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Science

NO APOLOGIES:
"So much for altruism. I didn't do it for science, and I didn't do it for mankind. I did it for me, and it was worth it."
— journalist Jon Franklin in his speech, "The End of Science Writing"

Telling the stories of stars and quarks

The world was not enough, so a foreign correspondent decided to cover the universe

By Malcolm W. Browne
New York Times

After 22 years as a science writer, I recently retired to cut firewood in Vermont and enjoy the memories of an exciting life, in which I covered a half-dozen wars before discovering the deeper satisfaction of observing and reporting the achievements of scientists.

I relished my 17 years as a foreign correspondent, but believe it or not, even the high drama of disaster, violence and political upheaval that dominates front pages can lose its luster for journalists seeking new experiences. After a time, a reporter may begin to sense a sameness in most of the events that pass as news. When that happens, a lucky few of us discover that in science, almost alone among human endeavors, there is always something new under the sun.

In 1977, weary of the sameness of war and politics, I returned to the United States to become a science writer — a transition that almost overwhelmed me at first. Although I had earned my living in a chemical laboratory during the 1950s, I almost had forgotten how speedily science booms along.

For example, in the past quarter-century alone, the American Chemical Society has added more than 10 million chemical substances to its list of molecules, most of them human-made. Stupendous strides in chemical synthesis have given the world a wealth of new materials and drugs and have created classes of molecules, including hollow molecules shaped like cages that contain even smaller molecules.

Perhaps most intriguing of all, chemists are turning up more hints of how life may have originated from the carbon spawned in the explosions of supernovae.

Big-bang in journalism

The 1960s and '70s were a time of great ferment in all the sciences, and the momentum of those years has carried to the present. Among the major achievements in physics I was privileged to report were the discovery of the top quark (a subatomic particle) at Fermilab outside Chicago — the last of six quarks predicted by theory — and the discovery in Japan that the elusive neutrino (a still-mysterious subatomic particle) probably has some mass, a finding with profound implications (about whether the universe will expand forever or ultimately collapse in on itself).

Sometimes, science writers watching the deluge of discoveries in fields such as physics, chemistry, molecular biology and astrophysics have outpaced the thinking of the scientists themselves, and science writing has bloomed as a major component of general journalism.

At the New York Times, for example, the science editor, Walter Sullivan, had been steeping himself in astrophysics for decades when in 1965 two scientists at Bell Labs, Arno A. Penzias and Robert W. Wilson, accidentally discovered a faint microwave radio signal coming from all directions in the sky. It was the first hard evidence that the universe began with a "Big Bang."

Penzias later paid Sullivan one of the warmest compliments ever given a science writer, after reading an article that expanded on the implications of the discovery: "Only after reading Sullivan's story," he said, "did we fully understand what we had done." In 1978 Penzias and Wilson, their discovery having radically changed humanity's view of the cosmos, were awarded a Nobel Prize.

The raw material used in news coverage of important discoveries is often rather skimpy: a news release from a university, a telephone message from a scientist friend, or a brief paper in a professional journal. It is up to the science writer to judge the significance of the findings and to place them in context.

This means that the writer must be a perpetual student.

News stories about astronomy, for example, frequently have to do with black holes, and for many astronomy fans it's enough to know that black holes suck in everything near them and won't let anything — even light — escape. But to understand black holes at a deeper level requires familiarity with Einstein's general theory of relativity, and some of the greatest minds in physics are still puzzling over some of relativity's implications.

The presumably lesser mind of the science writer has an even harder row to hoe than that of the scientist. But try, he or she must.

Sifting through junk

Curiously, as science floods the world with discoveries of variable quality — unhappily, the overwhelming majority of scientific papers fall into the category of junk science — the task of the writer seems to grow easier in some ways.

The science itself gets harder all the time, of course. But no discovery occurs in a vacuum, a fact that has helped many science writers find their way through the fog. Newton, the discoverer of much that is essential to physics and mathematics, wrote that he could not have seen so far without having stood on the shoulders of giants. In a small way, the science writer also can stand on the shoulders of giants. Most discoveries are incremental steps, and if a writer comes to terms with the earlier steps, new findings generally slide into an intelligible context.

The science writer also lives in dread of losing readers' interest, which happens all too often. For instance, it's hard to persuade a reader (or editor) to take seriously some gigantic experiment that produced only a null result. So the writer is obliged to point out that null results can have far-reaching scientific importance. The failure of an experiment by Dr. Albert Michelson and Dr. Edward Morley a century ago to detect the Earth's passage through a hypothetical universal "ether" lent powerful support to Einstein's relativity theory. Scientists will soon begin a quest for gravity waves in a strikingly similar experiment, and any writer unfamiliar with Michelson and Morley's work will have trouble reporting the story.

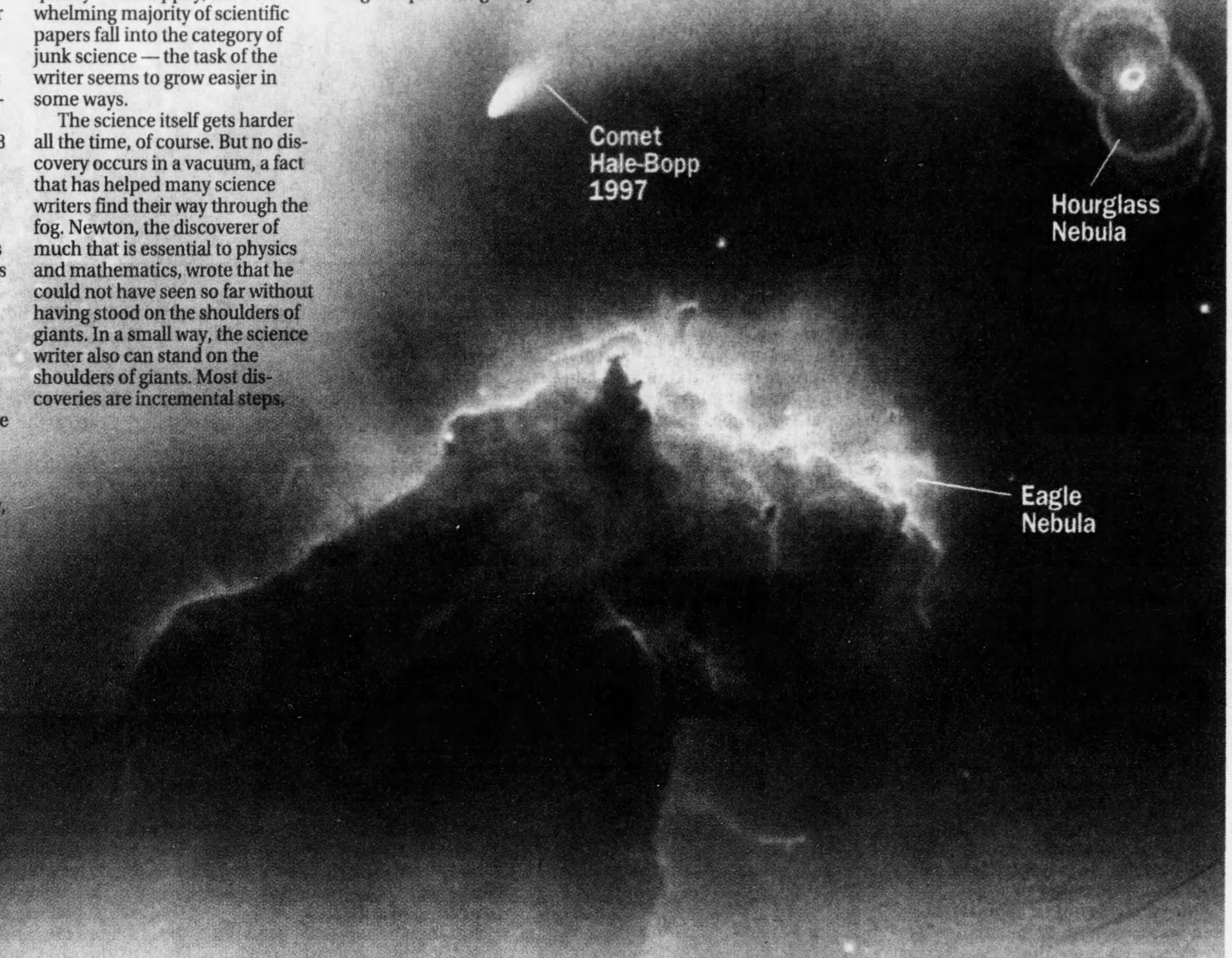
In other words, it takes a prepared mind to appreciate the value of a subtle experiment, and a science writer must impart this appreciation to readers, even at the cost of glazing a few eyes.

The formula for success

Practice may not make perfect, but a science writer who stays in the game long enough is bound to get better. Unfortunately, it can happen that both the writer and reader may miss the significance of a scientific development; it is like being knocked down by a strong opponent.

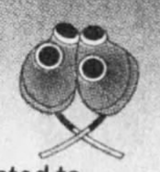
Paul Gallico, a renowned sports writer in the 1930s, relished such encounters. Before writing about a boxing match he covered, he went into the ring with Jack Dempsey, who knocked him down. This, Gallico said, taught him all that he needed to know about being hit, and that helped flavor his coverage.

Science writers and their readers sometimes get knocked down by hard ideas rather than by hard gloves. But the experience of grappling with such things as the fiendish mathematics of superstring theory [an overarching explanation of the forces in the universe] or the complicated tactics of the AIDS virus is its own reward, even at the cost of some bumps.



Malcolm W. Browne, New York Times science writer, 1977-99.

A quarter-century of discoveries



- **1977** The Apple II, the first personal computer available in assembled form, is introduced.
- **1978** The first "test-tube" baby, Louise Brown, is born in Great Britain.
- **1981** AIDS is officially recognized as a disease.
- **1982** Seattle dentist Barney Clark receives the first human artificial heart, the Jarvik 7.
- **1984** The Internet is created to allow universities to share the resources of five supercomputer centers.
- **1985** A hole in the Earth's ozone layer is discovered over Antarctica.
- **1992** The World Wide Web is developed by a British scientist.
- **1996** NASA scientists find evidence of what may be a primitive life form on a piece of Martian rock that came to Earth as a meteor fragment.
- **1997** Dolly the sheep is cloned by Scottish researchers.
- **1998** Construction of the International Space Station begins.
- **1999** Fears of world-wide computer failure because of the Y2K bug prompts major efforts to avert the problem.

Star Tribune graphic by David Silk. Space montage created with images from NASA and the Hubble Space Telescope.

Study of deformed frogs muddied by mystery and politics

By Tom Meersman
Star Tribune Staff Writer

The Observatory

You wouldn't think that a book about frogs would be all that interesting. Herpetology is, after all, "the filmy, dank science of slithery things living in dark, wet places," according to Minnesota writer William Souder. But "A Plague of Frogs" — Souder's first book — is not about ordinary frogs. "The Horrifying True Story," as the subtitle says, begins with an incident that cast Minnesota as a principal player in a continuing national and international scientific mystery.

On Aug. 8, 1995, schoolchildren on a nature outing near Henderson, Minn., noticed young frogs in a farm pond with missing, withered and shortened hind limbs. The questions that their discovery raised about pollution, water quality, sensitive creatures and possible human health effects have reverberated ever since.

Souder chronicles the story of the ensuing four years, reporting his observations and telling the stories of key researchers as he looks over their shoulders in the field and peers through their microscopes in labs. His book is a fascinating tale not only of deformed frogs, but also of the messiness of science when it's viewed up close and personal.

Souder is no armchair observer. He takes the reader on an ambitious cross-continental voyage in search of answers. He wades through the mud in CWB, the acronym for an unidentified lake in central Minnesota near Brainerd that is the hottest of hot spots, with deformity rates of more than 70 percent in some species. He hikes on Mount St. Hillaire in Quebec's St. Lawrence River Valley with the Canadian scientist who has examined more deformed frogs than anyone else in the world.

Souder jounces along rutted gravel roads in northern Vermont with scientists who are studying wetlands that produced deformed frogs the year before. He dons a lab gown and rubber boots to view frog necropsies at the National Wildlife Health Center in Madison, Wis. And he drives along the switchbacks of the Cascade Mountains in Oregon, visiting research sites at which experiments have linked declines in frog populations with ultraviolet radiation from the sun.

Through it all, Souder, who covered the story as a stringer for the Washington Post, examines the numerous hypotheses about the deformities: pesticides, parasites, increased ultraviolet radiation (from ozone depletion), acid rain, new diseases and climate change, among others.

It's a complicated mystery with more questions than answers. After four years of research, writes Souder, no one can say with certainty why frog deformities in Minnesota and elsewhere have occurred or what that could mean.

But Souder's tale is not without various subplots about the prickly personalities, professional jealousies and occasional noncooperation that are part of science — and human nature — and that hinder progress toward answers. Souder is dismayed, but not surprised, by the "medieval fiefdoms" of science that become established in different universities and government agencies as scientists compete for research funds, especially for emerging, high-profile issues.

Photo by Martin Ouellet

Scientists studying frog deformities in Canada noticed that the additional limbs seemed to occur on one side.

"Much as we might want to believe that scientists are open-minded and ruthlessly objective, the truth is otherwise. Scientists are as blinkered and stuck on their own pet theories about everything as anyone else.," he writes. "Scientific method is supposed to be about proposing testable hypotheses and then attempting to disprove them. It would be a much prettier process if it actually worked that way. More often, scientists propose hypo-theses and then defend them fiercely while trying to tear down everyone else's."

Souder presents his conclusions not with fist-pounding, righteous indignation but with a matter-of-fact attitude of a reporter simply telling what he found. He also observes other behind-the-scenes phenomena that didn't make the headlines:

➤ Martin Ouellet, the eminent Canadian deformed-frog researcher, cannot understand why state and federal agencies in the United States have focused nearly all of their attention on a few sites where deformities have been reported, rather than trying to determine more accurately the scope of the problem.

➤ Stan Sessions, a biologist at Hartwick College in south-central New York State, wrote letters to Minnesota Gov. Jesse Ventura and others last July arguing that parasites could explain nearly all of the frog deformities and that checking on possible chemical causes — an effort funded by the state — was a waste of time.

➤ The Minnesota Pollution Control Agency (MPCA) news conference on Sept. 30, 1997, was called against the advice of its federal research partner, the National Institute of Environmental Health Sciences, and the Minnesota Department of Health. Although the MPCA's data were preliminary, it nevertheless declared at the time that the source of the deformities was "something in the water."

➤ David Hoppe, a University of Minnesota-Morris biologist and one of the most knowledgeable frog experts in the state, grew increasingly concerned about the disorganized nature of the MPCA's research effort in 1996, and he worried about what might happen to the data he submitted as part of a contract with the state. It turned out that he had reason for concern: The MPCA took nearly two years to write the 1996 field report, and never included Hoppe's data because it lost the information.

— William Souder's book "A Plague of Frogs: The Horrifying True Story" (Hyperion, 299 pages, $23.95) will be published March 15.

Home Planet

An update on the Earth

Why birds never ask for directions

Migratory birds have an unusual blue-light photoreceptor in their eyes and brains that may allow them to actually see the Earth's geomagnetic field, say scientists at the University of Illinois at Urbana-Champaign. A team of researchers led by physicist Klaus Schulten believe that the photoreceptor, known as a cryptochrome, may be the site of a neurochemical reaction that allows birds not only to see the geomagnetic field, which makes a compass point north, but to superimpose it onto traditional visual images of the landscape. By comparing the angle of the magnetic field lines to the horizon, birds and other magnetically sensitive animals can figure out where they are and where they are going. "We know that the magnetic compass ability is widespread in animals," Schulten said. "But it has been a mystery how magnetoreception is achieved in higher animals." There may be more to the system than the photoreceptor, he said, but the research is heading down a "new, promising track."

Why dolphins head south for the winter

Snowflakes, those air-filled crystals of ice that drop gently from the sky, create a fair amount of high-frequency noise when they land on water and can disrupt animal sonar systems, as well as underwater monitoring equipment. The researchers, led by Andrea Prosperetti, mechanical engineer at Johns Hopkins University in Baltimore, said the subsurface noise is caused by the microscopic bubbles of air inside each snowflake. Before the bubble can make it back to the surface and pop, it emits a high-pitched screeching sound — too high for humans to hear, but noticeable to aquatic animals such as porpoises and whales. The falling snow adds as much as 30 decibels to other underwater noise. That isn't a lot of noise — more than a whisper, less than a normal speaking voice — but it's enough to clutter up the sonar signals of animals and sonar-tracking devices alike. The research was funded in part by the Office of Naval Research.

— Jim Dawson. Next week: Newton's Apple