On the 10th anniversary of the Gulf War, scientists say they may never find an explanation for the mysterious malady that struck some veterans

Gulf War Illness: The Battle Continues

Watching it unfold on CNN, the Gulf War seemed almost antiseptic. On 16 January 1991, the allied forces launched a series of "precision" air attacks that looked more like a game of Nintendo than the messy engagements of, say, Vietnam. Once Iraqi forces were "softened up" enough for the ground war to begin on 24 February, driving them out of Kuwait was a breeze. Four days later, it was all over, at the cost of just 148 U.S. combat casualties—35 of them as a result of friendly fire—instead of the tens of thousands that the Pentagon had feared. By the fall, all 697,000 U.S. troops were home.

But for the soldiers on the ground, the war was unnervingly real. Iraq's President Saddam Hussein had used nerve gas both in the war with Iran and to mass-murder residents of a Kurdish village; there was every reason to suspect he would resort to biological or chemical weapons again. In anticipation, some 100,000 troops were vaccinated against anthrax and another 8000 against botulism toxoid, two suspected biological agents. Along with their weapons, the troops were issued gas masks, which they had to don frequently when the nerve gas detectors blared. Many soldiers followed their commanders' orders to pop pyridostigmine bromide (PB) tablets, which were supposed to protect against a gas attack, but how well would they work? Some troops also witnessed widespread death and destruction among Iraqi forces. These assaults came on top of the day-to-day hardships of camping out in the Saudi desert for months, where the heat could reach an intolerable 45°C. Desert flies—which could carry disease—were rampant, as were scorpions and snakes. Showers were infrequent, and the food was lousy.

Even before they returned home, the first Gulf veterans had become ill. In the ensuing years, many more in some European countries and the United States started complaining of a series of medical problems, such as fatigue, headaches, muscle and joint pains, rashes, dizziness, forgetfulness, loss of concentration, and depression.

Yet 10 years later, after the United States alone has spent $155 million on research, scientists are still at a loss to explain what caused "Gulf War illness." Hundreds of researchers have produced bookshelves full of papers; over a dozen expert panels have pored over the evidence, held scores of hearings, and turned up little but more paper.

So it wasn't a surprise last week that when Gulf War researchers gathered for another big meeting in a Washington suburb,* nobody could report a breakthrough—fresh and convincing evidence, say, that unequivocally linked the broad collection of physical problems to exposure to nerve gas, vaccines, or some danger lurking in the desert. And by now, most researchers concede that they will never find a satisfying answer. "We will find a few more pieces to the jigsaw," says Simon Wessely, a Gulf War illness researcher at Guy's, King's and St. Thomas' Hospital in London. "But I'll bet you the mortgage there won't ever be that sudden bright flash of light."

Disappointed or unwilling to believe that science can't provide an answer, some frustrated veterans talk of government neglect and cover-ups (see sidebar on p. 816). Others have embraced a bewildering variety of offbeat theories, most of which promise to offer a clear explanation of their problems and, sometimes, a cure. The U.S. Congress has jumped in as well, promoting and funding dubious studies that often have not withstood scientific scrutiny—to the frustration of the Department of Defense (DOD) and the Department of Veterans Affairs (VA), which are stuck with the tab. And the end is not in sight; several of the studies may continue for at least another decade. "We're going to look as long as there's a chance we're going to find something," says John Feussner, the VA's top research official.

CREDIT: REUTERS NEWMEDIA INC./CORBIS

Burning questions. Smoke from massive oil well fires was just one of many potential health hazards troops faced in the Gulf.

Toxic soup

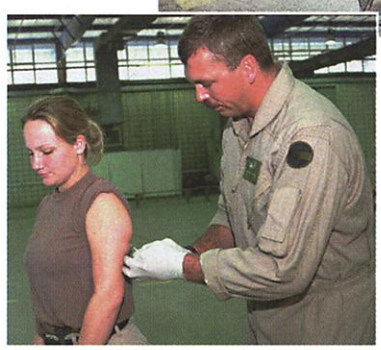
From the beginning, the list of possible culprits was long. Perhaps nerve gas was used after all, even though it didn't claim any immediate victims. Or there might have been side effects of the PB pills. Some veterans were exposed to depleted uranium, a heavy compound that was used in tank-shattering ammunition rounds and is also blamed for "Balkan War syndrome," an alleged mystery illness among U.N. peacekeepers who served

* Conference on Illnesses Among Gulf War Veterans: A Decade of Scientific Research. Alexandria, Virginia, 24–27 January.

in former Yugoslavia. Others blamed pesticides that were used widely to keep fleas, mosquitoes, and sandflies at bay. Then there were anthrax and botulism vaccines; endemic infectious agents, such as the *Leishmania* parasite; and smoke from oil wells set ablaze by the withdrawing Iraqi forces. "It was quite a toxic soup," says Feussner.

The research effort did not kick into full gear for several years, in part because the Pentagon—as it now admits—was slow to react. The turning point came in 1996, when information surfaced showing that shortly after the war, American forces had blown up a huge ammunition depot near Khamisiyah, Iraq, which, unknown to the troops, contained thousands of rockets filled with the nerve gases sarin and cyclosarin. Although no one was known to have suffered acute poisoning, many soldiers could have been exposed to low concentrations as the gases wafted away. The estimated number of the exposed quickly grew from several hundred to tens of thousands.

That revelation dealt a blow to the Pentagon's credibility, leading to an outcry among veterans and forcing the government to boost its research spending. DOD created the Office of the Special Assistant for Gulf War Illnesses (OSAGWI) to coordinate all its Gulf War illness activities and investigate possible exposures. DOD and the VA also started funding a vast research effort, now comprising almost 200 different projects. Some 40% of the $155 million spent to date has gone to DOD and VA researchers; the rest has funded studies conducted by other government agencies, such as the Centers for Disease Control and Prevention (CDC), and universities. The two agencies also funded the Institute of Medicine (IOM) and the RAND Corp. to conduct independent reviews of relevant scientific literature.



Danger in the air. Soldiers had to prepare for chemical warfare *(top)* and missile attacks *(right)*. Anthrax vaccines *(bottom)* are another alleged culprit behind Gulf War illness.

CREDITS: (CLOCKWISE FROM TOP) AFP/CORBIS; AFP/CORBIS; GUSTAVO FERRARI/AP

Three syndromes?

Although they haven't produced an answer, many studies have been reassuring. Gulf veterans' mortality rate is similar to that of service personnel who did not go to the Gulf and is only half that of the same age group in the general population—although one study showed that they are slightly more prone to die in accidents, a phenomenon seen in other veteran populations as well. Their children do not have an increased rate of birth defects, and several studies have shown that vets aren't hospitalized more than nonveterans. Still, study after study has shown that Gulf War vets report more medical problems than peers who stayed home. By now, few suggest that they're malingering and should just "pull themselves together." "They're really ill," says Michael Kilpatrick, chief of staff of OSAGWI.

So what's wrong with them?

To answer that question, several researchers have tried to link the medical problems to specific exposures. To find out who was exposed to gases from the Khamisiyah depot, for instance, the Pentagon had the entire blowup reenacted at the Dugway Proving Ground in Utah. Findings about how the gases were released, combined with known data about their physical properties and the weather at the time, were used to model the path of the toxic plume. Overlaying that with a map showing the positions of all Army units yielded an estimate of who might have been exposed. Those 98,910 soldiers were sent a letter notifying them of their possible exposure.

However, a study by Gregory Gray and his colleagues at the Naval Health Research Center in San Diego suggests that this cohort hasn't been hospitalized more often than other troops. (Recently, the Pentagon has repeated the exercise, using more accurate toxicity data as well as more precise information on troop positions. Last December, the department announced that the plume most likely bypassed 32,806 soldiers notified earlier, but exposed 34,819 new ones. Gray has yet to repeat the hospitalization study to account for the new data.)

A group led by Wessely in London has found some evidence for a vaccine link. In 1999, they reported that British soldiers who were immunized against anthrax and plague were at a higher risk of getting ill; in a second study published last year, they showed that those vaccinated in the Gulf area itself were especially at risk. Wessely suspects that the numerous shots may be harmless but may cause ill health when they're administered during times of stress. He admits, however, that the evidence is tenuous.

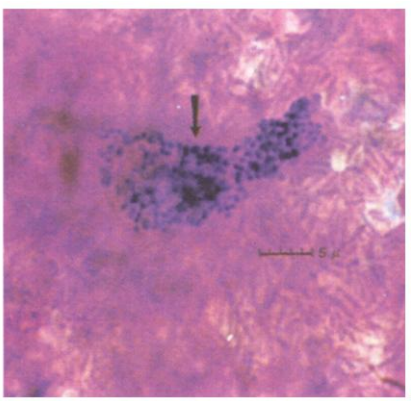
The only researcher who says he has uncovered clear links between exposure to a variety of substances and health damage is Robert Haley, an epidemiologist at the University of Texas Southwestern Medical Center in Dallas. In a 1997 paper in the *Journal of the American Medical Association (JAMA)*, Haley used a statistical technique called factor analysis on 249 veterans to determine whether a specific cluster of symptoms existed that would warrant the term "syndrome." He found three. Syndrome 1, or "impaired recognition," is marked by problems with attention, memory, and reasoning. Syndrome 2, or "confusion-ataxia," results in problems like disorientation, balance disturbances, and vertigo. Syndrome 3 ("arthromyoneuropathy") includes symptoms like muscle aches and weakness.

In a second paper in the same issue of *JAMA*, Haley showed that 23 sufferers from those syndromes performed worse than 20 healthy controls on a series of neurological tests, indicating that they had "generalized injury to the nervous system." And in a third paper with the same 249 subjects, he reported that the risk of Syndrome 1 was greatest among veterans who said they had worn flea collars during the war; Syndrome 2 (the worst of the three) was associated with self-reported exposure to nerve gas or PB; and the chance of suffering from Syndrome 3 seemed to in-

Congress Explores the Scientific Fringe

Edward Hyman thinks he can see it in the urine. Gulf War veterans suffer from a potentially lethal infectious disease, he says, and he has a special test that can detect the bacteria in a urine sample. He has a treatment, too: Bombarding the body with antibiotics can kill the bugs and cure the patient. Few other scientists subscribe to that view. But in 1996, Congress decided to bypass the skeptics and award Hyman, a retired physician in New Orleans, a whopping $3.4 million to carry out a clinical trial—more than almost any other single Gulf War researcher has ever received.

Five years later, Hyman has finished the study. But he didn't follow double-blind procedures, and his results haven't been published. Even if they were, researchers say they would be wary. "It looks to me like fringe [science]," says Michael Kilpatrick, a Gulf War illness official at the Pentagon. Indeed, critics argue that the episode is a prime example of how Congress's desire to micromanage research, combined with a hefty dose of pork-barrel spending, can lead to an outcome that satisfies no one.



Infectious disease? Hyman says gram-positive bacteria—detected here in the urine of a patient with another disease—cause Gulf War illness.

Hyman first saw a Gulf War illness patient on CNN in 1992. He says he immediately recognized the man's symptoms; he'd seen them in many patients in his private practice—for instance, in women with silicone breast implants. "There you know where the infection is," he says. "It's on top of the implants." Gulf War illness, on the other hand, is a systemic disease, he says, caused by similar, so-called gram-positive bacteria that Hyman suspects are prevalent in the Gulf. Standard lab tests can't detect those bugs. But by using a special staining technique on a urine sample, Hyman claims he can make dead, "exploded" bugs visible by microscope in about an hour.

Hyman tracked down the soldier he saw on TV, tested his urine, and offered to treat him as he had dozens of others: by administering high doses of multiple antibiotics for several months, both intravenously and orally. Usually, he starts with two or three drugs. "If it doesn't work, I can add another one, or I may increase the dose," he says. "I rarely get to five [drugs], but I often get to four." (Hyman takes antibiotics himself, too; he says he's probably the biggest user of clindamycin in the world. "Do you think I want to get the damn disease?" he asks. "It's communicable!")

Several of Hyman's patients have delivered glowing testimonials before Congress and in other venues. Impressed, Hyman's fellow Louisianan Robert Livingston, then chair of the House Appropriations Committee, wanted to give Hyman a chance to expand his work. So when the Pentagon declined to fund Hyman's research several years ago, Livingston added language to an appropriations bill that forced the department to give Hyman's Louisiana Medical Foundation the multimillion-dollar grant.

Other researchers are less impressed. Most say there's no evidence that Gulf War illness is a contagious disease. A team from the University of Texas Southwestern Medical Center in Dallas tried the staining technique, but they saw no difference between ill vets and healthy controls, as they reported in 1998 in the *American Journal of the Medical Sciences*. (In a testy letter, Hyman claimed they made "fatal mistakes" using the technique.)

In his 36-patient trial, Hyman gave half the patients a placebo and the other half antibiotics; but he says he couldn't adhere to the double-blind design because he needs to tailor the treatment to the patient, based on his diagnostic findings. Although unusual, the approach is scientifically valid, says Quentin Deming, a former director of the clinical study unit at Albert Einstein College of Medicine in New York City, who directed Hyman's trial. "It's a test of the man's method," says Deming, not of a fixed regimen, as most trials are.

But others are dubious. "You know what's going to happen if and when that piece of work sees the light of day," says John Feussner, the top official for Gulf War research at the Department of Veterans Affairs (VA). "The scientific and the medical community will be skeptical." Indeed, Hyman says at least two journals have rejected a paper describing his findings, and he was not selected to give a presentation at last week's Gulf War illness research meeting in Alexandria, Virginia.

"It's terrible" to fund a study with taxpayers' money and never see the outcome, says Kilpatrick. For the Pentagon and the VA, Hyman's study has also created a dilemma, he says: how to further treat veterans who took part in the trial. Hyman has urged several vets to keep taking antibiotics, lest the infection return. But Kilpatrick says VA doctors can't prescribe infinite amounts of antibiotics without some scientific rationale. "We've committed these patients into a research project," says Kilpatrick, "and now the researcher says, 'I'm done with you, but you need more antibiotics [to ward off the disease].' " Hyman says he needs to do more research to see if and when veterans can be taken off antibiotics. "I would like to do another trial," he says. "It's beginning to all fit together."

–M.E.

crease with the use of a government-issued insect repellent that contained DEET.

"Haley was the first one to use this kind of analysis, and it was a very important contribution," says Charles Engel, head of the Walter Reed Deployment Health Clinical Center in Washington, D.C. But from the start, Haley's studies were strongly criticized for methodological problems, such as small, nonrepresentative samples and the lack of a control group in the factor analysis.

In subsequent years, at least four groups have tried to replicate the work with different groups of veterans, but none of them has found the same sets of symptoms. Instead, they found that Gulf War vets report the same symptoms as the general population, where they go by different names, such as chronic fatigue syndrome and fibromyalgia. The difference is that the veterans report them at an unusual rate for a group of mostly young men. As a result, most researchers have concluded that the war didn't produce a new "syndrome"—a term reserved for a unique, as yet unexplained set of symptoms. Although Haley's group has gone on to produce many more papers—in 1999, for instance, they claimed to have found evidence of brain damage using a technique called magnetic resonance spectroscopy—critics are invariably wary.

There are other reasons why many researchers are skeptical of ever finding the "true cause" of Gulf War illness. In addition to whether the panoply of symptoms amounts to a distinct syndrome, toxicity data for most of the alleged culprits are sketchy and difficult to interpret in the context of the Gulf War. For sarin, for instance, scientists have gleaned some knowledge from terrorist attacks in Japan in 1994 and 1995. But as an IOM panel concluded in a literature review last September, it's unclear whether low-level exposure can have long-term health effects. The same is true for PB, depleted uranium,

CREDIT: EDWARD HYMAN, *BIOTECHNIC AND HISTOCHEM.* 67, 1 (1992)

and anthrax vaccines used in the Gulf, the panel wrote.

Compounding the problem, reliable information about individual exposures in the Gulf is scant. The military's record-keeping during the war was admittedly sloppy: The DOD does not know who was vaccinated for what, for instance, or who took PB pills. Individual exposures to smoke from oil well fires or to uranium are equally impossible to gauge. Asking veterans themselves is possible, but that poses another problem: Sick people often tend to preferentially remember possibly unhealthy situations, an effect called "recall bias" that bedevils many an epidemiological study.

Add to that the aging of the veteran population, which in itself causes additional disease, and most researchers think the data are just too weak to ever show a clear pattern. "We debated for 3 or 4 decades about a link between smoking and lung cancer," says Walter Reed's Engel. "There, we had a well-defined exposure and a very well-defined disease. Here, we have neither. So it's hard to be optimistic."

Five treatments

But that conclusion is difficult for many to accept. Veterans' organizations, for instance, have sharply criticized the Pentagon and the VA for not tackling the problem seriously. Members of Congress—some with large veteran constituencies—have often blasted the official research program as well. Last year, for instance, chair Christopher Shays (R–CT) of the House subcommittee on National Security, Veterans Affairs, and International Relations demanded to know from researchers and defense officials why they had so little to show for their efforts, despite having spent more than $100 million. "Within another year, we want five different treatments from you," Shays warned the panel. Representative Bernie Sanders (Ind–VT) added that he had learned of several recent breakthroughs by independent scientists. "So my inclination is to take this research out of the government's hands," he said, his face red with anger, "and give it to the people who know where it has to go!"

"I know that criticism, and I'm chagrined by it," says John Feussner, the VA's top official for research. "Congress has told me, 'We can send a man to the moon, but you can't figure out this?' And my response is, 'Yes, this is far more difficult than rocket science.' " The problem, as CDC epidemiologist Drue Barrett politely says, is that members of Congress sometimes "lack understanding of the scientific process."

Nor do most scientists have much faith in the "breakthroughs" politicians promote. In 1996, Congress decided to bypass the peer-review process set up by DOD and the VA and directly award $3.4 million to Edward Hyman, an independent researcher who claims to have a cure for Gulf War illness. But his theory has met with widespread skepticism, and his trial hasn't resulted in a published paper yet (see sidebar on p. 814). "It discourages good investigators when they see policy-makers pressured into funding [non–peer-reviewed] studies," says Gray.

Many scientists are equally wary of another independent researcher whom Shays and others have endorsed. Pamela Asa, an immunologist from Memphis, argues that anthrax vaccines used in the Gulf may have made soldiers sick because they contain a fatty compound called squalene, which Asa thinks can trigger autoimmune diseases. There's no proof that the vaccines used in the Gulf contained squalene, and the Pentagon emphatically denies they did; nor is there solid evidence that squalene, a precursor to cholesterol that's ubiquitous in the human body, causes autoimmune diseases. But Asa's theory entered the spotlight after a long story in *Vanity Fair* in 1999; last year, she published a paper in *Experimental and Molecular Pathology* showing that more than 95% of a group of 38 sick veterans had antibodies to squalene, while none of 12 healthy controls did. "I want you to translate that into a treatment," Shays demanded of the scientific panel last year.

The IOM panel blasted Asa's paper for methodological flaws; Carl Alving, a researcher at the Walter Reed Army Institute of Research in Silver Spring, Maryland, calls it "egregious." Even so, Alving is now studying the issue, because veterans and politicians have shown an interest in it. "Congress charged the Army to do it, so what the heck, I'll do it," he says. And although he thinks Asa's work is flawed, antibodies to lipids happen to be Alving's specialty, and he suspects he may learn something interesting.

Political pressure also explains why the VA is currently conducting a large, multimillion-dollar clinical trial based on a theory many scientists consider questionable at best. Garth Nicholson, director of the private Institute for Molecular Medicine in Huntington Beach, California, claims that health problems in many vets may be caused by a relatively obscure microorganism called *Mycoplasma fermentans*. Nicholson's tests have shown that as many as half of all ill veterans are infected with the bug, compared to only about 6% to 9% of a healthy control group. A 6- to 12-month treatment with an antibiotic called doxycycline can rid the body of the bug and make patients better, says Nicholson.

But it's not clear whether *M. fermentans* really causes disease; most researchers think it may be innocuous. Under normal circumstances, scientists wouldn't launch a trial if such key data were disputed. Scientifically, "it's the cart before the horse," says Kilpatrick. But in this case, the VA is spending $3.5 million to check it out. In the trial, 491 veterans across the country were given doxycycline or a placebo for a year. The results are expected later this year.

Although researchers may question some of the work in this broad and sometimes off-

No clear answer. RAND Corp. consultant Beatrice Goulomb summarizes the evidence on pyridostigmine bromide at a 1999 Pentagon press briefing.

Still fighting. Veterans like Kevin Shores are pushing for solutions to their health problems.

CREDITS: (TOP TO BOTTOM) DOUG MILLS/AP; TOM OLMSCHEID/AP

Restoring Faith in the Pentagon

If you attend a meeting about Gulf War illness, you can't miss Kirt Love and Venus Hammack. He's the big white guy and she's the slim African-American woman with the video camera in the back. Love and Hammack are always there, recording tape after tape; they even moved to a small town in Virginia (Hammack from Massachusetts, Love from Texas) to be closer to Washington, D.C., the epicenter of Gulf War illness policy. They've amassed a wealth of information on the war, and Love maintains a Web site that looks exactly like one operated by the Pentagon, "just to annoy the hell out of them." Military maps of the Iraqi desert adorn the walls of his office.

Like many other veterans, Love and Hammack—both ill after serving in the Gulf—have turned their anger into activism. And they're sure of one thing: The Department of Defense has no intention of letting the truth about Gulf War illness come out. Lots of information about potential exposures has remained secret, they contend, and instead of getting to the bottom of it, the Pentagon is pushing the theory that stress causes Gulf War illness. "It's a don't-look, don't-find policy," says Hammack.

"OSAGWI selectively ignored evidence ... and repeatedly showed ... an unwillingness to investigate leads."
—PSOB staffer William Taylor

"There was no fire wall between the oversight party and the party being under oversight."
—Board member Vinh Cam

They're not the only ones. Questions about the Pentagon's ability to objectively study Gulf War illness, especially among veterans, have dogged the department for years and spawned numerous conspiracy theories. Removing those doubts has proven difficult. Just 6 weeks ago, an independent panel established in part to restore trust published its final report, concluding that the Pentagon had worked "diligently ... to leave no stone unturned." But that friendly pat on the back was spoiled by nasty disputes among panel members and staff, some of whom charge that its review was flawed and anything but independent.

President Clinton established the Presidential Special Oversight Board (PSOB) in 1998 to review the Pentagon's Gulf War illness efforts. In particular, the seven-member board kept watch over the Office of the Special Assistant for Gulf War Illnesses (OSAGWI), which coordinates all Gulf War illness efforts at the Pentagon. One of OSAGWI's main tasks is to study possible exposures during the Gulf War, especially to chemical and biological warfare agents. It has, for instance, investigated many alleged incidents in which nerve gas might be involved.

From the outset, Gulf War vets criticized the PSOB, chaired by former Senator Warren Rudman (R–NH), for its close ties to the Pentagon. (Four of its seven members were retired military brass.) They also said the board was light on scientific expertise and questioned whether it would have the independence needed to take OSAGWI to task. Now, they claim that a resignation letter made public by the Gulf War Veterans Resource Center shows they were right. In the letter, dated 20 September 2000 and directed to panel chair Rudman, PSOB staff analyst William Taylor said he could no longer work for the PSOB because it was not taking its oversight job seriously. Rudman had proposed to give OSAGWI an "A for effort" in the final report, Taylor wrote, even though "OSAGWI's efforts fall short in nearly every conceivable way." But attempts to criticize OSAGWI were "squashed" by panel members, he wrote. (Roger Kaplan, PSOB's former deputy executive director, says that Taylor later offered his apologies to Rudman; in a letter that Kaplan made available, Taylor says he was "angry" at the time and offers to retract his original letter. Taylor, who now works at the Department of Health and Human Services, declined to comment.)

More conflicts surfaced when the report came out in December. In a strongly worded appendix, panel member Vinh Cam, an immunologist and consultant from Greenwich, Connecticut, charged that she had been left out of the loop while the report was written. She claims that a chapter about the importance of stress in Gulf War illness is "a blatant misrepresentation" of the board's discussions and was added at the last moment. She also attacked the cozy relationship between the panel and the office it was supposed to oversee. "At times, the PSOB acted more like an extension of OSAGWI," Cam wrote.

Her remarks were countered by a scalding rebuttal written by Rudman. Cam had been "aloof and uncommunicative" and "has no one to blame but herself for her isolation," he wrote in a second appendix to the report. He also criticized her expense accounts: "Dr. Cam accounted for 47.73% of all board member billings!," Rudman stated, before thanking all other members, who "provided far more extensive contributions at no or little cost to the taxpayer." Cam says there was nothing irregular about her expense reports.

The PSOB closed down 2 weeks ago. For veterans like Love and Hammack, the imbroglio feeds their suspicions that the PSOB's independent review was a whitewash. "All they had to do was approve of everything OSAGWI did," says Love. Most others involved in Gulf War illness—including OSAGWI chief of staff Michael Kilpatrick—declined to comment on the affair. But researchers privately acknowledge that the furor has been counterproductive, to say the least. "This just adds to the anxiety," says one insider. "It's sad, the way it has panned out." **–M.E.**

beat research portfolio, they say it does prove one thing: DOD and the VA are open to any theory. "The Pentagon really has pumped a lot of money in all kinds of directions, including some that many people don't think deserve it," says Gray.

Soldier's Heart

If the simple explanations for Gulf War illness are wrong, why do many vets feel ill? Although they don't claim to know the exact answer, some researchers believe these problems may have little to do with anything specific in the Gulf and everything to do with war itself.

After almost every major armed conflict in recent history, formerly healthy soldiers have come back sick, says Craig Hyams of the Naval Medical Research Center in Silver Spring, Maryland. For a seminal 1996 paper in the *Annals of Internal Medicine*, Hyams dug up more than 100 medical studies of veterans' health after a series of wars. Comparing them was difficult, because medical knowledge and traditions have changed, and doctors gave each syndrome a different moniker.

After the Civil War, for instance, many soldiers were diagnosed with a condition called "irritable heart," or Soldier's Heart,

Déjà vu. Many armed conflicts, including the Vietnam War, caused chronic ill health among veterans.

CREDIT: PFC L. PAUL EPLEY/AP PHOTO

Same syndrome? A 1992 plane crash in Amsterdam sparked a wave of health complaints similar to those of Gulf War veterans.

which some claimed was caused by the straps of heavy backpacks that compressed muscles, nerves, and vessels around the heart. During World War I, many became ill with "effort syndrome" (so-called because it was exacerbated by exercise) and "shell shock," a phenomenon attributed to tremors from nearby explosions or to the stress of the horrific battles. The Vietnam War produced post-traumatic stress disorder and Agent Orange syndrome.

Despite the different names, symptoms such as fatigue, shortness of breath, headaches, sleep disturbances, and memory and concentration loss characterized each postwar syndrome. And in several cases—not just following the Gulf War—these health problems sparked exhaustive but ultimately frustrating scientific efforts to find a cause.

Perhaps it doesn't even take a war: Several Gulf War researchers have taken a keen interest in the aftermath of a 1992 plane crash in Amsterdam. After an El Al Boeing 747 plowed into a 10-story suburban apartment building there—killing the crew of four as well as 39 residents—hundreds of neighborhood residents, rescue workers, and others involved in the crash started complaining about a variety of health problems that were, again, strikingly similar to Gulf War illness. (So were the alleged culprits: The plane had contained depleted uranium as ballast—as many jumbos do—and the cargo was later revealed to have contained a chemical precursor to the nerve gas sarin.) "You can get these syndromes anytime you have horrific events, unknown exposures, and a large enough population," says Hyams, who believes "Balkan War syndrome" is just the latest manifestation of the same phenomenon.

Not that labeling Gulf War illness as a postwar syndrome like any other makes it suddenly comprehensible. Scientists still don't know how psychological stress, perhaps combined with physiological discomfort, can produce chronic ill health. Personality is probably a factor, says DOD's Kilpatrick. Adds Stephen Hunt, a doctor who treats Gulf War vets at the VA's medical center in Seattle, "One of the problems is that traditional biomedicine has a dualistic approach. It's either physical or psychological. What we're running into here is that the two can't be separated."

Nonetheless, the similarities with chronic fatigue syndrome and fibromyalgia do offer some clues about how Gulf War illness might be treated. Recent studies have shown that frequent, light physical exercise can diminish symptoms of those diseases; so can cognitive-behavioral therapy, in which patients learn how to minimize the impact of their illness on their lives. Several VA centers now offer veterans a program that encompasses elements of both. And in the second large treatment trial currently under way, the VA is spending $7.55 million to determine whether exercise, cognitive-behavioral therapy, or a combination of both is helpful in a group of almost 1100 Gulf War veterans.

Meanwhile, the military is also pondering how to be better prepared for the aftermath of the next war. Already, teams that help control combat stress, prevent disease, and survey environmental hazards have become routine during deployments, says Hyams. The Pentagon also says it is improving its medical record-keeping so that next time, officials can better determine who was exposed to what. And it's developing a system to keep an electronic record of every soldier's health from enlistment until death. Such a database should enable DOD to determine quickly and decisively whether a certain group of soldiers suffers excessively from a certain disease, says Hyams.

Although such measures may circumvent much of the uncertainty after a war, they may not be able to prevent the health complaints in the first place. "When you send young people to fight, they're going to come back with injuries other than their legs blown off," says Wessely. "It's just another part of the cost of war." **–MARTIN ENSERINK**

CREDITS: (TOP TO BOTTOM) AP; KUMIKO OGOSHI

ACADEMIC HARASSMENT

Women Faculty Battle Japan's Koza System

After a hollow court victory, a Japanese researcher steps up her fight to improve conditions in academia

TOKYO—For most people, winning a court case is the end of the battle. But for Kumiko Ogoshi it was just another round in her fight against discrimination and harassment in Japanese universities, a problem that many women faculty members say has marginalized them at institutions throughout the country. And victory seems far away.

Last fall, Ogoshi, a research associate at Nara Medical University, made Japanese legal history when a district court found her supervising professor guilty of harassing her in an attempt to get her to quit (*Science*, 27 October 2000, p. 687). The court ordered Nara Prefecture, which runs the school, to pay $5000 in compensation. But the verdict didn't have the impact that she had hoped. "There was no reflection [by university authorities] upon the significance of the court ruling," she says. "They filed their appeal the next day, and they seem to think they can just go on as they always have."

Speaking up. Kumiko Ogoshi has a Web site for faculty members to share their experiences.

Hoping to prevent that from happening, Ogoshi and a small band of supporters are setting up a nonprofit organization to tackle what is called, in shorthand, "akahara." In its broadest sense, academic harassment is not sexual in nature but covers abuses of power by senior professors against junior faculty members as well as more subtle forms of discrimination that have kept women from moving up the academic ladder. The root of the problem is the hierarchical structure of research groups, in which professors hold near-absolute power. Ogoshi and her supporters ac-