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LETTERS

Remembering Shanker

The Fall 2007 issue of *American Educator* presents an excerpt from a new biography of Albert Shanker, AFT's dynamic President from 1974 until his death in 1997. The issue discusses some of the more than 1,300 columns in the *New York Times* written by Al Shanker with the heading, "Where We Stand." While most of the articles dealt with matters of concern to children's education, Al was also interested in adult education, particularly the education of disadvantaged adults. I had the honor and pleasure of serving with Al on an advisory panel for the Work in America Institute in the early 1990s. I was also fortunate in having three of the "Where We Stand" columns discuss some of the research that colleagues and I did with adult learners.

Al Shanker was a direct, thoughtful man of great wisdom and humor. This new biography, coming a decade after Al's death, celebrates the life and work of a true leader in American education.

—Thomas G. Sticht
International Consultant in Adult Education
El Cajon, Calif.

Praise for Plutarch

I enjoyed your article by Gilbert T. Sewall (Fall 2007) on Plutarch and was moved to write. I am a classicist and former high school teacher whose certification to teach Latin, grades 9-12, and run a media center, K-12, is still valid in Florida. Back in the early 1990s, I designed a course titled "Plutarch's *Lives* in Translation" that I have taught intermittently to small groups of students. The students are thrilled to see Plutarch's resilient and determined heroes springing back from repeated defeats and unfortunate circumstances.

Of late, I have been studying the long overlooked tradition of Greek and Latin study by people of African descent. Until fairly recently, there was a strong interest in the study of Greek and Latin in the U.S., beginning with Phyllis Wheatley, John Chavis, and Alexander Crummell. Here are a few interesting items that my work has uncovered:

- The first black member of the Modern Language Association and the first black man to publish a textbook for ancient Greek was William Sanders Scarborough. Scarborough was the first student produced by Atlanta University and a former slave who later became president of Wilberforce University (1908-1920).
- The first black woman involved in writing a beginning Latin textbook was

Helen Chesnutt, daughter of the black novelist Charles Chesnutt. She earned a B.A. at Smith and later an M.A. in Latin at Columbia University.

■ W.E.B. Du Bois, who taught Greek at Wilberforce University (1894-1896), adapted the myth of Jason and Medea to form the plot of his first novel, *Quest of the Silver Fleece*.

We do not yet have a comprehensive history of black classicism, but one thing is clear: Black classicism forms an authentic and deeply meaningful part of our common intellectual achievement. If you have any doubt, read *The Autobiography of William Sanders Scarborough: An American Journey form Slavery to Scholarship.* He will, I think, convince you!

—Michelle Valerie Ronnick
Professor
Wayne State University
Detroit, Mich.

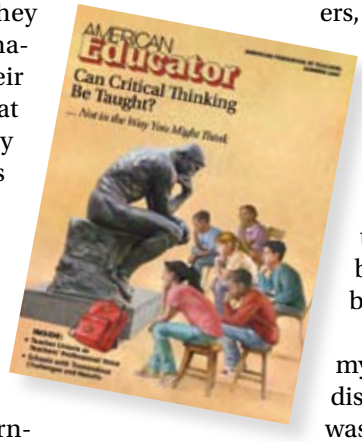
Your Fall 2007 issue is serendipitous—coupling as it did the excellent excerpt from the Shanker biography by Richard D. Kahlenberg and "Teaching Plutarch in the Age of Hollywood" by Gilbert T. Sewall. Each piece reflects on the other. The biography of Shanker is an example of a modern "Life" and illustrates those moral qualities that Plutarch endorses.

Wisdom, practicality, resolution, strength—these are the characteristics of Fabius in "Plutarch for the Sound-Bite Generation." They are also the characteristics that Shanker demonstrated. And they are universal qualities that students should be able to identify in other biographies and in responsible members of their own families.

Although, as Sewall believes, pop culture offers few positive role models, television and the Internet should not be ignored but rather used as allies in assignments. Students could be challenged to compare and contrast the profiles on Facebook with those in the *Lives*—for good or bad. In addition, students could even collaborate on a Facebook profile as Plutarch might have created one. The results might be surprising and rewarding to Roger Kimball who says "character has ceased to impress us." When the goal is rediscovering the timeless Plutarch in the 21st century, students will rise to the occasion, once they have been prepared to understand his significance.

—Mitzi Witkin
Retired English Teacher
New York, N.Y.

Content Is Grist for Thinking



All children have critical thinking skills. They make choices and analyze situations in their lives constantly. What they need is exactly what Mr. Willingham's article (Summer 2007) suggests—a logical, sequential, core curriculum through the grades that covers all subjects, including forgotten ones like geography, government, and civics. Then they can be taught to express themselves orally, in writing, and through the use of technology. They will then be able to apply their already developed thinking skills to academic subjects.

Boredom is the enemy of creativity and learning. Spending a whole school day on empty skill lessons is meaningless. Kids know when the emperor has no clothes.

—Marilyn Chadwick
Former Coordinator,
Peer Intervention Program
New York, N.Y.

Learning from Stanton Elementary

Karin Chenoweth's contention in the Summer 2007 issue that it is indeed possible for all schools, regardless of geographic, ethnic, or socioeconomic context, to produce students who think at high levels and perform well on standardized tests is accurate.

Her profile of M. Hall Stanton Elementary School in Philadelphia supplies ample evidence that given adequate leadership, teaching staff, resources, and administrative structures, any school can implement programs that can dramatically improve student achievement as measured by standardized tests. That, as Ms. Chenoweth reports, is being done. But that statement begs the question: Now what?

I was a teacher at Stanton starting in the fall of 2001 until the end of 2005, the year that produced the results Ms. Chenoweth celebrates. The difference was dramatic. The quality of the instruction improved under the guidance of our new curriculum leaders, and the focus of that instruction sharpened when weaknesses were revealed through disciplined analysis of test data. Other damaging realities, however, remained beyond the reach of our best efforts.

When I first began my work for the school district of Philadelphia, I was supplied with abundant training. Much of the summer leading up to my first year was spent at workshops that mixed veterans with new recruits. When discussion would turn to the relentless truth that many of Philadelphia's children are undone by the violence and despair of their neighborhoods, the facilitators often supplied two pieces of advice: 1) do your best, and if you affect the life of even one child then you've done your job, and 2) to be effective educators, we should admit our inability to affect the realities of the neighborhoods and focus on our instruction.

Those well-meaning sentiments are, to my ears, declarations of defeat. As long as the conditions in which these children are raised persist, then those children cannot be adequately educated. Let me suggest what every teacher in America's inner cities knows, but is timid about admitting publicly: The positive momentum created through the most caring, rigorous, and dynamic school experience is all but destroyed for far too many of our children as soon as their sneakers hit the sidewalk after the three o'clock

(Continued on page 48)

WHY SOME PEOPLE THINK

VIRGINIA WOOLF

IS THE STATE'S OFFICIAL ANIMAL.

One of the world's most influential writers, Virginia Woolf. Novelis writeris, not Canis lupus.

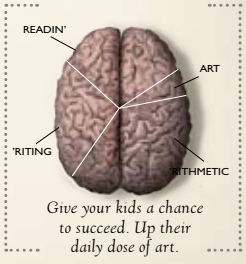
KIDS DON'T GET ENOUGH ART THESE DAYS. Sort of explains why some might think Britain's most influential novelist is an East Coast predator. For the record, Virginia Woolf is not a fierce carnivorous mammal. Nor is she from Virginia.

Adeline Virginia Woolf was born in London in 1882. While her brothers attended school, she was educated at home. Only when the boys brought friends home from Cambridge University was the famed Bloomsbury Group formed with Virginia as the cornerstone. Here she escaped the conventions of society to freely explore philosophy, religion and art. With this freedom, Virginia went on to create the modern novel.

Virginia Woolf wrote legendary novels with opposable thumbs.

During the Post-Impressionist movement, Virginia was influenced to reject linear writing. Her most well-known novel, *Mrs. Dalloway*, is a masterpiece in her "stream-of-consciousness" style. And still, more than three-quarters of a century after her death, she continues to inspire readers and writers around the world. Other than William Shakespeare, she is perhaps studied by more college students than any other author.

Art like Virginia Woolf's can transform lives. It pays off in more ways than you can imagine. In fact, the more art kids get, the more knowledgeable they become in subjects like math and science. The end result is that your well-rounded kid will become a well-rounded adult. For the *Ten Simple Ways* you can help instill more art in kids' lives, please visit AmericansForTheArts.org.



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Notebook

One of Our Own

Hats off to a reader who notified *American Educator* that former counselor and union member Thelma Mothershed Wair was one of the Little Rock Nine. The Fall 2007 issue of *American Educator* included a story commemorating the 50th anniversary of integration at Central High School in Little Rock, Ark. The issue featured instructional resources for teachers looking to supplement lessons on desegregation, as well as an interview with Ernest Green, the only senior in the Nine.

Wair was a junior when she enrolled in all-white Central High in 1957. She and her peers endured taunting from white classmates, but persevered and finished the academic year. By the fall of 1958 however, public high schools were closed in Little Rock because of a segregationist backlash. Wair never attended classes at Central again, but she eventually received her diploma from there (by mail), after having met the graduation requirements by taking correspondence classes and attending summer school in St. Louis, Mo. Wair later became a counselor for the East St. Louis schools and a member of the East St. Louis Federation of Teachers. She retired in 1994.

Wair has continued to participate in celebrations marking Central High's integration. In 1990, she attended an event in honor of the 100th anniversary of President Eisenhower's birth. Former Governor Faubus, who clashed with the President when he refused to allow the Nine to enter the school, also attended. Wair told the *Illinois Union Teacher* in 1994 that she never thought Faubus was aware of any of the Nine as individuals, but, as she recalls, "he said, 'Hi, Thelma,' just like I was an old friend, so I guess he did know us, all the time."

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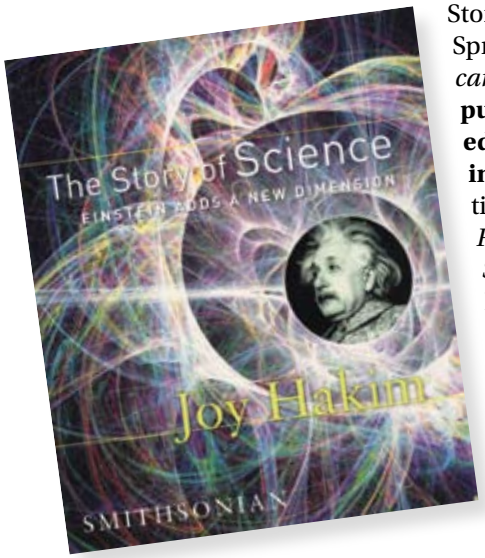
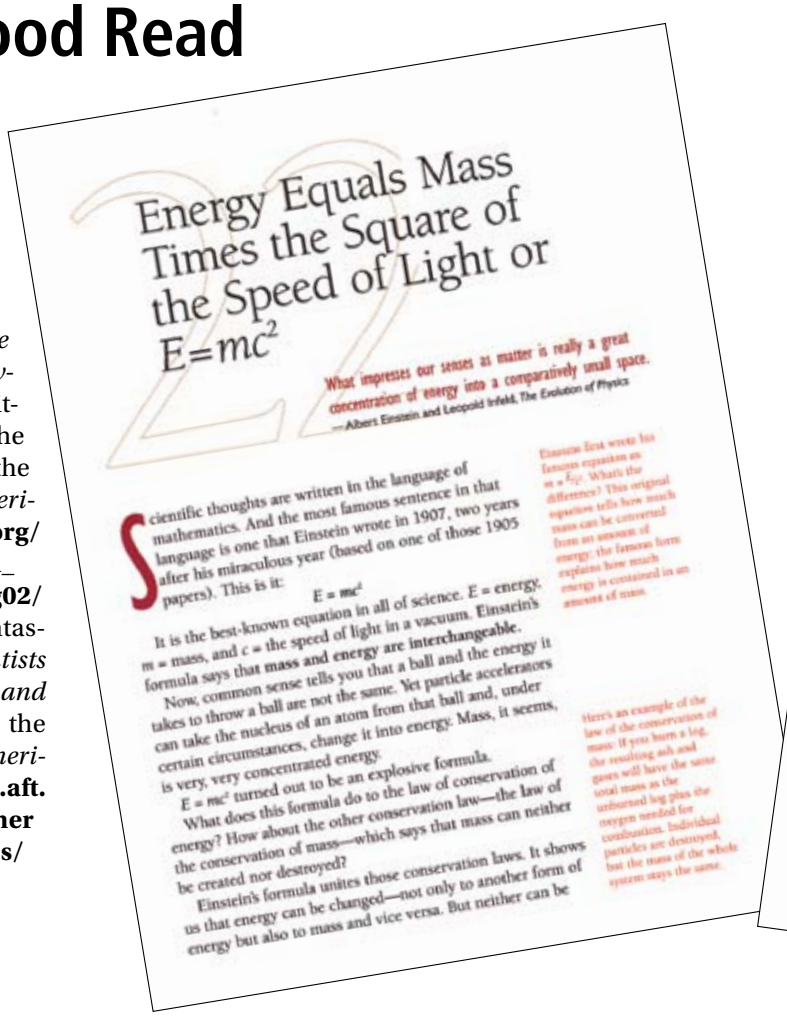
Above, Thelma and her mother, Mrs. A. L. Mothershed, look at a picture of President Eisenhower and Arkansas Gov. Orval Faubus as they met to discuss the Little Rock integration impasse. Left, Thelma Mothershed, Minnie Brown, and Melba Patillo discuss their first full day of school at Central High on September 25, 1957.

Physics Becomes a Good Read

In *The Story of Science: Einstein Adds a New Dimension*, Joy Hakim weaves together the science, history, and personalities behind the major advances in physics over the past 100 years. The result is a fascinating tale that's much more accessible (and fun) than the typical science text. And, it's written with middle and high school students in mind.

This is Hakim's third book in her *Story of Science* series. The first two, *Aristotle Leads the Way* and *Newton at the Center*, are equally well researched and written. For excerpts, see "The Story of the Atom" in the Spring 2002 issue of *American Educator* (**www.aft.org/pubs-reports/american_educator/issues/spring02/index.htm**) and "Fantastic Journey: *How Scientists Figured Out the Shape and Size of the Earth*" in the Fall 2004 issue of *American Educator* (**www.aft.org/pubs-reports/american_educator/issues/fall04/index.htm**).




22
Energy Equals Mass Times the Square of the Speed of Light or $E=mc^2$

What impresses our senses as matter is really a great concentration of energy into a comparatively small space.
—Albert Einstein and Leopold Infeld, The Evolution of Physics

Scientific thoughts are written in the language of mathematics. And the most famous sentence in that language is one that Einstein wrote in 1907, two years after his miraculous year (based on one of those 1905 papers). This is it:

$E = mc^2$

It is the best-known equation in all of science. E = energy, m = mass, and c = the speed of light in a vacuum. Einstein's formula says that **mass and energy are interchangeable.**

Now, common sense tells you that a ball and the energy it takes to throw a ball are not the same. Yet particle accelerators can take the nucleus of an atom from that ball and, under certain circumstances, change it into energy. Mass, it seems, is very, very concentrated energy.

$E = mc^2$ turned out to be an explosive formula.

What does this formula do to the law of conservation of energy? How about the other conservation law—the law of the conservation of mass—which says that mass can neither be created nor destroyed?

Einstein's formula unites those conservation laws. It shows us that energy can be changed—not only to another form of energy but also to mass and vice versa. But neither can be

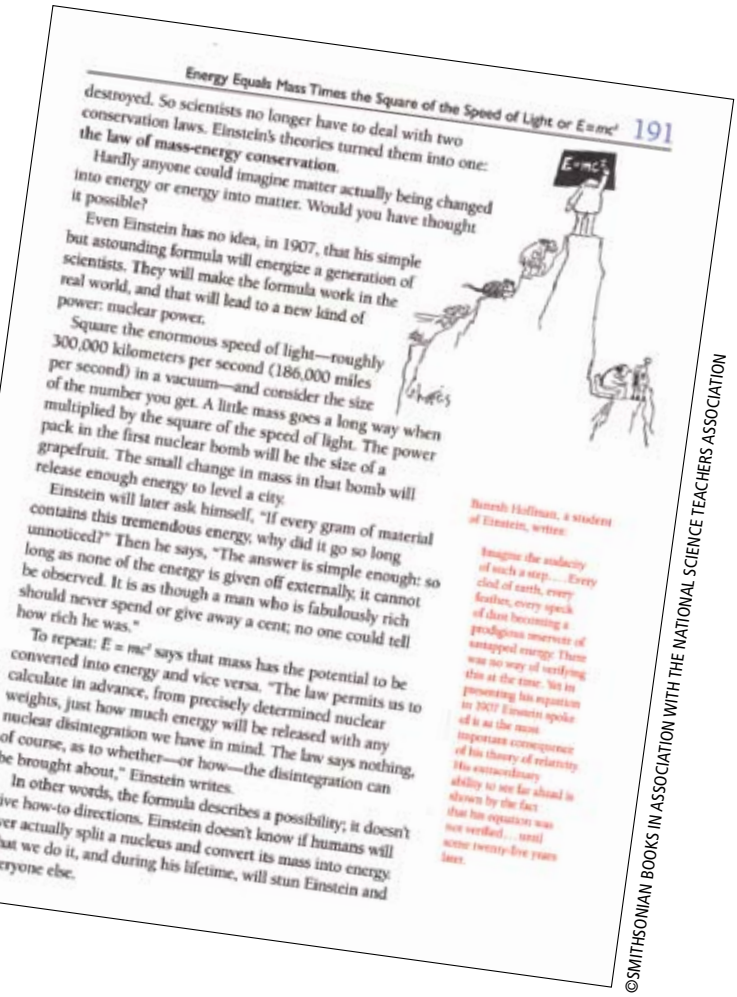
A Greenhouse on the Moon

Scientists at the National Aeronautics and Space Administration (NASA) know they can put a man on the moon. But can he grow plants there, too? That's what NASA wants to find out with its Engineering Design Challenge for this school year.

NASA scientists hope that astronauts may one day be able to grow plants on the moon, which could be used to supplement meals. According to NASA's Web site, astronauts face serious challenges in growing plants there because the moon has no atmosphere, no liquid water, and none of the nutrient-rich soil we have on Earth. That's why NASA is asking students to design and build a growth chamber, a contraption that allows plants to grow with controlled temperature, light, humidity, among other things that plants normally need to grow on Earth.

Students must use their own materials—anything as simple as a soup can or as complex as a hydroponics box (in which plants are grown in mineral nutrients instead of soil)—to build the chambers. All that NASA will provide students are 50 regular seeds and 50 seeds that flew in

ILLUSTRATED BY NENAD JAKESEVIC



Energy Equals Mass Times the Square of the Speed of Light or $E=mc^2$ 191

destroyed. So scientists no longer have to deal with two conservation laws. Einstein's theories turned them into one: **the law of mass-energy conservation.**

Hardly anyone could imagine matter actually being changed into energy or energy into matter. Would you have thought it possible?

Even Einstein has no idea, in 1907, that his simple but astounding formula will energize a generation of scientists. They will make the formula work in the real world, and that will lead to a new kind of power: nuclear power.

Square the enormous speed of light—roughly 300,000 kilometers per second (186,000 miles per second) in a vacuum—and consider the size of the number you get. A little mass goes a long way when multiplied by the square of the speed of light. The power pack in the first nuclear bomb will be the size of a grapefruit. The small change in mass in that bomb will release enough energy to level a city.

Einstein will later ask himself, "If every gram of material contains this tremendous energy, why did it go so long unnoticed?" Then he says, "The answer is simple enough: so long as none of the energy is given off externally, it cannot be observed. It is as though a man who is fabulously rich should never spend or give away a cent; no one could tell how rich he was."

To repeat: $E = mc^2$ says that mass has the potential to be converted into energy and vice versa. "The law permits us to calculate in advance, from precisely determined nuclear weights, just how much energy will be released with any nuclear disintegration we have in mind. The law says nothing, of course, as to whether—or how—the disintegration can be brought about," Einstein writes.

In other words, the formula describes a possibility; it doesn't give how-to directions. Einstein doesn't know if humans will ever actually split a nucleus and convert its mass into energy. But we do it, and during his lifetime, will stun Einstein and everyone else.

Banesh Hoffman, a student of Einstein, writes:

Imagine the audacity of such a step.... Every clod of earth, every feather, every speck of dust becoming a prodigious reservoir of untapped energy. There was no way of verifying this at the time. Yet in presenting his equation in 1907 Einstein spoke of it as the most important consequence of his theory of relativity. His extraordinary ability to see far ahead is shown by the fact that his equation was not verified... until some twenty-five years later.

space on the last space shuttle mission. The seeds will be available to the first 100,000 registrants who must be residents of the U.S., U.S. territories, or outlying areas. Guidelines for the challenge are posted at **www.nasa.gov/audience/foreducators/plantgrowth/joinchallenge/Teach_the_Challenge.html**. Registration is free.

Essentially, the chamber should function as a greenhouse in which seeds can germinate and grow into healthy plants to feed astronauts, make more seeds, and generate fresh oxygen. NASA's Web site explains that "only plants can recycle atmospheric carbon dioxide (exhaled by astronauts when they breathe) back into useful oxygen. Astronauts could run out of oxygen on long-duration missions unless they have plants to regenerate their atmosphere."

To have your students sign up for the challenge and learn more about why plant chambers are important to NASA, visit **www.nasa.gov/audience/foreducators/plantgrowth/joinchallenge/index.html**.

Clara Barton for Roberto Clemente: Want to Trade?

If you're an elementary school teacher looking to liven up your lessons on American history, join the club—The Heroes Club. Created by businessman Brian Batson and educator Dennis Denenberg, The Heroes Club is a set of 25 trading cards that depicts 25 American heroes and the virtues they represent.

For instance, Benjamin Franklin's card explains that he represents the virtue of service and notes that he started many important services that we still use today: the public library, the postal system, and the police department. Clara Barton's card describes her as "a real-life action figure," who cared for wounded soldiers in the Civil War and started the American Red Cross, and, therefore, represents compassion.

Cesar Chavez's card, which also mentions Dolores Huerta, the co-founder of the United Farm Workers, associates him with perseverance for having championed migrant workers' rights. "Migrant workers harvest many of the fruits and vegetables we eat," the card reads. "In the 1960s migrant workers were paid $1 a day. They worked many hours (often in fields sprayed with poisons) and lived in shacks without electricity or running water. Cesar and Dolores made people aware of the terrible living and working conditions. They held meetings all over the country and told true stories of the migrants' poverty. Their perseverance in this struggle helped to improve the lives of migrant workers."

The cards serve as a fun—yet educational—way for teachers to take a break from history textbooks and use a relatively inexpensive supplement. A set of 25 cards costs $9.95.

A list of the heroes, their virtues, and pictures of the trading cards appear on The Heroes Club Web site, **www.theheroesclub.org**. Worksheets and lesson plans, both of which prompt students to think about the challenges a particular hero faced and why our lives are better today because of that person, are also posted there.

4,000 Meters Below

New Research Reveals the Wonders of the Deep Sea

By Claire Nouvian

Love at first sight is how journalist and filmmaker Claire Nouvian describes her first glimpse of the exotic creatures of the deep sea, "some with surprising shapes or baffling colors, others that spat out threatening flashes of blue light, and others still that undulated with infinite grace, producing iridescent sparkles." She was captivated, desperate to know more, and disappointed at the dearth of information available to the general public. "How is it possible that the Earth bears such marvels and that people don't even know about them?" she asked. Since the book she wanted didn't exist, she created it herself. The result is The Deep*, an aesthetic introduction to the deep sea with over 200 striking photos that range from sublime to grotesque and 14 short, accessible essays by the world's leading oceanographers. Here, we offer an excerpt from Nouvian's introduction, four of the oceanographers' essays, and a dozen photos.*

—*Editors*

On dry land, most organisms are confined to the surface or, at most, to altitudes of a 100 meters—the height of the tallest trees. In the oceans, though, available living space has both vertical and horizontal dimensions. With an average depth of 3,800 meters, the oceans offer 99 percent of the space where life can develop on Earth. A staggering thought.

The deep sea, which has been immersed in total darkness since the dawn of time, occupies 85 percent of this space, and thus forms the planet's largest habitat.

And what do we know about it?

Compared to what remains to be discovered, practically nothing. The earliest explorations of the midocean ridges date back to the 1970s. The first midwater dives to explore the vast deep-sea domain took place in the 1980s; even the very first studies of the deep seafloor were undertaken only relatively recently, with the large-scale oceanographic trawling campaigns of the 19th century. Currently, only about five percent of the seafloor has been mapped with any reasonable degree of detail, which relegates the overwhelming majority of the abyssal plains and other deep-sea habitats to the unknown. Moreover, in some of the expeditions carried out in the Southern Atlantic or around seamounts in the Pacific, 50 percent to 90 percent of the specimens coming up in the nets are unidentified specimens. For the last 25 years, a new deep-sea species has been described every two weeks, on average. Current estimates about the number of species yet to be discovered vary between 10 and 30 million. By comparison, the number of known species populating the planet today, whether terrestrial, aerial, or marine, is estimated at about 1.4 million. The deep sea no longer has anything to prove; it is without a doubt Earth's largest reservoir of life.

—Claire Nouvian
The Deep

Claire Nouvian is a journalist, producer, and film director for French and international television. This article was excerpted from the book The Deep: The Extraordinary Creatures of the Abyss *by Claire Nouvian, published by the University of Chicago Press,*

Cover, Pandea rubra; Red paper lantern medusa
Size 15 centimeters
Depth 550-1,200 meters
The lantern medusa's ability to crumple and wrinkle its bright red umbrella, or to bend its form into right angles, is quite unusual for a gelatinous animal.

Left, Genus Grimpoteuthis, species undetermined; Dumbo octopus
Size 20 centimeters
Depth 300-5,000 meters
Researchers have already described 14 species of Grimpoteuthis, but beyond the taxonomic description made on the basis of animals captured by trawlers, these octopuses for the most part are still enigmatic. © 1999 MBARI.

The Exploration of the Deep

By Cindy Lee Van Dover

In the first century A.D., Roman naturalist and historian Pliny the Elder believed that already the sea was understood, that the definitive list of marine fauna was complete—totaling 176 species—and that, "by Hercules, in the ocean ... nothing exists which is unknown for us." Sailors of his time knew that our blue planet was covered with a skin of seawater over much of its surface, but they could not know the vastness of the volume of water beneath the surface, nor how many different creatures might live there. It wasn't until French mathematician Pierre Simon Laplace calculated the depth of the Atlantic Ocean in the late 1700s that we began to understand what the "deep" in "deep sea" means. At an average depth of 2.2 miles, the deep sea, the largest ecosystem on our planet, has been hidden from our view, inaccessible and unknown, for nearly as long as man has sailed upon it.

The deep sea was long perceived as a lifeless world. In 1858, British naturalist Edward Forbes wrote that life could not exist below 300 fathoms (1/3 mile). Forbes's "azoic theory" was soon thoroughly discredited by Sir Charles Wyville Thomson, who led the first oceanographic circumnavigation of the world: the *Challenger* Expedition of the 1870s. Over four years, Thomson and his colleagues scraped the seafloor with trawls and dredges at depths of up to nearly five miles and recovered more than 4,000 new species of marine life. The dredged-up animals were often mangled almost beyond recognition, but they were nevertheless precious specimens that revealed hitherto untold tales about the rich diversity of deep-sea fauna. There were limits to what could be inferred from these samples; they often provided little insight into the way life on the seafloor looked, or into how the animals might interact with one another. To paraphrase explorer and humanist Théodore Monod, attempting to understand life in the deep sea using dredges is like aliens try-

Latrunculia apicalis; Green globe sponge
Size 12 centimeters height
Depth 10-1,200 meters
Sponges have retained through the ages a simple body plan that consists of an assembly of filtering cells that grow very slowly and without a precise pattern, which gives rise to a variety of forms. © Bjorn Gulliksen/uwphot.no.

In 1960, the *Trieste* descended seven miles to the deepest part of the ocean, the Mariana Trench. It is a record that remains unmatched today: More men have walked on the moon than have dived to the deepest part of our oceans.

Marrus orthocanna
Size 40 centimeters
Depth 400-2,200 meters
Though they do not have powerful jaws, sharp teeth, or threatening fins, siphonophores are still veritable killing machines that number among the most voracious predators of the oceans. The curtain of stinging tentacles they deploy can attain a length of 40-50 meters in the largest of the known siphonophores. Steven Haddock © 2006 MBARI.

ing to understand life on Earth by blindly dangling a hook from space and retrieving a cockroach, a T-shirt, and an iPod. Trawls and dredges allow us to measure the biological diversity found in the deep sea—they are still used today for species counts and other statistics—but they are almost useless for understanding animal behavior in natural settings. To achieve this goal, one needs to observe organisms in their environment.

In the late 19th century, an underwater voyage was the dream of many adventurers inspired by Jules Verne's *20,000 Leagues under the Sea*, but it was not until the 1930s that the first explorers descended beyond where light penetrates, into the relentless dark, the veritable deep sea. William Beebe—lanky, literary, lyrical naturalist of the Bronx Zoo—was the leader of these first deep dives, ultimately making a round trip half a mile down. Otis Barton, a young man of large fortune, designed and built the bathysphere, a tethered metal sphere with an inside diameter of less than three feet in which the deep-sea pioneers cramped themselves for several hours during each immersion. In accounts of his dives, Beebe gives attention to the pale green "dancing" lights—the bioluminescent lanterns of creatures unnamed and never seen before by any man—which came into focus before his astonished eyes.

As Beebe explored beneath the surface of the sea in his bathysphere, Swiss scientist Auguste Piccard was making the first flights into the stratosphere, "out far beyond the atmosphere," nearly 10 miles above the ground. To accomplish this feat, Piccard designed a pressurized, spherical gondola suspended beneath a hydrogen-filled balloon. Using the principles of design he learned from its construction, Piccard worked to fulfill his own dream of descending, untethered, into the depths of the sea. He built a small metal sphere that could withstand pressure and coupled it to a buoyant "balloon" filled with gasoline. Dream became reality when, in 1954, Piccard descended to a depth of 4,000 meters in his bathyscaphe, the first untethered class of vehicle to take people into the deep sea. In 1960, the *Trieste*, a second generation bathyscaphe operated by Piccard's son Jacques and U.S. Navy lieutenant Don Walsh, descended seven miles to the deepest part of the ocean, the Mariana Trench. The Walsh and Piccard dive was more a record breaker than a dive of exploration, but it is a record that remains unmatched today: More men have walked on the moon than have dived to the deepest part of our oceans.

The technological successes of the bathyscaphes inspired a team of U.S. oceanographers led by geologist Al Vine to call for a smaller, more maneuverable submersible that could be used to explore the deep sea. With its gasoline balloon, the *Trieste* was inherently buoyant; she sank only when loaded with expendable weights. Thus she could descend and ascend, but she could not adjust her depth once her weights were dropped, nor could she move laterally. *Alvin*, the three-person submersible named for Al Vine, was the first deep-diving submersible to require a pilot who could drive over the seafloor by controlling the angle and speed of a large aft propeller. *Alvin* made its first dives in 1964, marking the commencement of the true age

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of ocean exploration.

Alvin, together with the new French submersible, *Cyana*, demonstrated the merit of submersibles as scientific workhorses during an unprecedented mission of exploration: Project FAMOUS (French-American Mid-Ocean Undersea Study, 1972). Geologists were able to dive up to 2.5 miles below the surface and observe for the first time the Mid-Atlantic Ridge, the long volcanic mountain chain that bisects the Atlantic Ocean. In the mid 1970s, geologists shifted their focus from the Atlantic to the Pacific, diving to 1.5 miles on the Galápagos Rift, where they encountered warm water (20° C or more) flowing out of cracks in the rocky seafloor. Soon after, they discovered spectacular hot springs (350° C) spewing from tall mineral chimneys on the East Pacific Rise, the mountain range that begins in the Gulf of California and extends southward off the coasts of Central and South America.

Geologists had predicted that hot springs, "hydrothermal vents," would exist on the seafloor, but no one anticipated the extraordinary communities of strange animals bathed in the flow of warm water. Reports of six-foot-long red-plumed worms living on chemicals in the water hastened return trips to the dive sites by biologists. The seafloor observations of the late 1970s motivated the development of deep-submergence assets by other nations. *Alvin* and *Cyana* were joined by other deep-diving research submersibles operated by French, Canadian, Russian, and Japanese teams.

Since the discovery of hydrothermal vents in 1977, the pace of exploration in the deep sea has steadily increased, fueled by the finding of novel adaptations to extreme environments and by the gain of fundamental insights into how our planet works. Our increasing ability to access the seafloor with new tools and sensors promotes and enhances exploratory activities. Tethered and untethered robots are now the tools of choice for many of the challenges faced by deep-sea explorers. Nevertheless, the construction of two new human-occupied submersibles, one Chinese and the other American, underscores the anticipated need for a human presence on the seafloor for the next half century.

Man has observed less than one percent of the seafloor; the challenge lies before us. During the 20th century, the deep sea became accessible. In this 21st century, the deep sea will become known.

Living Lights in the Sea

By Edith Widder

The deep sea is often described as "a world of eternal darkness." That is a lie. While it is true that sunlight does not penetrate below 1,000 meters, that does not mean that it is a lightless world down there. In fact, there are lots of lights—billions and billions of them. These are animal lights and they serve many life-sustaining functions. There are lights for finding food, lights for attracting mates, and lights used for defense. All these lights are generated by a chemical process called bioluminescence. There are only a few creatures on land that can make light. Fireflies and glowworms are some of the best known examples, but there are a handful of others such as some earthworms, click beetles, snails, centipedes, and fungi. These, however, are relatively rare and they do not play a significant role in the balance of nature. By contrast, in the oceans there are so many animals that make light that there are vast regions where as many as 80 to 90 percent of the animals collected in nets are bioluminescent. In the ocean, bioluminescence is the rule rather than the exception.

In the ocean, bioluminescence is the rule rather than the exception. Headlights may occur below the eye, behind the eye, or in front of the eye. And, as with some cars, some headlights can be rolled down and out of sight when they are not in use.

The reason that there are so many animals in the oceans that make light has to do with the nature of the oceanic visual environment. Out away from shore, in the vast open ocean that forms the largest living space on our planet, there are no trees or bushes for animals to hide behind. But just as on land, prey need to hide from predators. Some animals hide by being transparent. Others hide by descending into the dark depths during the day and only ascending into food-rich surface waters under cover of darkness. And still others remain at depths below the penetration of sunlight and survive on food that sinks or swims into the depths. It is because so many animals in the ocean survive by hiding in darkness that the ability to make light is so prevalent.

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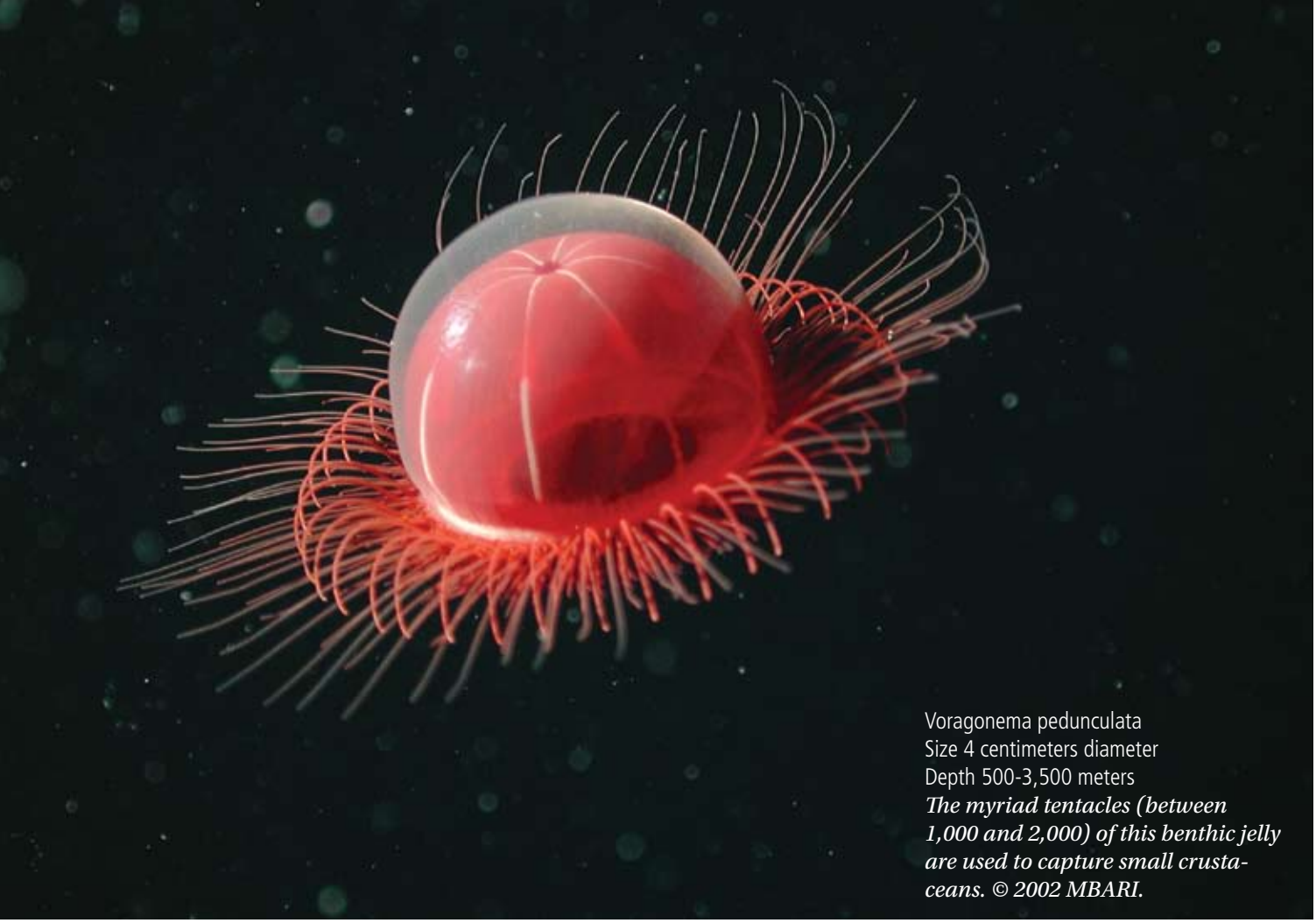
Right, Tuscaridium cygneum; Radiolarians
Size 1.2 centimeters
Depth 400-2,200 meters
Like a constellation in space, these radiolarians float in the deep water column and produce a bioluminescent glow when disturbed. These members of the zooplankton are primitive, unicellular organisms that sometimes form spherical colonies armed with spines. They feed on phytoplankton, but also upon animal prey, such as copepods, jellies, and other gelatinous creatures. After death, their siliceous skeletons provide one of the principal components of abyssal sediment. Steven Haddock © 2006 MBARI.

Below, Genus Tomopteris, species undetermined
Size from a few millimeters to 30 centimeters
Depth 0-4,000 meters
There are several species of Tomopterid worms, which, depending on nutrition, vary in color from red to orange, passing through violet to total transparency. One feature that all the species have in common is the ability to secrete a yellowish, bioluminescent fluid from glands at the tip of their appendages. The purpose of this yellowish light, which is practically imperceptible to the creature's neighbors, remains a mystery. K.J. Osborn © 2004 MBARI.

For animals that spend their lives avoiding sunlight, a built-in headlight can be a very handy device. There are many fish, shrimp, and squid that use headlights to search for prey and to signal to mates. Headlights may occur below the eye, behind the eye, or in front of the eye. Many headlights have a highly reflective surface that helps direct the light outward, much like a car's headlights. And, as with some cars, some headlights can be rolled down and out of sight when they are not in use—a handy way of hiding that reflective surface and allowing the fish to better blend into the darkness. Most headlights in the ocean are blue, which is the color that travels furthest through seawater and the only color that most deep-sea animals can see. But there are some very interesting exceptions like dragonfish with red headlights that are invisible to most other animals, but that the dragonfish can see and use like a sniper scope to sneak up on unsuspecting, unseeing prey. Dragonfish also have blue headlights that they can use like high beams to see into the distance.

Other animals use glowing lures to attract prey. Much of the fecal matter and decaying foodstuffs that rain down from above are covered with glowing bacteria, which is why a glowing lure can easily be mistaken for dinner, when it instead signals an untimely death in a toothy jaw. Lures may dangle from fishing rods that poke out of the top of the head or out of the chin; they may even be found at the tip of a very long tail.

Light is also used for defense. Many animals that live in the twilight depths between 200 and 1,000 meters use a camouflage trick called counterillumination to obliterate their silhouettes with bioluminescence. At a distance, individual belly lights called photophores blur into a light field that exactly matches the color and intensity of the dim



Voragonema pedunculata
Size 4 centimeters diameter
Depth 500-3,500 meters
The myriad tentacles (between 1,000 and 2,000) of this benthic jelly are used to capture small crustaceans. © 2002 MBARI.

filtered sunlight overhead. And if a cloud passes over the sun, the fish, shark, squid, or shrimp either dims its belly lights or swims upward to maintain that perfect match. One of the fish that uses this camouflage trick is called the benttooth bristlemouth (Cyclothone acclinidens); it is so common that it is believed to be the most abundant vertebrate on the planet. Imagine that! The most abundant animal with a backbone, and most people have never seen or heard of it.

Another common defensive trick is for the prey to release its bioluminescent chemicals into the face of a predator, just as a squid or an octopus releases an ink cloud. The light either blinds or distracts the predator, allowing the prey to flee into the darkness. Many jellies use this trick, as do shrimp and squid. There is even a fish, called the shining tube shoulder, that can shoot the equivalent of photon torpedoes out of a fleshy, backward-pointing pipe located just above its pectoral fin.

Still another use of light for defense is as a burglar alarm. Blaring horns and flashing lights on your car are meant to discourage a burglar because of the unwanted attention they attract; brilliant displays of bioluminescence serve the same purpose. When caught in the clutches of a predator, a prey's only hope of escape may be to attract the attention of a larger predator that will attack the attacker. Some of the most spectacular light shows in the ocean are burglar alarms. One of the best examples is the pinwheel display of the common deep-sea jellyfish, *Atolla*. It is a display that has to be seen to be believed; in the dark depths of the ocean it can attract the attention of a predator over 100 meters away.

Bioluminescence occurs in all the world's oceans from surface to bottom and from coast to coast. Appreciating how animals use their lights is important to understanding this ecosystem that represents more than 99 percent of our biosphere. Various light-producing chemicals extracted from different animals have also proved enormously valuable in medical and genetic research. Living lights in the ocean are beautiful, mysterious, useful to humans, and absolutely essential to the animals that possess them.

The Deep Seafloor: A Desert Devoid of Life?

By Craig M. Young

Once thought to be a flat and lifeless desert, the deep seafloor is now known to have more topographical relief than the Himalayas and a diversity of animal life that may exceed that of the Amazon Rain Forest and the Great Barrier Reef

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Right, Umbellula magniflora; Droopy sea pen
Size over 1 meter
Depth 600-6,100 meters
The droopy sea pen is a form of coral that anchors in the muddy sediment using a water-inflated bulbous foot. It extends its high stalk to more than a meter over the seafloor so that its feeding polyps can take advantage of currents that are more vigorous than those sweeping right above the bottom. © David Wrobel.

Below, Riftia pachyptila; Giant tube worm
Size up to 2 meters
Depth 2,000-2,850 meters
Up until 1979, whenever one thought about worms, the image of a colorless earthworm came immediately to mind, but the discovery of the giant, sublimely colored creatures living around hydrothermal vents in the eastern Pacific abruptly changed that view. Robert D. Ballard remembers: "With no eyes, no mouth, or any other obvious organs for ingesting food or secreting waste, and no means of locomotion, it was no worm, snake, or eel, but no plant either—the strangest creature we had ever seen." © 2003 MBARI.

combined. If all of the dry land on Earth were pushed into the sea with bulldozers, it would fill only about one twenty-third of the ocean's volume. The Himalayas, the Alps, and the Rocky Mountains are all dwarfed by the Mid-Atlantic Ridge, an enormous range of mountains that divides the deep Atlantic from north to south, with only a few scattered islands, like Iceland and the Azores, peeking above the waves. The sheer vastness of the deep seafloor boggles the mind.

Apart from bioluminescence produced by the animals themselves and perhaps a faint glow emanating from hydrothermal vents, the deep sea is dark—much too dark for plants to grow—so all life in the deep sea consists of either microbes or animals. Deep-sea forests have animals instead of trees: sea anemones, corals, and tubeworms. Deep-sea plains have no grasses or shrubs, but they do have wandering herds of animals. Instead of wildebeests and antelopes, deep-sea herds of sea urchins and sea cucumbers graze across these plains, their food consisting not of leaves but of mud. Despite

Deep-sea plains have no grasses or shrubs, but they do have wandering herds of animals. Instead of wildebeests and antelopes, deep-sea herds of sea urchins and sea cucumbers graze across these plains, their food consisting not of leaves but of mud.

Right, Genus Grimpoteuthis, species undetermined; Dumbo octopus
Size up to 1.5 meters
Depth 300-5,000 meters
The behavior and biology of this finned octopus are still largely uncertain. It is frequently found close to the bottom in all the world's oceans, though it can also adventure rather far up. © 2003 MBARI.

Below, Careproctus longifilis; Threadfin snailfish
Size 15 centimeters
Depth 1,900-2,997 meters
Like a prehistoric tadpole, this fish with a face perforated by large sensory pores seems to confirm the myth of the deep sea as a haven for fossil creatures that have remained unchanged since the dawn of time. Despite its strange looks, the threadfin snailfish is not among the oldest sentinels of our planet, as are the horseshoe crab and the coelacanth, whose fossil records date back more than 250 million years. © 2002 MBARI.

continuous darkness, high pressure, near-freezing temperatures, and scarce food, animals occupy virtually all of the deep seafloor, from Arctic to Antarctic and from the margins of continents to the deepest ocean trenches.

Nearly three-fourths of the deep ocean floor is very flat. Vast abyssal plains lying between 4,000 and 6,000 meters in the deep ocean basins are blanketed with the accumulated skeletons of small plants, protists, and animals that live and die in the overlying waters. In relatively shallow seas (less than 3,000-5,000 meters in most places), the calcium skeletons of tiny protists (foraminiferans), algae (coccolithophores), and snails (pteropods) sink to form soft chalky sediment known as calcareous ooze. At greater depths, calcium dissolves away, leaving sediments composed mostly of silica (glass) skeletons of radiolarian protists and diatoms. Below the very transparent oligotrophic waters of the Sargasso Sea and other midocean unproductive areas, the sediment has very few skeletons, consisting instead of fine volcanic ash and desert dust that settles from the air and sinks below the surface of the sea.

The flatness and apparent monotony of the abyssal plains belie their biological diversity. When fine seafloor sediments are carefully sieved, one finds that most of the action is below the surface; large numbers of tiny worms, clams, snails, brittle stars, and bizarre crustaceans burrow in the sediments or move slowly through the mud, playing out age-old dramas of feeding, breeding, and survival. A careful look at the muddy seafloor from a submersible window reveals traces of these dramas in the form of tracks, trails, mounds, pits, and grooves. Long worms extend their mucus-covered bodies from deep burrows to make star-shaped patterns as they sweep up mud from as far as they can reach. Shrimp, lobsters, and clams shoot sediment from their holes to make tiny volcanoes with caldera-like burrows. On top of the sediment, sea cucumbers by the millions mop the uppermost layers, licking first one tentacle then another, while tiny tube-feet propel them in an endless quest to harvest the bacteria-laden mud. When disturbed, some of these lumbering animals leap off the seabed and dance away with surprising grace. Deep-sea urchins with soft, balloon-like bodies sport whimsical gelatinous bags that hide painfully venomous protective spines. Delicate sponges with roots and skeletons of woven glass reach into the water, filtering bacteria and providing off-bottom resting places for brittle stars, crinoids, and crabs. Small fish stand quietly on tripod-like fins, capturing whatever the currents deliver. Others hover with heads pointed down, awaiting the emergence of unsuspecting animals from the sediments. Graceful eels, rattail fish, and sharks prowl slowly above the bottom, stalking prey and following the odors of whatever carrion they can find.

Most conditions on the deep seafloor are quite stable, with pressure, temperature, and salinity being virtually unchanged during the course of years, decades, and even millennia. It came as a great surprise, therefore, when scientists discovered not long ago that a small proportion of deep-sea animals reproduce at particular times of the year. How do sea urchins and brittle stars on the deep ocean

floor know when it is spring or fall at the surface? Food supply appears to be the answer. Except at hot water vents where chemical energy drives the ecosystem, all animal life on the deep seafloor depends ultimately on the plants and animals that live and die in the upper water column. Dead material from above eventually sinks to the bottom, and because plankton production in the upper water column follows seasonal cycles of light and nutrients, the arrival of dead plankton on the bottom also has a seasonal cycle. Thus, animals gorging themselves on newly arrived plankton corpses (detritus) can invest more energy in egg and sperm production at some times of year than at other times. Once gonads are produced, animals must find mates in complete darkness. Many sea urchins and sea cucumbers wander about by themselves for most of the year, then pair with others of their species for the short breeding season. Nobody knows if they find each other entirely by chance or if they communicate with chemical scents.

The deep seafloor is not entirely flat and muddy. The midocean ridges are made of volcanic rock, as are the active and inactive underwater volcanoes called seamounts. The relatively steep margins of continents are also rocky, and melting icebergs drop stones or boulders onto the ocean floor. Wherever rocks are found, there are specialized animals that live permanently attached to them. Vast reefs of ghostly white corals may extend several meters high off the ocean bottom. Stalked sea lilies (crinoids) bend in the current like tall wind-blown umbrellas, collecting tiny particles from the water that passes them by. Specialized starfish reach upward with pincer-covered arms that grab the legs of tiny shrimp. Carnivorous sea squirts with wide-open mouths wait for hapless baby fish to land, then grab them like Venus flytraps. Sponges, crinoids, and sea fans extending upward from the bottom are colonized by a diverse assemblage of other animals. In the clear and food-limited waters of the deep sea, high spots with maximum exposure to water currents are prime real estate. The most colorful and diverse assemblages of animals are often found, therefore, on the tops of boulders and the peaks of seamounts.

Gas Promotes Mass: Methane Seeps

By Lisa Levin

Imagine a Jacuzzi with jets set on low, or your soft drink after a good shaking. Now pretend those bubbles are filled with methane rather than air or carbon dioxide. There you have the scene at some of the strangest, and most recently discovered, ecosystems on the seafloor: methane seeps. Here, aggregations of clams, mussels, and tubeworms thrive on the chemicals emanating from the seabed. Prior to the discovery of seeps, scientists thought that chemically driven systems on the deep seafloor were associated only with hot vents. Seeps proved them wrong. First revealed in 1984, cold seeps have since been discovered throughout the world's oceans.

Methane seeps occur from the shallow subtidal zone to the ocean trenches, at depths ranging from 15 meters to more than 7,800 meters. Thus, they are not exclusively a deep-sea phenomenon; however, only those systems below the continental shelf host highly specialized biological communities.

Methane is a clear, highly combustible, odorless gas, familiar to all as a source of energy for our gas stoves and home heating. Natural gas, recovered by drilling, is about 75 percent methane. It smells only because organic sulfur compounds are added so that gas leaks can be detected. Methane is found in the Earth's crust under the ocean. In areas of high primary production, large amounts of organic matter—mainly plankton—are deposited over millions of years in the seabed along the edge of the continents. As the organic material sinks and accumulates on the seafloor, it becomes buried under layers of sediment. Then microbes

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(or the effect of pressure and heat in certain areas) decompose the organic matter without any oxygen, resulting in the formation of methane.

When the deep-buried methane moves upward towards the seafloor, it is consumed by microbes that interact with other bacteria to produce sulfide. Although sulfide, which smells like rotten eggs, is usually highly toxic, it supports a suite of animals that are specialized in dealing with chemical environments; these are chemosynthetic animals, similar in their body organization to the animals found at hydrothermal vents. The fauna attracted to the methane seepage form true animal oases on a landscape of otherwise relatively featureless, homogeneous sediment in the deep sea. First, bacteria graze on the chemical fluids (methane and sulfide) that seep out of the seafloor. Then, special clams and mussels arrive that house symbiotic bacteria that can harvest the chemicals to produce energy for their hosts. Also present at seeps are tubeworms with sulfide-consuming bacteria; some have very long roots that can reach a meter down under the seafloor to look for sulfide.

Methane formed within the seafloor can be squeezed upward by the subduction of oceanic plates under the continental margins. That's why these new ecosystems were named "methane seeps" when they were first discovered. Since then, scientists have learned that methane does not always "seep" out of the seafloor. It can also be exposed by earthquake-induced landslides. For these reasons methane seeps are common along the entire Pacific rim: off Japan, Alaska, Oregon, California, Costa Rica, Peru, and Chile, all areas where there is a great deal of tectonic activity. Seep communities can also occur in other settings, in association with hydrocarbons such as petroleum oil, tar, or asphalt.

Contact with cold water causes crystallization: Methane becomes trapped in a prison of water molecules, forming a solid ice within the seafloor.

The first animal communities ever seen living at seeps on the deep seafloor were found in 1984 off Florida in the deep Gulf of Mexico, associated with brines containing sulfide. Brine is a very salty water that oozes out of large salt deposits within the Earth's crust. Two hundred million

Hesiocaeca methanicola; Iceworms
Size up to 5 centimeters
Depth 540 meters
Which of the two ought to be considered more unusual? The pink worm working nonchalantly in a ball of methane-flavored ice, or the ice itself? When temperatures are low and pressures high, methane crystallizes within a prison of water molecules, forming little heaps of ice called methane hydrates. This phenomenon is a curiosity in itself, but the discovery in 1997 of polychaete worms sculpting the orange hydrate surfaces reminds us that we have not yet been introduced to all the strange phenomena of our planet.
© Ian McDonald.

Add Depth to Lessons on *The Deep*

The Deep's 14 essays are an excellent resource for high school science teachers (or English teachers looking for informative non-fiction reading material). For middle and elementary school teachers, the following Web sites provide lesson plans, videos, and other instructional resources to help pique students' interest in exploring the deep sea:

- The National Oceanic and Atmospheric Administration offers lesson plans at **www.education.noaa.gov/tocean.html**. For fifth and sixth grades, lessons focus on deep-sea habitats and "animals of the fire ice," such as methane hydrate ice worms and hydrate shrimp.
- Videos of the technologies that have opened up ocean exploration are posted at the Public Broadcasting Service (PBS) Web site, **www.pbs.org/saf/1207/**. The site also includes student activities, such as "Light Stick Chemistry" for fifth- through eighth-graders. The activity, listed at **www.pbs.org/teachers/sciencetech/inventory/oceanography-68.html**, helps students understand bioluminescence in deep-sea marine life with something as simple as a light stick.
- For students in kindergarten, first, and second grades, the Study Abroad Semester At Sea Sailing Program offers age-appropriate lesson plans on its Web site at **www.sea.edu/academics/k12.asp?plan=specializedinsea**. In one such activity, students make a mural to investigate how ocean animals are adapted to certain parts of their environment.
- National Geographic features several K-12 lessons, one of which is sure to excite the youngest generation of budding scientists. "Fish Aren't Afraid of the Dark!" is geared toward students from kindergarten to second grade. In this lesson, posted at **www.nationalgeographic.com/xpeditions/lessons/08/gk2/seasfish.html**, students use yardsticks, flashlights, and drawing materials to understand how light might help bioluminescent animals.

—Editors

years ago, the Gulf of Mexico became an isolated sea, which dried out entirely, producing an eight-kilometer-thick layer of salt. Later, a passage linked the Gulf to the oceans again. Today, the salt layer is trapped under millions of years of sedimentation, but plate movements called "salt tectonics" cause this buried substance to reach the seafloor, where it sometimes forms distinct "brine lakes."

The global inventory of methane in the deep ocean may be 10 times that of the conventional oil reservoir, gas fields, and coal beds combined. New seeps are discovered every few months and will probably prove to be much more widespread than hydrothermal vents, whose geographical distribution is essentially linked to the volcanic activity at midocean ridges or behind subduction zones.

At high pressure and low temperatures in the deep sea, methane can occur in solid form, known as gas hydrate. The hydrates form by the movement of methane gas upward in the seabed along faults and cracks. Contact with cold water causes crystallization: Methane becomes trapped in a prison of water molecules, forming a solid ice within the seafloor. Massive quantities of methane hydrates occurring along the continental margins could represent a major future energy source, as one liter of methane hydrate contains 168 liters of methane gas. However, the solid form is stable only at high pressure and cold temperatures, posing a challenge for recovery, transport, and implementation as a fuel source. A big problem linked to the use of methane remains; it is a greenhouse gas, warming the atmosphere far more than carbon dioxide. Some theories suggest that massive release of gas hydrates long ago in the Earth's history could have triggered rapid severe warming of the atmosphere. This may have occurred during the Permian-Triassic extinction event 252 million years ago for example, or during the Paleocene-Eocene thermal maximum 55 million years ago, but this idea is still under debate.

Seep systems host a wealth of biodiversity, from microbes to mussels. Strange new microbial interactions and relationships are emerging with every visit to new seeps. The animal communities inhabiting cold seeps are similar to those at hydrothermal vents, but differ in the absence of elevated temperature, and in having greater longevity. Seep emissions occur at temperatures similar to those in surrounding sediments, thus they are sometimes called "cold seeps." Seep fluid emissions, while shifting positions locally, are thought to persist in a particular area for much longer periods of time than many hydrothermal vents (venting is inherently ephemeral, at least where the ridge crest spreads quickly), creating more stable communities with longer-lived organisms. Seep tubeworms, for example, may live for over 200 years!

The study of methane seeps is still in its infancy. We have yet to discover most seeps and perhaps most seep species. We don't yet know how seep animals reproduce, move between seeps, respond to settlement cues, or interact with one another. Better understanding of seep ecosystems may ultimately unlock secrets about climate change, the evolution and maintenance of life in the deep sea, and possibly even life on other planets, where oxygen is scarce and toxic chemicals abound. ❐

Conjuring Cut Scores

How It Distorts Our Picture of Student Achievement

By Chester E. Finn, Jr., and Michael J. Petrilli

No Child Left Behind made many promises, one of the most important of them being a pledge to Mr. and Mrs. Smith that they would get an annual snapshot of how their little Susie is doing in school. Mr. and Mrs. Taxpayer would get an honest appraisal of how their local schools and school system are faring. Ms. Brown, Susie's teacher, would get helpful feedback from her pupils' annual testing data. And the children themselves would benefit, too.

So far so good; these are the ideas that underpin 20 years of sensible education reform. But let's return to little Susie Smith and whether the information coming to her parents and teachers is truly reliable and trustworthy. This fourth-grader lives in suburban Detroit, and her parents get word that she has passed Michigan's state test. She's "proficient" in reading and math. Mr. and Mrs. Smith understandably take this as good news; their daughter must be "on grade level" and on track to do well in later grades of school, maybe even go to college.

Would that it were so. Unfortunately, there's a lot that Mr. and Mrs. Smith, and Susie's teachers, don't know. They don't know that Michigan set its "proficiency passing score"—the score a student must attain in order to pass the test—among the lowest in the land. So Susie may be "proficient" in math in the eyes of Michigan education bureaucrats, but she still could have scored worse than five-sixths of the other fourth-graders in the country. Susie's parents and teachers also don't know that Michigan has set the bar particularly low for younger students, such that Susie is likely to fail the state test by the time she gets to sixth grade—and certainly when she reaches eighth grade—even if she makes regular progress every year. And they also don't know that "proficiency" on Michigan's state tests has little meaning outside the Wolverine State's borders; if Susie lived in California or Massachusetts or South Carolina, she would have missed the "proficiency" cut-off by a mile.

Mr. and Mrs. Smith know that little Susie is "proficient." What they don't know is that "proficient" doesn't mean much. This is the proficiency illusion.

Standards-based education reform is in deeper trouble than we knew, both the Washington-driven, No Child Left Behind version and the older versions that most states undertook for themselves in the years since *A Nation at Risk* (1983) and the Charlottesville education summit (1989). It's in trouble for multiple reasons. Foremost among these: On the whole, states do a bad job of setting (and maintaining) the standards that matter most—those that define student proficiency for purposes of NCLB and states' own results-based accountability systems.

We've known for years that there's a problem with many states' academic standards—the aspirational statements, widely available on state Web sites, of what students at various grade levels should know and be able to do in particular subjects. Fordham has been appraising state standards since 1997, as has the American Federation of Teachers. A few states do a super job, yet our most recent comprehensive review (2006) found that "two-thirds of schoolchildren in America attend class in states with mediocre (or worse)

ILLUSTRATED BY MICHAEL GLENWOOD

Chester E. Finn, Jr., is president of the Thomas B. Fordham Institute, where Michael J. Petrilli is vice president for national programs and policy. This article is adapted from the foreword to The Proficiency Illusion, *published by the Thomas B. Fordham Institute and the Northwest Evaluation Association and online at* ***http://edexcellence.net/doc/The_Proficiency_Illusion.pdf***.


120
192
250
174
143
168

expectations for what their students should learn." Instead of setting forth a coherent sequence of skills and content that comprise the essential learnings of a given subject—and doing so in concrete, cumulative terms that send clear signals to educators, parents, and policymakers—many states settle for nebulous, content-lite standards of scant value to those who are supposed to benefit from them.

That's a serious problem, striking at the very heart of results-based educational accountability. If the desired outcomes of schooling aren't well stated, what is the likelihood that they will be produced? If teachers, textbook writers, and curriculum planners don't get decent guidance from state education leaders, and parents have no clarity regarding what their daughters and sons are expected to learn, the odds are slim that school results will be strong.

Yet that problem turns out to be just the opening chapter of an alarming tale. For we also understood that, when it comes to the real traction of standards-based education reform, a state's posted academic standards aren't all that matters. They describe the desired outcomes of school, but what is at least as apt to drive actual classroom behavior—and the public's understanding of how its children and its public education system are doing—is the passing level (a.k.a. the "cut score") on the state's actual tests. At day's end, voters and those they elect to office are likely to define educational success by how many kids pass the state test and how many fail. No matter what the aspirational statements the state sets forth as its educational goals, the rubber meets the road when the testing program determines that Susie (or Michelle or Caleb or Tyrone or Rosa) is or is not "proficient" as determined by her scores on state assessments.

The advent of high-stakes testing in general, and No Child Left Behind in particular, have underscored this. When NCLB asks whether a school or district is making "adequate yearly progress" in a given year, what it's really asking is whether an acceptable number of children scored at (or above) the "proficient" level as specified on the state's tests—and how many failed to do so.

We set out, therefore, to learn more about the meaning of "proficiency" as represented by cut scores on state tests, in particular the scores used for NCLB accountability purposes. Yet the context for this examination is our keen awareness of the interrelatedness of a state's cut scores and its academic standards. If the latter are nebulous, inscrutable, light on content—or kitchen-sink like in their naïve expectation that kids will learn everything about everything—it's folly to expect that fooling around with test cut scores will solve the problem. A state needs to be as smart about the one as about the other—a double play that far too few jurisdictions succeed at.

What We Asked

In the present study, we set out to determine whether states' "cut scores" on their tests are high, low, or in between. Whether they've been rising or falling (i.e., whether it's been getting harder or easier to pass the state test). And whether they're internally consistent as between, say, reading and math, or fourth and eighth grade.

One cannot answer such questions by examining academic standards alone. A state may have awesome standards even as its test is easy to pass. It could have dreadful standards, yet expect plenty from its test-takers—causing serious consternation among teachers, curriculum directors, and others charged with preparing youngsters for such exams. It might have standards that are carefully aligned from one grade to the next, yet be erratic in setting its cut scores.

To examine states' cut scores carefully, you need a yardstick external to the state itself, something solid and reliable that state-specific results and trends can be compared with. The Northwest Evaluation Association (NWEA) has both a long-lived, rock-steady scale and a computerized assessment called the "Measure of Academic Progress" (MAP) that is used for diagnostic and accountability purposes by schools and school systems in many states. Not all states, to be sure, but it turns out that in a majority of them (26, to be precise), enough kids participate in MAP and the state assessment to allow for useful comparisons to be made and analyses performed.

The NWEA experts (see sidebar, p. 23) accepted the challenge. The three key questions they sought to answer are straightforward and crucial:

- How hard is it to pass each state's tests?
- Has it been getting easier or harder since enactment of NCLB?
- Are a state's cut scores consistent from grade to grade? That is, is it as hard (or easy) for a 10-year-old to pass the state's fourth-grade tests as it is for a 14-year-old to pass the same state's eighth-grade tests?

What We Learned

The findings of this inquiry are sobering, indeed alarming. We see, with more precision than previous studies, that "proficiency" varies wildly from state to state, with "passing scores" ranging from the 6th percentile to the 77th. Over the past few years, twice as many states have seen their tests become easier in at least two grades as have seen their tests become more difficult. (Though we note, with some relief, that most state tests have maintained their level of difficulty—such as it is—over this period.) And, only a handful of states peg proficiency expectations consistently across the grades, with the vast majority setting thousands of little Susies up to fail by middle school by aiming precipitously low in elementary school.

What does this mean for educational policy and practice? What does it mean for standards-based reform in general and NCLB in particular? It means big trouble—and those who care about strengthening U.S. K-12 education should be furious. There's all this testing—too much, surely—yet the testing enterprise is unbelievably slipshod. It's not just that results vary, but that they vary almost ran-

(Continued on page 28)

The Proficiency Illusion

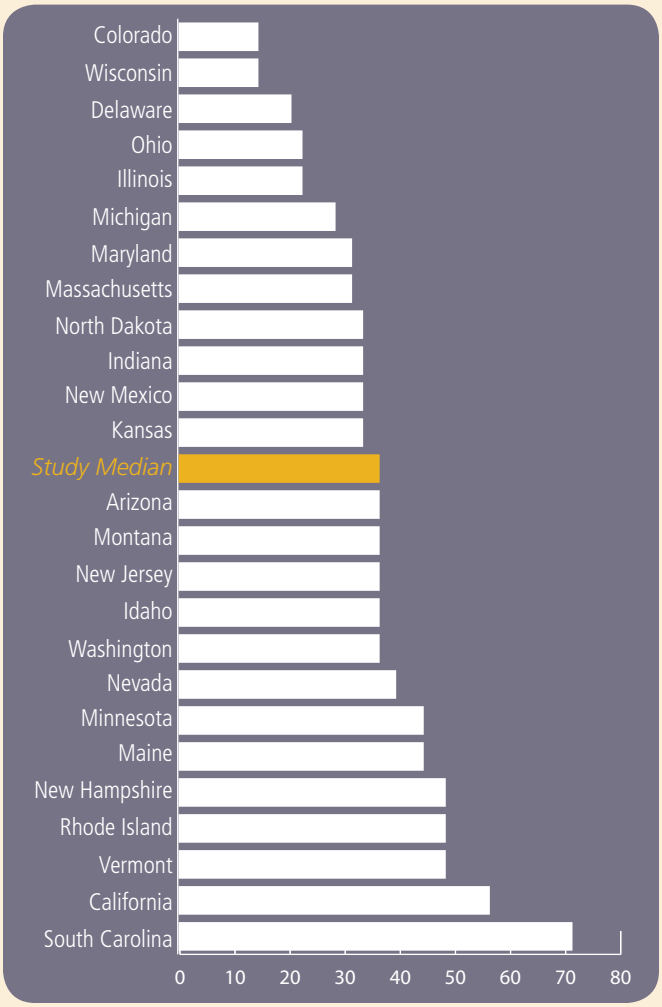
By John Cronin, Michael Dahlin, Deborah Adkins, and G. Gage Kingsbury

At the heart of NCLB is the call for all children to become "proficient" in reading and math by 2014. Yet that law expects each state to define proficiency as it sees fit and to design its own tests. Serious problems have arisen as a result. We summarize four of them here. For the full results of our study, read *The Proficiency Illusion* online at **http://edexcellence.net/doc/The_Proficiency_Illusion.pdf**.

I. State tests vary greatly in their difficulty.

To compare how difficult it is to score proficient on states' tests, we needed to convert the states' proficiency cut scores to a single common scale. Our Measures of Academic Progress (MAP), a computerized adaptive test, provided that scale; having done extensive norming studies with MAP, we were able to estimate the percentile scores on MAP corresponding to each state's cut scores. As Figure 1 shows, we found that eighth-grade reading cut scores ranged from the 14th percentile (Colorado*) to the 71st percentile (South Carolina).

Figure 1 – Grade 8 estimated reading proficiency cut scores for 2006 (ranked by MAP percentile)



II. Differences in state proficiency cut scores can be seen in the rigor of the assessment items.

The differences in proficiency cut scores are not numerical artifacts. They represent real differences in the assessment items that students are expected to be able to answer. To illustrate this point, we selected several states to represent the range of proficiency cut scores used for grade 4 reading and math. We then extracted questions from the MAP item pool that were equivalent in difficulty to the proficiency cut scores for each of these states. Using the MAP items shown below, we can compare what "proficiency" requires in reading and math in several different states.

To make comparison easier, all the reading items focused on a single skill that is commonly required in all state standards: the ability to distinguish fact from opinion. Almost all reading curricula have introduced this concept prior to fourth grade.

For mathematics, we extracted examples of items from the MAP item bank with difficulty ratings equivalent to five states' proficiency cut scores in algebraic concepts. None of the items requires computational abilities that would be beyond the scope of a typical grade 4 curriculum.

Reading Exhibit 1 – Grade 4 MAP item with difficulty equivalent to Colorado's proficiency cut score (scale score 187, 11th percentile)

Alec saw Missy running down the street. Alec saw Paul running after Missy. Paul was yelling, "Missy, stop! Wait for me!"

What do we know for sure?

A. Missy is Paul's big sister, and she is mad at him.
B. Paul is mad at Missy and is chasing her down the street.
C. Alec saw Paul running after Missy and calling for her to wait.
D. Alec tried to stop Missy because Paul wanted to talk to her.

Almost all fourth-graders answer this item correctly. It contains a very simple passage and asks the student to identify the facts in the passage without making an inference. The student does not have to understand terms like "fact" or "opinion" to correctly answer the question.

* Colorado currently reports the state's "partially proficient" level of academic performance on its state test as "proficient" for NCLB purposes, while using the higher "proficient" level for internal state evaluation purposes. In effect, Colorado has two standards: an easier standard for NCLB, and a harder standard for internal state use. For purposes of fairly comparing Colorado to other states, we used its NCLB-reported standard. Consequently, all subsequent references to "proficient" or "proficiency" in Colorado should be understood as referring to the NCLB-reported standard.

Reading Exhibit 2 – Grade 4 MAP item with difficulty equivalent to Wisconsin's proficiency cut score (scale score 191, 16th percentile)

Which sentence tells a fact, not an opinion?

A. Cats are better than dogs.
B. Cats climb trees better than dogs.
C. Cats are prettier than dogs.
D. Cats have nicer fur than dogs.

This item is also quite easy for most fourth-graders and does not require reading a passage. It does introduce the terms fact and opinion, however, and some of the distinctions between fact and opinion are subtle. For example, some children may believe that the differences in cat and dog fur are fact.

Reading Exhibit 3 – Grade 4 MAP item with difficulty equivalent to North Dakota's proficiency cut score (scale score 199, 29th percentile)

Summer is great! I'm going to visit my uncle's ranch in July. I will be a really good rider by August. This will be the best vacation ever!

Which sentence is a statement of fact?

A. Summer is great!
B. I'm going to visit my uncle's ranch in July.
C. I will be a really good rider by August.
D. This will be the best vacation ever!

Most fourth-graders answer this item correctly. The differences between fact and opinion in this item are considerably more subtle than in the prior item. For example, many fourth-graders are likely to believe that "Summer is great!" is not a matter of opinion.

Reading Exhibit 4 – Grade 4 MAP item with difficulty equivalent to California's proficiency cut score (scale score 204, 43rd percentile)

The entertainment event of the year happens this Friday with the premiere of Grande O. Partie's spectacular film Bonzo in the White House. This movie will make you laugh and cry! The acting and directing are the best you'll see this year. Don't miss the opening night of this landmark film—Bonzo in the White House. It will be a classic.

What is a fact about this movie?

A. It is the best film of the year.
B. You have to see it Friday.
C. It opens this Friday.
D. It has better actors than any other movie.

Just over half of fourth-graders from the MAP norm group answer this item correctly. The question requires the student to navigate a longer passage with more sophisticated vocabulary.

Indeed, the student has to know or infer the meaning of "premiere" to answer the question correctly.

Reading Exhibit 5 – Grade 4 MAP item with difficulty equivalent to Massachusetts's proficiency cut score (scale score 211, 65th percentile)

Read the excerpt from "How Much Land Does a Man Need?" by Leo Tolstoy.

So Pahom was well contented, and everything would have been right if the neighboring peasants would only not have trespassed on his wheatfields and meadows. He appealed to them most civilly, but they still went on: now the herdsmen would let the village cows stray into his meadows, then horses from the night pasture would get among his corn. Pahom turned them out again and again, and forgave their owners, and for a long time he forbore to prosecute anyone. But at last he lost patience and complained to the District Court.

What is a fact from this passage?

A. Pahom owns a vast amount of land.
B. The peasant's intentions are evil.
C. Pahom is a wealthy man.
D. Pahom complained to the District Court.

This item is clearly the most challenging to read (it is Tolstoy after all), and the majority of fourth-graders in the NWEA norm group got it wrong. The passage is long relative to the others and contains very sophisticated vocabulary. At least three of the options identify potential facts in the passage that have to be evaluated.

Math Exhibit 1 – Grade 4 MAP item with difficulty equivalent to Colorado's proficiency cut score (scale score 191, 8th percentile)

Tina had some marbles. David gave her 5 more marbles. Now Tina has 15 marbles. How many marbles were in Tina's bag at first?

What is this problem asking?

A. How many marbles does Tina have now?
B. How many marbles did David give to Tina?
C. Where did Tina get the marbles?
D. How many marbles was Tina holding before David came along?
E. How many marbles do Tina and David have together?

This item, which reflects the Colorado NCLB proficiency cut score, is easily answered by most fourth-grad-

ers. It requires that students understand the basic concept of addition and find the right question to answer, although students need not actually solve the problem.

Math Exhibit 2 – Grade 4 MAP item with difficulty equivalent to Illinois's proficiency cut score (scale score 197, 15th percentile)

Marissa has 3 pieces of candy. Mark gives her some more candy. Now she has 8 pieces of candy. Marissa wants to know how many pieces of candy Mark gave her.

Which number sentence would she use?

A. 3 + 8 = ?
B. 3 + ? = 8
C. ? X 3 = 8
D. 8 + ? = 3
E. ? – 3 = 8

This item, reflecting the Illinois cut score, is slightly more demanding but is also easily answered by most fourth-graders. It requires the student to go beyond understanding the question to setting up the solution to a one-step addition problem.

Math Exhibit 3 – Grade 4 MAP item with difficulty equivalent to Texas's proficiency cut score (scale score 205, 34th percentile)

Chia has a collection of seashells. She wants to put her 117 shells into storage boxes. If each storage box holds 9 shells, how many boxes will she use?

Which equation best represents how to solve this problem?

A. 9 – 117 = ?
B. 9 ÷ 117 = ?
C. 117 X 9 = ?
D. 117 + 9 = ?
E. 117 ÷ 9 = ?

This item, at a difficulty level equivalent to the Texas cut score, is answered correctly by most fourth-graders but is harder than the previous two. The student not only must be able to set up the solution to a simple problem, but must also know how to frame a division problem in order to answer the question correctly.

Math Exhibit 4 – Grade 4 MAP item with difficulty equivalent to California's proficiency cut score (scale score 212, 55th percentile)

8 + 9 = 10 + ?

A. 6
B. 9
C. 17
D. 7
E. 6

When the proficiency expectations in grade 4 mathematics range from setting up simple addition problems to solving complex, multi-step multiplication problems, then meeting these expectations achieves no real equity.

Most fourth-grade students in the MAP norm group do not answer this question correctly. The more advanced concept of balance or equivalency within an equation is introduced in this item. This concept is fundamental to algebra and makes this much more than a simple arithmetic problem. The student must know how to solve a problem by balancing the equation.

Math Exhibit 5 – Grade 4 MAP item with difficulty equivalent to Massachusetts's proficiency cut score (scale score 220, 77th percentile)

The rocket car was already going 190 miles per hour when the timer started his watch. How fast, in miles per hour, was the rocket car going seven minutes later if it increased its speed by 15 miles per hour every minute?

A. 205
B. 295
C. 900
D. 1330
E. 2850

This is obviously the most demanding item of the set and is not answered correctly by most fourth-graders within the MAP norm group. The student must understand how to set up a multiplication problem using either a two-step equation, 190 + (7 x 15) = ?, or a multi-step equation, 190 + (15+15+15+15+15+15+15) = ?

These examples from reading and mathematics make it apparent that the states we studied lack a shared concept of proficiency. Indeed, their expectations are so diverse that they risk undermining a core objective of NCLB—to advance educational equality by ensuring that all students achieve their states' proficiency expectations. When the proficiency expectations in grade 4 mathematics range from setting up simple addition problems to solving complex, multi-step multiplication problems, then meeting these expectations achieves no real equity. The reading examples, too, show that "proficiency" by no means indicates educational equality. A student who can navigate the California or Massachusetts reading requirements has clearly achieved a much different level of competence than has one who just meets the Colorado or Wisconsin proficiency standard.

The proficiency expectations have a profound effect on the delivery of instruction in many states. Because of the consequences associated with failure to make adequate yearly progress (AYP), there is evidence that instruction in many classrooms and schools is geared toward ensuring that students who perform near the proficiency bar pass the state test (Neal and Whitmore-Schanzenback, 2007). In Illinois, for example, this is apt to mean that some classrooms will place greater emphasis on understanding simple math problems like the one in Math Exhibit 2, while California and Massachusetts students are working with algebraic concepts of much greater sophistication, such as those in Math Exhibits 4 and 5.

III. Standards for mathematics are generally more difficult to meet than those for reading.

Two sample items (Reading Exhibit 6 and Math Exhibit 6) illustrate the difference in difficulty between the reading and math standards.

Reading Exhibit 6 – Grade 8 MAP item with difficulty equivalent to Massachusetts's proficiency cut score (scale score 216, 31st percentile)

Read the passage.

Katya's eyes adjusted to the dimness. She could tell that someone had once inhabited this place. She noticed markings on the walls, and she knew they would be a significant part of her archaeological study. There were jagged lines of lightning and stick figures.

What story element has the author developed within this passage?

A. theme
B. plot
C. conflict
D. setting

This reading item has the same difficulty as the Massachusetts grade 8 reading cut score and is answered correctly by the vast majority of eighth-graders. The passage is not complex, and students who are familiar with the literary concept of setting will answer it correctly.

Math Exhibit 6 – Grade 8 MAP item with difficulty equivalent to Massachusetts's proficiency cut score (scale score 242, 67th percentile)

Maria has $5.00 more than Joseph. Together they have $37.50. Which of these equations would you use to find the amount of money Joseph has?

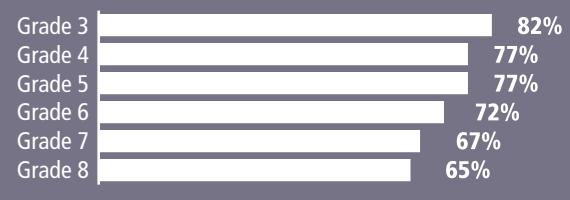
A. $j + (5 \times j) = \$37.50$
B. $j + (j \div 5) = \$37.50$
C. $5 \times j = \$37.50 + j$
D. $2 \times (j + 5) = \$37.50$
E. $j + j + 5 = \$37.50$

This item has the same difficulty as the Massachusetts mathematics proficiency standard and is missed by the majority of eighth-grade students in the NWEA norm group. The question is a multi-step problem and addresses a concept commonly found in Algebra I. Although the items in these two exhibits come from different disciplines, we know that the mathematics item is empirically more difficult than the reading item because far fewer eighth-graders within the NWEA norm group successfully answer the math item than the reading item.

IV. Reading and math tests in the upper grades are generally more difficult to pass than those in earlier grades (even after taking into account obvious differences in student development and curriculum content).

The experience of Minnesota illustrates some of the issues that may be encountered when a proficiency standard is not calibrated across grades. Imagine that you are a parent viewing the results of the Minnesota Comprehensive Assessment – series II (MCA-II) in the newspaper. Figure 2 shows the spring 2006 statewide reading results.

Figure 2 – Proportion of students scoring proficient or better on the Minnesota Comprehensive Assessment in reading (MCA-II), 2006



A parent interpreting these results would probably assume that third-graders in the state were doing far better than their peers in eighth grade. They might be concerned about the "deteriorating" performance in grades 7 and 8. Indeed, newspaper editorials, talk radio, and online discussions might identify a "crisis in the middle grades" and

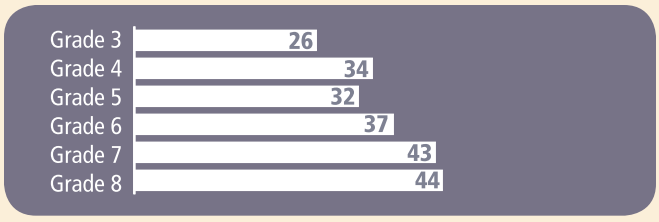
call for radical changes in the curriculum and organization of middle schools. Gradually, Minnesotans might come to believe that the discrepant results are a product of slumping middle school students and their lackluster teachers; meanwhile, they might believe that all is well in their elementary schools. Yet it is not clear that either inference would be warranted. If we look at Minnesota students' performance on the 2005 NAEP test in reading, shown in Table 1, we see that fourth- and eighth-graders perform about the same on their respective tests (albeit far below state-reported performance). Why then the grade-to-grade gap in performance on the Minnesota state assessment?

Table 1 – Minnesota's performance on the 2005 NAEP in reading

	Grade 4	Grade 8
Percentage performing "proficient" or above	**38%**	**37%**

The answer lies in understanding that the difference in reported performance is really a function of differences in the difficulty of the cut scores and not actual differences in student performance. If we look at Figure 3, which shows the NWEA percentile ranks associated with the MCA-II proficiency cut scores for reading, we see that the third-grade cut score was estimated at the 26th percentile, meaning that 26 percent of the NWEA norm group would not pass a standard of this difficulty. By extension, 74 percent of NWEA's norm group would pass this standard. The proficiency cut score for eighth-grade, however, was estimated at the 44th percentile. This more difficult standard would be met by only 56 percent of the NWEA norm population.

Figure 3 – Reading proficiency cut scores by grade in MAP percentiles, 2006



Now we can see that the difference in reported performance reflects differences in the difficulty of the cut scores rather than any genuine differences in student performance. According to our estimates, because of the difference in difficulty of the standards, about 18 percent fewer students would pass the Minnesota test in eighth grade than passed in third (74% - 56% = 18%). And in fact the Minnesota results show that 17 percent fewer eighth-graders passed the MCA-II than third-graders.

These data make the problem obvious. Poorly calibrated standards create misleading perceptions about the performance of schools and children. They can lead parents, educators, and others to conclude that younger pupils are safely on track to meet standards when that is not the case. They can also lead policymakers to conclude that programs serving older students have failed because proficiency rates are lower for these students, when in reality, those students may be performing no worse than their younger peers. And conclusions of this sort can encourage unfortunate misallocations of resources. Younger students who might need help now if they are to reach more difficult standards in the upper grades do not get those resources because they have passed the state tests, while schools serving older students may make drastic changes in their instructional programs in an effort to fix deficiencies that may not actually exist.

Poorly calibrated standards create misleading perceptions. Younger students who might need help do not get resources because they have passed the state tests, while schools serving older students may make drastic changes in their instructional programs to fix deficiencies that may not actually exist.

Bringing coherence to the standards by setting initial standards that are calibrated to the same level of difficulty can help avoid these problems. If states begin with calibrated standards, then they know that between-grade differences in performance represent changes in the effectiveness of instruction, rather than in the difficulty of the standard. Armed with this knowledge, schools can make better use of resources to address weaknesses in their programs and can build on strengths.

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(Continued from page 22)

domly, erratically, from place to place and grade to grade and year to year in ways that have little or nothing to do with true differences in pupil achievement. America is awash in achievement "data," yet the truth about our educational performance is far from transparent and trustworthy. It may be smoke and mirrors. Gains (and slippages) may be illusory. Comparisons may be misleading. Apparent problems may be nonexistent or, at least, misstated. The testing infrastructure on which so many school reform efforts rest, and in which so much confidence has been vested, is unreliable—at best. We believe in results-based, test-measured, standards-aligned accountability systems. They're the core of NCLB, not to mention earlier (and concurrent) systems devised by individual states. But it turns out that there's far less to trust here than we, and you, and lawmakers have assumed. Indeed, the policy implications are sobering. First, we see that Congress erred big-time when NCLB assigned each state to set its own standards and devise and score its own tests. No matter what one thinks of America's history of state primacy in K-12 education, this study underscores the folly of a big modern nation, worried about its global competitiveness, nodding with approval as Colorado sets its eighth-grade reading passing level at the 14th percentile while South Carolina sets its at the 71st percentile. A youngster moving from middle school in Boulder to high school in Charleston would be grievously unprepared for what lies ahead. So would a child moving from third grade in Detroit to fourth grade in Albuquerque.

Moreover, many states are internally inconsistent, with more demanding expectations in math than in reading and with higher bars in seventh and eighth grade than in third and fourth (though occasionally it goes the other way), differences that are far greater than could be explained by conscious curricular decisions and children's levels of intellectual development. This means that millions of parents are being told that their 8- and 9-year-olds are doing fine in relation to state standards, only to discover later that (assuming normal academic progress) they are nowhere near being prepared to succeed at the end of middle school. It means that too little is being expected of millions of younger kids and/or that states may erroneously think their middle schools are underperforming. And it means that Americans may wrongly think their children are doing better in reading than in math—when in fact, less is expected in the former subject.

NCLB does not seem to be fueling a broad "race to the bottom" in the sense of many states lowering their cut scores in order to be able to claim that more youngsters are proficient. But, this study reveals that, in several instances, gains on state tests are not being matched by gains on the Northwest Evaluation Association (NWEA) test, raising questions about whether the state tests are becoming easier for students to pass. The NWEA's experts describe this as a "walk to the middle," as states with the highest standards were the ones whose estimated passing scores dropped the most.

If the desired outcomes of schooling aren't well stated, if teachers, textbook writers, and curriculum planners don't get decent guidance from state education leaders, and parents have no clarity regarding what their daughters and sons are expected to learn, the odds are slim that school results will be strong.

NCLB aside, what is the meaning of a "standard" if it changes from year to year? What is the meaning of measurable academic gains—and "adequate yearly progress"—if the yardstick is elastic?

Standards-based reform hinges on the assumption that one can trust the standards, that they are stable anchors to which the educational accountability vessel is moored. If the anchor doesn't hold firm, the vessel moves—and if the anchor really slips, the vessel can crash against the rocks or be lost at sea.

That, we now see clearly, is the dire plight of standards-based reform in the U.S. today.

What to do? It's crazy not to have some form of national standards for educational achievement—stable, reliable, cumulative, and comparable. That doesn't mean Uncle Sam should set them, but if Uncle Sam is going to push successfully for standards-based reform, he cannot avoid the responsibility of ensuring that they get set. NCLB edition 1.0 didn't do that and, so far as one can read the policy tea-leaves today, version 2.0 won't either. If the feds won't act, the states should, by coming together to agree to common, rational, workable standards (as most states have been doing with regard to high-school graduation rates). □

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ILLUSTRATED BY DAN SHERBO

HOW WE LEARN

ASK THE COGNITIVE SCIENTIST

Should Learning Be Its Own Reward?

How does the mind work—and especially how does it learn? Teachers' instructional decisions are based on a mix of theories learned in teacher education, trial and error, craft knowledge, and gut instinct. Such gut knowledge often serves us well, but is there anything sturdier to rely on?

Cognitive science is an interdisciplinary field of researchers from psychology, neuroscience, linguistics, philosophy, computer science, and anthropology who seek to understand the mind. In this regular American Educator *column, we consider findings from this field that are strong and clear enough to merit classroom application.*

By Daniel T. Willingham

Question: In recent months, there's been a big uproar about students being paid to take standardized tests—and being paid even more if they do well. Can cognitive science shed any light on this debate? Is it harmful to students to reward them like this? What about more typical rewards like a piece of candy or five extra minutes of recess?

There has been much debate recently about boosting standardized test scores by paying students. Here are a few examples that I read about in the news. In Coshocton, Ohio, third- and sixth-graders are being paid up to $20 for earning high scores on standardized tests. In New York City, fourth-grade students will receive $5 for each standardized test they take throughout the year, and up to $25 for each perfect score. Seventh-graders will get twice those amounts. In Tucson, Ariz., high school juniors selected from low-income areas will be paid up to $25 each week for attendance. These and similar programs affect just a tiny fraction of students nationwide. But rewarding students with things like small gifts, extra recess time, stickers, certificates, class parties and the like is actually pretty common. Most teachers have the option of distributing rewards in the classroom, and many do. For example, in a recent survey of young adults, 70 percent said that their elementary school teachers had used candy as a reward (Davis, Winsler, and Middleton, 2006).

So whether or not your district offers cash rewards for standardized test scores or attendance, you've probably wondered if rewarding your students for their classwork is a good idea. Some authors promise doom if a teacher rewards students, with the predicted negative effects rang-

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ing from unmotivated pupils to a teacher's moral bankruptcy (e.g., Kohn, 1993). Others counter that rewards are harmless or even helpful (e.g., Cameron, Banko, and Pierce, 2001; Chance, 1993). Where does the truth lie? In the middle. There is some merit to the arguments on both sides. Concrete rewards can motivate students to attend class, to behave well, or to produce better work. But if you are not careful in choosing what you reward, they can prompt students to produce shoddy work—and worse, they can cause students to actually like school subjects less. The important guidelines are these: Don't use rewards unless you have to, use rewards for a specific reason, and use them for a limited time. Let's take a look at the research behind these guidelines.

Do Rewards Work?

Rewarding students is, from one perspective, an obvious idea. People do things because they find them rewarding, the reasoning goes, so if students don't find school naturally rewarding (that is, interesting and fun), make it rewarding by offering them something they do like, be it cash or candy.

In this simple sense, rewards usually work. If you offer students an appealing reward, the targeted behavior will generally increase (for reviews, see O'Leary and Drabman, 1971; Deci, Koestner, and Ryan, 1999). Teachers typically use rewards like candy, stickers, small prizes, or extra recess time. They use them to encourage student behaviors such as completing assignments, producing good work, and so on. In one example (Hendy, Williams, and Camise, 2005) first-, second-, and fourth-graders were observed in the school cafeteria to see how often they ate fruits and vegetables. Once this baseline measure was taken, they were rewarded for eating one or the other. Students received a token for each day that they ate the assigned food, and tokens could be redeemed for small prizes at the end of the week. Not surprisingly, students ate more of what they were rewarded for eating.

But things don't always go so smoothly. If you mistakenly offer a reward that students don't care for, you'll see little result. Or, if you reward the wrong behavior, you'll see a result you don't care for. When I was in fourth grade, my class was offered a small prize for each book we read. Many of us quickly developed a love for short books with large print, certainly not the teacher's intent. In the same way, if you reward people to come up with ideas, but don't stipulate that they must be good ideas, people will generate lots of ideas in order to gain lots of rewards, but the ideas may not be especially good (Ward, Kogan, and Pankove, 1972). It's often possible to correct mistakes such as these. Unappealing rewards can be replaced by valued rewards. The target behavior can be changed. My fourth-grade teacher stipulated that books had to be grade-appropriate and of some minimum length.

Because rewards are generally effective, people's objection to them in the classroom is seldom that they won't work. The op-ed newspaper articles I have seen about the student payment plans described above don't claim that you can't get students to go to school by paying them (e.g., Carlton, 2007; Schwartz, 2007). They raise other objections.

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The common arguments against rewards fall into three categories. Let me state each one in rather extreme terms to give you the idea, and then I'll consider the merits of each in more detail. The first objection is that using rewards is immoral. You might toss your dog a treat when he shakes hands, but that is no way to treat children. Classrooms should be a caring community in which students help one another, not a circus in which the teacher serves as ringmaster. The second objection is that offering rewards is unrealistic. Rewards can't last forever, so what happens when they stop? Those who make this argument think it's better to help students appreciate the subtle, but real rewards that the world offers for things like hard work and politeness. After all, adults don't expect that someone will toss them a candy bar every time they listen politely, push their chair under a table, or complete a report on time. The third objection is that offering rewards can actually decrease motivation. Cognitive science has found that this is true, but only under certain conditions. For example, if you initially enjoy reading and I reward you for each book you finish, the rewards will make you like reading less. Below, I'll explain how and why that happens. Let's consider each of these arguments in turn.

Are Rewards Immoral?

Don't rewards control students? Aren't rewards dehumanizing? Wouldn't it be better to create a classroom atmosphere in which students wanted to learn, rather than one in which they reluctantly slogged through assignments, doing the minimal work they thought would still earn the promised reward? Cognitive science cannot answer moral questions. They are outside its purview. But cognitive science can provide some factual background that may help teachers as they consider these questions.

It is absolutely the case that trying to control students is destructive to their motivation and their performance. People like autonomy, and using rewards to control people definitely reduces motivation. Even if the task is one students generally like, if they sense that you're trying to coerce them, they will be less likely to do it (e.g., Ryan, Mims, and Koestner, 1983). It is worth pointing out, however, that rewards themselves are not inherently controlling. If students are truly offered a choice—do this and get a reward, don't do it and get no reward—then the student maintains control. Within behavioral science, it is accepted that rewards themselves are coercive if they are excessive (e.g., National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978). In other words, if I offer you $200 to take a brief survey, it's hard to know that you're freely choosing to take the survey.

Rewards in classrooms are typically not excessive, and so are not, themselves, controlling. Rather, rewards might be an occasion for control if the teacher makes it quite clear that the student is expected to do the required work and collect his or her reward. That is, the teacher uses social coercion. So too, we've all known people we would call "manipulative," and those people seldom manipulate us via rewards. They use social means. In sum, the caution against controlling students is well-founded, but rewards are not inherently controlling.

Are rewards dehumanizing? Again, it seems to me that the answer depends on how the student construes the reward. If a teacher dangles stickers before students like fish before a seal, most observers will likely wince. But if a teacher emphasizes that rewards are a gesture of appreciation for a job well done, that probably would not appear dehumanizing to most observers.* Even so, rather than offer rewards, shouldn't teachers create classrooms in which students love learning? It is difficult not to respond to this objection by saying "Well, duh." I can't imagine there are many teachers who would rather give out candy than have a classroom full of students who are naturally interested and eager to learn. The question to ask is not "Why would you use rewards instead of making the material interesting?" Rather, it is "After you've wracked your brain for a way to make the material interesting for students and you still can't do it, then what?" Sanctimonious advice on the evils of rewards won't get chronically failing students to have one more go at learning to read. I think it unwise to discourage teachers from using any techniques in the absolute; rather, teachers need to know what research says about the benefits and drawbacks of the techniques, so that they can draw their own conclusions about whether and when to use them. Considering the merits of the two other objections will get us further into that research.

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What Happens When Rewards Stop?

This objection is easy to appreciate. If I'm working math problems because you're paying me, what's going to happen once you stop paying me? Your intuition probably tells you that I will stop doing problems, and you're right. In the fruits and vegetables study described earlier, students stopped eating fruits and vegetables soon after the reward program stopped.

Although it might seem obvious that this would happen, psychologists initially thought that there was a way around this problem. Many studies were conducted during the 1960s using token economies. A token economy is a system by which rewards are administered in an effort to change behavior. There are many variants but the basic idea is that every time the student exhibits a targeted behavior (e.g., gets ready to work quickly in the morning), he or she gets

* Such positive framing of rewards does not reverse the negative impact of rewards on motivation (see p. 32), but telling students that rewards signal acknowledgement of good work, rather than the closing of a bargain, seems more in keeping with the spirit of education.

a token (e.g., a plastic chip). Students accumulate tokens and later trade them for rewards (e.g., small prizes). Token economies have some positive effects, and have been used not only in classrooms, but in clinical settings (e.g., Dickerson, Tenhula, and Green-Paden, 2005).

When the idea of a token economy was developed, the plan was that the rewards would be phased out. Once the desired behavior was occurring frequently, you would not give the reward every time, but give it randomly, averaging 75 percent of the time, then 50 percent of the time, and so on. Thus, the student would slowly learn to do the behavior without the external reward. That works with animals, but normally not with humans. Once the rewards stop, people go back to behaving as they did before (Kazdin, 1982; O'Leary and Drabman, 1971).*

Well, one might counter, it may be true that students won't spontaneously work math problems once we stop rewarding them, but at least they will have worked more than they otherwise would have! Unfortunately, there is another, more insidious consequence of rewards that we need to consider: Under certain circumstances, they can actually decrease motivation.

How Can Rewards Decrease Motivation?

The previous section made it sound like rewards boost desired behavior so long as they are present, and when they are removed behavior falls back to where it started. That's true sometimes, but not always. If the task is one that students like, rewards will, as usual, make it more likely they'll do the task. But after the rewards stop, students will actually perform the previously likable task *less* than they did when rewards were first offered.

A classic study on this phenomenon (Lepper, Greene, and Nisbett, 1973) provides a good illustration. Children (aged 3 to 5 years old) were surreptitiously observed in a classroom with lots of different activities available. The experimenters noted how much time each child spent drawing with markers. The markers were then unavailable to students for two weeks. At the end of the two weeks, students were broken into three groups. Each student in the first group was taken to a separate room and was told that he or she could win an attractive "Good Player" certificate by drawing a picture with the markers. Each was eager to get the certificate and drew a picture. One-by-one, students in a second group were also brought to a separate room, encouraged to draw, and then given a certificate, but the certificate came as a surprise; when they started drawing, they didn't know that they would get the certificate. A third group of students served as a control group. They had been observed in the first session, but didn't draw or get a certificate in this second session. After another delay of about two weeks, the markers again appeared in the classroom, and experimenters observed how much children used them. The students in the first group—those who were promised the certificate for drawing—used the markers about half as much as students in the other two groups. Promising and then giving a reward made children like the markers less. But giving the reward as a surprise (as with the second group of students) had no effect.

This has been replicated scores of times with students of different ages, using different types of rewards, and in realistic classroom situations (see Deci et al., 1999 for a review). What is going on? How can getting a reward reduce your motivation to do something? The answer lies in the students' interpretation of why they chose to use the markers. For students who either didn't get a reward or who didn't expect a reward, it's obvious that they weren't drawing for the sake of the reward; they drew pictures because they liked drawing. But for the children who were promised a reward, the reason is less clear. A student might not remember that he drew because he wanted to draw, but rather he remembered really wanting the certificate. So when the markers were available again but no certificate was promised, the student may well have thought "I drew because I wanted that certificate; why should I draw now for nothing?"

The analogy to the classroom is clear. Teachers seek to create lifelong learners. We don't just want children to read, we want children to learn to love reading. So if, in an effort to get children to read more, we promise to reward

The key factor to keep in mind is that rewards only decrease motivation for tasks that students initially like. If the task is dull, motivation might drop back down to its original level once the rewards stop, but it will not drop below its original level.

* Readers who are familiar with interventions to reduce students' aggressive or antisocial behavior may be surprised at this finding. Such interventions do often use rewards and then phase them out. But keep in mind that the rewards are just one part of a complex intervention and that in order to be effective, such interventions must be implemented in full. To learn more about the use of rewards in such an intervention, see "Heading Off Disruption: How Early Intervention Can Reduce Defiant Behavior—and Win Back Teaching Time," *American Educator,* Winter 2003-2004, available at **www.aft.org/pubs-reports/american_educator/winter03-04/index.html**.

them for doing so, we might actually make them like reading less! They will read more in order to get the pizza party or the stickers, but once the teacher is no longer there to give out the rewards, the student will say "Why should I read? I'm not getting anything for it."

The key factor to keep in mind is that rewards only decrease motivation for tasks that students initially like. If the task is dull, motivation might drop back down to its original level once the rewards stop, but it will not drop below its original level. Why does the appeal of the task make a difference? As I mentioned, rewards hurt motivation because of the way students construe the situation: "I drew with markers in order to get a certificate," instead of "I drew with markers because I like to draw with markers." But if the task is dull, students won't make that mistaken interpretation. They never liked the task in the first place. That hypothesis has been confirmed in a number of studies showing that once the reward is no longer being offered, having received a reward in the past harms the motivation for an interesting task, but not for a dull task (e.g., Daniel and Esser, 1980; Loveland and Olley, 1979; Newman and Layton, 1984).

This finding might make one wonder whether rewards, in the form of grades, are behind students' lack of interest in schoolwork; by issuing grades, we're making students like school less (Kohn, 1993). It is true that students like school less and less as they get older. But it is wise to remember that motivation is a product of many factors. Researchers often distinguish between extrinsic motivators (e.g., concrete rewards or grades that are external to you) and intrinsic motivators (things that are internal to you such as your interest in a task). The effect described above can be succinctly summarized: Extrinsic rewards can decrease intrinsic motivation. We would thus expect that intrinsic and extrinsic motivation would be negatively correlated. That is, if you work mostly for the sake of getting good grades and other rewards, then you aren't very intrinsically motivated, and if you are highly intrinsically motivated, that must mean you don't care much about rewards. That's true to some extent, but the relationship is far from perfect. College students whose intrinsic and extrinsic motivation have been measured usually show a modest negative correlation, around -.25[†] (Lepper, Corpus, and Iyengar, 2005). This seems reasonable since motivation is actually pretty complex—we rarely do things for just one reason.

What Makes Rewards More or Less Effective?

If you decide to use rewards in the classroom, how can you maximize the chances that they will work? Three principles are especially important. Rewards should be desirable, certain, and prompt.

The importance of desirability is obvious. People will work for rewards that appeal to them, and will work less hard or not at all for rewards that are not appealing.[‡] That is self-evident, and teachers likely know which rewards would appeal to their students and which would mean little to them.

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Less obvious is the importance of the certainty of a reward, by which I mean the probability that a student will get a reward if he or she attempts to do the target behavior. What if you've set a target that seems too difficult to the student, and he won't even try? Or what if the target seems achievable to the student, he makes an attempt and does his best, but still fails? Either reduces the likelihood that the student will try again. Both problems can be avoided if the reward is contingent on the student trying his best, and not on what he achieves. But that has its drawbacks, as well. It means that you must make a judgment call as to whether he tried his best. (And you must make that judgment separately for each student.) It is all too likely that some students will have an inflated view of their efforts, and your differing assessment will lead to mistrust. Ideally, the teacher will select specific behaviors for each student

[†]A correlation of zero would indicate that they were unrelated, and a correlation of -1.0 would indicate that they were perfectly related.

[‡]There are exceptions to this generalization, notably in the social realm. People will work hard without reward as part of a social transaction. In such situations a small reward will actually make people less likely to work (e.g., Heyman and Ariely, 2004). For example, if an acquaintance asks you to help her move a sofa, you would assume that she's asking a favor as a friend, and you might well help. But if she offers you $5 to move the sofa you think of the request as a business transaction, and $5 may not seem like enough money. These social concerns could apply to the classroom; some students might work to please the teacher. But such social transactions rest on reciprocity. If your friend with the poorly placed sofa never helps you out, you will get tired of her requests. It would be difficult to set up a classroom relationship that used social reciprocity between teachers and students.

What Is the Difference between Rewards and Praise?

You may have noticed that I have limited my discussion to the effects of concrete rewards—candy, cash, and so on. Isn't praise a reward as well? It can be, but praise as it's usually administered has some important differences. The most important is that praise is usually given unpredictably. The student doesn't think to himself, "If I get 90 percent or better on this spelling test, the teacher will say 'Good job, Dan!'" Rewards are different. There is usually an explicit bargain in the classroom, with the understanding that a particular behavior (e.g., 90 percent or better on a spelling test) merits a reward. As described in the main article, the decrease in motivation for a task only occurs if the reward was expected (and if the students enjoy the task). Since praise is not expected, it does not lead to an immediate decrement to motivation.

Another important difference between praise and concrete rewards is that the former is often taken as a more personal comment on one's abilities. Rewards typically don't impart information to the student. But praise can carry quite a bit of meaning. For starters, it tells the student that she did something noteworthy enough to merit praise. Then too, the student learns what the teacher considers important by listening to what she praises. A student may be told that she's smart, or that she tried hard, or that she's improving. In the short run, sincere praise will provide a boost to motivation (Deci et al., 1999), but in the long run, the content of praise can have quite different effects on the students' self-concept and on future efforts (e.g., Henderlong and Lepper, 2002; Mueller and Dweck, 1998). The key is in what type of praise is given. When faced with a difficult task, a child who has been praised in the past for her *effort* is likely to believe that intelligence increases as knowledge increases and, therefore, will work harder and seek more experiences from which she can learn. In contrast, a student who has been praised for her *ability* will likely believe that intelligence is fixed (e.g., is genetically determined) and will seek to maintain the "intelligent" label by trying to look good, even if that means sticking to easy tasks rather than more challenging tasks from which more can be learned.

A final difference between praise and rewards lies in students' expectations of encountering either in school. At least in the U.S., praise is part of everyday social interaction. If someone displays unusual skill or determination or kindness, or any other attribute that we esteem, it is not unusual to offer praise. In fact, a teacher who never praised her students might strike them as cold, or uncaring. No such expectation exists for rewards, however. It is hard to imagine teaching students without ever praising them. It is easy to imagine teaching students without ever offering them a concrete reward.

For more on praise and its effects, see "Ask the Cognitive Scientist," *American Educator,* Winter 2005-2006, available at **www.aft.org/pubs-reports/american_educator/issues/winter05-06/cogsci.htm**.

—D.W.

as targets, with the target titrated to each student's current level of ability.

A corollary of rewards being desirable is that they be prompt. A reward that is delayed has less appeal than the same reward delivered immediately. For example, suppose I gave you this choice: "You can have $10 tomorrow, or $10 a week from tomorrow." You'd take the $10 tomorrow, right? Rewards have more "oomph"—that is, more power to motivate—when you are going to get them soon. That's why, when my wife calls me from the grocery store, it's easy for me to say "Don't buy ice cream. I'm trying to lose weight." But when I'm at home it's difficult for me to resist ice cream that's in the freezer. In the first situation, I'm denying myself ice cream sometime in the distant future, but in the second I would be denying myself ice cream right at that moment. The promise of ice cream two minutes from now has higher value for me than the promise of ice cream hours from now.

It is possible to measure how much more desirable a reward is when given sooner rather than later. In one type of experiment, subjects participate in an auction and offer sealed bids for money that will be delivered to them later. Thus, each subject might be asked "What is the maximum you would pay right now for a reward of $10, to be delivered tomorrow?"* Subjects are asked to make bids for a variety of rewards to be delivered at delays varying from one to 30 days. Then, researchers use subjects' bids to derive a relationship between the amount of time that the reward is delayed and how much people value the delayed reward. Subjects typically show a steep drop off in how much they value the reward—with a one-day delay, $20 is worth about $18 to most subjects, and with a one-week delay, the value is more like $15 (e.g., Kirby, 1997). In other words, there is a significant cost to the reward value for even a brief delay. Other studies show that the cost is greater for elementary school students than college students (e.g., Green, Fry and Myerson, 1994). That finding probably matches your intuition: As we get older, we get better at delaying gratification. Distant rewards become more similar to immediate rewards.

In this section I've summarized data showing that

*The procedure is actually what researchers call a second-bid auction; the highest bidder wins the auction, but pays the price of the second highest bid. This procedure is meant to ensure that people bid exactly what the item is worth to them. The workings of the auction are explained in detail to subjects.

rewards should be desirable, certain, and prompt if they are to be effective. These three factors provide some insight into the extrinsic (but non-tangible) rewards that almost all schools offer: grades and graduation. Grades are not as rewarding as we might guess because they are seldom administered right after the required behavior (studying), and the reward of a diploma is, of course, even more distant. Then too, low-achieving students likely perceive these rewards as highly uncertain. That is, hard work does not guarantee that they will receive the reward.

Putting It All Together: Are Rewards Worth It?

When all is said and done, are rewards worth it? I liken using rewards to taking out a loan. You get an immediate benefit, but you know that you will eventually have to pay up, with interest. As with loans, I suggest three guidelines to the use of rewards: 1) try to find an alternative; 2) use them for a specific reason, not as a general strategy; and 3) plan for the ending.

Try to find an alternative.

It is very difficult to implement rewards without incurring some cost. If the reward system is the same for all class members, it won't work as well as an individualized approach and you will likely reward some students for tasks they already like. If you tailor the rewards to individual students, you vastly increase your workload, and you increase the risk of students perceiving the program as unfair.

The size of the costs to motivation, although real, should not be overstated. As mentioned earlier, there are many contributors to motivation, and putting a smiley sticker on a spelling test will probably not rank high among them. Still, why incur the cost at all, if an alternative is available? The obvious alternative is to make the material intrinsically interesting. Indeed, if you follow that precept, you will never offer an extrinsic reward for an intrinsically interesting task, which is when the trouble with motivation really starts.

It is also worth considering whether student motivation is the real reason you use rewards. Do you put stickers on test papers in the hopes that students will work harder to earn them, or just for a bit of fun, a colorful diversion? Do you throw a class pizza party to motivate students, or to increase the class's sense of community? You might still distribute stickers and throw the party, but not make them explicitly contingent on performance beforehand. Announce to the class that they have done such a good job on the most recent unit that a party seems in order. Thus, the party is still an acknowledgement of good work and still might contribute to a positive class atmosphere, but it is not offered as a reward contingent on performance.

Use rewards for a specific reason.

A wise investor understands that taking out a loan, although it incurs a cost, might be strategic in the long run. So too, although a rewards program may incur some cost to motivation, there are times when the cost might be worth it. One example is when students must learn or practice a task that is rather dull, but that, once mastered, leads to opportunities for greater interest and motivation. For example, learning the times tables might be dull, but if students can get over that hump of boredom, they are ready to take on more interesting work. Rewards might also be useful when a student has lost confidence in himself to the point that he is no longer willing to try. If he'll attempt academic work to gain a desirable extrinsic reward and succeeds, his perception of himself and his abilities may change from self-doubt to recognition that he is capable of academic work (Greene and Lepper, 1974). Thereafter, the student may be motivated by his sense of accomplishment and his expectation that he will continue to do well.

Although a rewards program may incur some cost to motivation, there are times that the cost might be worth it. For example, learning the times tables might be dull, but if students can get over that hump of boredom, they are ready to take on more interesting work.

Use rewards for a limited time.

No one wants to live with chronic debt, and no one should make rewards a long-term habit. Although the cost of using rewards may not be large, that cost likely increases as rewards are used for a longer time. In addition, there would seem to be an advantage to the program having a natural ending point. For example, students are rewarded for learning their times tables, and once they are learned, the rewards end. The advantage is that any decrease in motivation might stick to the task. In other words, students will think "times tables are boring, and we need to be rewarded to learn them" rather than "math is boring, and we need to be rewarded to learn it." In addition, if students are told at the start of the program when it will end, there may be fewer complaints when the goodies are no longer available. ☐

(References on page 47)

A Child's Delight

These Little-Known Books Are Sure to Enchant Your Students

By Noel Perrin

Unlike adults, children have no easy access to literary guides. What they read is usually random. If lucky, they'll be given a few of the classics of children's literature as birthday and Christmas presents. They may bump up against a few others in school. A handful they may see transformed into videos.

But there are many wonderful minor classics and even some major ones they are apt to miss altogether—unless a teacher or a parent or an uncle or a godmother steps in. This article is designed to assist steppers-in with three short essays, each about a wonderful but little-known book for children. Little-known to children, I mean, and also to most parents, godparents, etc. Some are very well known to children's book editors and librarians, and to people who work in the children's sections of good bookstores.

Having had first two children of my own and later four stepchildren to read to, and having read aloud for two or three thousand nights so far; having had a mother who wrote books for children, and later a wife who wrote even better books for children; having taught American literature at Dartmouth College; and having, of course, once been a child myself, and one addicted to reading, I have had virtually a whole lifetime in which to learn about marvelous books written for the young. So, many years ago, when the *Washington Post* invited me to write a column, "Rediscoveries for Children" on little-known classics, I felt ready. This article—and my book, which is titled *A Child's Delight*—are based on that column.

Looking at the whole range of children's literature, I have obviously chosen books that I admire and that my children and stepchildren loved. I have also followed a simple rule. I checked each group of books with a group of students, often my own American literature students at Dartmouth. If more than 10 or 20 percent had read it, it did not get in. The Narnia books, for example, didn't have a prayer, nor did *Little Women*, the *Little House* books, Kipling's *Jungle Book*, or *Winnie-the-Pooh*.

There is just one more thing to be said. In no sense have I systematically covered children's literature. My selections tilt toward the 20th century, partly because it really was the golden age of children's literature, but partly because I feel uneasy with the insistent moralizing of many of the earlier classics, like Charles Kingsley's *Water Babies* and John Ruskin's *The King of the Golden River.* (I don't like the quite different moralizing tone of some modern stuff, either, and you will find none of that in here.)

But now it's time to turn to the actual books.

Millions of Cats, by Wanda Gág, 1928

Once there was a little girl named Wanda. She was the eldest child of an artist named Anton Gág and his wife Lissi. Along with her five younger sisters and her one brother, Wanda grew up in a small town in Minnesota.

All seven of the children were artistically gifted, and all "began to draw as soon as they could hold a pencil." (I'm quoting Rebecca Keirn in a book called *Three Women Artists*.)

But the children didn't just draw. They also made music, told stories, decorated eggs, loved to write. Let's look in on

ILLUSTRATED BY SERGE BLOCH

Noel Perrin (1927-2004) was professor of English, emeritus and adjunct professor of environmental studies at Dartmouth College. This article is excerpted from A Child's Delight, *by Noel Perrin and reprinted with permission of both the Trustees of Dartmouth College and the University Press of New England, Hanover, N.H. © 1997.*

a typical evening, say in the year 1905. Wanda is 12. The whole family is gathered in the living room, which is unlike any other living room in New Ulm, Minn.—and unlike 99.99 percent of living rooms in the U.S. Among his many artistic activities, Anton paints murals, and he has completely covered the ceiling with cherubs and clouds.

Down below, on the mortal earth (or, more precisely, on the floor of the living room), the whole family is grouped around the piano. Lissi plays, and they all sing. Another evening it might be perfectly quiet in the house, because everyone except the baby is busy drawing. A third evening, one of the children might be reading a story aloud, usually one she had written herself. Poor kids, what else could they do with their evenings? They grew up not only pre-television, but pre-radio.

Though Anton and Lissi probably wouldn't have had a TV set anyway. Being Bohemians, they would have scorned to. Anton in fact was a double bohemian. Bohemian with a capital B because he grew up in that part of the Austro-Hungarian empire called Bohemia, where his father had been a woodcarver. He only came to the U.S. in 1873. Bohemian with a small b, as was Lissi, because he was unconventional, non-bourgeois, what was then called a free spirit. I'm not just thinking of the cherub-covered ceiling and the row of little girls busy making sketches. Anton was determined to make his living from art, whether that was a practical idea or not, and in New Ulm, Minn., at the turn of the century, it was a resoundingly impractical one. As Rebecca Keirn temperately puts it, Anton was "an exceptionally competent easel painter in an area where the market for such work was limited." That's your true bohemian: a starving artist.

But it's one thing to starve alone in a garret, and quite another to have seven hungry little faces looking at you down the table. So Anton found a new art. The average American at the turn of the century may not have cared greatly about easel painting or cherubs, but he would buy a photograph, so Anton and Lissi opened a photographer's studio, and they scraped by. Later, Anton even got an occasional commission for a mural in a courthouse or a church.

But bohemians, lower-case, are often physically frail; artists often die young. When Wanda was 14, her father fell ill, and when she was 15 he died. The last words he spoke were to her, whom he considered the most talented of all his children. She must be the successful artist, he told her, that he himself had never quite managed to be.

Wanda was in ninth grade when her father died. She had a few things to do before she could become a major artist, like finish high school and help her grieving mother raise the younger children. They had almost no money. Anton's yearlong illness had been costly, and health insurance was far in the future, like TV.

Wanda helped a lot—was even a second mother—and her financial contribution came entirely through art. As a high school student, she designed and sold greeting cards. She gave drawing lessons. Best of all, she began to sell both drawings and stories to the children's section of a Minneapolis newspaper. (Poor Minneapolis kids: no TV.) In

one two-year period she sold 35 pictures, 14 stories (10 of which she also illustrated), and four poems.

After graduation she briefly lapsed into prudence and spent one non-artistic year teaching school. She was 19. Then she got scholarships: first to an art school in St. Paul and eventually to the Art Students League in New York. She never finished the course. Soon after she got to New York, her mother died, which left it to her to finish raising the younger children. She dropped out of the League, moved those children still at home to New York, and supported them all by doing commercial art. In the variety of artistic schemes to make money that she thought of, she showed herself to be her father's true daughter. She painted lamp shades. She did fashion illustrations. She designed interesting toys. And—my favorite—in 1925 she began syndicating a series of picture puzzles that she called Wanda's Wonderland. She was now 32. She had raised the children, she was enjoying a bohemian life in New York City, she had become financially successful. But she had done no major work yet, nothing to fulfill a deathbed promise.

Then, three years later, the miracle occurred. Wanda published her first book, a picture book for small children. It's called *Millions of Cats*, and it has stayed in print from that moment to this.

It is a very simple book with a very simple story. An old man and an old woman live in a "nice clean house which had flowers all around it, except where the door was." What perfect phrasing those last five words are—exactly how a child would see it or say it.

But the old couple are lonesome. "'If only we had a cat,' sighed the very old woman." So the old man sets off to find her one.

What he finds is like the Gág family, only more so. In the famous refrain that runs through the book, he comes on a hill and sees:

> Cats here, cats there,
> Cats and kittens everywhere,
> Hundreds of cats,
> Thousands of cats,
> Millions and billions and trillions of cats.

He selects one cat to take home. But then he sees another so appealing that he picks that one, too. Then a third, a fourth, and finally he picks the whole several trillion. They all accompany him, and they are like a force of nature. They come to a pond, they all take a drink—and the pond is dry. Now they are hungry. Each cat eats one bite of grass (this is not sound natural history, like *Watership Down*), and the hills are bare.

The old woman is much startled when the procession arrives: "'My dear!' she cried, 'What are you doing? I asked for one little cat, and what do I see?'" Then she speaks the refrain. After that she adds, "We can never feed them all."

The ending of the book is actually quite bloody. The old woman asks the cats (they are talking cats) to select the prettiest one of all, for her to keep. The ensuing brawl is so violent that she and the old man run into the house (which may possibly have cherubs on the ceiling) to avoid the noise. Both of them are gentle and peace-loving.

When it's finally quiet again, and they come out, only one kitten is left; the rest have performed the anatomical impossibility of all eating each other. The old couple is happy with the one kitten left.

The ending doesn't *feel* bloody, though, and that's because it's obvious to a child from the very first wonderful drawing that these are not flesh-and-blood cats, or people, either. Everything is stylized, symmetrical, incantatory—and almost perfectly timeless. *Millions of Cats* is one of those rare books that feels on publication day as if it had been part of our literature for a couple of centuries. It was seen as an instant classic in 1928, and it remains as pure a delight today as it was then. To those who know the history of the author's family, there is a little extra pleasure in being aware that there is one touch of collaboration. Wanda wrote all the words, and drew all the pictures. But she didn't do the very pretty hand lettering in which the story is told. That's the work of another of the seven talented Gágs, her younger brother Joseph.

One doesn't repeat a success as nearly perfect as this one. Though like both parents she died early, Wanda had time to produce half a dozen other books. All are worth looking at for their art, and the one called *Nothing at All* is also worth reading for the story, provided you and the child you are reading to have a tolerance for a slightly mechanical plot structure. But only *Millions of Cats* is up there in the empyrean, safe among the cherubs and clouds. Anton would have been proud.

Mistress Masham's Repose, by T. H. White, 1946

When people get really caught up in a book, they often find themselves reluctant to reach the end. They wonder what the characters would be doing if the author had only let them have a few more chapters. If writers themselves, they may go beyond wondering. They may take over the characters, and give them space in their own books. They may even take over the plot, and write an actual sequel.

T. H. White, the distinguished author of *The Once and Future King,* was devoted to both practices. As a very young man, he tried continuing Jane Austen in a special Whiteish way. Like most of us, he loved *Pride and Prejudice.* So he wrote ... not a novel about the married life of Elizabeth Bennet and Mr. Darcy as it would have occurred between 1797 and about 1840, but a 20th century murder mystery,

set partly on Darcy's estate. Many of the characters are descendents of Elizabeth and Darcy. That book is called *Darkness at Pemberley*.

A few years later, he introduced two characters from a Robert Surtees novel into a hunting novel of his own. Since Surtees wrote between 1838 and 1864, his characters would now be quite elderly. No problem. White has them holed up in a sort of large wine cellar. It's the wine that keeps them going.

White also did a bit of rescue work on Robert Louis Stevenson, and at one time he considered bringing Don Quixote into the 20th century. (Graham Greene later had the same thought, and wrote *Father Quixote.*)

But the best continuation White ever did was in a children's book. He continued *Gulliver's Travels.* He does not pick up where Swift left off, he merely picks up one of Swift's hints.

Readers of *Gulliver's Travels* may remember that when the intrepid mariner leaves Lilliput, he takes with him a pocketful of Lilliputian farm animals.... These he shows to the captain of the ship that rescues him—in fact, he gives Captain Biddel one of each. At this point White takes over.

Readers of *Gulliver* may remember that when the intrepid mariner leaves Lilliput, he takes with him a pocketful of Lilliputian farm animals. He's got a little flock of three-inch-long sheep and half a dozen cows the size of chipmunks. These he shows to the captain of the ship that rescues him—in fact, he gives Captain Biddel one of each.

At this point White takes over. In Swift, Captain Biddel now fades from view. In White he steps forward, a look of greed on his face. A shrewd businessman, Captain Biddel realizes there's big money to be made out of tiny farm animals, and even bigger money to be made out of tiny human beings. The first chance he gets, he sails back to the latitude where he picked up Gulliver. He cruises around until he finds Blefescu and Lilliput. He then kidnaps 13 people, plus as many sheep, cows, and thumb-sized sheepdogs as he can grab, and sails home to England. Here, he exhibits his captives in a sort of miniature traveling zoo.

After much suffering, the Lilliputians escape with their animals. They manage to get to a small island in a lake on a country estate, where they hide. Two hundred years later, their descendents are still living on that island, nearly a thousand of them by now: the nation of Lilliput in Exile. How have they escaped detection, right up to the year

1946? Partly by taking extraordinary care, partly through good fortune. It is their good luck that the estate, a ducal one, is both vast and neglected. The lake is choked with water weeds, the island overgrown with briars. No full-sized human being has set foot there in many years.

All that is background. The story White tells begins when a full-sized person does come. She is the heroine of the book and the heiress to the estate, a 10-year-old girl named Maria. Do not imagine some privileged little future duchess. Yes, Maria will be a great lady some day. Right now she is an orphan, left in the guardianship of the local vicar, an odious man. This cleric, the Rev. Mr. Hater, has appointed a remote cousin of Maria's, a Miss Brown, to be her governess. Miss Brown is worse than odious, she is cruel. She and the vicar keep Maria rigidly suppressed; they also siphon off most of what little money still comes in so that the great house of Malplaquet gradually continues to crumble. Maria's only friends are the one servant left from her parents' time, who is the cook, and a remarkably eccentric professor who occupies a gamekeeper's cottage elsewhere on the estate.

Maria, having no parents to love or be loved by, not allowed even to keep a pet, is naturally thrilled when she discovers Lilliput in Exile—and her first act is to steal a baby that she finds asleep in a two-inch cradle. She intends to take it home and keep it (well hidden from Miss Brown) as something to play with and to lavish affection on. When the mother attempts to prevent this, Maria takes her, too. Then she is both puzzled and angry that mother and baby are not grateful at being carried back to the palace of Malplaquet and offered bits of a strawberry. She would have been so nice to them!

Part of the action of the book turns on Maria's discovery that ownership and love do not go well together. Suppose, the Professor says to Maria, you become the patroness of Lilliput in Exile, their Superwoman, their strong protector: "You would be a Big Bug then, however kind you were, and they would be little bugs, without the capitals. They would come to depend on you; you would come to boss them. They would get servile, and you would get lordly." We who live in a Big Bug nation should recognize that description. And maybe wince a little when we think of all the Lilliputs we currently boss—and expect to be loved by.

Maria does learn her lesson, and does become friends with the Lilliputians on an equal basis. They then open their hidden city to her, and share their lives. The best chapters of the book result, as Maria gets to see how these tiny people operate in a world where a robin on the grass can look them in the eye, a domestic cat looms larger than ever a saber-toothed tiger did to the cave people, a swooping owl means instant death. My very favorite describes the fishing expedition she gets to watch. The People keep a square-rigged sailing ship in a secret harbor on the far side of the island, and at night they sail out to hunt pike rather the way Nantucketers used to sail out to hunt whales.

But eventually Miss Brown catches Maria sneaking out to go visit the island—and worse, she then finds several tiny presents the People have given her. Maria refuses to explain where she got these things. When Miss Brown locks Maria in her room, planning to starve her into submission, the People eventually come in force, about 500 of them, to bring her food. (Three whole roasted bullocks, 48 loaves of grass-seed bread.)

Rhoda Blumberg has done something special, and has produced a really fine book for older children. For those whose taste runs to the exotic, an irresistible book. And it's all true.

The worst possible thing then happens. Miss Brown catches a Lilliputian. She and the Vicar realize, far more clearly and ruthlessly than Captain Biddel did in the 18th century, that the owner of a lot of miniature human beings can get very rich indeed. A thrilling struggle ensues, with Maria, the People, the Cook, and the Professor on one side, and the Vicar and Miss Brown on the other. The People eventually win.

T. H. White was a good and possibly a great writer. Like most such, he was prepared to take almost infinite pains. *Mistress Masham's Repose* went through four radically different versions between the time White began to write it in 1942 and its publication in 1946. In the first version, for example, the Vicar and Miss Brown speak in Elizabethan blank verse.

But even the fourth version, the one that finally got printed, is not quite as good as it might have been. White was in deep grief at the time he finished it, almost incapacitated. "I lost the only living creature I loved on the 25th of last November," he wrote sadly in 1945, "and I know that I shall call out her name when I die." Polishing the manuscript with a cool head seemed out of the question. So he sent it to his best friend, the novelist David Garnett, with

instructions to edit it freely: "You may leave out whole chapters, if you like, for I trust your taste implicitly and my own not at all."

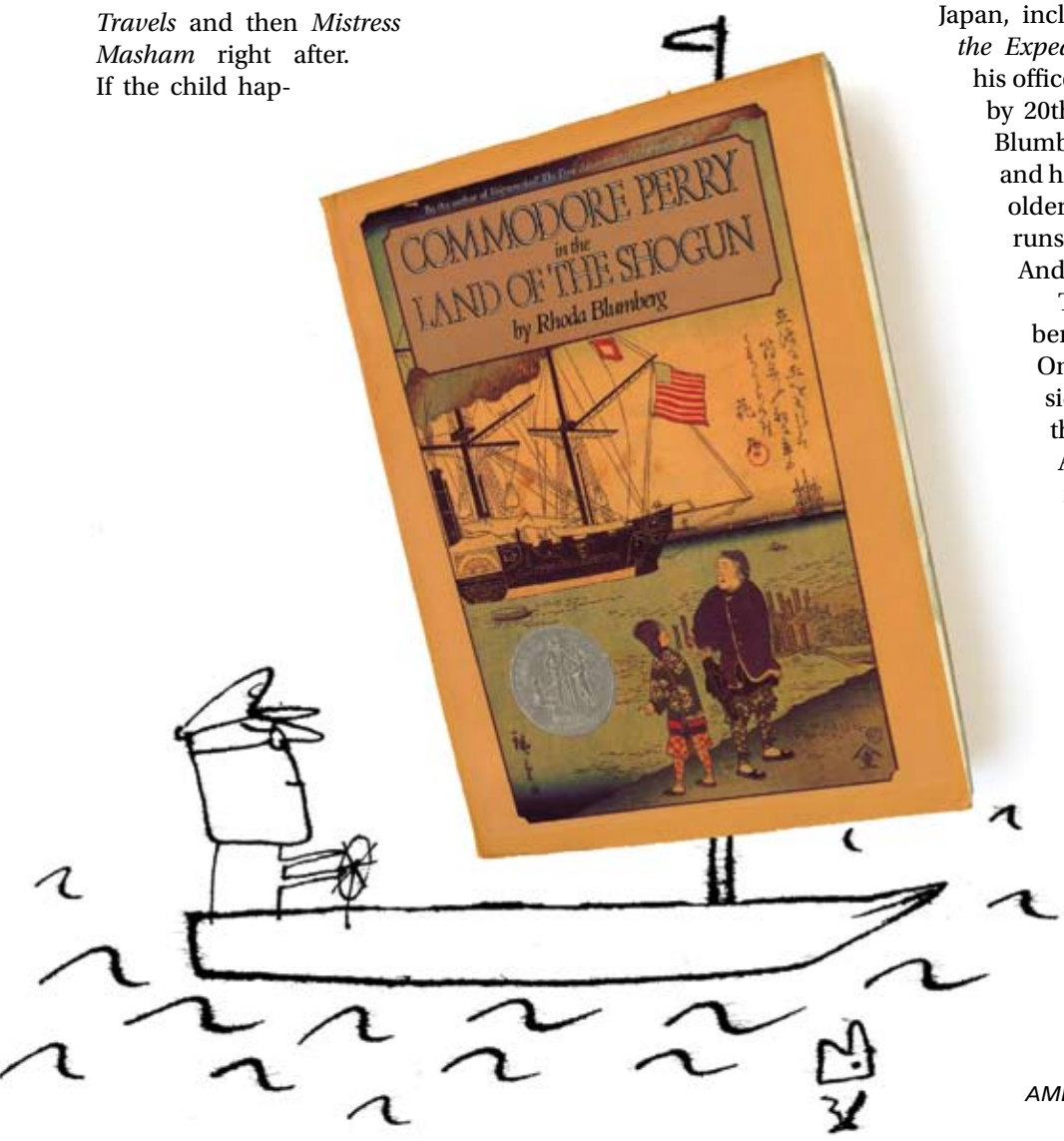
Garnett cut no chapters, but he did write T H. White a memorable letter. It is part gasp of pleasure and part solemn warning.

"You have stumbled upon a most beautiful subject which you will never get again & you have the opportunity to write a masterpiece," Garnett said. Some of that masterpiece is already present, he went on, but much of the book is spoiled by facetious and tiresome jokes, by "a lot of twaddle about Miss Pribble [as Miss Brown then was] and the Vicar," and so on. Plus an overindulgence in capital letters when the Lilliputians are talking, I'd add.

"It is a real tragedy," Garnett concluded, "for you are on the edge of a book which will make you immortal." He begged White to delay publication and to revise still more.

White listened to what his friend said, and he did make extensive new changes. They are not extensive enough. It was *The Once and Future King* that would make White immortal, not *Mistress Masham's Repose.*

And yet, as finally issued, it is a masterpiece, though a flawed one. I can think of few greater pleasures in reading aloud to a bookish child than to read that child first *Gulliver's Travels* and then *Mistress Masham* right after. If the child happens to be especially observant, he or she may notice that Swift uses the Lilliputians (*and* the Brobdignagians *and* the Yahoos) to belittle human nature, but White uses them to magnify it. It is a stunning book for a child to know.



Commodore Perry in the Land of the Shogun, by Rhoda Blumberg, 1985

Four ships are approaching a foreign coast. They are not expected and not welcome. Especially since two of them appear to be breathing fire. More Europeans to bother the King of the Jolliginki? No, this is Commodore Perry of the U.S. Navy, coming to bother the Japanese. President Millard Fillmore has sent him to open Japan, which has been closed to foreign visitors since the year 1636. It is now 1853.

Hundreds of American whaling ships, like Melville's *Pequod*, are cruising the Pacific, and with some frequency one or another of them gets caught in a typhoon and wrecked on the coast of Japan. Surviving crew members wind up in Japanese jails. The first aim of Perry's mission is to put a stop to that. Second: Promote trade. Third: Get in ahead of the British, French, and Russians, all of whom are itching to open closed doors.

There are plenty of books about Perry in Japan, including Perry's own *Narrative of the Expedition,* various journals kept by his officers and men, and many accounts by 20th century historians. But Rhoda Blumberg has done something special, and has produced a really fine book for older children. For those whose taste runs to the exotic, an irresistible book. And it's all true.

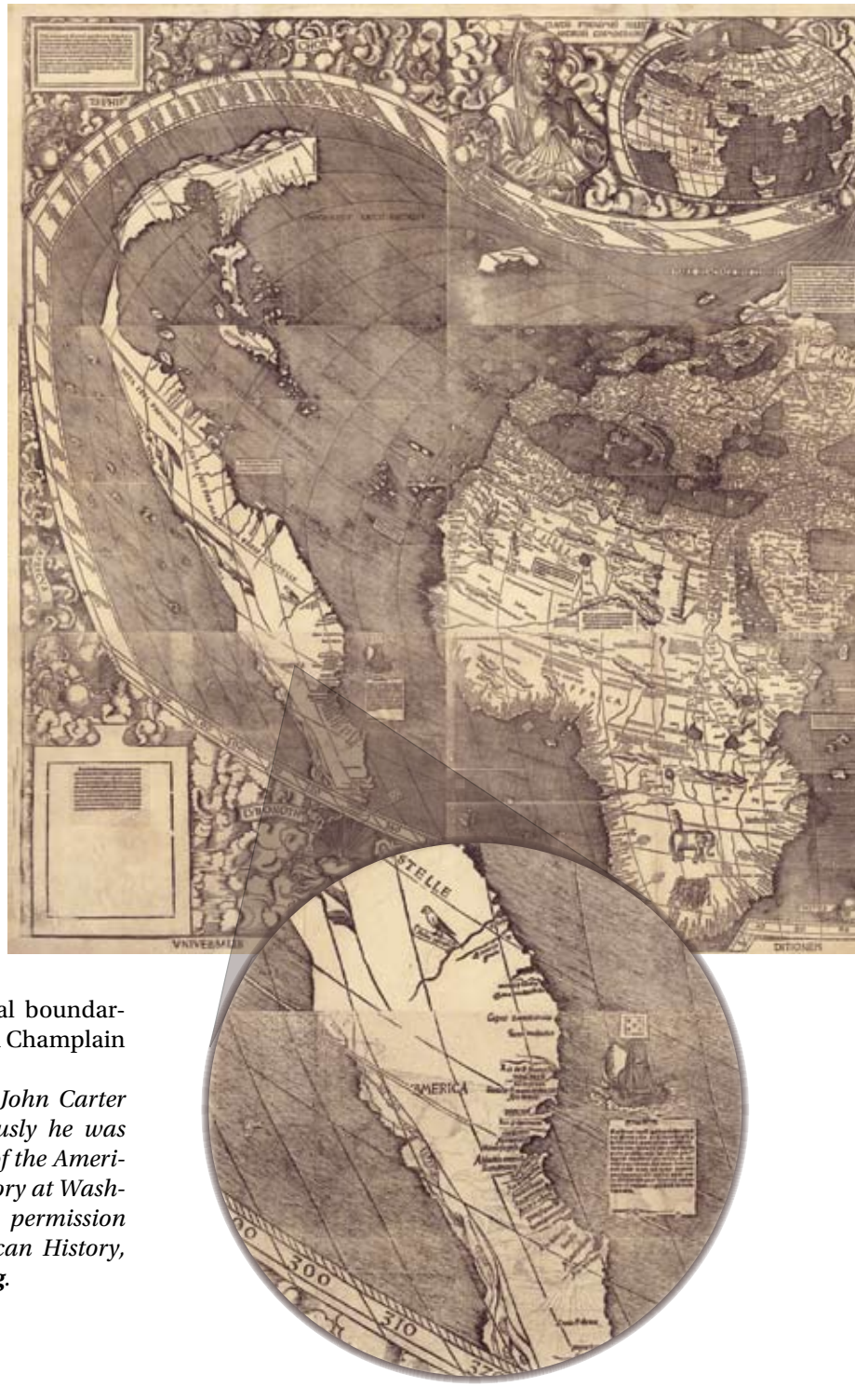
Two things distinguish Ms. Blumberg's book from the many others. One is that she knows and tells both sides: how the Japanese looked to the Americans, but also how the Americans looked to the Japanese. This she does both in her text and in the illustrations, of which there are about 60.

In the text, for example, you get to sample the reports made to the shogun's government by a man named Manjiro, who knows more about Americans than anyone else in Japan. Reason: His fishing boat was wrecked in a typhoon when he was 14, and he was rescued by a homeward bound American whaler. He lived for 10 years in Fairhaven, Mass., and then in California, before he slipped back into Japan.

(Continued on page 46)

Navigating the Age of Exploration

And Restoring Our Capacity for Astonishment



By Ted Widmer

The end of 2007 seems a worthy time to reappraise the Age of Exploration, and not merely because a season of anniversaries is upon us. Of course, Jamestown's 400th was widely publicized, thanks to a number of new books and exhibitions and regal visits from President Bush and Queen Elizabeth. But this is also the 500th anniversary of the Waldseemüller map (right), the first document to use the word "America," planted squarely over Brazil. Coming up quickly are the 400th anniversaries of two communities that are just as American as Jamestown, but couldn't be more different—Quebec (founded in 1608 by Samuel de Champlain) and Santa Fe (settled circa 1608 by Juan Martinez de Montoya).

If these historical rhymes create a temporary surge of excitement, they also present a conundrum for the teacher of American history. How exactly does an outlier like Champlain fit into our discipline, with its neatly marked temporal and geographical boundaries? If the class in question is U.S. history, then Champlain

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Cartographer Martin Waldseemüller compiled this map in 1507. Called "America's birth certificate," this is the first map to say America (see detail, opposite). Waldseemüller selected the name to honor Amerigo Vespucci, who had gathered map data on the New World during voyages in 1501–1502 and who Waldseemüller mistakenly believed had discovered the New World. This extraordinarily detailed map, which is on permanent display at the Library of Congress, was the first multi-sheet printed wall map; it measures 4 ½ feet tall by 8 feet wide.

instantly becomes marginal. How many brave instructors are teaching a full continental and hemispheric perspective? The answer, one suspects, is very small. There are a scattering of courses, at the university level, on "The Atlantic World," but that term is a bit of a misnomer when applied to places like Peru or Puget Sound. The first English settlers of North America were intensely aware of their French and Spanish neighbors—yet we seem barely to be.

But the questions that vex us can also be the most intriguing. Today, we cannot make a cell phone call without revealing our precise GPS coordinates. But in the Age of Exploration, hardly anyone knew exactly where they were, or whose claims encompassed what territory. That ignorance was an essential fact of American history, and it conveniently allowed settlers to roam where they would—well beyond where they were permitted to. Who can precisely say where the West was in, say, 1700? Deerfield? Albany? Lake Superior? California? Why is it that U.S. history books always tell us that the first slaves were brought in 1619 (to Jamestown), when they were in Spanish Florida well before that? In fact, Jamestown was not even the first European settlement on that site—the Spanish had built one of their own in 1570, just a few miles north.

Should we not, in the spirit of the explorers, try to stretch our boundaries a bit? To expand the geography of American history does more than enlarge our space—it changes the story itself. To spend more time in the century before

Jamestown, and to reflect on all of the non-Jamestowns that were also beginning, offers a way to deepen our history considerably. Best, it brings back our polyphony, and the glorious sound of people speaking in a huge range of European and indigenous languages about what it means to be American.

Of course, the "Age of Exploration" is not entirely terra incognita. In the early republic, this was one of the subjects that U.S. historians were quickest to plumb, from Joel Barlow to Washington Irving to Francis Parkman. The year 1492 is probably the most famous date in American history, memorized in rhyming couplets by millions of schoolchildren every year. Could anyone be more famous than Columbus? Even lesser explorers—Verrazano, Champlain—have enormous objects named after them. Pirates never seem to go out of fashion, as Johnny Depp reminded us again this summer, and the ongoing popularity of "Survivor" indicates that we have not entirely lost touch with the reality show that was early American history.

Yet it is remarkable how little we know, after all of these centuries, about the specific explorers themselves, or where they were trying to go, or their impact when they arrived. It could even be argued that we know less than we did a generation ago. In 1992, many expressed ambivalence over the propriety of celebrating the 500th anniversary of Columbus's landing in the New World, and the very word "discover" has an uncomfortable air for many, reeking of Eurocentrism. But surely there are ways to encompass these concerns and recognize the discoveries as the extraordinary achievements of courage and knowledge they were. Before Columbus, the Atlantic was the *Mare Tenebrosum*, or Sea of Darkness, on most maps. Now, it takes five hours to fly across. We should never entirely forget the fear that there might be nothing on the other side.

Fortunately, we have tools to fight against ignorance, just as they did. There is no shortage of materials for those who wish to look into the first chapter of American history. The ancient maps and manuscripts are lovingly preserved in places like the John Carter Brown Library, the Newberry, the Huntington, and the Library of Congress, where Waldseemüller's map resides (1,000 were printed—this lone orphan survives). And, of course, they live on in the European repositories, both princely and public, where all facts about the New World were sent year-after-year to satisfy an insatiable curiosity about America.

Patient sifting through these records offers numerous rewards to the diligent. It confirms that what we see as inevitable "history" often felt highly tentative to those involved at the time. What would have happened if the Pilgrims had settled in Guyana, as they contemplated, rather than Plymouth? Or if the natives had not been decimated by disease at precisely the moment of their arrival? Surely fortune was smiling on these early experiments. But there was more to it than a few bits of good luck (dice are among the many artifacts that have been excavated at Jamestown). The discovery and settlement of the New World was a vast collective enterprise, embracing forms of knowledge from a thousand traditions. Every journey across the Atlantic brought back improvements to the science of navigation, allowing explorers to pull the veil back a little further. Every moment of contact with the inhabitants of the Americas brought deeper understanding of flora and fauna, which revolutionized the way Europeans ate, drank, and looked at the world (often, after 1492, through tobacco smoke). Without doubt, much of this knowledge was purchased with extraordinary violence, a fact that the early historians were loath to explore. Some are still loath to embrace that truth. Only this spring, the Pope raised a tempest throughout South America when he gave a speech in Brazil that claimed the natives were "silently longing" for Christianity before it was presented to them—and that this was in no way "the imposition of a foreign culture."

A close study of the Age of Exploration is rewarding in other ways as well. For one thing, it gives the lie to one of the prevailing assumptions of American history—that we are a new people, inhabiting a New World. A quick glance at the publication that announced Columbus's discovery—the *Epistola* of 1493—makes it clear that he was in many ways closer to the Middle Ages than to our own time. In fact, the primitive woodcut that purported to show his arrival in the Indies was borrowed from another book,

Too often, we historians tend to tell our story with the knowledge of the end result to come—the creation of an enormously powerful nation called the United States. But it is strangely liberating to look at the old maps, and see the vast stretches not-yet-filled-in, and populated instead with mermaids and unicorns and other figments of Europe's overheated imagination.

Begin Your Own Exploration Online

The Age of Exploration, which stretched from the early 15th century to the early 17th century, may have been largely driven by a desire for quicker, easier trade routes, but it resulted in so much more—not the least of which was European settlement of the Americas. To learn more about this extraordinary time, go to *History Now* (**www.historynow.org/06_2007/index.html**), the online journal for K-12 teachers that originally published "Navigating the Age of Exploration." You'll find essays, book reviews, lesson plans, and other resources for elementary through high school teachers. Don't miss the "Interactive History" section, shown right (**www.historynow.org/06_2007/interactive.html**), in which you and your students can examine five rare maps printed between 1511 and 1651 and see how the perception of North American geography changed over the years.

History Now also has an additional resources section (**http://historynow.org/06_2007/ask2.html**) with dozens of books and Web sites that expand on Widmer's article. Here's a taste of what you'll find: The National Humanities Center's Toolbox Library (**www.nhc.rtp.nc.us/pds/tblibrary.htm**), which features primary source documents on the European presence in North America from 1492-1690, and the Newport News, Va., Mariners' Museum's online curriculum guide (**www.mariner.org/educationalad/ageofex/**).

—Editors

about a pilgrimage to the Holy Land. On the day that President Bush visited Jamestown, in May 2007, an object was dislodged from the ground, and it turned out to be a metal sword hilt, ca. 1590—an object that seemed as Arthurian as American.

Too often, we historians tend to tell our story with the knowledge of the end result to come—the creation of an enormously powerful nation called the United States. But it is strangely liberating to look at the old maps, and see the vast stretches not-yet-filled-in, and populated instead with mermaids and unicorns and other figments of Europe's overheated imagination. Champlain's earliest and supposedly scientific renderings of the new world include a large winged dragon, ready to take flight. Well into the 18th century, maps of the Atlantic continued to include completely fictitious islands that had been legends for centuries, but never existed—the Sunken Land of Buss, St. Brendan's Isle, Hy-Brazil, the Island of the Seven Cities, and a dozen others.

Each age writes history for its own reasons, and another reason to go back to this older past is to see how much of the present we can find there. Environmental history is rapidly rising in popularity as a consequence of our growing anxiety over climate change. Nature is ubiquitous in the Age of Exploration—the cold snaps that drove Europeans (especially English) to leave their home countries, the diseases and foods and medicines that were instantly exchanged upon contact, and the species loss that resulted. All bear further investigation, by scientists as well as historians.

In a similar manner, it may surprise a new generation of researchers to learn how much of Islam can be found in the Age of Exploration. Not only in the debt to Arab astronomers and geographers, which was considerable, but in the way that new commodities found in the Americas (silver) altered traditional trade patterns between Europe and the Ottoman Empire.

Finally, the Age of Exploration can help restore something that we are perhaps unaware that we have lost in the cynical 21st century: our capacity for astonishment. The discovery of the New World was many things to many people—liberating, tyrannical, cruel, and generous, all at the same time. But there is no doubt that it was immense, and set in motion a pendulum that will never stop swinging. At the end of *The Great Gatsby,* Fitzgerald's narrator steps back to imagine his Long Island setting as it would have appeared centuries earlier, to the first explorers:

> And as the moon rose higher the inessential houses began to melt away until gradually I became aware of the old island here that flowered once for Dutch sailors' eyes—a fresh, green breast of the new world. Its vanished trees, the trees that had made way for Gatsby's house, had once pandered in whispers to the last and greatest of all human dreams; for a transitory enchanted moment man must have held his breath in the presence of this continent, compelled into an aesthetic contemplation he neither understood nor desired, face to face for the last time in history with something commensurate to his capacity for wonder.

The real wonder, perhaps, lies in how much remains to be explored. ❐

Child's Delight

(Continued from page 41)

Manjiro has all sorts of things to tell the government, many of them not in the least related to Perry's ships or mission. For example, in America, Manjiro reports, "it is customary to read books in the toilet." It is also customary to have a dinky little wedding, followed by that extraordinary thing, a honeymoon: "For their wedding ceremony, the Americans merely make a proclamation to the gods, and become married, after which they usually go on a sightseeing trip to the mountains. They are lewd by nature, but otherwise well-behaved."

The illustrations are more interesting yet. About one-third of them are done by Americans, mostly by the two official artists who accompanied the expedition. Some are just stunning, like a painting of the augmented squadron that Perry brought for his second visit in 1854. Nine warships under full sail, a sight of heartrending beauty.

But it's the two-thirds by Japanese artists that give one to think. Many are sketches of Americans: of Perry himself, of Captain Joel Abbott of the U.S.S. *Macedonian*, of common sailors on shore leave. Without exception, we have long sharp noses and too much hair. We look fierce, barbaric. One reason this book is for big children and not small ones is that the Japanese portrait of Commodore Perry on page 23 could easily give a person nightmares. What might give a person a fit of laughter, on the other hand, is the illustrated chart that instructs Japanese men how to dress like Westerners. The Japanese artist didn't intend it as a joke; he is quite serious with his cravats and top hats and heraldically crossed black umbrellas. But to think that our ancestors deliberately chose to dress like that, and that the silly 19th-century Japanese wanted to copy them, how could it fail to tickle a jeans-clad 12-year-old? Ms. Blumberg's second great strength is the richness of context she provides. It's remarkable. I have read a fair amount of Japanese history, and have spent time in Japan besides. I thought I knew most things about Perry's expedition and its context. I was wrong. To take just one example, the traffic across the Pacific in that remote era was far greater than I had realized. Consider the spring of 1854. While Perry and the nine ships he had brought for the second visit were still anchored in the northern port of Hakodate, what should come sailing in but one of those American whalers? The *Eliza Mason*, 21 months out of New Bedford. No fear of jail now, with the great guns of the *Powhatan* and the *Macedonian* trained on the port.

The whaling captain and his wife and young son are on shore in a flash. The wife, Abigail Jernegan, is the first Western woman to set foot in Japan in about 240 years. She happily spends the night on shore, and when she goes back to the *Eliza Mason* the next day, she is soon followed by a messenger carrying a beautifully wrapped package. Inside is something she forgot on shore: an ordinary pin.

Fifteen days after the squadron left, the first tourist ship arrived. It was actually a private yacht, the *Lady Pierce,* owned by a Connecticut millionaire named Silas Burrows. He had no idea that the Japanese had just signed the Treaty of Kanagawa, thus reopening the country to visitors. He had made his own arrangements for slipping through the closed door: He had brought another Japanese castaway along to be his excuse for stopping. A man of imagination, he had also had some special gold coins minted in San Francisco, to give as presents. He gave them out, all right, but very soon he got them back. Like official American coinage then and now, his special coins had the word "liberty" stamped on them. Liberty was not a thing the shogunal government altogether approved of. The coins were collected from the recipients and returned to Mr. Burrows.

American children are said to be notoriously weak in history and geography. Books like this seem to me to be an ideal strengthener. There is no dumbing down. There is just such richness of detail that the child is apt to forget all about TV, and go right on reading.

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Oh, one last thing. Who said he would get kissed if only they'd sign the treaty? That was Commodore Perry, age 59. He has just been entertaining five Japanese commissioners and their retinues aboard the *Powhatan*. He has served a great deal of liquor. One of the commissioners is a bit drunk. As he leaves, "He hugged the Commodore so hard that Perry's new epaulettes were crushed. Perry did not mind the hug. 'Oh,' he said to his officers, 'if they will only sign the Treaty, he may kiss me.'"

Didn't know dignified commodores could joke like that, did you? ❑

Cognitive Scientist

(Continued from page 35)

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Letters

(Continued from page 3)

bell. Even at Stanton, a school held up as a beacon of hope for inner city education, the discipline and imagination lasts only six daylight hours. The other 18 hours swallow up too many of our kids in violence, neglect, hunger, and despair.

This reality is exactly why I've begun working on a Web site for teachers: **www.circlesofinfluence.net**. The site will work to amplify teachers' voices so that they can be heard by the leaders and lawmakers that play a direct part in the crafting and enforcing of crucial legislation. It is time to admit that we cannot continue to tweak the system, focus exclusively on our instruction, and tell ourselves that we can do this one kid at a time. We can't. It's time to get political.

—Ted Smith
Sixth-grade Teacher
Ravena-Coeymans-Selkirk Middle School
Ravena, N.Y.

The Summer 2007 issue of *American Educator* had an outstanding pair of articles by Karin Chenoweth on improved educational outcomes in north Philadelphia schools. I was able to use them as a reference point when teaching a July workshop for "low-performing providers" to improve voluntary pre-kindergarten outcomes in Orange County, Calif. Thanks to the AFT for the quality of this information.

—Liz Jenkins

Wal-Mart Jeopardizes Manufacturing

Thank you for the Richard Wilson article about Wal-Mart (Spring 2007). Before I began my teaching career, I worked as a ceramic artist for a large decorative arts company. Wal-Mart and cheap knock-offs caused the company to discontinue manufacturing. It is a sad state of affairs facing our country. Without a manufacturing base, how can a country grow?

—Brenda Hatter
Art Teacher
Thomas Jefferson Rusk Middle School
Irving, Texas

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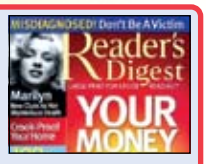

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