variety of galaxies

The Life Cycle of Galaxies



THE STRING THEORY LANDSCAPE

The theory of strings predicts that the universe might occupy one random "valley" out of a virtually infinite selection of valleys in a vast landscape of possibilities

By Raphael Bousso and Joseph Polchinski

PHYSICISTS COULD SOON BE CREATING BLACK HOLES IN THE LABORATORY

QUANTUM BLACK HOLES

By Bernard J. Carr and Steven B. Giddings

The Illusion of Gravity

The force of gravity and one of the dimensions of space might be generated out of the peculiar interactions of particles and fields existing in a lower-dimensional realm

By Juan Maldacena

An ECHO of Black Holes

Sound waves in a fluid behave uncannily like light waves in space. Black holes even have acoustic counterparts. Could spacetime literally be a kind of fluid, like the ether of pre-Einsteinian physics?

By Theodore A. Jacobson and Renaud Parentani

ASTRONOMER

What my friends think I do

What my mom thinks I do

What society thinks I do

What the university thinks I do

What I think I do

What I really do

https://www.facebook.com/photo.php?fbid=638223742425&set=a.610601697225.2096038.8404414&type=1&theater

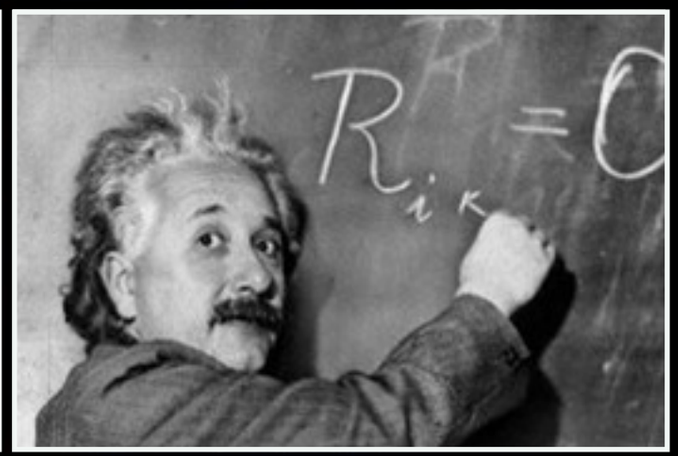
THEORETICAL PHYSICIST

What my friends think I do

What my mom thinks I do

What society thinks I do

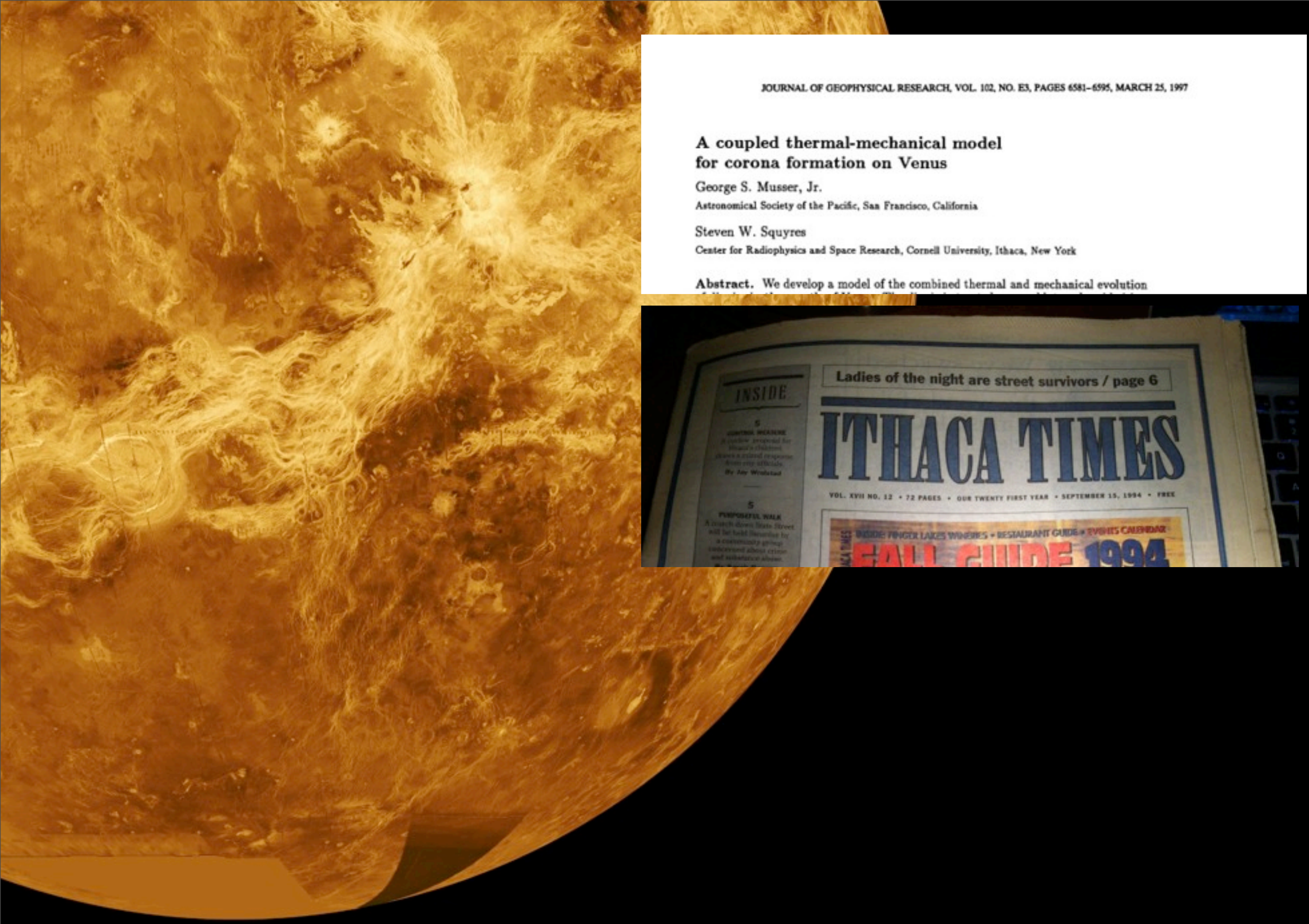
What the university thinks I do



What I think I do

What I really do

http://www.cbs.com/shows/big_bang_theory/photos/103797/the-hawking-excitation/103798, http://access.aasd.k12.wi.us/wp/baslerdale/2009/10/30/why-care-about-e-mc2-on-colbert/, http://couragewolfmeme.com/courage-wolf-571, http://kevinspraggett.blogspot.com/2011/06/karpovs-chess-schools.html, http://www.law-guy.com/



JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 102, NO. E3, PAGES 6581–6595, MARCH 25, 1997

A coupled thermal-mechanical model for corona formation on Venus

George S. Musser, Jr.
Astronomical Society of the Pacific, San Francisco, California

Steven W. Squyres
Center for Radiophysics and Space Research, Cornell University, Ithaca, New York

Abstract. We develop a model of the combined thermal and mechanical evolution

INSIDE

Ladies of the night are street survivors / page 6

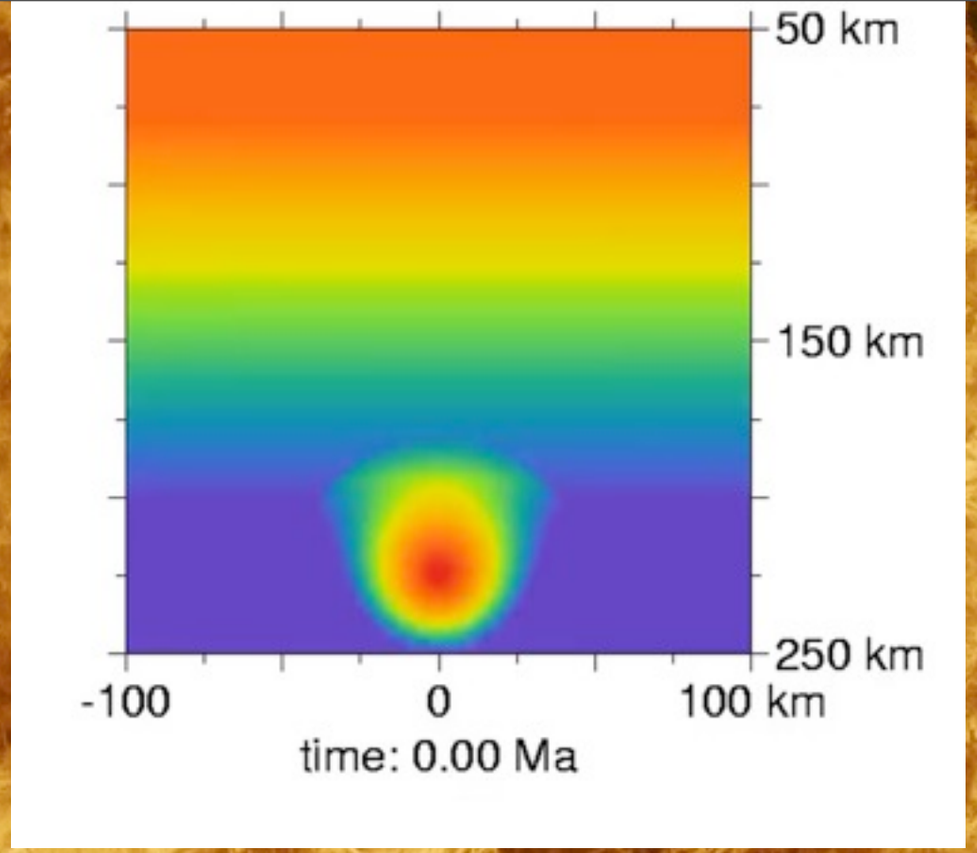
ITHACA TIMES

VOL. XVII NO. 12 • 72 PAGES • OUR TWENTY FIRST YEAR • SEPTEMBER 15, 1994 • FREE

INSIDE: FINGER LAKES WINERIES • RESTAURANT GUIDE • EVENTS CALENDAR

FALL GUIDE 1994

http://solarsystem.nasa.gov/multimedia/gallery/Venus.jpg; http://nssdc.gsfc.nasa.gov/image/planetary/mars/



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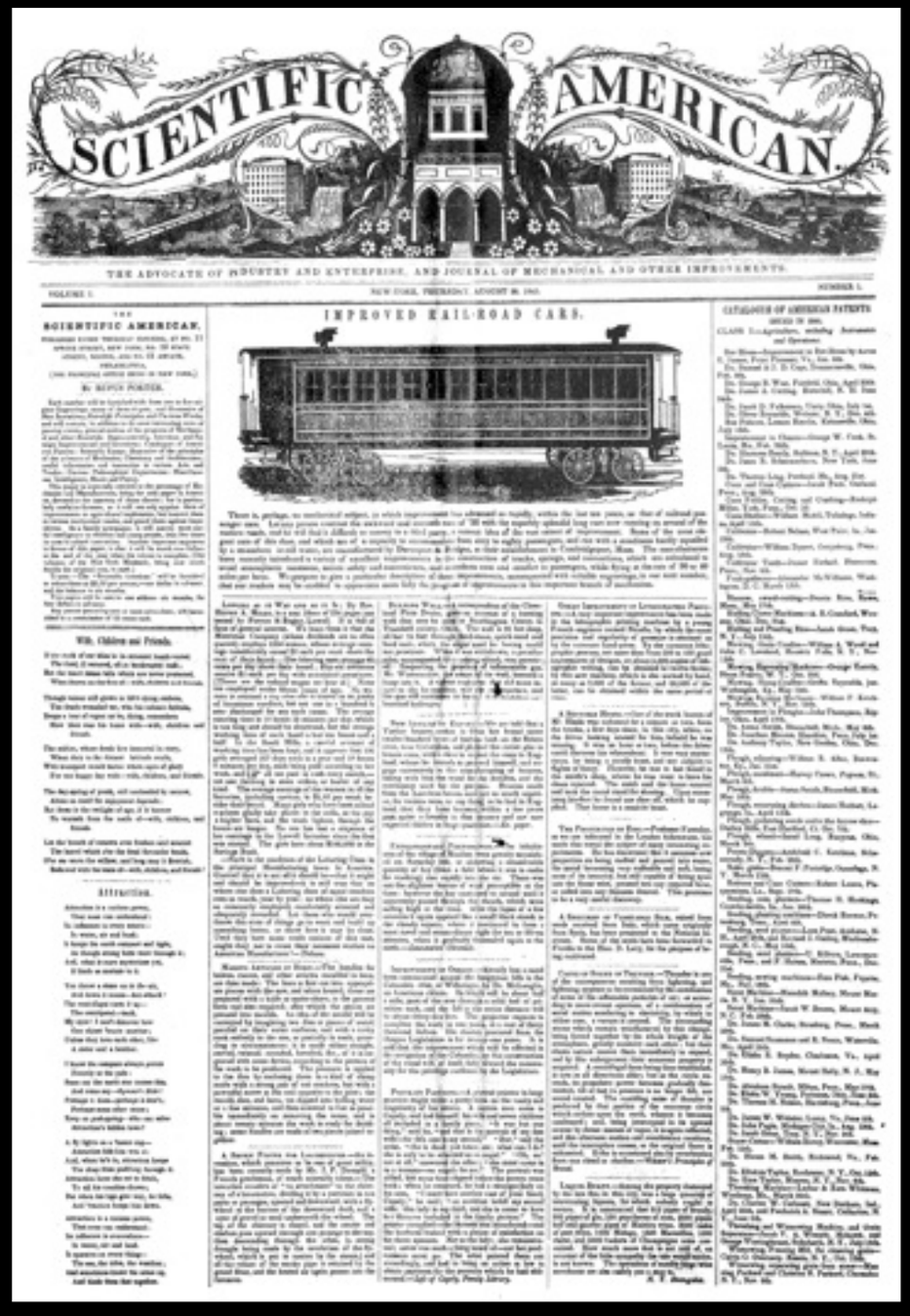
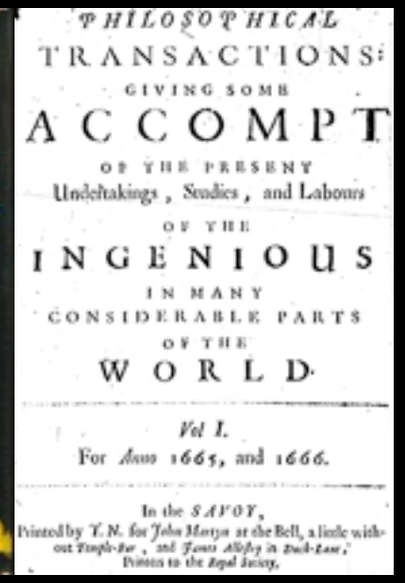
http://solarsystem.nasa.gov/multimedia/gallery/Venus.jpg; http://nssdc.gsfc.nasa.gov/image/planetary/mars/

Early History




PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.
Vol I.
For Anno 1665, and 1666.
In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little without Temple-Bar, and Henry Allestry in Duck-Lane,
Printers to the Royal Society.

http://upload.wikimedia.org/wikipedia/commons/f/fe/Scientific_american_2808184.png, http://

Chronicle of the Industrial

- Rufus Porter
  - Schoolmaster, painter, musician, editor, inventor of the revolver (sold to Colt)
  - After 10 months, bored, he sold *Scientific American* for $800 to…

Chronicle of the Industrial

- Orson Desaix Munn, 22
- Alfred Ely Beach, 19
  - Beach was son of *New York Sun* publisher and inventor of first subway (pneumatic tube)
  - Magazine processed one-third of patents issued in U.S.

Chronicle of the Industrial

Scientific American. [MARCH 5, 1870.

THE PNEUMATIC TUNNEL UNDER BROADWAY, N. Y.

We give this week illustrations of this remarkable work, which, with a brief description of the details of construction and mode of operation, will give the general reader a good understanding of the nature of this mode of transit. Having fully set forth the benefits to be derived from it in a previous article, we shall confine ourselves at present entirely to a description of the work and a brief history of the origin and progress of transit by means of air inclosed in tubes.

FIG. 1.

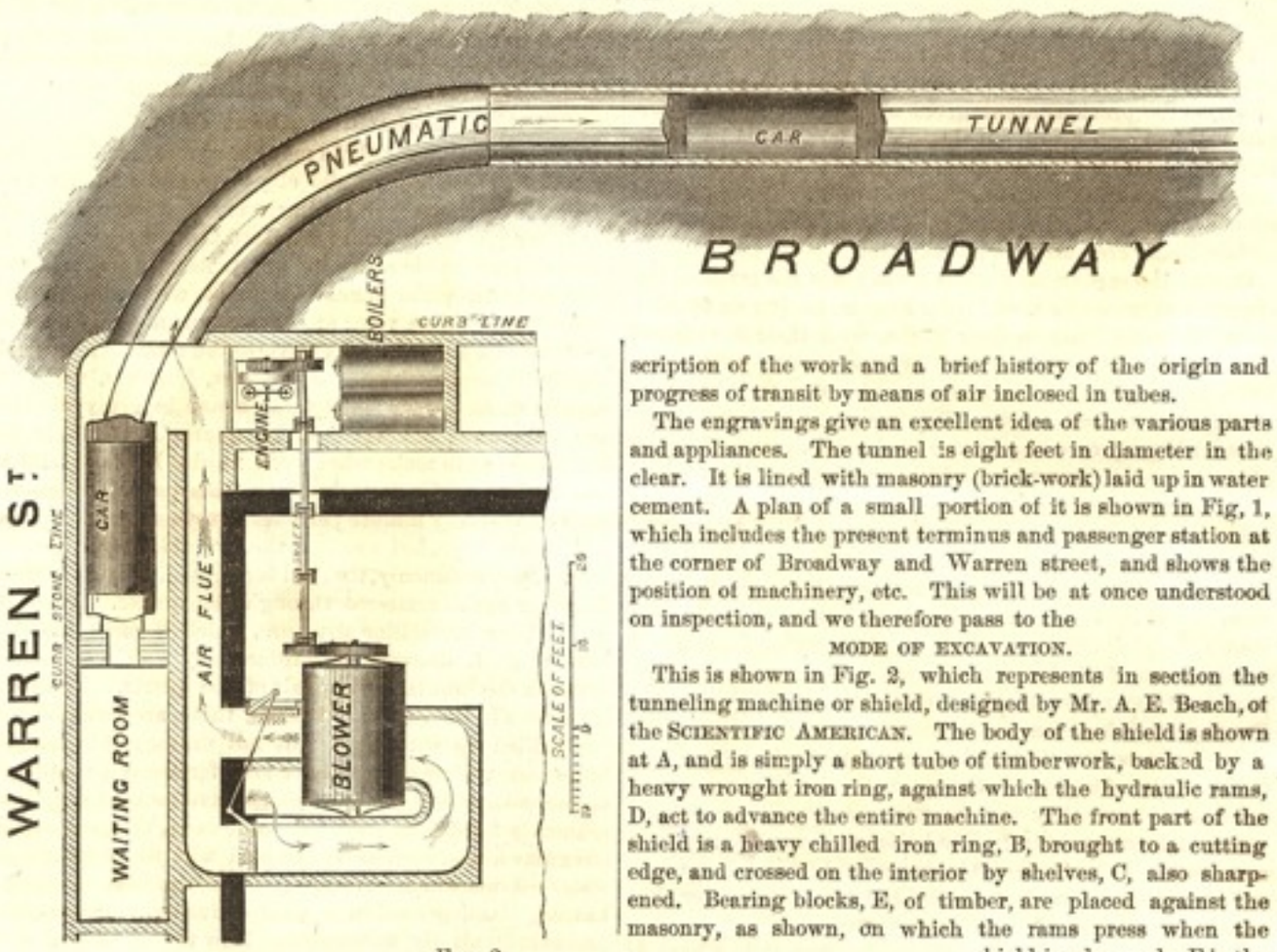
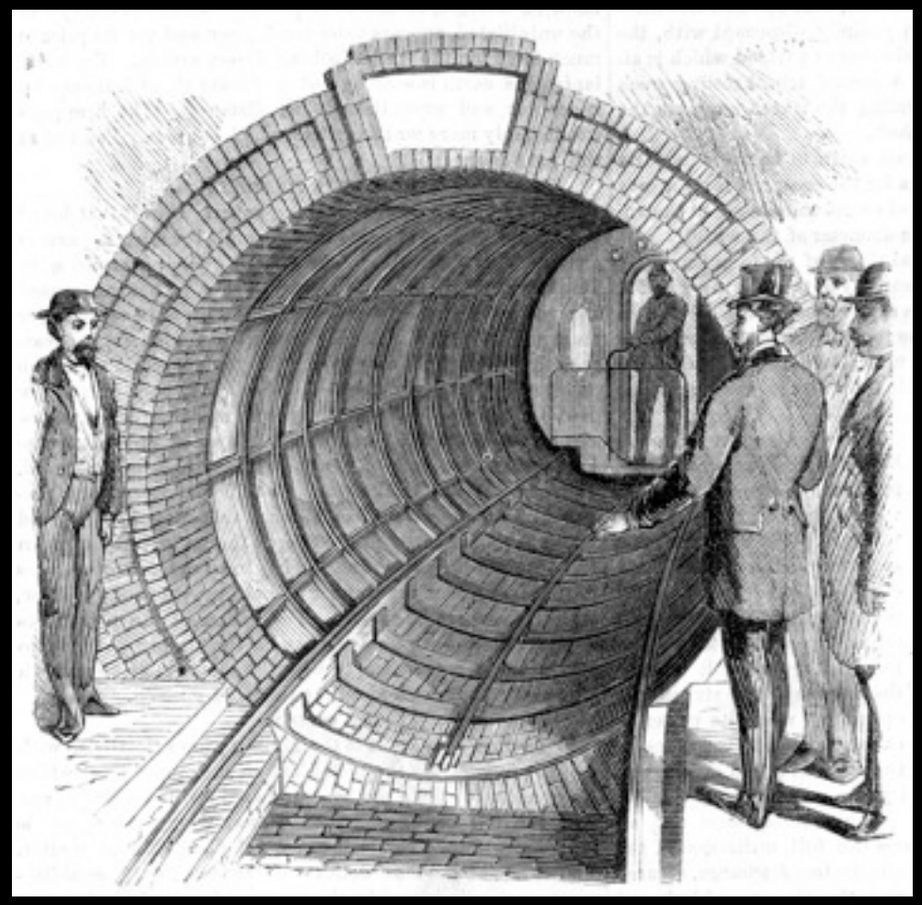


FIG. 2.

The engravings give an excellent idea of the various parts and appliances. The tunnel is eight feet in diameter in the clear. It is lined with masonry (brick-work) laid up in water cement. A plan of a small portion of it is shown in Fig, 1, which includes the present terminus and passenger station at the corner of Broadway and Warren street, and shows the position of machinery, etc. This will be at once understood on inspection, and we therefore pass to the

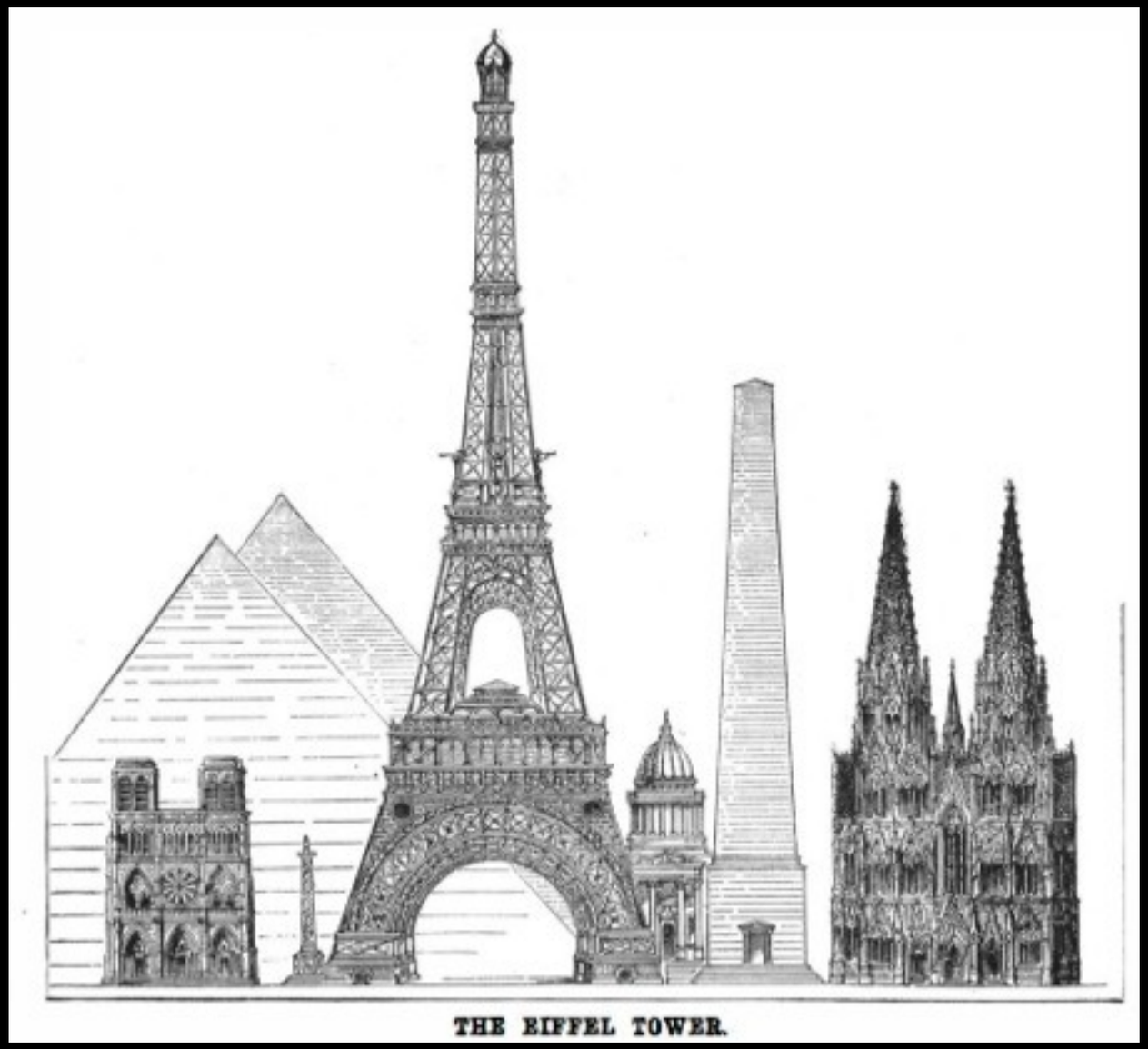
MODE OF EXCAVATION.

This is shown in Fig. 2, which represents in section the tunneling machine or shield, designed by Mr. A. E. Beach, of the SCIENTIFIC AMERICAN. The body of the shield is shown at A, and is simply a short tube of timberwork, backed by a heavy wrought iron ring, against which the hydraulic rams, D, act to advance the entire machine. The front part of the shield is a heavy chilled iron ring, B, brought to a cutting edge, and crossed on the interior by shelves, C, also sharpened. Bearing blocks, E, of timber, are placed against the masonry, as shown, on which the rams press when the shield is advanced. F is the



http://upload.wikimedia.org/wikipedia/en/9/90/Beach_Pneumatic_plan.jpg, http://upload.wikimedia.org/

Chronicle of the Industrial



THE EIFFEL TOWER.

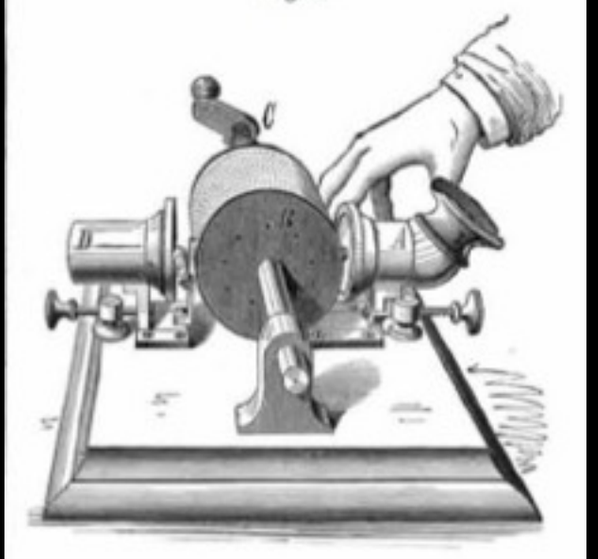
[DECEMBER 22, 1877.

THE TALKING PHONOGRAPH.

Mr. Thomas A. Edison recently came into this office, placed a little machine on our desk, turned a crank, and the machine inquired as to our health, asked how we liked the phonograph, informed us that it was very well, and bid us a cordial good night. These remarks were not only perfectly audible to ourselves, but to a dozen or more persons gathered around, and they were produced by the aid of no other mechanism than the simple little contrivance explained and illustrated below.

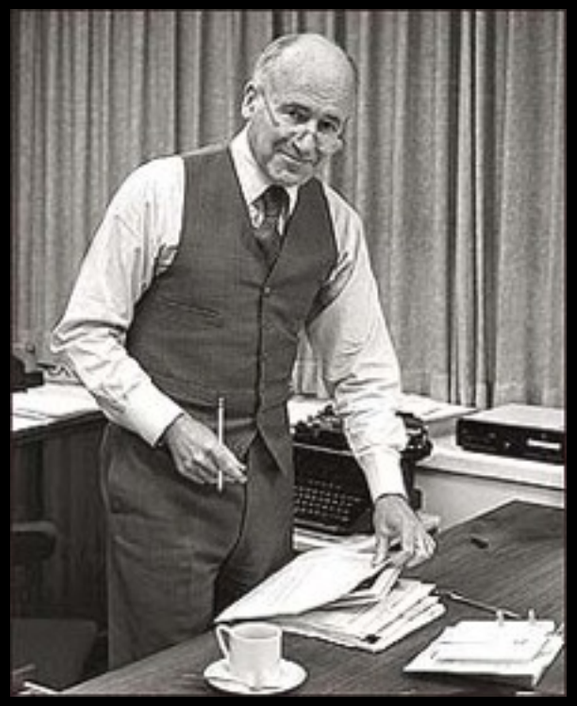
The principle on which the machine operates we recently explained quite fully in announcing the discovery. There is, first, a mouth piece, A, Fig. 1, across the inner orifice of which is a metal diaphragm, and to the center of this diaphragm is attached a point, also of metal. B is a brass cylinder supported on a shaft which is screw-threaded and turns in a nut for a bearing, so that when the cylinder is caused to revolve by the crank, C, it also has a horizontal travel in front of the mouthpiece, A. It will be clear that the point

Fig. 1.



12 Dec 1877, 18 May 1889

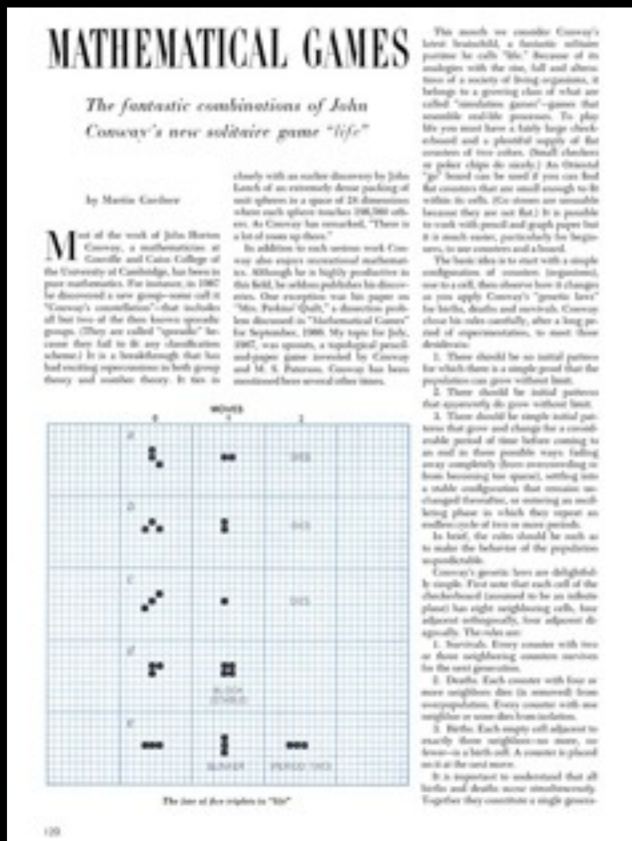
Birth of the Modern *Sci Am*

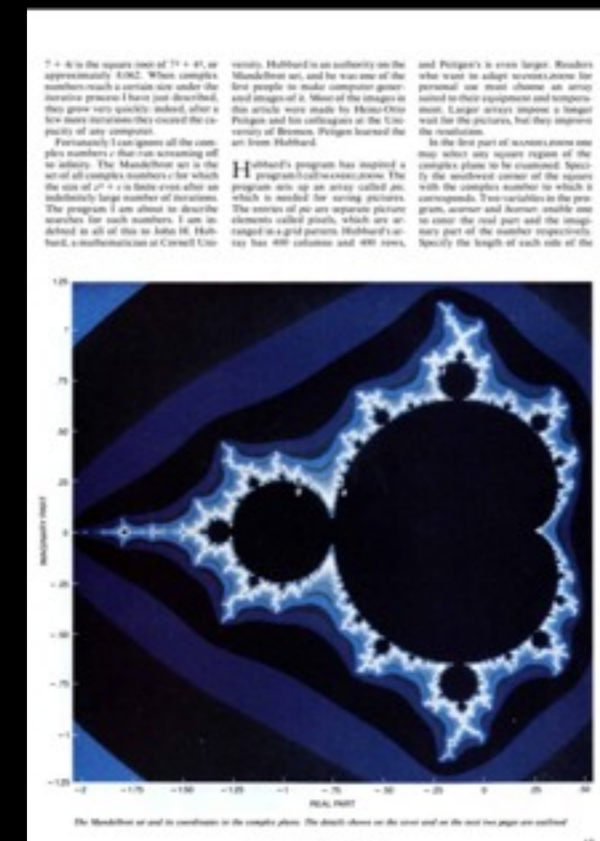


- Gerard Piel, 33
- Dennis Flanagan, 28
  - *Life* magazine reporters
  - "Joint effort" between scientists and journalists

http://www.janusmuseum.org/panabasis/jan05.htm

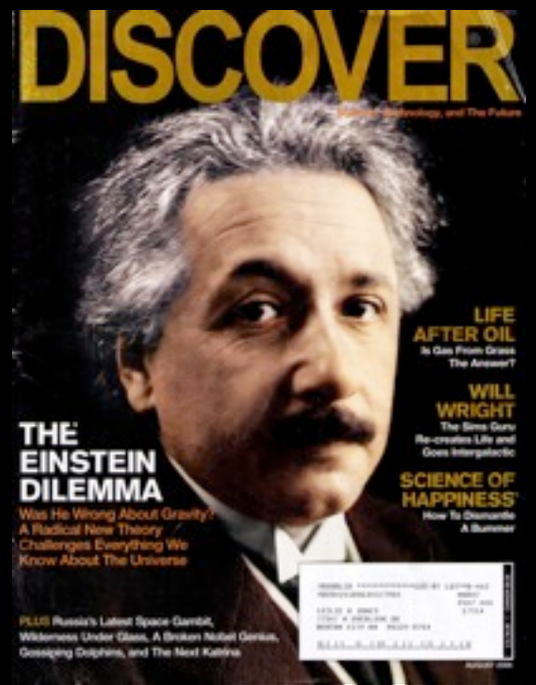
Golden Years

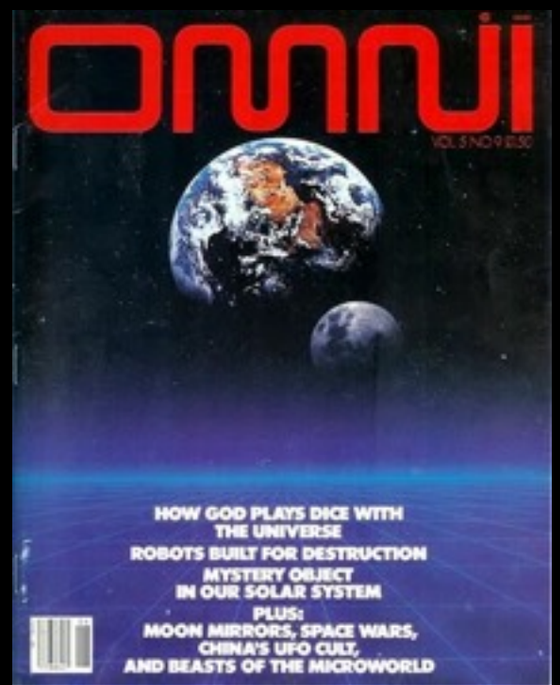


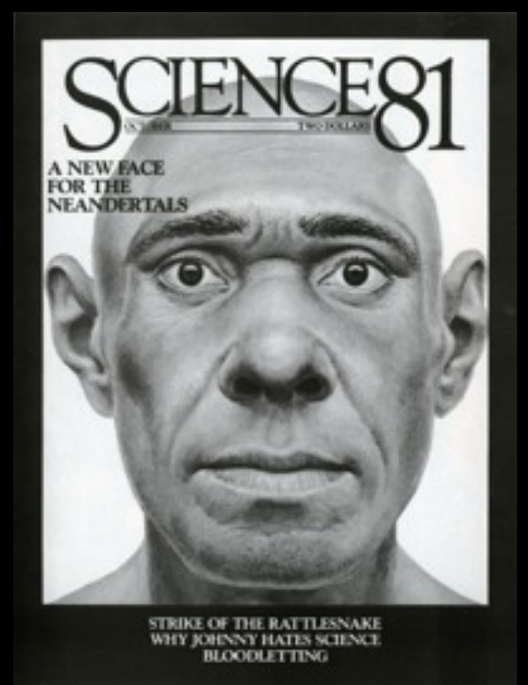


October 1970, September 1974, August 1985,

Boom … and Bust







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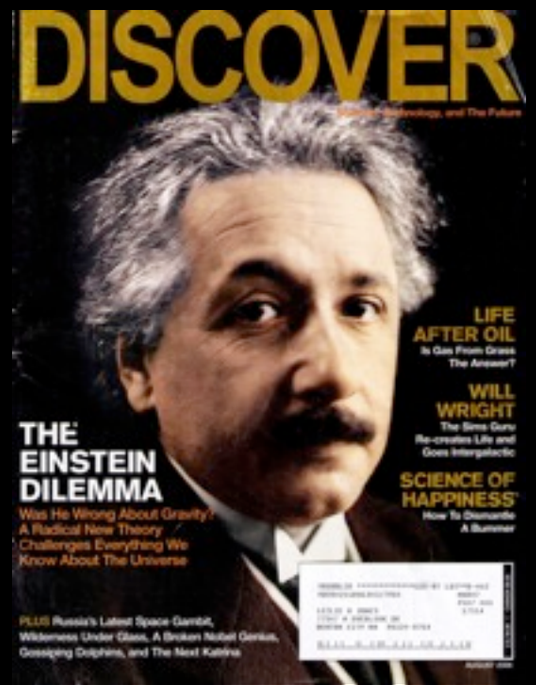
Boom … and Bust



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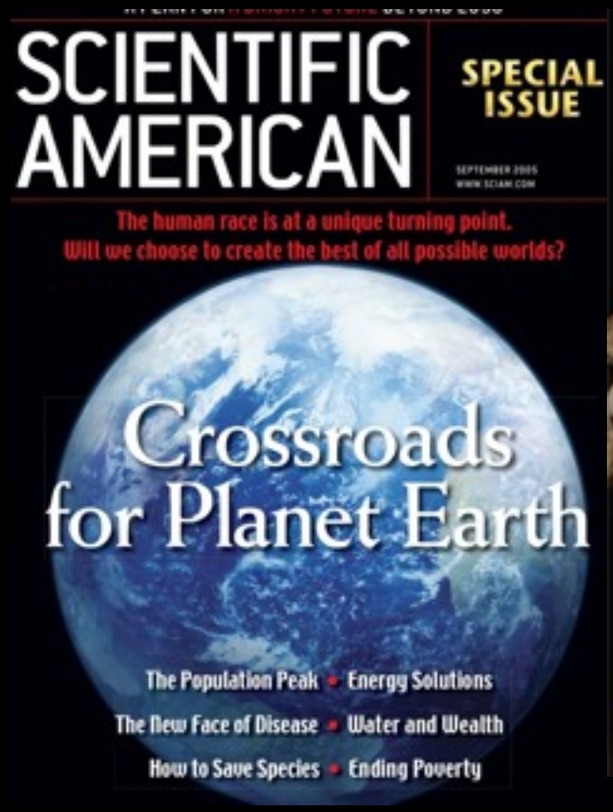
Recent Years



Today: Print Readers

- 450,000 circulation in U.S.
  - 3.3 million readers worldwide
  - Record subscriber renewal rates
- U.S. newsstand sales average: 70,000
  - In top 100 of U.S. titles
  - BUT newsstand for SA & all magazines sliding: –15% to –20% in 2011 from 2010
    - Factors: Borders bookstores close, airline traffic down, POS changes, inherent display flaws (“Men’s”)

What's Going On?

- Print (MRI)
  - 47 median age
  - 70% male/30% female
- Online (Nielson)
  - 37 median age—YES, 10 years younger
  - 56.5% male/43.5% female
- Print/online readers respond differently
  - On different devices, the audience shifts
  - And on different services, they change, too

SCIENTIFIC AMERICAN

Who Are the Readers?

scientists (3–4%)

engineers (6–15%)

doctors (4–8%)

teachers (10–15%)

students (4–8%)

managers (25%)

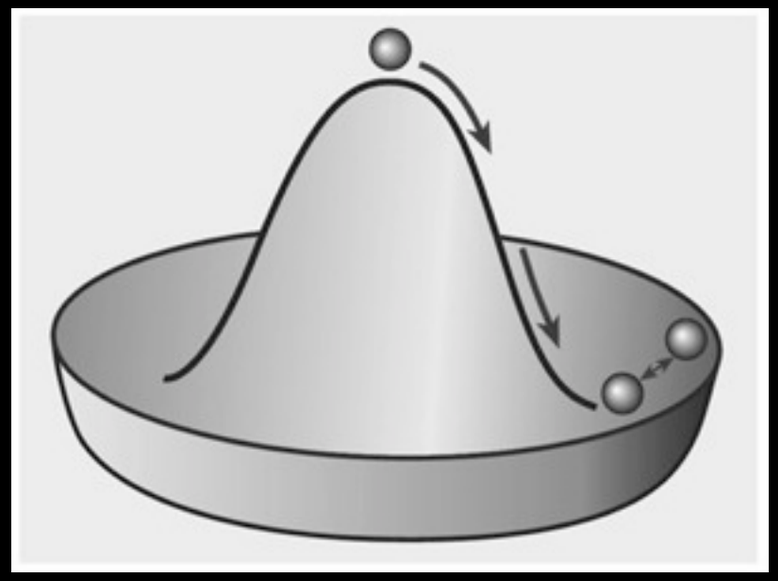
by Avonelle Wing, 26 Mar 12

What Makes a *Sci Am* Story?

present a problem/paradox/tension/mystery
provide some resolution
needn't be—shouldn't be—linear
represent not just author's work, but a community's
thematic rather than mission- or instrument-based
timely: why now?
how you know what you know
make a point (spouse test)

Words to the Wise

*under*estimating the reader
worrying what colleagues will say
journalese: “insights,” “implications”
received-wisdom syndrome
metaphors that don’t travel well
obsessing over length
readers can stop anytime



http://vinodwadhawan.blogspot.com/2012/01/9-symmetry-is-supreme.html

Words to the Wise

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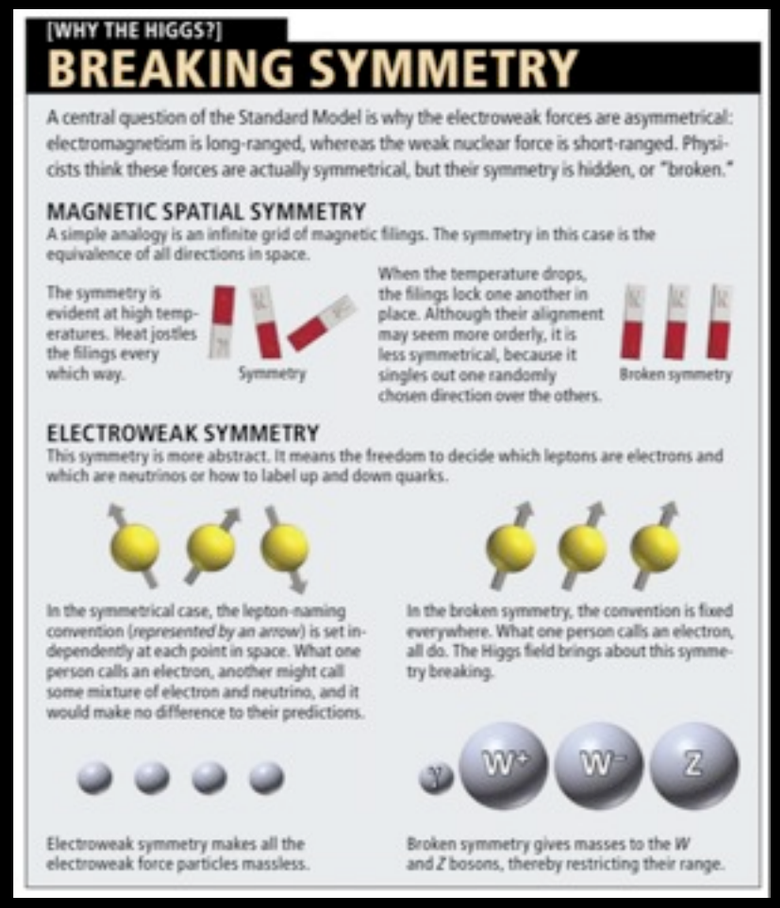


[WHY THE HIGGS?]

BREAKING SYMMETRY

A central question of the Standard Model is why the electroweak forces are asymmetrical: electromagnetism is long-ranged, whereas the weak nuclear force is short-ranged. Physicists think these forces are actually symmetrical, but their symmetry is hidden, or “broken.”

MAGNETIC SPATIAL SYMMETRY

A simple analogy is an infinite grid of magnetic filings. The symmetry in this case is the equivalence of all directions in space.

The symmetry is evident at high temperatures. Heat jostles the filings every which way.

Symmetry

When the temperature drops, the filings lock one another in place. Although their alignment may seem more orderly, it is less symmetrical, because it singles out one randomly chosen direction over the others.

Broken symmetry

ELECTROWEAK SYMMETRY

This symmetry is more abstract. It means the freedom to decide which leptons are electrons and which are neutrinos or how to label up and down quarks.

In the symmetrical case, the lepton-naming convention (*represented by an arrow*) is set independently at each point in space. What one person calls an electron, another might call some mixture of electron and neutrino, and it would make no difference to their predictions.

In the broken symmetry, the convention is fixed everywhere. What one person calls an electron, all do. The Higgs field brings about this symmetry breaking.

Electroweak symmetry makes all the electroweak force particles massless.

Broken symmetry gives masses to the *W* and *Z* bosons, thereby restricting their range.

http://vinodwadhawan.blogspot.com/2012/01/9-symmetry-is-supreme.html

Life Cycle of a Print Article I

Article → Editorial → Invitation → Writing → Drafts → Submission → Waiting

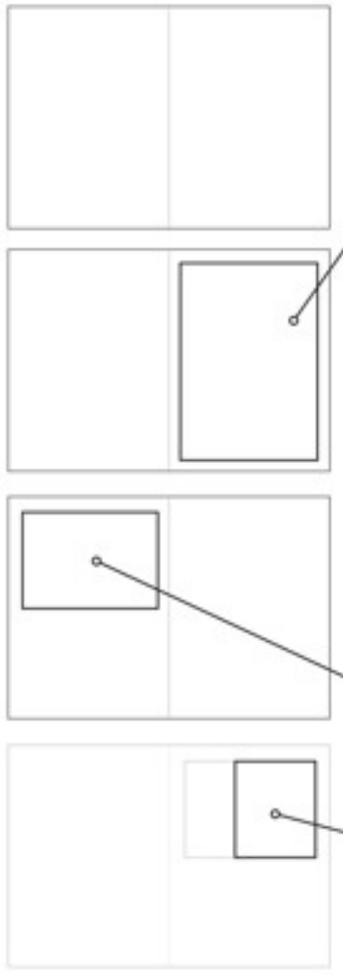
Life Cycle of a Print Article II

line-editing; summary for art and web team	(e.g., December)
author review of line-edit	(early January)
copy-editing and first proofs	(late January)
full proofs	(early February)
article goes to press	(mid-February)
goes up on newsstands and website	(mid-March)
it ain't over: readers' responses	(April, May)


CODEPENDENCE OF ANOTHER ORDER
SUPER SUPERNOVAE
MACHINE BRAIN
by Jen Christiansen, 29 Mar 12

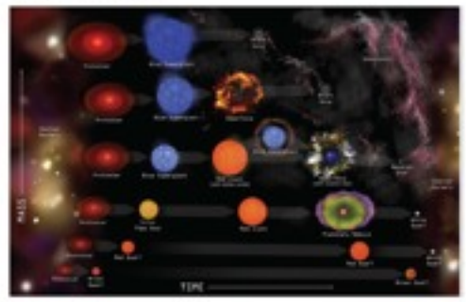
AUTHOR GOLDSMITH
TITLE FUTURE OF STARS
EDITOR MUSSER
MONTH MARCH

INFOGRAPHICS



Box 1: Birth, life, and death of stars

How stars are born and die (stars of different masses die in different ways). Era of intense star formation is over, but the universe is, and will be, far from static. Something like this:



Box 2: Collision of Milky Way and Adromeda

Our star and planet system is due for a collision. Interactions like this will reinvigorate star formation temporarily, producing starbursts.

Box 3: chart: the effects of higher levels of heavy elements in future stars

1) increased opacity of star's outer layers ---> lowers nucelar fuel consumption and nudges towards longer life

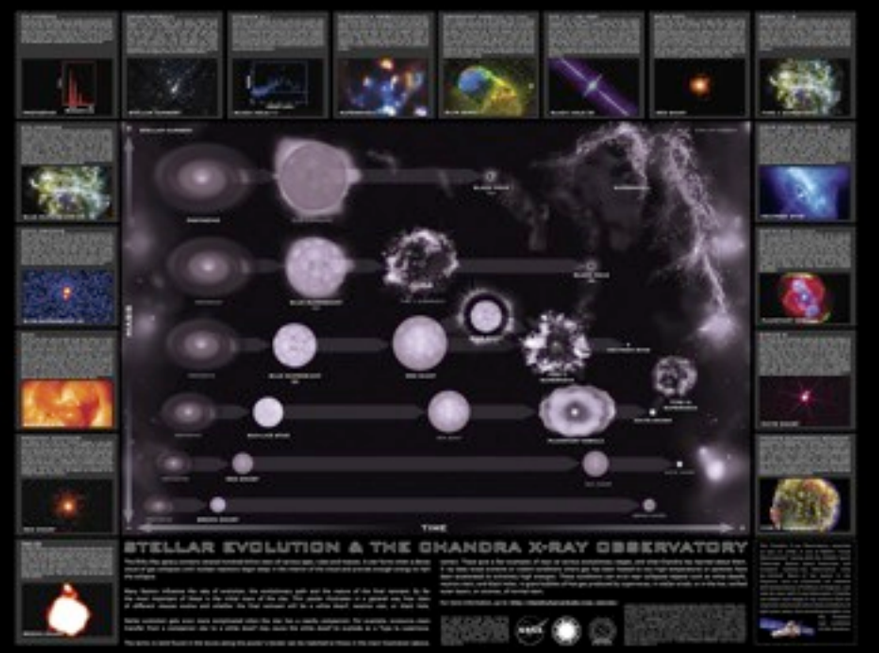
2) but, the heavy elements do not participate in nuclear fusion, therfore reducing nuclear fuel available, and limiting the star's life

These 2 effects operate on different timescales: could be interesting to plot them over time, showing prospects for a long life, then crossing over into the zone of limited life when heavy elements reach a certain level.

Also-- heavy elements should favor birth of planets.

http://blogs.scientificamerican.com/at-scientific-american/2012/02/21/the-evolution-of-a-scientific-american-

Evolution of an Infographic



http://chandra.harvard.edu/edu/formal/stellar_ev/poster_horiz_med2.jpg

http://blogs.scientificamerican.com/at-scientific-american/2012/02/21/the-evolution-of-a-scientific-american-

OVERLINE TEEKAY

Birth, Life, and Death of Stars

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Stellar Evolution Head Teekay

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How Do Helium White Dwarf Stars Fit in?

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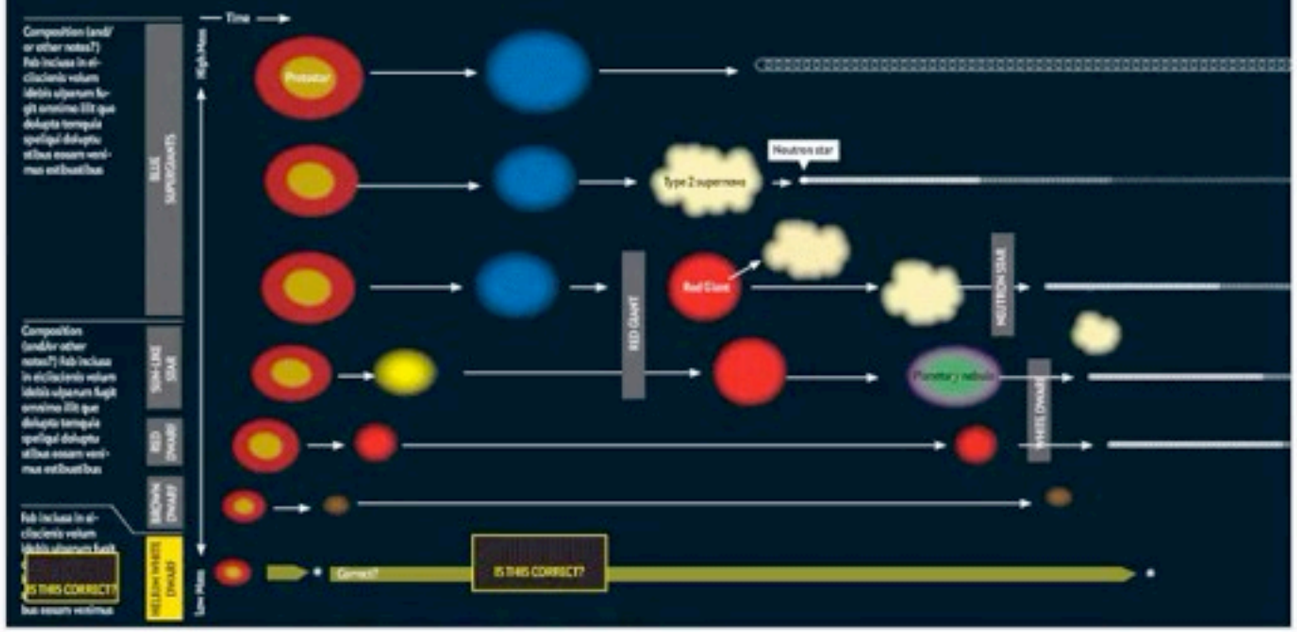

http://blogs.scientificamerican.com/at-scientific-american/2012/02/21/the-evolution-of-a-scientific-american-

The Emperor, Darth Vader a

blogs.scientificamerican.com/observations/2012/03/30/the-emperor-darth-vader-and-the-ultimate-ultimate-theory-of-p...

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Observations

Opinion, arguments & analyses from the editors of *Scientific American*

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The Emperor, Darth Vader and the Ultimate Ultimate Theory of Physics

By George Musser | March 30, 2012 | 4

Share Email Print

PASADENA—The theory is so obscure there's not a Wikipedia page about it yet. It might be impossible to formulate mathematically. One theoretical physicist calls it the Emperor Palpatine of theories, even more powerful and inscrutable than the

Blog Network Highlights

4 Apr 12

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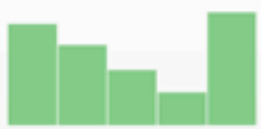

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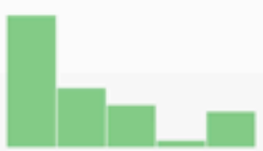

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Why They Visit: Social Factor

- Social community referrals +172% (+2.1M)
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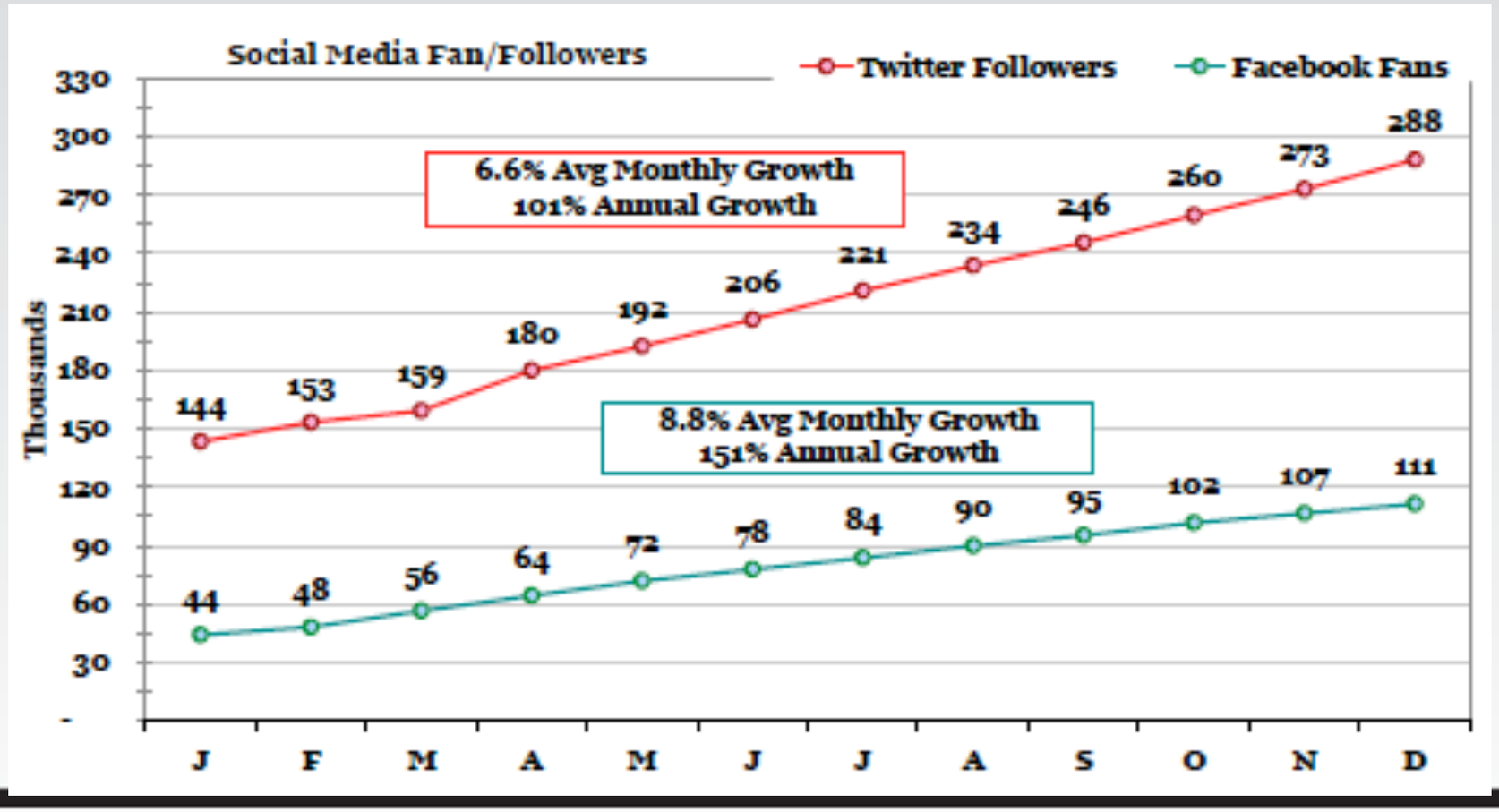

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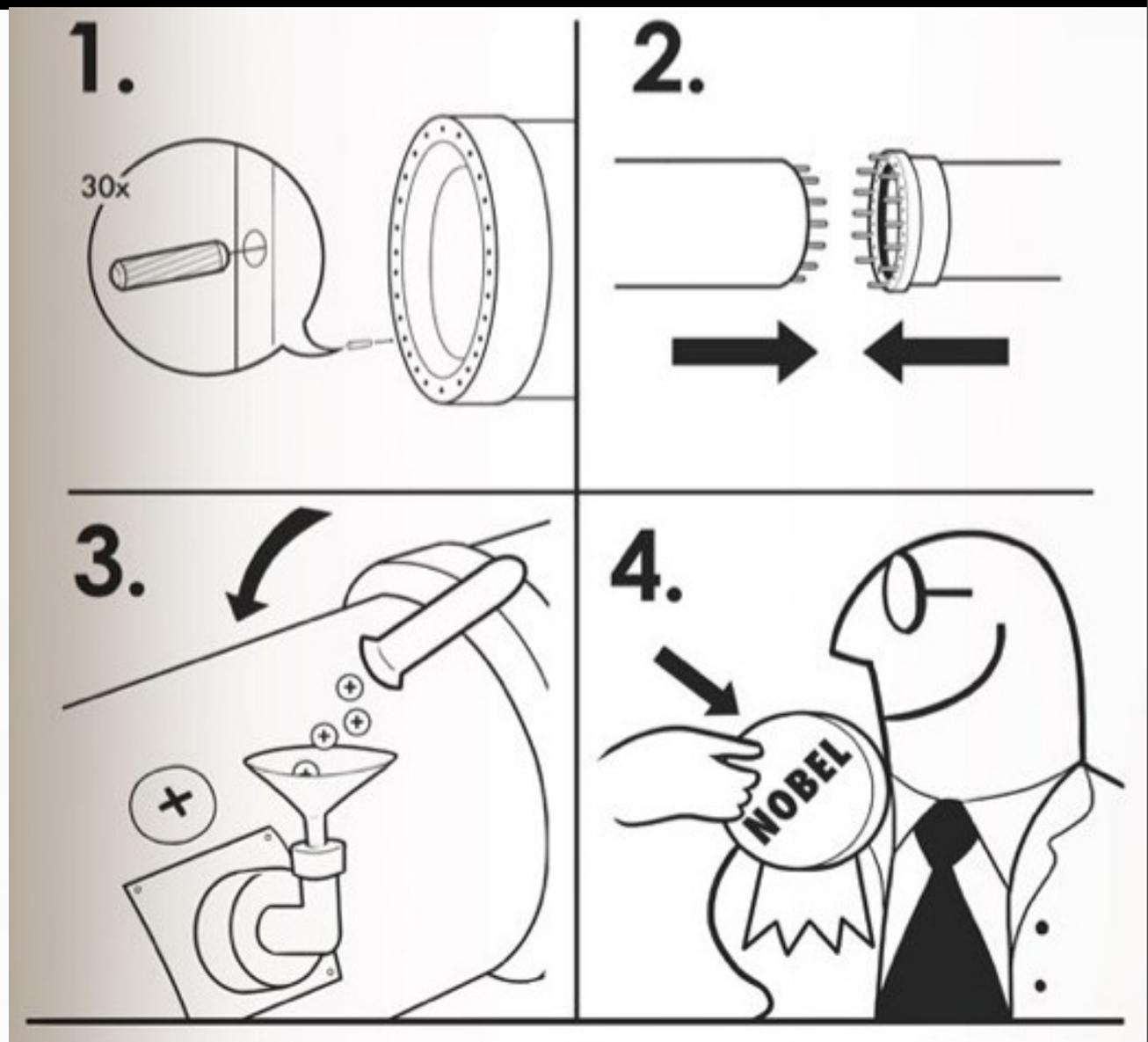

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