

Science Communication

A Visual Perspective

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Health Research Alliance • 28 March 2019



Why?

Why think about design?

Why think about design?

Design matters.

OFFICIAL BALLOT, GENERAL ELECTION
PALM BEACH COUNTY, FLORIDA
NOVEMBER 7, 2000

OFFICIAL BALLOT, GENERAL ELECTION
PALM BEACH COUNTY, FLORIDA
NOVEMBER 7, 2000

A

**ELECTORS
FOR PRESIDENT
AND
VICE PRESIDENT**

(A vote for the candidates will
actually be a vote for their electors.)

(Vote for Group)

(REPUBLICAN)
GEORGE W. BUSH - PRESIDENT
DICK CHENEY - VICE PRESIDENT 3 →

(DEMOCRATIC)
AL GORE - PRESIDENT
JOE LIEBERMAN - VICE PRESIDENT 5 →

(LIBERTARIAN)
HARRY BROWNE - PRESIDENT
ART OLIVIER - VICE PRESIDENT 7 →

(GREEN)
RALPH NADER - PRESIDENT
WINONA LaDUKE - VICE PRESIDENT 9 →

(SOCIALIST WORKERS)
JAMES HARRIS - PRESIDENT
MARGARET TROWE - VICE PRESIDENT 11 →

(NATURAL LAW)
JOHN HAGELIN - PRESIDENT
NAT GOLDHABER - VICE PRESIDENT 13 →

(REFORM)
← 4
PAT BUCHANAN - PRESIDENT
EZOLA FOSTER - VICE PRESIDENT

(SOCIALIST)
← 6
DAVID McREYNOLDS - PRESIDENT
MARY CAL HOLLIS - VICE PRESIDENT

(CONSTITUTION)
← 8
HOWARD PHILLIPS - PRESIDENT
J. CURTIS FRAZIER - VICE PRESIDENT

(WORKERS WORLD)
← 10
MONICA MOOREHEAD - PRESIDENT
GLORIA La RIVA - VICE PRESIDENT

WRITE-IN CANDIDATE
To vote for a write-in candidate, follow the
directions on the long stub of your ballot card.

Why think about design?

Design communicates.

Why think about design?

Design communicates.

Design engages.

The paradox of effective design

The paradox of effective design



“Pay no attention to that man behind the curtain!”

Okay, where to begin?

Okay, where to begin?

“What is my message?”

“Who is my audience?”

A far from comprehensive look
at nuts-and-bolts best practices

A far from comprehensive look
at nuts-and-bolts best practices

or

Just because you **can**,
doesn't mean you **should**.

Graphic Designer's Judgment Clouded By Desire To Use New Photoshop Plug-In

9/27/00 3:00pm • SEE MORE: WORKPLACE ▾

CLEVELAND HEIGHTS, OH—The aesthetic judgment of Paul Gaskill, a graphic designer working on a brochure for Valley View Apartments, was "severely clouded" by a desire to use a new Adobe Photoshop plug-in, coworkers at Blue Moon Design said Monday.



Photoshop plug-in enthusiast Paul Gaskill.

"Looking at this brochure, it's obvious Paul just wanted to use the 'wave' frame effect from that new PhotoFrame 2.0 software package we got last week," fellow Blue Moon graphic designer Jared Mahaffey said. "There's whacked-out, psychedelic edges all over the place—on the photos, on the floor-plan charts, even on the text boxes, for God's sake."

Typography

Don't outline text or use
Comic Sans or Papyrus.

And limit your typefaces.

Typography

One or two spaces
after a period?

Typography

This is an example of monospaced type.

This is an example of variable-width type.

Once upon a time, most text was typed on typewriters with monospaced characters. It made sense then to have double spaces after a period. It was necessary for readability.

Modern word processing has changed matters. A single space after a period is now correct and appropriate. Double spaces are too much, and actually hinder readability.

Line length

or

Yael shakes her fist at NSF
and machine readers.

If possible, a good rule of thumb is **65 characters per line** (including spaces).

Science communication is part of a scientist's everyday life, and in order to be an effective scientist, one must be an effective communicator. Scientists must give talks, write papers and proposals, communicate with a variety of audiences, and educate others. In this session, we will explore the goals and objectives of effective scientific communication. **Lines of text that are excessively long are difficult for the eye to follow, negatively impacting readability.** How can we as funders do our part to equip our grantees with the tools and resources to become effective communicators and ambassadors for their important work?

Strive for visual cohesion.

typography

color palette

style of imagery

Introduce visual hierarchy.

size

font

weight

capping

color

spacing

visual texture

white space

READ THIS FIRST

It's the initial bit of narrative that you'll absorb. The eye is drawn to it by its placement, but also by the use of a prominent heading that precedes the text.

This becomes secondary, but is still

emphasized. It's not unimportant. Visual hierarchy allows for much more content to be communicated and comprehended. There are lots of ways of introducing and exploring this approach to the visual communication of any type of content.

Be conscious of rights
and permissions.

Don't be this person.

→ *"Oh, it's fine to use.
I found it on Google."*

Word clouds

Word clouds
(usually, don't.)

Science

11 February 2011 | \$10



Okay, what next?

Audience engagement

“This matters to me, personally!”

Consider storytelling.

Why storytelling?

Storytelling humanizes.

And the human element is
where research all begins,
and where it all ends.

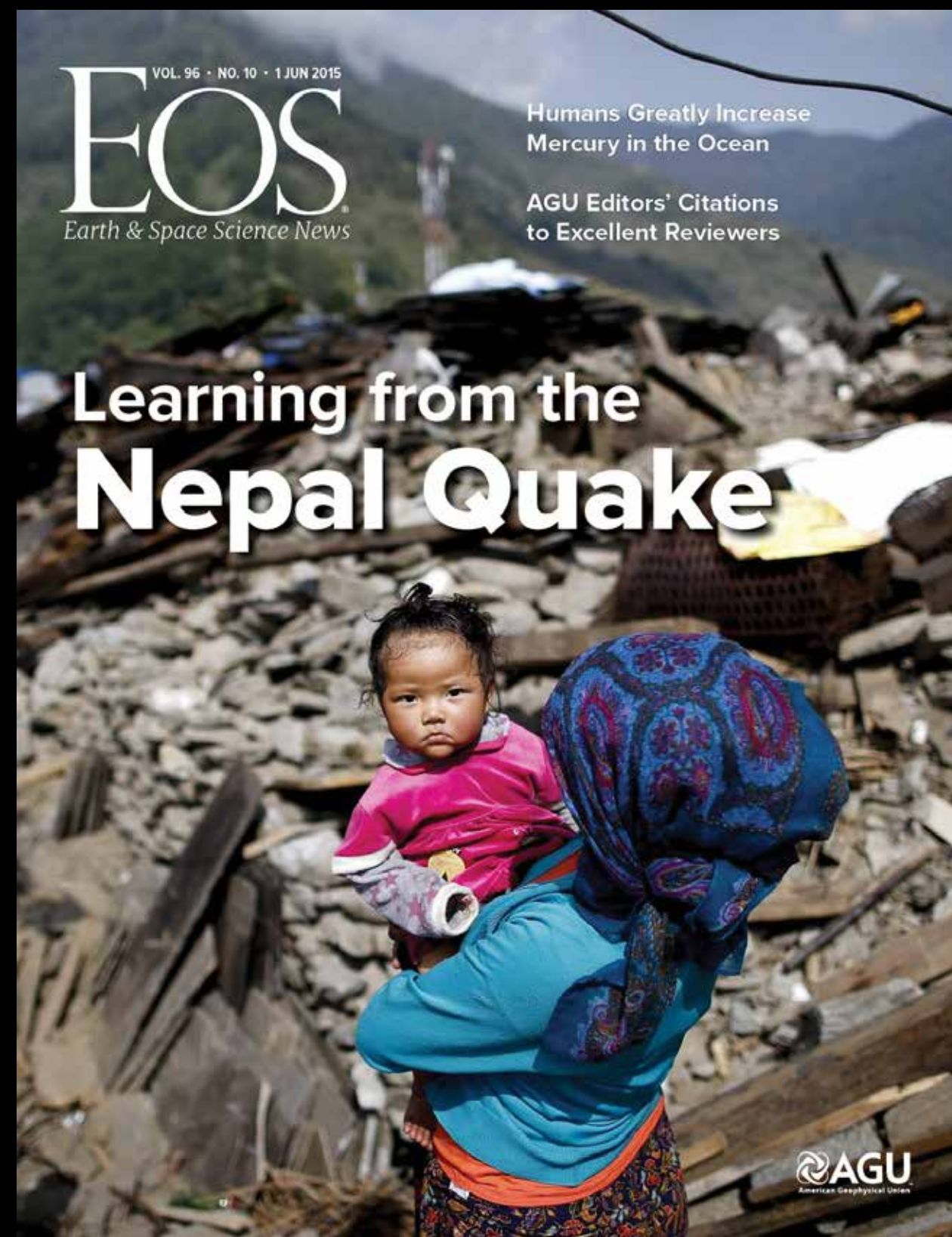
Can you make a connection?

Can you make a connection?
Then make a connection.

Make a connection.



Make a connection.



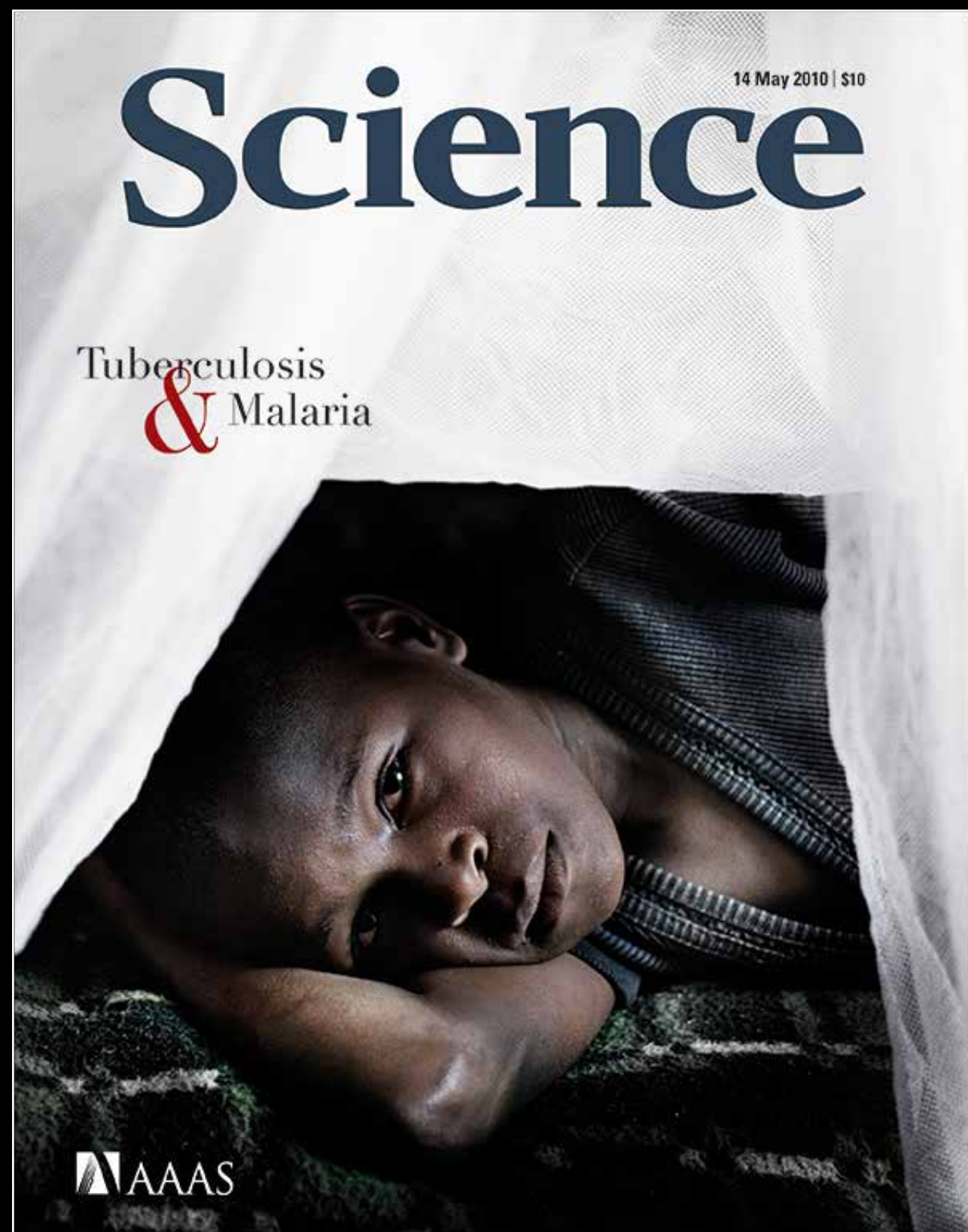
Eos 96, 10 (2015); EPA/Diego Azubel



Make a connection.



Make a connection.



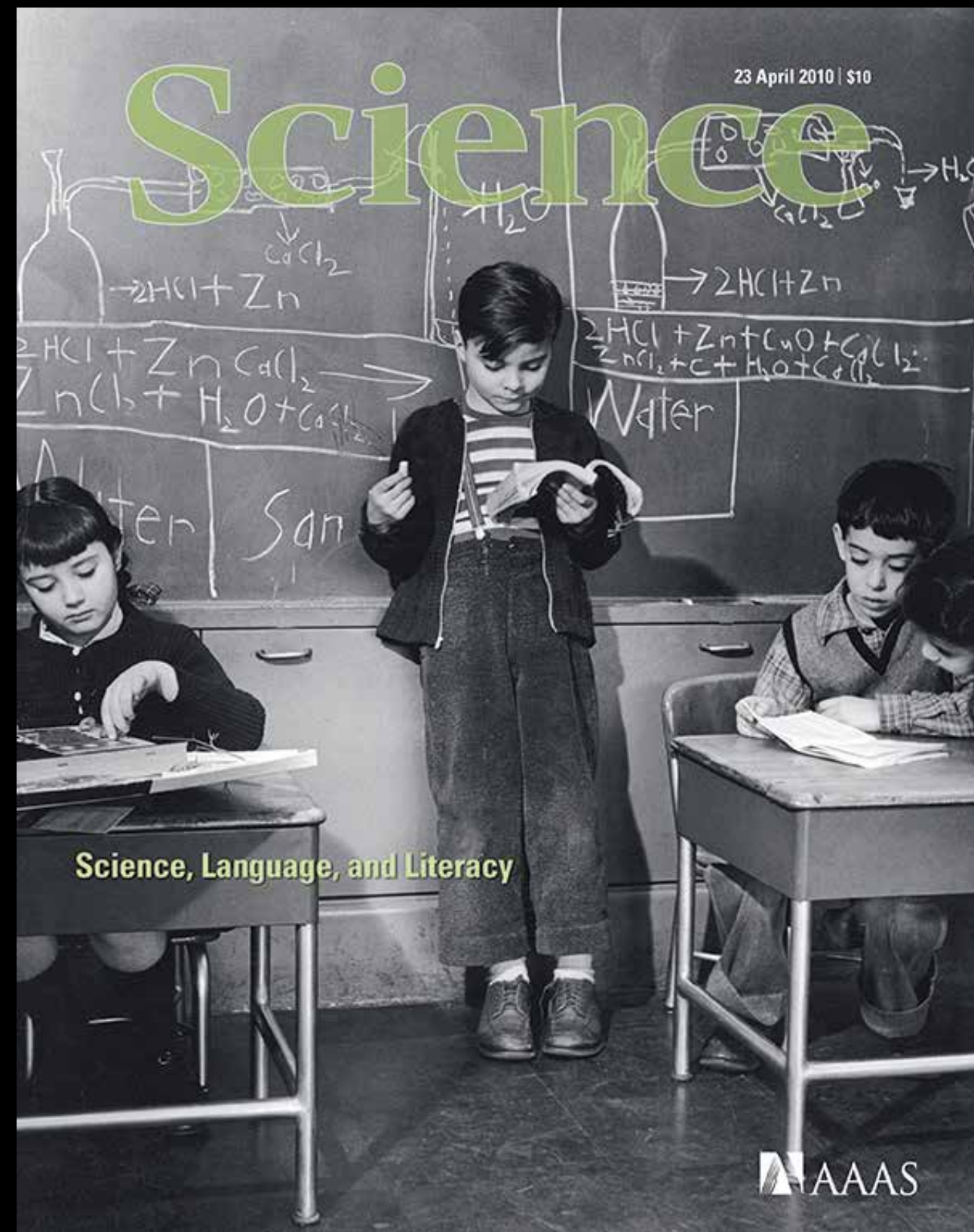
Science **328**, 777 (2010); Adam Nadel



Make a connection.



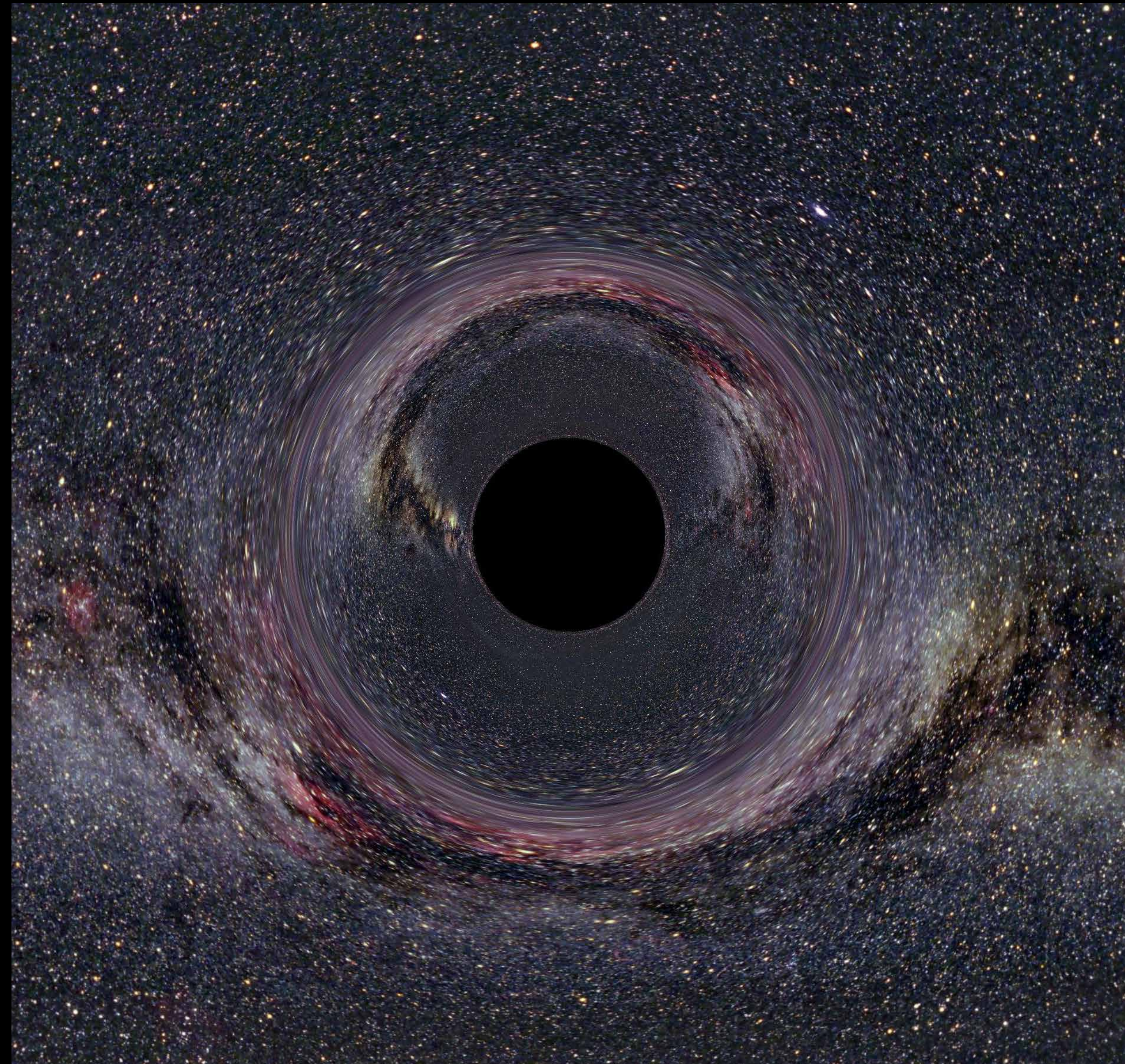
Make a connection.



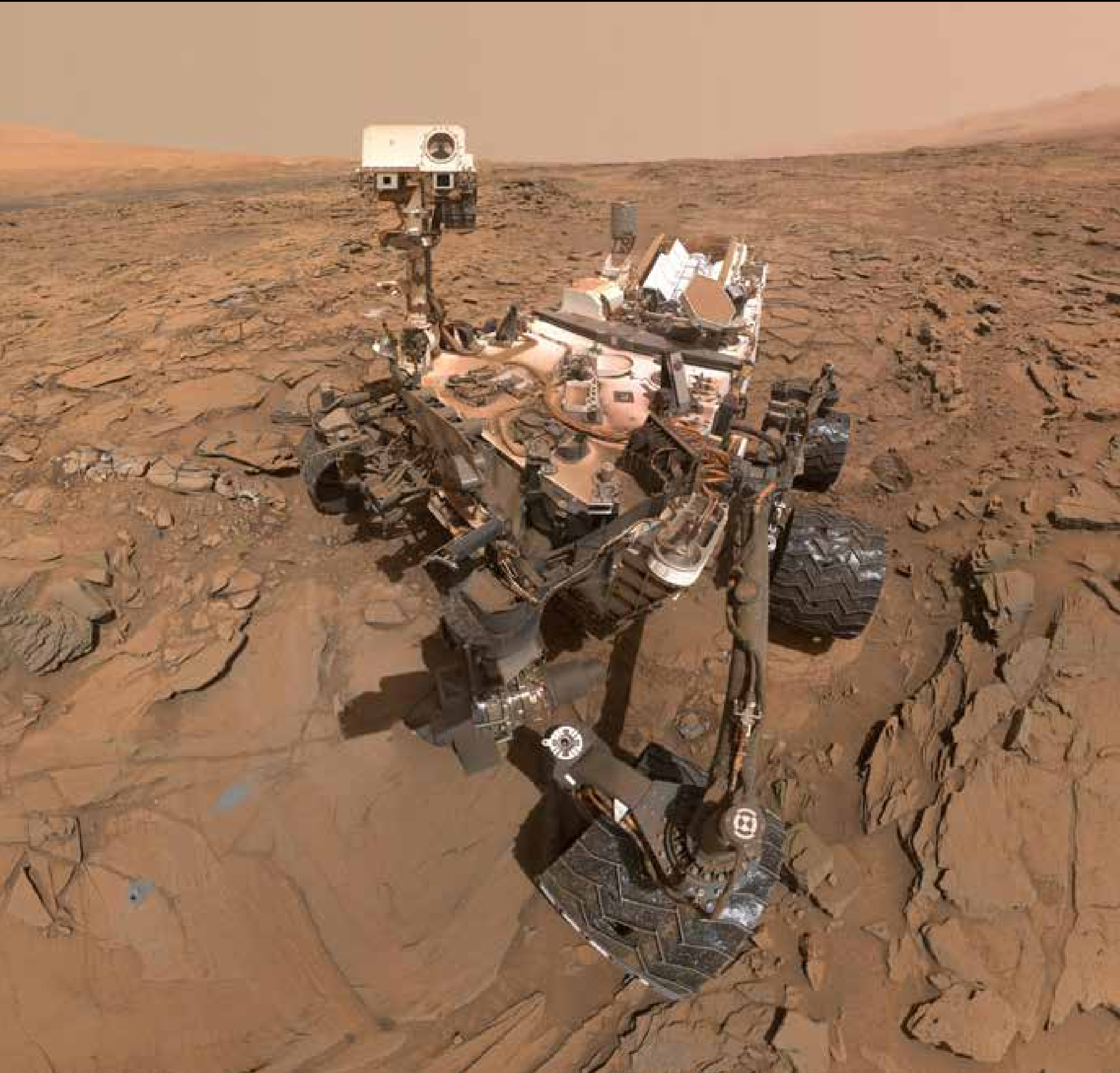
Science **328**, 393 (2010); Nina Leen/Time Life Pictures/Getty Images



Metaphors:
approachable and memorable.



CC BY 2.5 Rich Niewiroski Jr/www.projectrich.com/gallery
CC BY-SA 2.5 Ute Kraus, Physics education group Kraus, Universität Hildesheim



NASA/JPL-Caltech/MSSS
CC BY-SA 3.0 Ingfbruno via Wikimedia Commons

Explore visual metaphor.



Explore visual metaphor.



Science **328**, 1193 (2010)

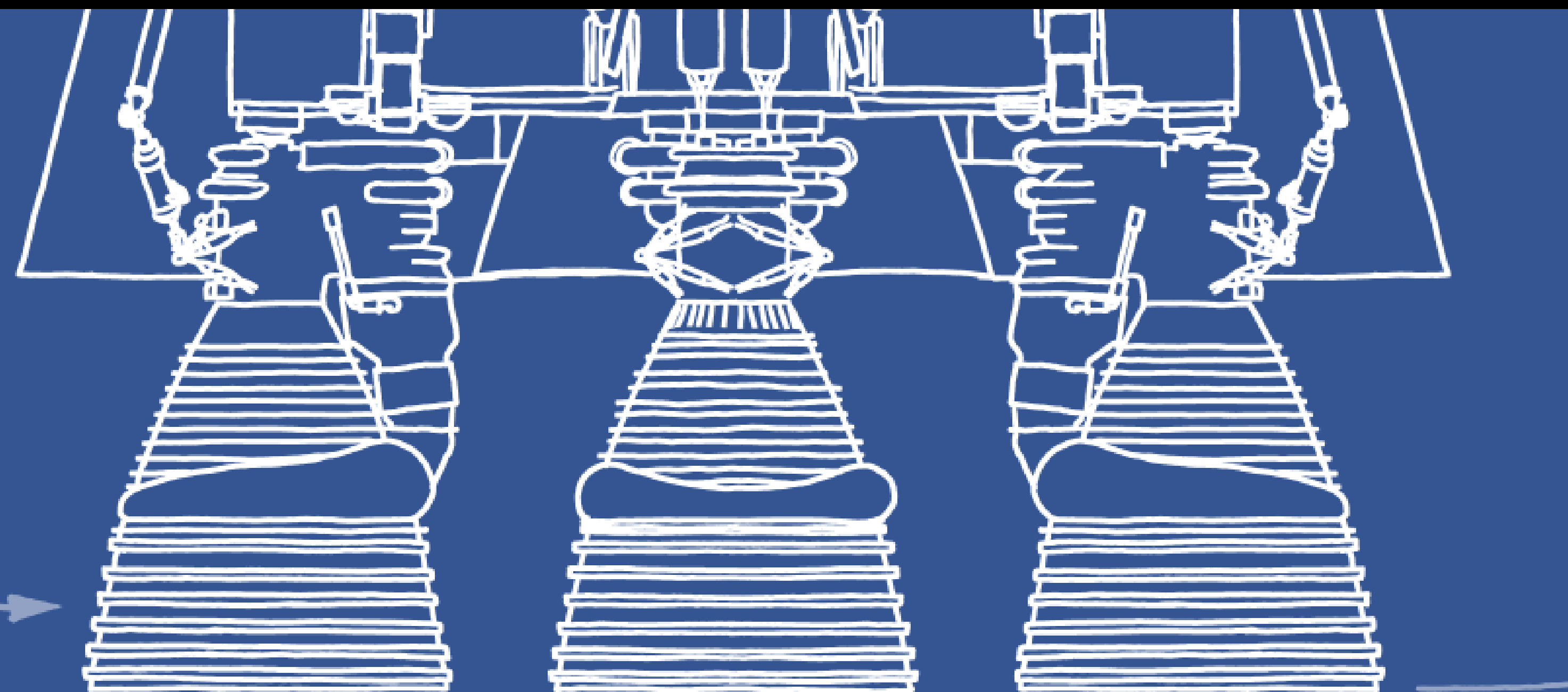
And *yes*, YOU CAN.

Embrace simplicity.

Embrace simplicity.
And humor.

Embrace simplicity.
And humor.
Sometimes together.

LOTS OF FIRE
COMES OUT HERE



THIS END SHOULD POINT TOWARD THE
GROUND IF YOU WANT TO GO TO SPACE.

IF IT STARTS POINTING TOWARD SPACE
YOU ARE HAVING A BAD PROBLEM AND
YOU WILL NOT GO TO SPACE TODAY.

Simplicity is powerful.

Simplicity is powerful.
Simplify the jargon
to tell the story.

Resist the urge to collage.

More is not more!

A. ramidus

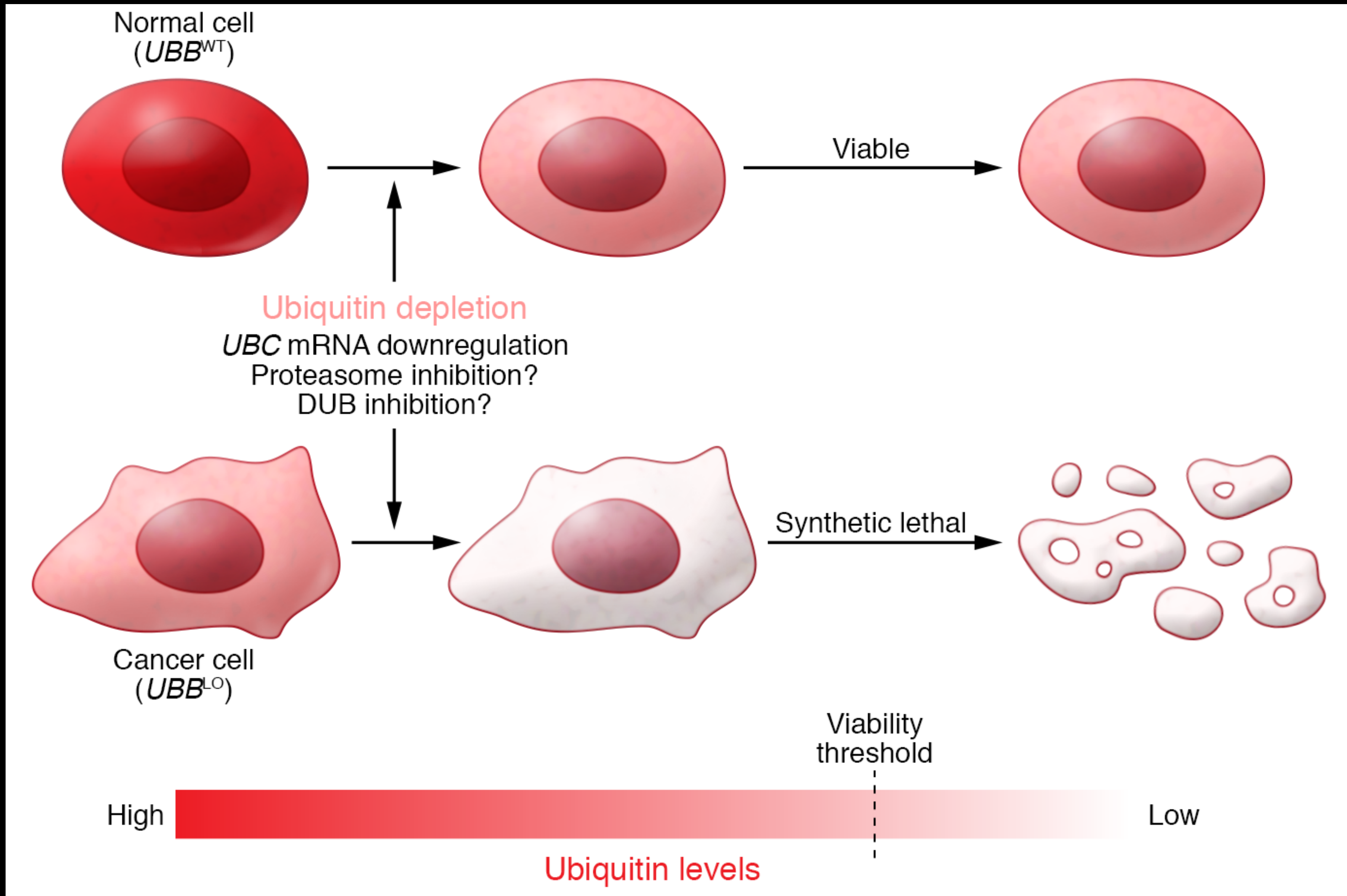


A. ramidus



Apply these concepts
to graphical abstracts.





Consider the tone.

HUMAN CONFLICT

HUMAN CONFLICT

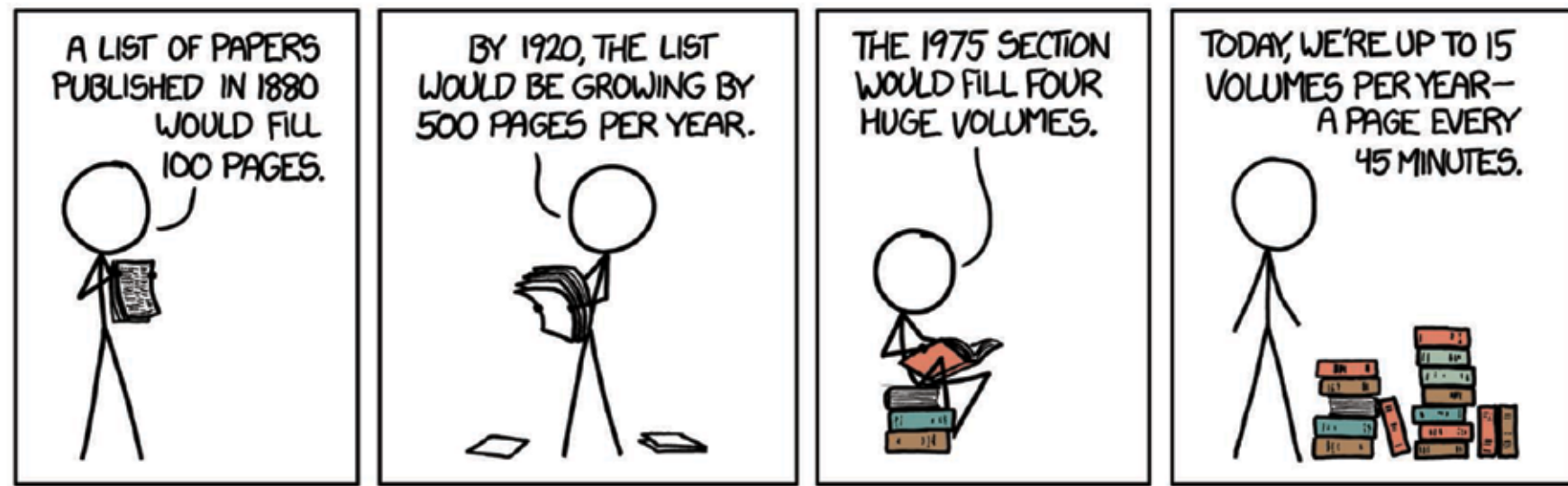
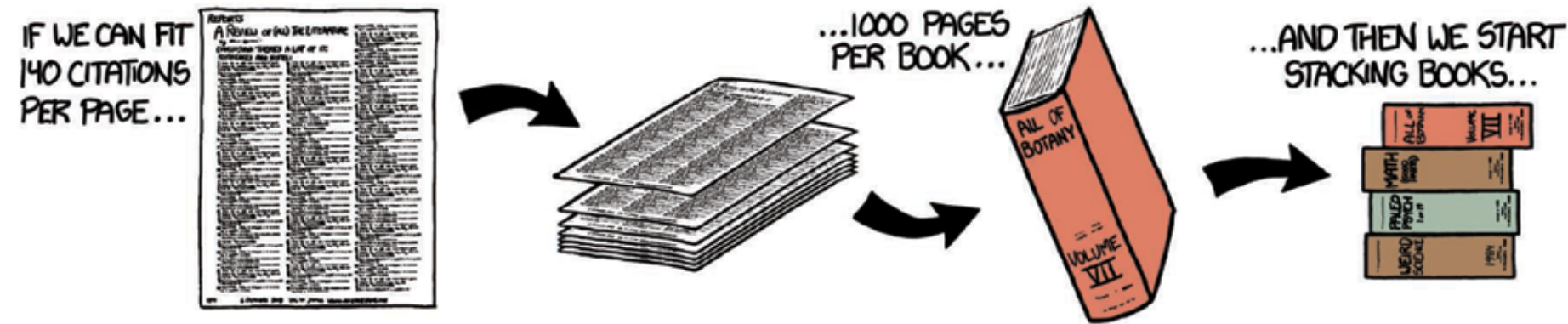


Science **336**, 818 (2012); Thinkstock
Hal Mayforth

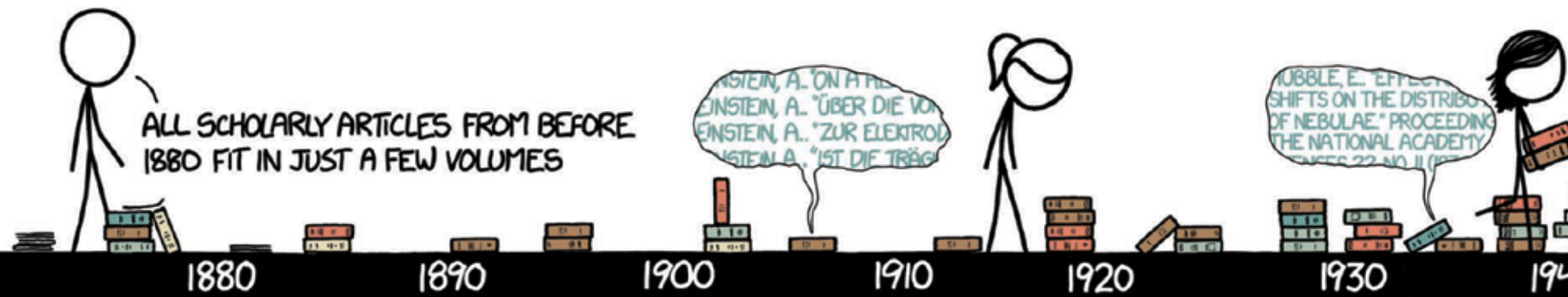
Can you create a story arc?

HOW MUCH SCIENCE IS THERE?

SCIENTIFIC PUBLISHING HAS BEEN ACCELERATING—A NEW PAPER IS NOW PUBLISHED ROUGHLY EVERY 20 SECONDS. LET'S IMAGINE A BIBLIOGRAPHY LISTING *EVERY* SCHOLARLY PAPER EVER WRITTEN. HOW LONG WOULD IT BE?

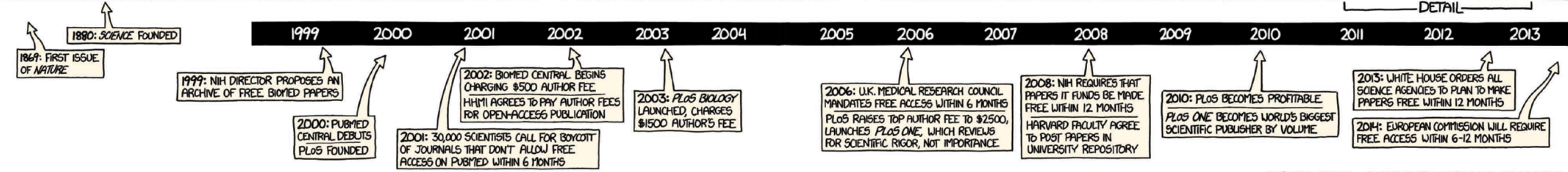
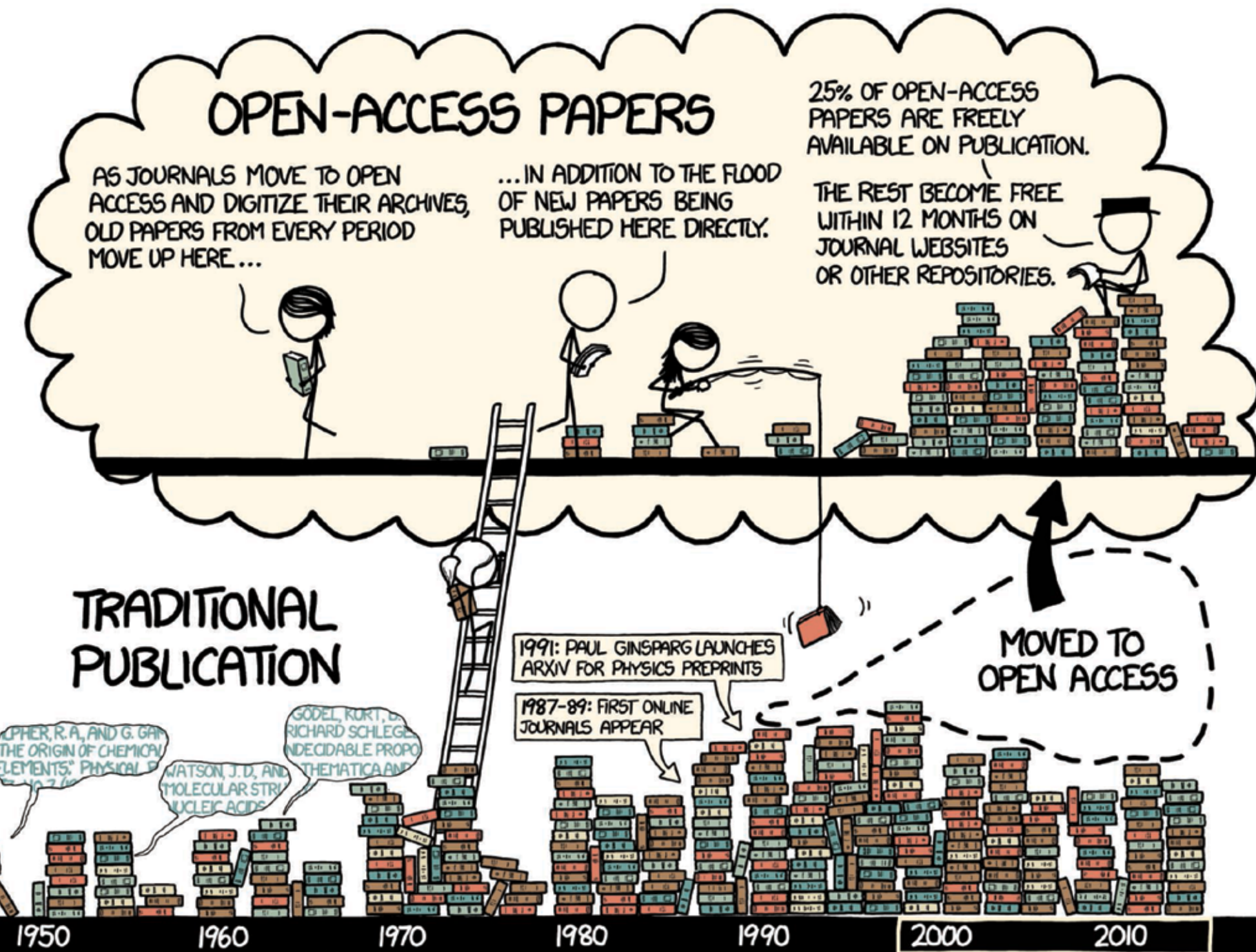


...THIS IS WHAT THE FULL LIST WOULD LOOK LIKE:

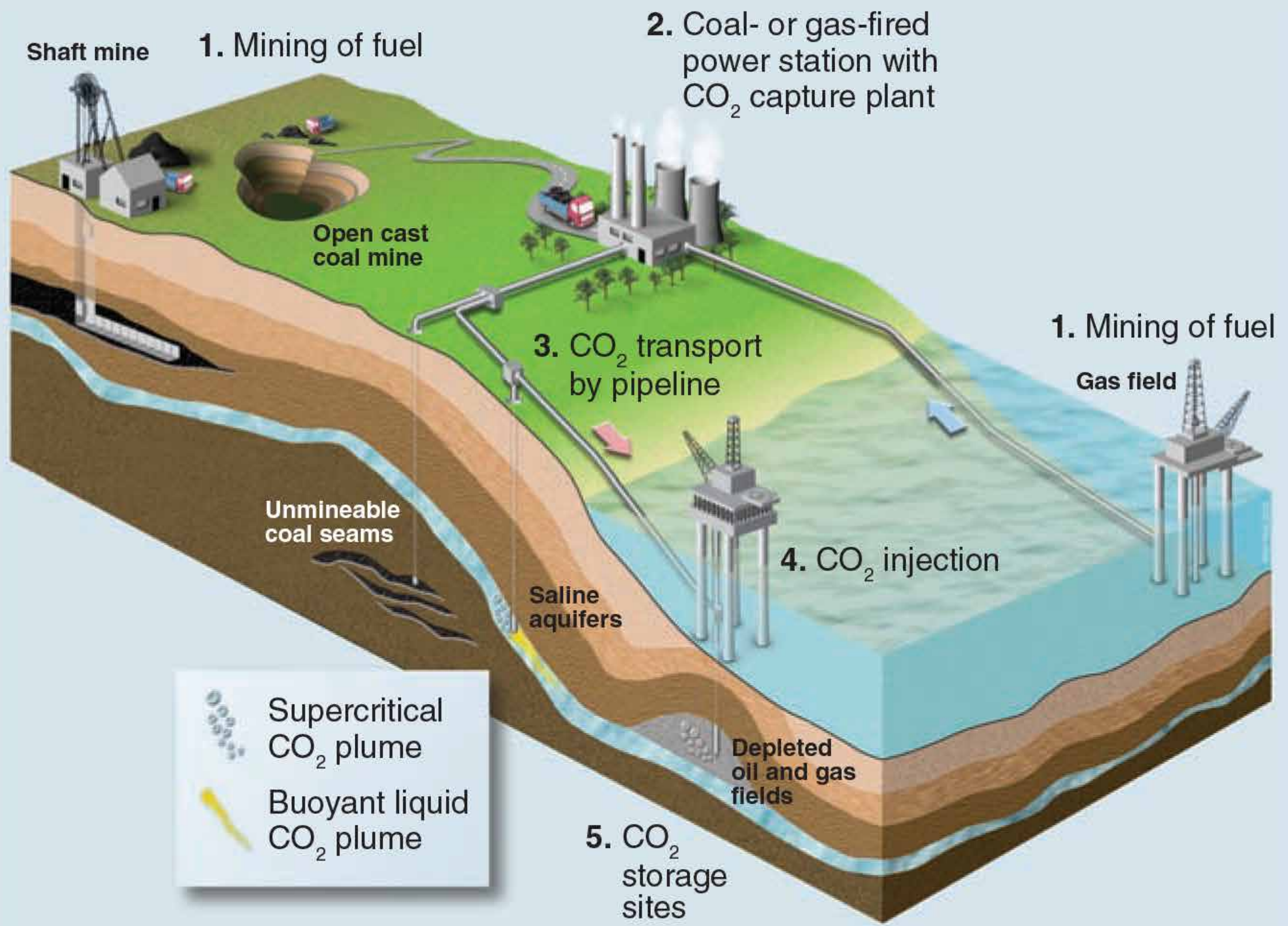


HOW OPEN IS IT?

SINCE THE ADVENT OF THE WEB, MUCH OF SCIENTIFIC PUBLISHING HAS BEEN MOVING TO *OPEN ACCESS*. ACCORDING TO SCIENCE-METRIX, OPEN ACCESS REACHED A "TIPPING POINT" AROUND 2011: MORE THAN 50% OF NEW RESEARCH IS NOW MADE AVAILABLE FREE ONLINE.



BY RANDALL MUNROE • REPORTING BY JOCELYN KAISER AND DAVID MALAKOFF



Or have a picture replace
1,000 words?



“Limitations” aren’t limiting.

necessary to take into consideration each peasant's individual position rather than the interests of the peasant community.⁸⁷ Many governors of the southern provinces made the same recommendations and suggestions. In 1900, the governor of Kherson calculated that local peasants needed a minimum of 10 desiatin for each household to survive. This governor suggested granting all land as private property to the peasants. Without private land, in his opinion, the peasants had no motivation to work, and as a result they waited constantly for redistribution of communal land.⁸⁸

The institutions of the village community that were foisted on peasants by the central authorities by the Emancipation undermined the traditional work ethic of the southern Russian peasants and generated social conflicts. The communal peasants on the southern frontier lived side by side with prosperous private landowners and foreign colonists. Facing dispossession, these peasants envied their prosperous neighbors. The governor of Kherson noted this dangerous trend among the local peasants. "Holding their land as public property," he wrote, "the communal peasants are dangerous neighbors for private owners, especially small landowners, because in all conflicting situations the former peasants are inclined to solve these conflicts by appealing to their communal law. In general, communal landholding weakens the notion [chuvstvo] of property in a peasant society with each new generation."⁸⁹

These negative results of the agrarian reforms in the southern provinces were aggravated by geographical mobility and confusion in social relations among migrant peasants. These uprooted peasants from central Russian and Ukrainian provinces with their "dislocated" identities had problems adjusting to the cultural rules of the charter rural groups in the South. Southern rural society had lost the traditional symbolic code that had been understandable to these "displaced" peasants.

By the end of the nineteenth century, impoverished and culturally disoriented peasants living on the brink of physical survival were ready to react violently against any "cultural alien" who looked threatening—whether a prosperous landowner, a colonist, or a Jew. The governor of Ekaterinoslav reported to the tsar in 1901: "The peasants' landlessness has become a common phenomenon in the province. When there was a landlord's property close to a vil-

lage, the worsening of social relations did not reach a critical point; but when that property moved from a legitimate heir to either a kulak or a colonist, then the hostility between them and the peasants often became very dangerous."⁹⁰ The desperate peasants tried to restore traditional justice in the southern countryside among all rural inhabitants. They considered unequal land distribution the main reason for their sufferings. Eventually, the peasants directed their hostility against anyone who had more land and lived better than they did.⁹¹ more text for show more text for show.

Revolutionary transitions from one phase of social development to another often lead to the dispossession and impoverishment of the masses. Such transitions have always resulted in social and cultural confusion, an identity crisis, and cultural disorientation. The sufferings of the transitional period also tend to provoke religious hopes about compensation in the "afterlife" among the dispossessed classes. This "chiliastic optimism of the oppressed" (according to Karl Mannheim), or "chiliasm of the defeated and hopeless" (according to E. P. Thompson) led to the organization of a religious community that could serve as a substitute for the older social patterns of living destroyed by the revolutionary changes.

The peasants of southern Russia underwent such revolutionary changes. In their disappointment with the social conditions and the Russian Orthodox Church, they turned to dissident religious movements.⁹² According to a priest, Ioann Nedzel'nitskii, the Russian Orthodox Church regarded defection as social protest. In Kherson province, the first peasant disturbances after the reform of 1861 occurred in the village of Liubomirka, where the future Stundist movement would originate. The provincial administration sent troops to suppress the peasant riots in Liubomirka in 1862. During debates with such Orthodox missionaries as Nedzel'nitskii, the sectarians always stressed the injustice in land distribution and the clergy's defense of the large landlords' interests. The peasant Stundist from Liubomirka, P. Greeva, publicly expressed his indignation at the local landowner, the nobleman Nikolai

Consider color.



DISSOLVED ORGANIC MATTER IN THE OCEAN CARBON CYCLE

By D. A. Hansell and C. A. Carlson

Controversy leads to a better understanding of carbon cycling through a massive pool of organic matter dissolved in Earth's oceans.

8 // Eos

15 August 2015

© iStock.com/Nadeika

Earth's deep oceans contain almost as much carbon in the form of dissolved organic molecules as the planet's atmosphere contains in the form of carbon dioxide (CO₂). Given the dynamic nature of this pool, it was likely a major player in global climate over geologic time scales. Evidence suggests that sequestering large amounts of dissolved organic carbon in the deep ocean may have helped bring the planet back from past warming episodes similar to the one humans are causing now.

Could today's oceans pull off another such climate rescue? Certainly not on the timeline we'd like, but a quarter century of research has scientists poised to make major progress toward understanding how the system works.

The road to this point was not always smooth; just a few decades ago, a shocking study threw scientists' entire understanding of dissolved organic carbon in the ocean into doubt. Efforts to test the then new, incredible, and, finally, erroneous data led to a deeper understanding of how the ocean sequesters carbon.

A Surprise Result Initiates a Controversy

In the mid-1980s, ocean scientists believed that dissolved organic carbon (DOC) remained mostly biologically inactive and did not vary much throughout the ocean depths. Given that the pool of carbon was not

considered particularly dynamic compared with nutrients and oxygen, it was considered by many to be boring and, as a result, was little studied.

Then came a surprise: *Sugimura and Suzuki* [1988] reported 2–5 times larger surface ocean DOC concentrations than others had previously observed. This stunning result hinged on a new analytical technique for measuring marine DOC by high-temperature catalytic oxidation. In this technique, DOC in seawater is oxidized at high temperature and the CO₂ generated is measured.

The results indicated significant variability in DOC from the surface ocean through to the greatest depths. If the results were correct, DOC was far from “boring,” instead being central to the ocean's carbon cycle.

Troubling Implications

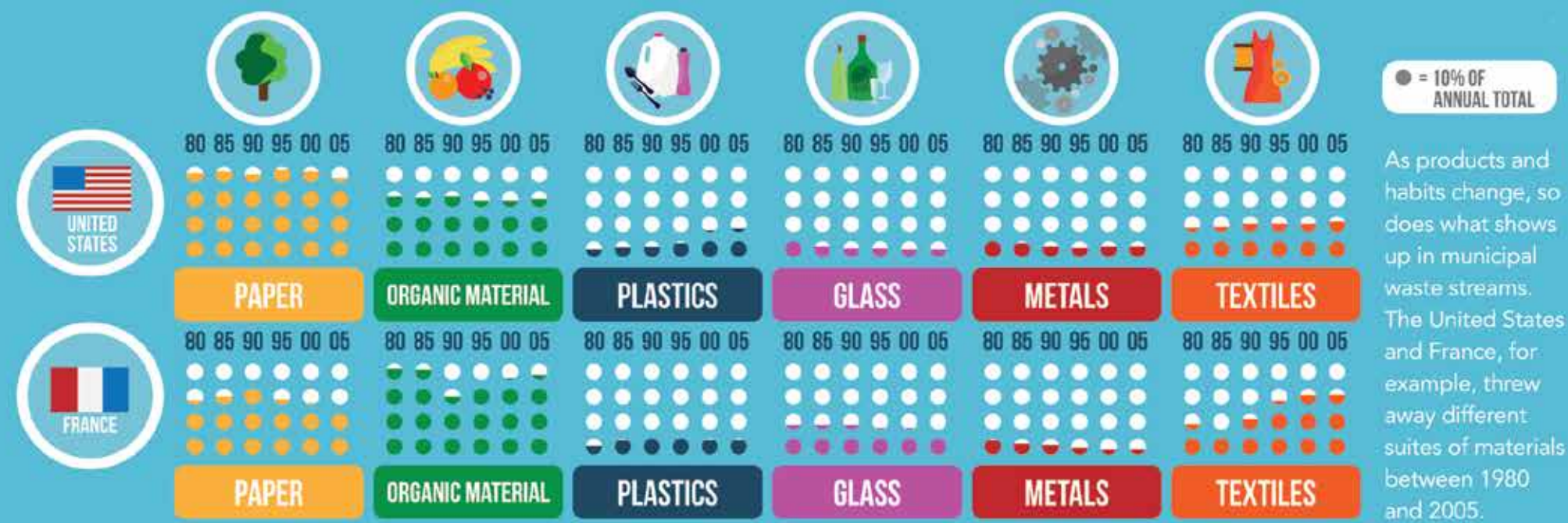
Many scientists took the results at face value in part because *Sugimura and Suzuki* [1988] showed a strong inverse relationship between their measured DOC concentrations and estimates of the oxygen utilized throughout the ocean's water column. Such an inverse relationship could be seen as consistent with what might be expected in nature: Oxygen was consumed while DOC was removed by DOC-consuming bacteria.

But if the deep ocean's oxygen consumption was primarily due to DOC consumption, the result was inconsistent with the prevailing biological pump model of the

Earth & Space Science News

Eos.org // 9

DIFFERENT SOCIETIES, DIFFERENT MUNICIPAL SOLID WASTE MATERIALS



THE FATE OF MUNICIPAL SOLID WASTE: BURY, BURN, OR RECYCLE?

How nations deal with their municipal solid waste can come down to geography, economics, and politics. Live in a nation with lots of cheap, open land near big cities? Burying your municipal solid waste in a landfill might be the cheapest option. But if real estate is expensive, burning it in an incinerator—and possibly generating some electricity with the heat—might be the choice. Or if there's political support and a reliable market, the most valuable waste materials could end up being recycled. Such factors help explain why the fate of waste varies greatly among nations, with some burying a majority of their documented municipal solid waste in landfills (top, right), while others tend to burn (middle) or recycle it (bottom).

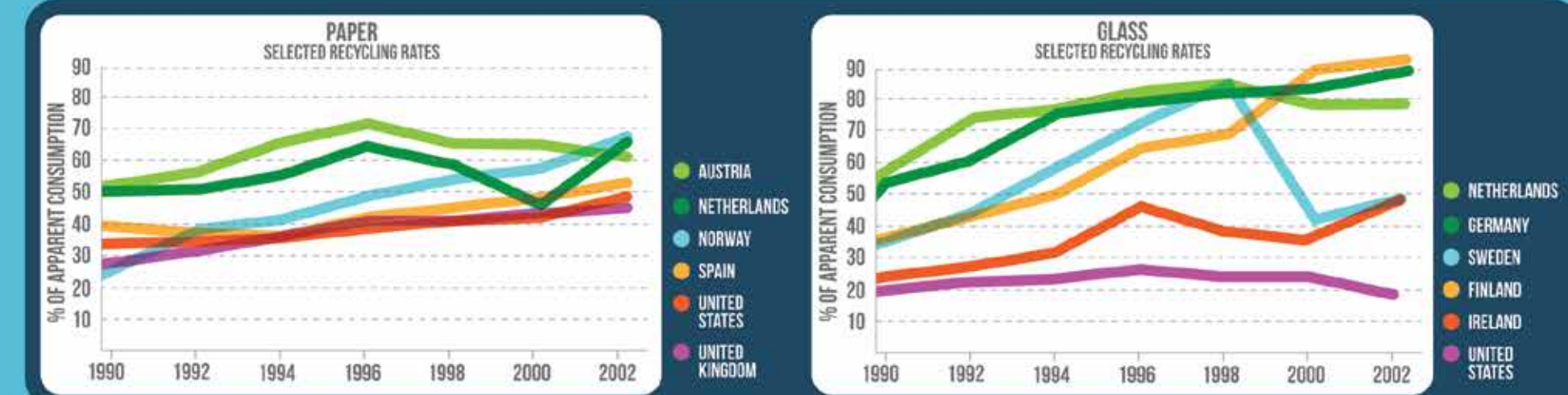


SOURCE: ALL DATA FROM OECD/OCDE

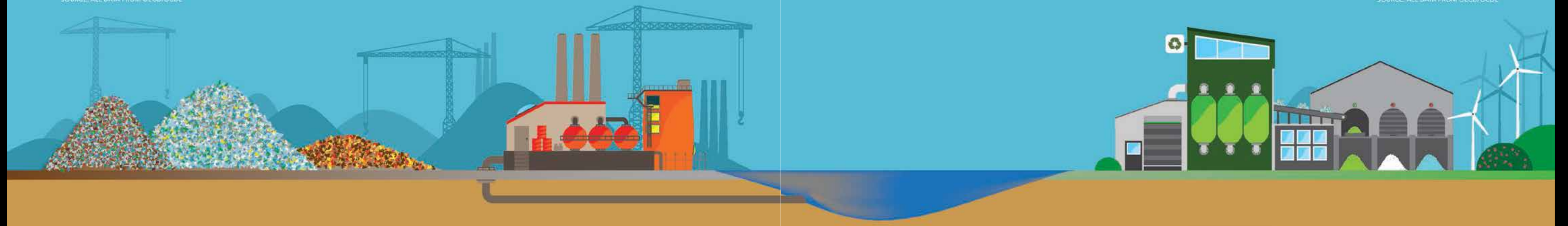
AS TIME PASSES, THE PRODUCTION & FATE OF MUNICIPAL SOLID WASTE IS CHANGING



As waste management becomes a more pressing global issue, some nations are trying to reduce their "waste intensity"—the average amount of municipal solid waste produced per person—with mixed results (top graphs). Governments are also moving to adopt policies that create incentives to recycle more material, such as paper and glass (below). Although global economic trends can sometimes weaken markets for recycled materials, many nations are reusing more of their most valuable waste products than they did decades ago.

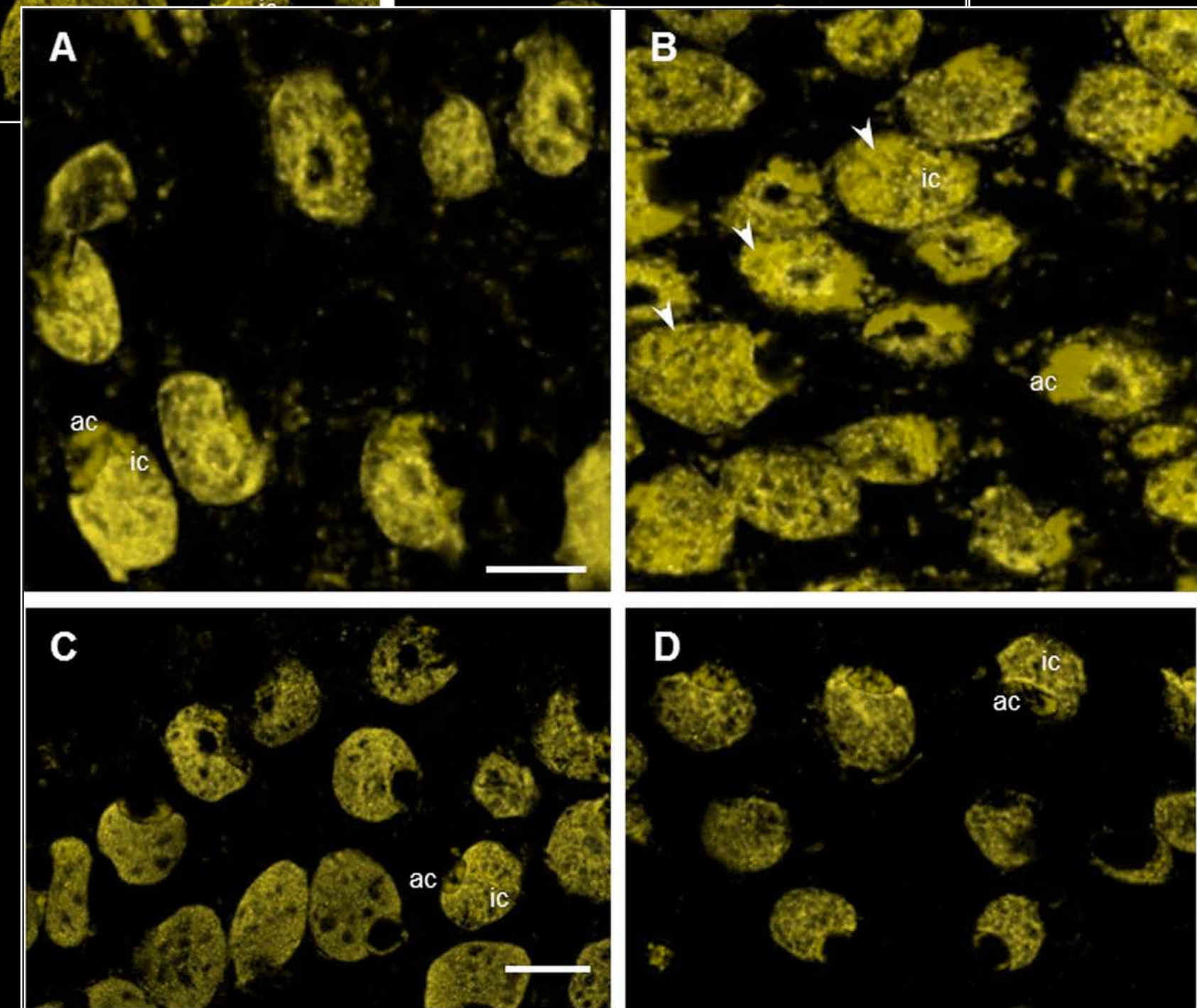
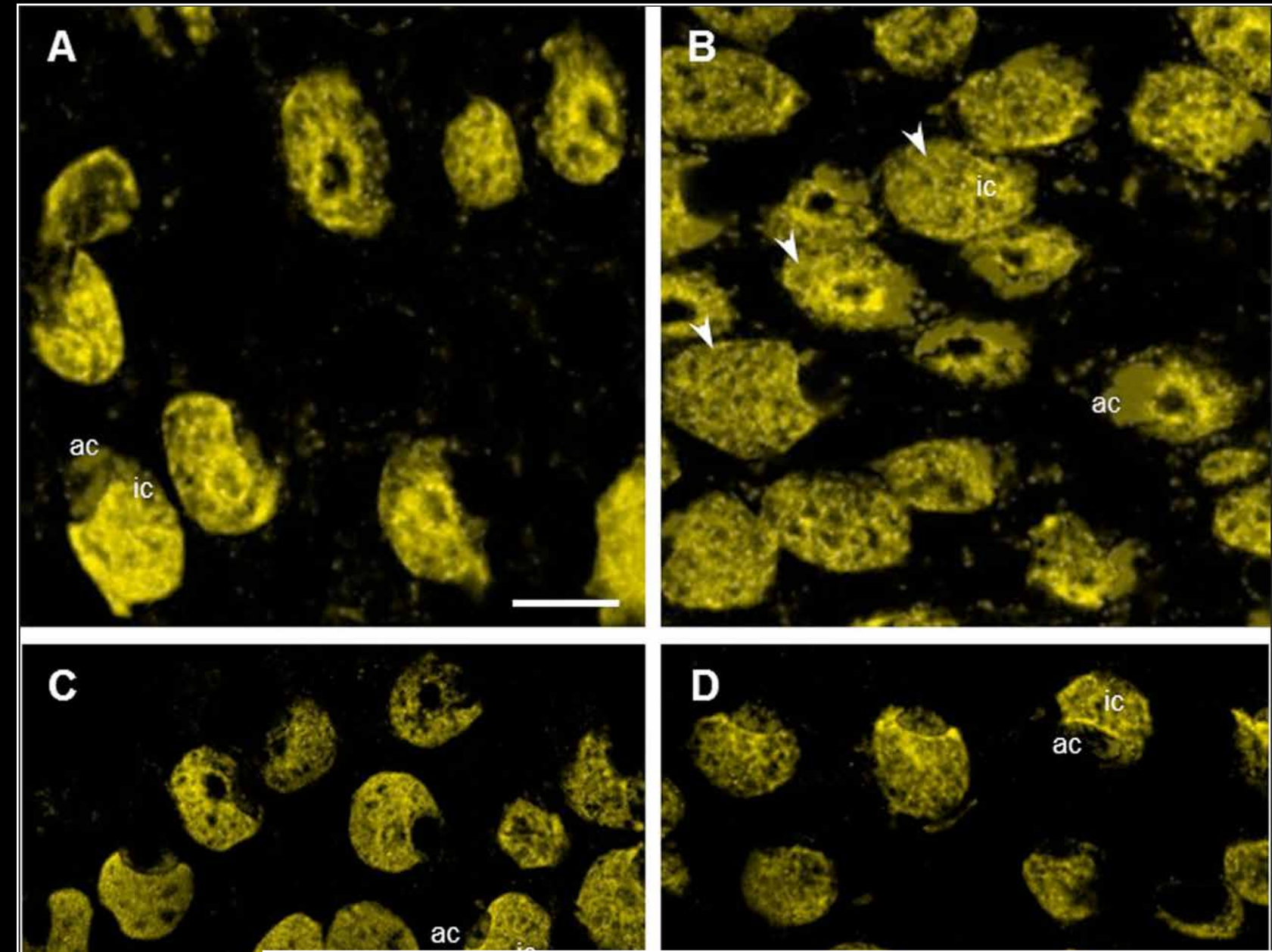
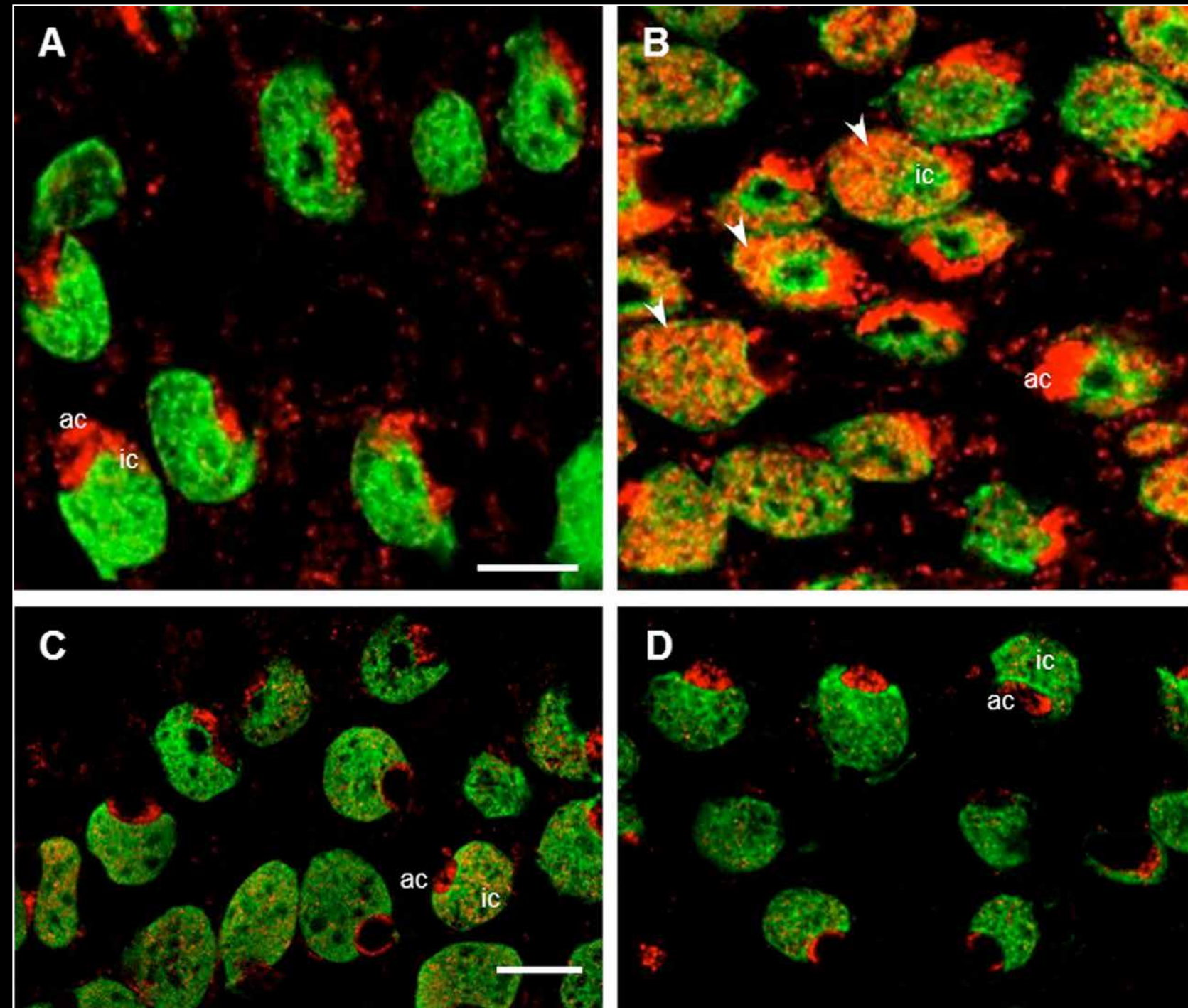


SOURCE: ALL DATA FROM OECD/OCDE



Consider color.

And consider those who can't.



Consider color.

And consider those who can't.

Design accordingly, and always employ
color vision deficiency simulation tools.

Adobe Creative Suite

www.colororacle.org

www.color-blindness.com/coblis-color-blindness-simulator

A parting thought:

Collaborate.

Thank you!

Gazelle Design Consultancy • yael@GazelleDC.com