ScienceNews

IN HIGH SCHOOLS | EDUCATOR GUIDE

September 17, 2016

Introductory Issue

SOCIETY FOR SCIENCE & THE PUBLIC

SN EDUCATOR GUIDE

September 17, 2016

Introductory Issue

Welcome to *Science News*

In the first edition of the *Science News* in High Schools Educator Guide for the 2016–2017 academic year, we will introduce you to the basics — and special features — of this award-winning news magazine. Published since 1922 by the Society for Science & the Public, *Science News* offers concise and comprehensive coverage of the latest discoveries and developments across scientific fields, from the biology of cells to the orbits of planets, from the warming of our atmosphere to the chemistry of the seas.

Within each issue, you'll find more than two dozen articles ranging from short critter profiles to breaking news stories to deep explorations of a trending area of scientific research. There are even reviews of science-themed films and books. Written by a staff of experienced science journalists, the magazine emphasizes clarity and accuracy while putting new findings in perspective. You won't find science hype here, and we don't gloss over the "how" of science. Instead, the articles in *Science News* reveal the true nature of this worthwhile endeavor — the ongoing collection of observations, the testing of hypotheses and the back-and-forth over conclusions, along with the rare Eureka! moments.

How can you make *Science News* work for you? Educators rely on *Science News* to keep themselves up to date on their own fields of interest. Many use the stories as springboards for discussing current issues of national and international importance, such as climate change and genetic engineering. Others use *Science News* to explore scientific concepts in a way that goes beyond the textbook. In the language arts classroom, *Science News* is a tool for talking about "what is news," for improving reading comprehension and for discussing style and approach in writing. Each edition of our Educator Guide will also provide questions, activities and other concrete ways to bring the magazine into the classroom. Check out the trove of existing Educator Guides at www.sciencenews.org/highschools/educator-guides

Science News at a Glance

Print publication rate: Every other week

Number of writers, editors and designers on staff: 20+

New stories online each day: 2 to 6

Location: Washington, D.C.

Readers in print and online: More than 1 million per month

Criteria for "news": new, unusual, interesting, important, relevant to people and, above all, accurate

Origin story: The Society for Science & the Public, formerly Science Service, was founded in 1921 by E.W. Scripps, of the influential publishing family, and biologist William E. Ritter to disseminate scientific information to newspapers around the country. Both founders thought democracy was threatened by

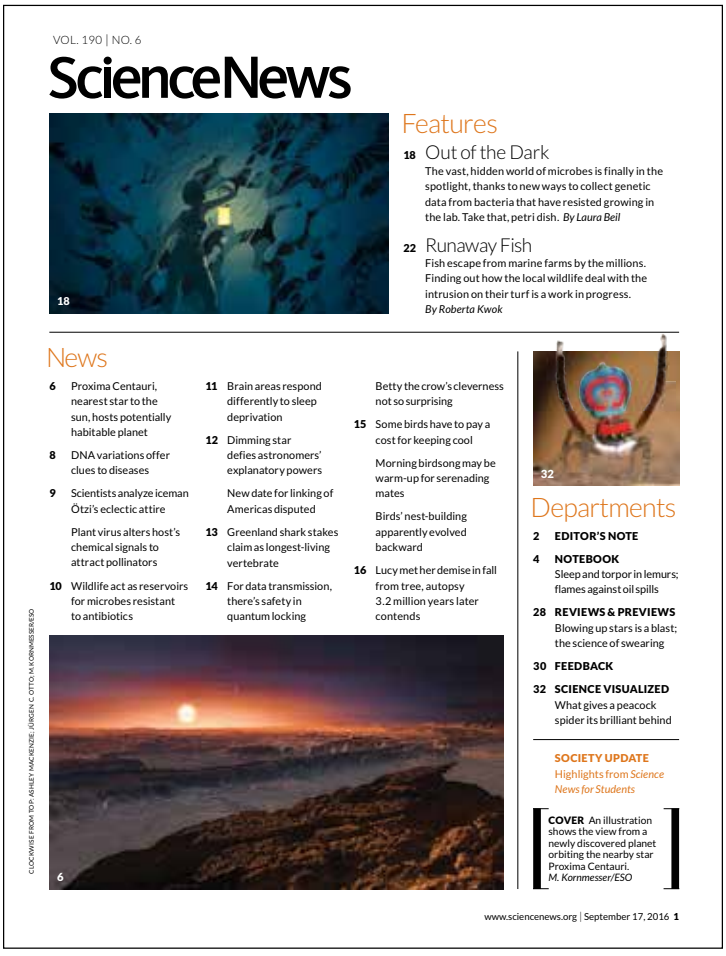
a lack of scientific understanding. When non-journalists began requesting the science updates in 1922, Science Service launched *Science News-Letter*, which later became *Science News*.

Story ideas come from: journal papers, field research, current events, scientific meetings, press releases, phone interviews

Biggest stories of the year, so far: the detection of gravitational waves, predicted a century ago by Albert Einstein, the discovery of a planet around our neighbor Proxima Centauri, and the spread of the Zika virus through the Americas

Magazine Content

- The **Table of Contents** is your guide to the entire issue of the magazine. In one page, you'll find brief summaries of all the stories covered. Ask your students: What can you tell about this magazine from this contents page? What can you infer about the breadth and depth of coverage? What stories are most important? What stories are you most interested in reading?



VOL. 190 | NO. 6

ScienceNews

Features

News

Departments

COVER An illustration shows the view from a newly discovered planet orbiting the nearby star Proxima Centauri. *M. Kornmesser/ESO*

CLOCKWISE FROM TOP: ASHLEY MACKENZIE, JÜRGEN C. OTTO, M. KORNMESSER/ESO

- The **Notebook** section, typically Pages 4 and 5, offers short news items that are often more light and playful than a straightforward news story. The items fall into rotating categories such as "It's Alive," "Say What?" or "For Daily Use." These quick hits can often be read in five minutes or less.

"**50 Years Ago**" pulls a quote from a news story in our archive and updates it with new reporting. Ask your students: What do scientists know now that they didn't know 50 years ago? What might change in the next 50 years? Lead a discussion about how scientific understanding advances as new data come in.

"**It's Alive**" is a profile of an organism and takes a creative approach to storytelling. Ask your students: What is the author's goal in this piece? How does the author use structure, setting, and figurative language? Consider asking students to rewrite the piece in a different style, or to write a similar piece about a different organism.

Excerpt from the September 24, 1966 issue of *Science News*

50 YEARS AGO

Genetic surgery is far away for humans

Optimism concerning application of genetic experiments to improve mankind is unwarranted now, a Canadian pediatrician told the Third International Congress of Human Genetics meeting in Chicago.... Although striking and sometimes controversial experiments in genetic surgery have in fact been performed in multicellular systems, he explained, public demand seems likely to outstrip scientific resources for the treatment of many forms of genetic disease.

UPDATE: Things are looking up for "genetic surgery." Gene therapy has been around since the 1980s, but researchers have recently developed more precise gene-editing tools, including one that sent a child's leukemia into remission in 2015. Scientists are most excited about a molecular scalpel known as CRISPR/Cas9 that cuts and manipulates DNA (*SN: 9/3/16, p. 22*). Researchers are optimistic about the tool's potential to treat several diseases, but it may be a while before CRISPR is widely used.

Despite living in the tropics, fat-tailed dwarf lemurs (shown at the Duke Lemur Center) are truer to physiologists' sense of hibernation than bears are.

LEMURS: DAVID HARING/DUKE LEMUR CENTER; GOBIES: BRENT SPIES

INTRODUCING

California's goby is two different fish

It's official: The southern tidewater goby is a thing. And it's chubbier and nubbier than its northern cousin.

Endangered tidewater gobies live in California's seaside lagoons. Ranging roughly the entire length of the state, the fish used to be considered one species. But a new study confirms that gobies living in Northern and Southern California are physically different, and now the southern swimmer has its own name: *Eucyclogobius kristinae*.

The northern goby, *E. newberryi*, is sleeker and longer than its southern counterpart. The southern fish has more girth and more nubby sensory organs exposed atop its head, researchers report July 27 in *PLOS ONE*.

Differences in DNA, found in earlier studies, suggest that the fish separated over a million years ago, probably because of geology. Tidewater gobies can dart from pool to pool in the rainy season but can become isolated by outcrops of rock or kelp. Today, the southern goby is found only in three coastal pools in San Diego's Camp Pendleton. The fish used to range north from San Diego County about 200 kilometers, says geobiologist David Jacobs of UCLA, who codiscovered the new species. As coastal cities grew, the goby lost habitat. Now that the southern species has its own name, Jacobs says, California is more likely to give it extra protection. — *Amy McDermott*

Northern (left) and southern (right) tidewater gobies have several physical and genetic differences that distinguish them as separate species. Both are endangered.

H. XIO, M. J. GOLLNER AND E. S. ORAN/PNAS 2016

IT'S ALIVE

Dwarf lemurs don't agree on sleep

Contrary to many adorable children's stories, hibernation is so not sleeping. And most animals can't do both at the same time.

So what's with Madagascar's dwarf lemurs? The fat-tailed dwarf lemur slows its metabolism into true hibernation, and stays there even when brain monitoring shows it's also sleeping. But two lemur cousins, scientists have just learned, don't multitask. Like other animals, they have to rev their metabolisms out of hibernation if they want a nap.

Hibernating animals, in the strictest sense, stop regulating body temperature, says Peter Klopfer, cofounder of the Duke Lemur Center in Durham, N.C. "They become totally cold-blooded, like snakes." By this definition, bears don't hibernate; they downregulate, dropping their body temperatures only modestly, even when winter den temperatures sink lower. And real hibernation lasts months, disqualifying short-termers such as subtropical hummingbirds. The darting fliers cease temperature regulation and go truly torpid at night. "You can pick them out of the trees," Klopfer says.

The fat-tailed dwarf lemur, *Cheirogaleus medius*, was the first primate hibernator discovered, snuggling deep into the softly rotting wood of dead trees. "You'd think they'd suffocate," he says. But their oxygen demands plunge to somewhere around 1 percent of usual. As trees warm during the day and cool at night, so do these lemurs. When both a tree and its inner lemur heat up, the lemur's brain activity reflects mammalian REM sleep.

Klopfer expected much the same from two other dwarf lemurs from an upland forest with cold, wet winters. There, *C. crossleyi* and *C. sibreei* spend three to seven months curled up underground, below a thick cushion of fallen leaves. "If you didn't know better, you might think they were dead because they're cold to the touch," Klopfer says.

Unlike the tree-hibernators, the upland lemurs take periodic breaks from hibernating to sleep, Klopfer, the Lemur Center's Marina Blanco and colleagues report in the August *Royal Society Open Science*. The lemurs generated some body heat of their own about once a week, which is when their brains showed signs of sleep (REM-like and slow-wave). "My suspicion is that sleep during torpor is only possible at relatively high temperatures, above 20° Celsius," Klopfer says. Sleep may be important enough for cold-winter lemurs to come out of the storybook "long winter's nap." — *Susan Milius*

SAY WHAT?

Blue whirl \bloo werl\ n.

A swirling flame that appears in fuel floating on the surface of water and glows blue

An unfortunate mix of electricity and bourbon has led to a new discovery. When lightning hit a Jim Beam warehouse in 2003, a nearby lake was set ablaze as the distilled spirit spilled into the water and ignited. Spiraling tornadoes of fire leapt from the surface. In a laboratory experiment inspired by the conflagration, researchers produced a new, efficiently burning fire tornado, which they named a blue whirl.

To re-create the bourbon-fire conditions, the researchers, led by Elaine Oran of the University of Maryland in College Park, ignited liquid fuel floating on a water bath. They surrounded the blaze with a cylindrical structure that funneled air into the flame, which began spinning and grew higher than 60 centimeters. The scientists were surprised when the chaotic fire calmed into a blue, cone-shaped flame just a few centimeters tall, which they report in the Aug. 23 *Proceedings of the National Academy of Sciences*.

"Firenadoes" are known to appear in wildfires, when swirling winds and flames combine to form a rotating inferno. They burn more efficiently than typical fires, as the whipping winds mix in extra oxygen to feed the flames. The blue whirl is even more efficient; its azure glow indicates complete combustion, which releases little soot, or uncombusted carbon, into the air.

Blue whirls could be a way to burn off oil spills on water without releasing much pollution, the researchers say, if they can find a way to control the flame in the wild. — *Emily Conover*

A swirling flame is produced in the lab by igniting fuel floating on top of water (left). The flame transitions into a fire tornado (center) then settles into an efficiently burning blue whirl (right).

Watch a blue whirl in action at bit.ly/SN_bluewhirl

"**Say What?**" introduces an unfamiliar term or concept. Ask your students: Why have scientists chosen this phrase to describe the phenomenon? Do you think it is fitting? Would you consider it jargon? How would you explain the concept in your own words? How would you adapt the explanation to a different audience?

- The **News** section, typically beginning around Page 6 and continuing to Page 15, offers clear and concise takes on the latest science findings. With more than a dozen stories, there's reporting that touches on many areas of science.

News stories start with what journalists call a "lede," intended to entice readers to keep going. Ask your students: What can you infer about the story based on this first paragraph alone? Are you interested in reading the story? Why or why not?

The first few paragraphs expand on that lede and give any background necessary for understanding why the story is important. Ask your students: What is the main topic of the article? What makes the finding "news"? What background information do you need to know to understand the article?

GENES & CELLS

Wildlife hosts antimicrobial resistance

Bacterial genes that thwart drugs turn up in all sorts of animals

BY SUSAN MILIUS

It's time to go wild studying antimicrobial resistance, a research team says.

Most analyses of how microbes come to laugh off the drugs and disinfectants that should kill them have focused on people in hospitals or livestock on farms, says Kathryn Arnold, a behavioral ecologist at the University of York in England. Yet a growing number of studies — in crows, elephant seals, voles and other wild animals — are raising big questions about where wildlife fits into the increasing threat of antimicrobial resistance. Genes for resistance are showing up in microbes flourishing in the guts and other parts of wild animals. How those genes get there and where they might now go needs serious attention, Arnold and colleagues argue in the August *Biology Letters* in a review of wildlife-related papers.

So far, scientists have not described a clear-cut case of genes for antimicrobial resistance traveling from wildlife microbial flora back to humans' microbes, but that scenario is "biologically logical," says Barry McMahon of University College Dublin. McMahon, who has examined gulls for antimicrobial resistance genes, endorses the new paper's case that overlooking wildlife and environmental factors leaves a big gap in understanding resistance.

So does Kathleen Alexander of Virginia Tech in Blacksburg. Monitoring what's circulating in wild animals might serve as an early warning for what's ahead. Focusing solely on hospitals, she says, is "monitoring the barn after the horse has left."

Genes for resistance can readily spread as bacteria multiply and carry their toolkits with them. And bacteria are "promiscuous," Arnold explains. They commingle genes with their own kind or with fairly strange strangers, widely distributing resistance genes. In this loose networking, a benign bacterium can pass along resistance genes to a pathogen, especially as resistance turns up in microbes in a wide diversity of animals.

One overview Arnold and her colleagues looked at tallied 210 papers (up through May 2015) that have reported some form of antimicrobial resistance in free-ranging animals.

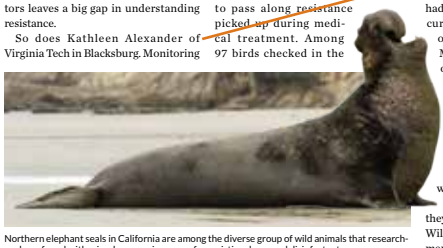
Known carriers include vertebrates (mostly North American birds and mammals) and a few invertebrates. For example, 15 of 590 fecal samples from American crows in three states carried *Enterococcus* bacteria with genes for resisting vancomycin, a drug of last resort for treating serious infections, a paper reported in 2014.

More puzzling reports come from places with few local people or livestock to pass along resistance picked up during medical treatment. Among 97 birds checked in the Arctic (Siberia, Alaska and Greenland), researchers in 2008 reported *Escherichia coli* bacteria resistant to 14 of the 17 antibiotics tested. Admittedly birds fly, but monkeys (outside of Oz) don't. In the Uxpanapa forests of Mexico, however, howler monkeys had *E. coli* resistance to ciprofloxacin, a synthetic antibiotic. That suggests some connection, however roundabout, between human medicine and faraway monkeys.

Maybe the answer is birds flying and roosting in trees. But for any resistance transfer involving wildlife, "the forensic trail isn't well understood," Arnold says. She hopes for tight chains of evidence showing how resistance moves among species and over distances. To date, researchers have only circumstantial evidence, much of it involving runoff from human wastes. A 2008 study of stranded northern elephant seals along the California coast, for instance, found that the nearer the animals were to outflow of freshwater from land, the more likely they were to test positive for antimicrobial-resistant *E. coli*.

Simple proximity to waste isn't the whole story, Arnold points out. Small differences in lifestyle matter, even among similar animals. Bank voles and wood mice living in the same British woodland both carried *E. coli* resistant to multiple antibiotics. But despite living in small rodents in the same habitat, *E. coli* populations in the animals ran a bit out of sync in amount and seasonal surge (mice had more and peaked earlier). Arnold's current coauthors — Nicola Williams of the University of Liverpool and Malcolm Bennett of the University of Nottingham — were among the researchers reporting these results in 2011.

Comparing levels of resistance among species offers clues to what's important in spreading the worrisome genes, says Alexander. In northern Botswana where she works, warthogs have extra antimicrobial resistance, she suspects because they eat human waste while cattle don't. Wildlife is already doing natural experiments, if researchers pay attention. ■



FRANK SCHULENBURG/WIKIMEDIA COMMONS (CC BY-SA 3.0)

Northern elephant seals in California are among the diverse group of wild animals that researchers have found with microbes carrying genes for resisting drugs and disinfectants.

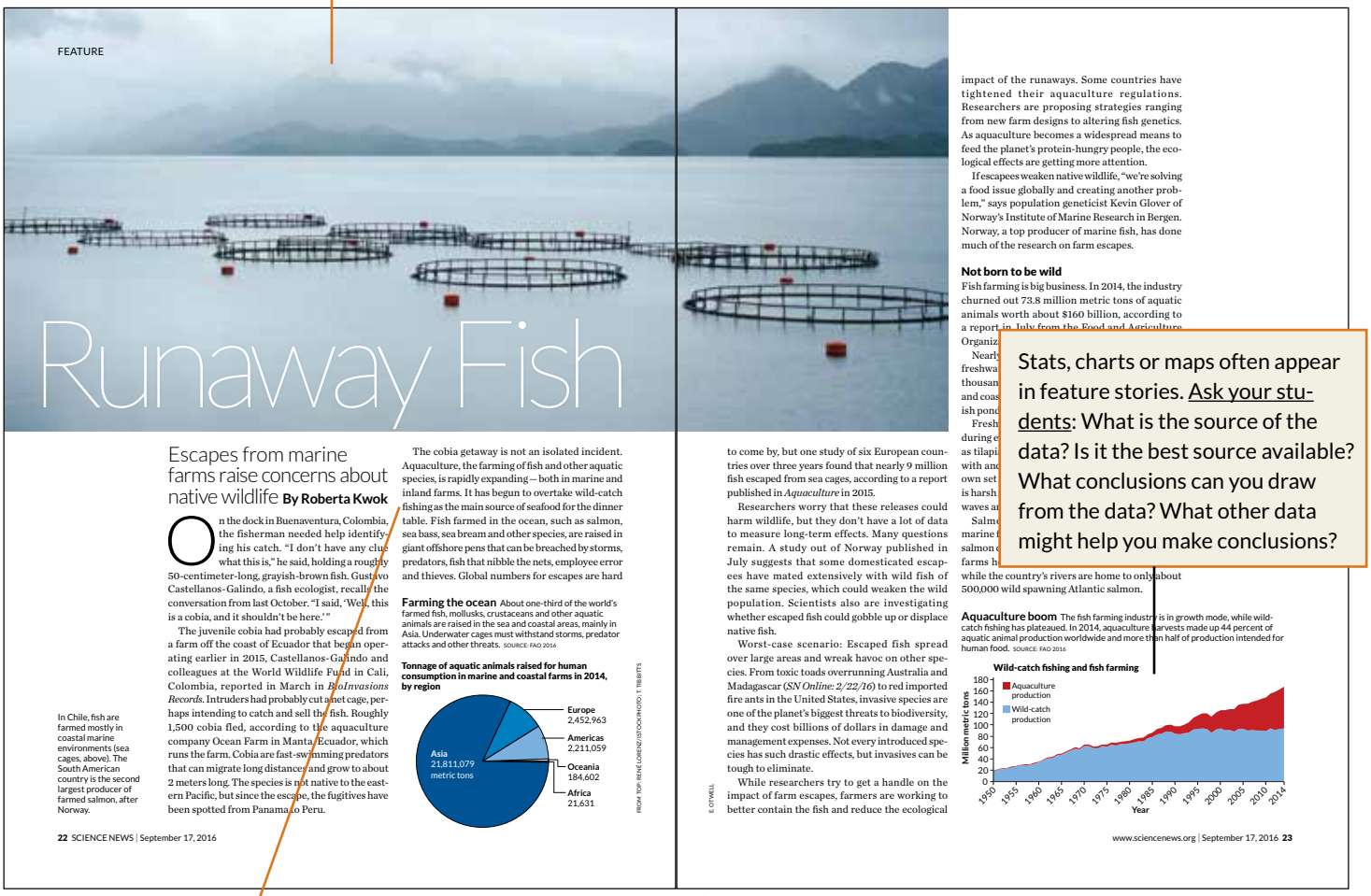
As students read the article, encourage them to write down any words or phrases they don't understand. Students can also make a list of the evidence that supports the new scientific finding and be prepared to present that evidence to the class. Ask your students: What questions do you have after reading the article? What sources might you consult to answer those questions?

Most *Science News* articles include a comment from someone not involved in the research, often more than one. Ask your students: Why is it important to get an outside opinion? What does it mean to be "objective" in science? What does "objectivity" mean in journalism?

- The **Features** appear after the News section. These are in-depth articles that explore a research trend or an emerging field. Often linked to questions of global importance, such as climate change, gun violence, or genetically modified foods, features give students a chance to explore current events. Because of their length — often around 2,000 words — these articles offer a lot of connections between basic concepts and are springboards for debates. But they also require more time and concentration to read. Consider splitting up the reading or having students read just one section. Often, the features contain detailed images or charts perfect for student analysis.

The opening image can reveal a lot about the content of the story. Ask your students: What do you think the story is about based on the opening image alone? Once students have made their predictions, ask them what questions they expect the article to answer. As they read, they can record the answers to their questions.

Feature stories sometimes include issues that are still under debate. One example from this story is: Should we put native wildlife at risk to feed a growing population? Encourage students to collect facts from the story and other resources to make an argument either for or against the debated statement. Hold a debate in class and then discuss what new scientific evidence could sway students' opinions.



FEATURE

Runaway Fish

Escapes from marine farms raise concerns about native wildlife

By Roberta Kwok

On the dock in Buenaventura, Colombia, the fisherman needed help identifying his catch. "I don't have any clue what this is," he said, holding a roughly 50-centimeter-long, grayish-brown fish. Gustavo Castellanos-Galindo, a fish ecologist, recalls the conversation from last October. "I said, 'Well, this is a cobia, and it shouldn't be here.'"

The juvenile cobia had probably escaped from a farm off the coast of Ecuador that began operating earlier in 2015, Castellanos-Galindo and colleagues at the World Wildlife Fund in Cali, Colombia, reported in March in *BioInvasions Records*. Intruders had probably cut a net cage, perhaps intending to catch and sell the fish. Roughly 1,500 cobia fled, according to the aquaculture company Ocean Farm in Manta, Ecuador, which runs the farm. Cobia are fast-swimming predators that can migrate long distances and grow to about 2 meters long. The species is not native to the eastern Pacific, but since the escape, the fugitives have been spotted from Panama to Peru.

The cobia getaway is not an isolated incident. Aquaculture, the farming of fish and other aquatic species, is rapidly expanding — both in marine and inland farms. It has begun to overtake wild-catch fishing as the main source of seafood for the dinner table. Fish farmed in the ocean, such as salmon, sea bass, sea bream and other species, are raised in giant offshore pens that can be breached by storms, predators, fish that nibble the nets, employee error and thieves. Global numbers for escapes are hard to come by, but one study of six European countries over three years found that nearly 9 million fish escaped from sea cages, according to a report published in *Aquaculture* in 2015.

Farming the ocean About one-third of the world's farmed fish, mollusks, crustaceans and other aquatic animals are raised in the sea and coastal areas, mainly in Asia. Underwater cages must withstand storms, predator attacks and other threats. SOURCE: FAO 2016

Tonnage of aquatic animals raised for human consumption in marine and coastal farms in 2014, by region

FROM TOP: RENE LORENZ/ISTOCK/HOYO; T. TIELBITS

In Chile, fish are farmed mostly in coastal marine environments (sea cages, above). The South American country is the second largest producer of farmed salmon, after Norway.

Researchers worry that these releases could harm wildlife, but they don't have a lot of data to measure long-term effects. Many questions remain. A study out of Norway published in July suggests that some domesticated escapees have mated extensively with wild fish of the same species, which could weaken the wild population. Scientists also are investigating whether escaped fish could gobble up or displace native fish.

Worst-case scenario: Escaped fish spread over large areas and wreak havoc on other species. From toxic toads overrunning Australia and Madagascar (*SN Online: 2/22/16*) to red imported fire ants in the United States, invasive species are one of the planet's biggest threats to biodiversity, and they cost billions of dollars in damage and management expenses. Not every introduced species has such drastic effects, but invasives can be tough to eliminate.

While researchers try to get a handle on the impact of farm escapes, farmers are working to better contain the fish and reduce the ecological impact of the runaways. Some countries have tightened their aquaculture regulations. Researchers are proposing strategies ranging from new farm designs to altering fish genetics. As aquaculture becomes a widespread means to feed the planet's protein-hungry people, the ecological effects are getting more attention.

If escapees weaken native wildlife, "we're solving a food issue globally and creating another problem," says population geneticist Kevin Glover of Norway's Institute of Marine Research in Bergen, Norway, a top producer of marine fish, has done much of the research on farm escapes.

Not born to be wild

Fish farming is big business. In 2014, the industry churned out 73.8 million metric tons of aquatic animals worth about $160 billion, according to a report in July from the Food and Agriculture Organiz

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while the country's rivers are home to only about 500,000 wild spawning Atlantic salmon.

Aquaculture boom The fish farming industry is in growth mode, while wild-catch fishing has plateaued. In 2014, aquaculture harvests made up 44 percent of aquatic animal production worldwide and more than half of production intended for human food. SOURCE: FAO 2016

E. OTHELL

Stats, charts or maps often appear in feature stories. Ask your students: What is the source of the data? Is it the best source available? What conclusions can you draw from the data? What other data might help you make conclusions?

In journalism, the "nut graph" captures the point of the story and tells the reader why it matters. (Read more about nut graphs from the Poynter Institute.) Ask your students: Can you identify the nut graph? How well does the nut graph answer the "who," "what," "why," "when" and "how" of the story? What do you already know about the topic from science class, social studies or your personal experiences?

Have students identify a problem in a story — such as how to prevent farmed fish from escaping. Ask your students: Can you come up with an engineering solution? What information and resources would you need to design the solution? What problems might you encounter along the way?

- The final pages of the magazine are devoted to: 1) **Reviews & Previews**, which often include opinions. Ask your students: How do these articles differ from the rest of the content? 2) The **Feedback** page, which includes comments and questions to the editor. Encourage students to write a comment based on a story they read. 3) **Science Visualized**, which conveys a finding or discovery in a visual way. Consider leading a discussion about why "a picture is worth a thousand words."

REVIEWS & PREVIEWS

SCREENTIME

Black hole game lets you blow up stars

If you have an appetite for cosmic destruction, there's an app for that.

NOVA Black Holes, a free iPad game developed by the PBS series *NOVA*, lets you hurl a star at other celestial objects while navigating an increasingly complex minefield of stars, planets and black holes. Each level presents a new target and a fresh landscape of obstacles. And unlike real stars — whose fates are determined by the weight they're born with — your star grows bigger and brighter as the game progresses until it collapses under its own gravity to form a black hole. That's the goal.

The game is addictive — there's something surprisingly satisfying about blowing up a star. As it hooks you, the game sneaks in tidbits about astronomy and physics along the way.

Early levels are easy: Set the angle and speed of your star, then let it fly toward its mark. As the levels progress, so does the difficulty. A nearby black hole threatens to consume your target before your star gets there. The gravity from a passing star grabs your sun and throws it off course (or possibly ushers it in the right direction). You must get the lay of the gravitational landscape and decide how to aim your star. Sometimes the right strategy is not intuitive: It might be best to swing around the backside of a neighboring star and get a gravity assist to send your star on its way.

Interacting with the game is simple (even if some missions are not). To aim, just touch your finger to your star and pull back, much like drawing a bow and arrow. Numbers showing the speed and angle help you refine your aim on the often inevitable next try. A grid shows how gravity warps the space near each star, helping you plot your trajectory.

Underlying the simple, attractive graphics is a simulator that realistically captures the physics of gravity and orbital motion. Success requires thinking through the implications of how all the stars on the field interact and devising creative ways to use gravity to steer your star. Aiming randomly and hoping for the best works, too. *— Christopher Crockett*

The objective of a new iPad game is to collide celestial objects together to grow a star so large that it collapses to form a black hole.

BOOKSHELF

Cognitive scientist puts profanity in its place

What the F
Benjamin K. Bergen
BASIC BOOKS, $27.99

Few of the expletives discussed in cognitive scientist Benjamin Bergen's new book can be spelled out in this review. But Bergen argues, in a bluntly engaging way, that the largely secret science of swearing reveals much about who we are.

Based on surveys of what people in several Western nations regard as unacceptable, the author divides profanity into four categories: praying (using names of religious figures and religious words, such as holy and damn, in secular ways), fornicating (the F-word and other terms for the sex act and genitals), excreting (everything related to bodily functions, from feces to vomit) and slurring (offensive words for groups based on ethnicity, religion, sexual orientation and so on).

Taboo words not only sound obscene, they have an obscene feel when spoken. A big part of that effect stems from the fact that the words are short and usually start and end with consonants, not softer-sounding vowels, Bergen says. In a study Bergen conducted, participants rated the made-up word "skoom" as more profane than "skoo."

Profanity often plays by its own grammatical rules, the author explains. If every sentence has to have a subject, for instance, then just try to find the subject of that all-purpose epithet "F-you." Perhaps different grammar variants exist for particular purposes, including swearing, he speculates.

Bergen concludes by critiquing studies that have allegedly shown that the more children hear profanity, the more aggressive and potty-mouthed they become. Children are more resilient to profanity than they're often given credit for, he says. Hearing a parent mutter a swear word falls far short of the reported harm to young children caused by exposure to violent images or verbal abuse, the author contends.

Slurs are an exception, Bergen writes. In experiments, people who overhear profane words for African-Americans or gay people tend to regard members of those groups as less human and keep their distance from them. Children who were called antigay slurs by middle-school peers also report high levels of anxiety and depression.

Banning slurs would only increase their power to hurt and offend, Bergen predicts. For that reason, adults should resist knee-jerk impulses to suppress any mention of words deemed especially vile. Instead, he advises, focus on addressing people with words they prefer and judging others more by their actions and intentions than their word choices.

Some prospective readers may avoid this book because of its subject matter. That would be a gosh-darned shame. *— Bruce Bower*

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FEEDBACK

JULY 23, 2016

Age-old questions

What is aging, exactly, and when does it start? Has the first person who will live to age 150 already been born? *Science News* writers **Laura Sanders**, **Tina Hesman Saey** and **Susan Milius** (below) answered these aging questions and others online in a Reddit Ask Me Anything. Read more at bit.ly/SN_Aging

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Live long and prosper

*In Science News' special report on aging (SN: 7/23/16, p. 16), writers **Laura Sanders**, **Tina Hesman Saey** and **Susan Milius** explored the latest research — from the evolution of aging in the animal kingdom to scientists' quest to delay the process in humans' bodies and minds.*

"I would very much like to know how research into aging may benefit people who are middle-aged or elderly now?" asked **leftysrule200** in a Reddit Ask Me Anything about the special report. "Is there any research that can result in treatments in the very near future, or are the real-world applications only going to be visible in the distant future?"

Middle-aged and elderly people will be the first to benefit from aging research, **Saey** says. "A clinical trial using the diabetes drug metformin as an antiaging therapy will begin soon. That drug will be tested on healthy people aged 60 and older," she says.

Sanders cautions that most anti-aging treatments are still a long way off. But various studies in rodents and humans provide potential clues to aging's secrets. Blood from young rats, for instance, has been shown to rejuvenate the bodies and brains of old rats. Based on those findings, a clinical study in humans is now under way that is looking at the effects of plasma from young donors on the brains of people with Alzheimer's. "If scientists could pinpoint the compounds that give young blood its power, then they could presumably develop drugs that mimic that process," **Sanders** says.

In the meantime, people may be able to slow the effects of aging by leading a healthy lifestyle. **Sanders** points to a long-term study of middle-aged women in Australia. Women who were more physically active had sharper memories 20 years later, the researchers found. Until proven anti-aging treatments are available, "it seems that keeping the body physically active and strong is one of the best ways to keep your brain sharp as you age," she says.

Dino spills its guts

*Tiny tracks discovered in the blackened stomach contents of a 77-million-year-old duck-billed dinosaur fossil suggest gut parasites infected dinosaurs, **Meghan Rosen** reported in "Parasites wormed way into dino's gut" (SN: 7/23/16, p. 14).*

Online reader **Jim Stangle Dvm** thought the worms may not have been parasites at all. "It is more likely that the tunnels were formed by a scavenger worm [after the dino had died]. Still I think the findings are way cool!" he wrote.

It's hard to say definitively whether the burrows were made by parasites or not, says paleontologist **Justin Tweet**. Scavenger worms could have tunneled through the gut after the dino's death, but his team found only one type of worm burrow "which suggests that either only one kind of scavenger had access to the carcass," or "that these burrows were an inside job," **Tweet** says.

That's no moon!

*A recently discovered asteroid appears to orbit Earth, but that's just an illusion. The asteroid orbits the sun, but its constant proximity to Earth makes it the planet's only known quasisatellite, **Christopher Crockett** reported in "Say What? Quasisatellite" (SN: 7/23/16, p. 5).*

Reader **Mike Lieber** wondered if the moon could also be a quasisatellite. "The gravitational attraction of the sun on the moon is twice that of the Earth," he wrote. "It seems that the apparent looping of the moon around the Earth is also illusory."

The moon is a true satellite, **Crockett** says. If the sun were to disappear, the moon would continue orbiting Earth. "The moon is within Earth's 'Hill sphere,' the volume of space in which Earth's gravity is the dominant influence," he says. "The strength of the gravitational force isn't as important as by how much it changes from one place to another." Given the moon's proximity to our planet, Earth prevails. "The moon orbits Earth and the Earth-moon system orbits the sun," he says.

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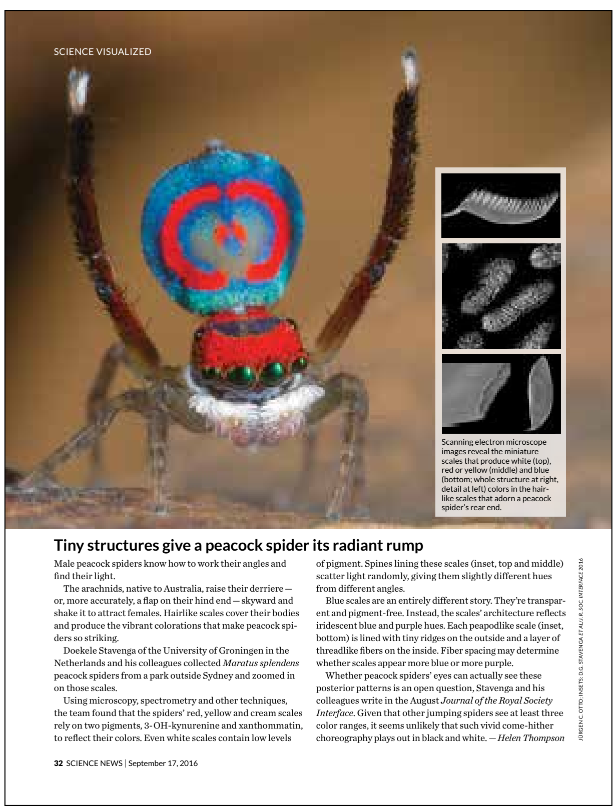

SCIENCE VISUALIZED

Scanning electron microscope images reveal the miniature scales that produce white (top), red or yellow (middle) and blue (bottom; whole structure at right, detail at left) colors in the hair-like scales that adorn a peacock spider's rear end.

Tiny structures give a peacock spider its radiant rump

Male peacock spiders know how to work their angles and find their light.

The arachnids, native to Australia, raise their derriere — or, more accurately, a flap on their hind end — skyward and shake it to attract females. Hairlike scales cover their bodies and produce the vibrant colorations that make peacock spiders so striking.

Doekele Stavenga of the University of Groningen in the Netherlands and his colleagues collected *Maratus splendens* peacock spiders from a park outside Sydney and zoomed in on those scales.

Using microscopy, spectrometry and other techniques, the team found that the spiders' red, yellow and cream scales rely on two pigments, 3-OH-kynurenine and xanthommatin, to reflect their colors. Even white scales contain low levels of pigment. Spines lining these scales (inset, top and middle) scatter light randomly, giving them slightly different hues from different angles.

Blue scales are an entirely different story. They're transparent and pigment-free. Instead, the scales' architecture reflects iridescent blue and purple hues. Each peapodlike scale (inset, bottom) is lined with tiny ridges on the outside and a layer of threadlike fibers on the inside. Fiber spacing may determine whether scales appear more blue or more purple.

Whether peacock spiders' eyes can actually see these posterior patterns is an open question, Stavenga and his colleagues write in the August *Journal of the Royal Society Interface*. Given that other jumping spiders see at least three color ranges, it seems unlikely that such vivid come-hither choreography plays out in black and white. *— Helen Thompson*

JÜRGEN C. OTTO; INSETS: D.G. STAVENGA ET AL/J. R. SOC. INTERFACE 2016

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Meet Some Staff Members

More than 20 people are involved in putting together the magazine you receive every two weeks — from writers to designers. Below you can read about just a few. Find more staff profiles online.

Eva Emerson As the editor in chief, Eva Emerson approves and oversees everything that goes in the magazine. She also writes the **Editor's Note** that appears in the front of each issue. She has been editor in chief of the magazine since 2012, and before that she served as managing editor. She's originally from Los Angeles, and has worked at the University of Southern California, the *Magic School Bus* television show, and the California Science Center. She is a huge fan of bacteria.

Christopher Crockett After eight years searching for exoplanets, probing distant galaxies and exploring comets as a working astronomer, Christopher Crockett found that he enjoyed talking about astronomy more than doing it. After leaving the U.S. Naval Observatory, he was a AAAS mass media fellow at *Scientific American* before joining *Science News* in 2014. His favorite planet is the roughly 500-light-year-distant CI Tau b, because he helped discover it.

Susan Milius graduated from Swarthmore College with a double major in biology and English. She has written about botany, zoology and ecology for publications including the *Scientist*, *Science*, *International Wildlife* and United Press International. Two of her articles have appeared in editions of the *Best American Science Writing*. She recently wrote an article about the evolution of aging that had her exploring the life history of a tiny pond invertebrate.

Tina Hesman Saey With a Ph.D. in molecular genetics, Tina Hesman Saey knows a lot about all things microscopic. She has researched tobacco plants and ethanol-producing bacteria, as well as how yeast turn genes on and off. After turning from science to writing, she worked as a newspaper reporter for seven years before coming to *Science News* magazine. She collects rubber ducks in the physical world and Pokémon in the virtual world.

More Resources Online

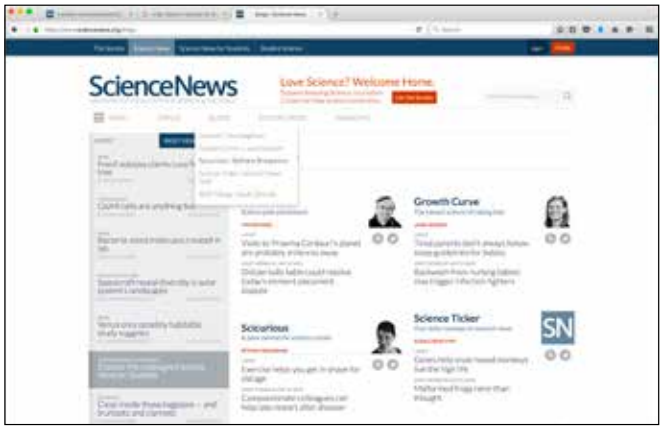
Science News in High Schools participants also receive free access to our daily website sciencenews.org, including breaking stories and our nearly century-old archive.

- View our **Topics** page to search by subject area. If you need an article for a lesson on DNA, for example, click on "Genes & Cells." What about electromagnetism? Those stories can be found in "Matter & Energy." And "Body & Brain" has fantastic coverage of the nervous system.

- See our **YouTube channel** for the latest videos for learners of all ages: www.youtube.com/user/ScienceNewsSSP

- The best way to search our **Archive** is to enter your search term into the search box at the upper right of the page and click the magnifying glass. For a fun project for students, have them search for stories from the month and year they were born. After clicking on the magnifying glass, use the drop-down menus on the search page to select your search criteria.

- We have several regular **Blogs**, including SciCurious, in which Bethany Brookshire takes readers behind the science curtain. Bethany recently explored how to do science through a delicious experiment — Cookie Science.



- And don't forget our sister site for tweens and teens, ***Science News for Students***, where you can find *Science News* stories and more written for a younger audience.