Cold Fusion: Only the Grin Remains

A year and a half after the original report of "fusion in a jar," a few dogged researchers are still hoping to confirm the existence of a low-level, neutron-producing nuclear process

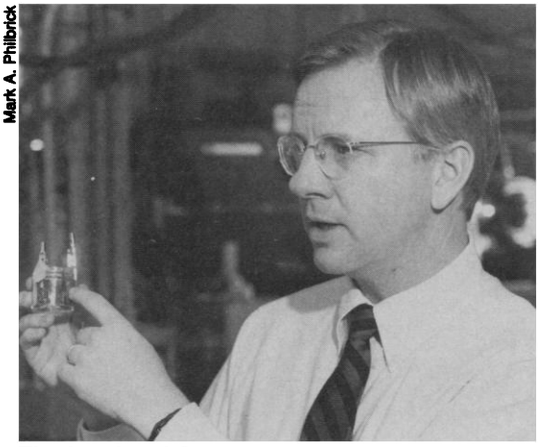
"All right," said the [Chesire] Cat; and this time it vanished quite slowly, beginning with the end of the tail and ending with the grin, which remained some time after the rest of it had gone."—Lewis Carroll, ***Alice's Adventures in Wonderland.***

LIKE THE CHESIRE CAT, COLD FUSION HAS slowly faded away. First to go was the vision of cheap, virtually inexhaustible power from sea water; next went the more modest claim that "fusion cells" were producing more heat than could be explained by known physical processes; and then accounts of excess tritium turned out to have a mundane explanation. But one part of the cold fusion cat has stubbornly remained—call it the "grin." Researchers at a number of labs around the world continue to report evidence of neutrons, albeit at a very low level. If they are correct, their work would signal the presence of some unknown nuclear phenomenon. Then, some of these die-hards believe, they—not the skeptics—will have not merely the grin but the last laugh.

From 22 to 24 October, 160 scientists met at Brigham Young University in Provo, Utah, to discuss the nuclear evidence. Although no dramatic new findings supporting cold fusion appeared, two salient points became clear. First, there is now a community of researchers who are unwilling to give up the search for proof that cold fusion is indeed a new nuclear phenomenon, and second, these researchers would like very much to distance themselves from the rest of the cold fusion field.

"All we're trying to say is that this is a legitimate field with a lot of evidence, and we'd appreciate it if people wouldn't associate us with Pons and Fleischmann," says Steven Jones, the organizer of the Brigham Young conference. Stanley Pons and Martin Fleischmann are, of course, the two chemists from the University of Utah in Salt Lake City who started the cold fusion brouhaha last year by claiming that a test tube nuclear reaction could produce enough excess heat to be a viable source of commercial power. But Jones had been independently studying the same sort of electrochemical cells with heavy water and palladium electrodes, and his work—which was reported contemporaneously with that of Pons and Fleischmann but got a tiny fraction of the news ink—is quite different from that of University of Utah team, both in style and substance. For instance, while Pons and Fleischmann made ample use of the popular media to describe their scientific claims, Jones kept a low profile. He submitted his work to a peer-reviewed journal and ultimately saw it published in *Nature*. (Pons and Fleischmann withdrew their work from the same journal saying they were too busy to answer reviewers' questions.)

More to the point, Jones' results may be scientifically unrelated to those of his cross-state rivals. Pons and Fleischmann claimed to find more heat produced by the cells than could be explained chemically and took this as indirect proof that room-temperature fusion was taking place. Jones, on the other hand, recorded small amounts of neutrons coming from his cells—direct evidence of nuclear reactions.



Mark A. Philbrick

The last laugh? *Or will Steven Jones' neutron results vanish like the rest of cold fusion?*

Hundreds of efforts to replicate the excess heat that Pons and Fleischmann saw have produced only a few partial successes, and many researchers now believe that the often strange heat readings in fusion cells are caused by some electrochemical phenomenon. The high levels of tritium that created excitement in fall 1989 now appear to have been the result of contamination in the palladium electrodes (*Science*, 15 June, p. 1301). That leaves the claims of low-level neutron production as the only part of cold fusion still visible, and like the grin on the Chesire Cat, this area shows signs of lingering long after the rest has gone.

The Brigham Young meeting heard a dozen researchers from labs in the United States, Italy, China, Japan, the Soviet Union, and Argentina report variations on Jones' original results. A group at Japan's Matsushita Electric Industrial Company, for example, used electrolytic cells similar to those of Jones (and Pons and Fleischmann) but with pulsed instead of steady currents. Several teams, including one headed by Howard Menlove at Los Alamos National Laboratory, continue to see neutrons when containers of deuterium gas and palladium or titanium metal are heated and cooled. Many of the techniques are not new, but the researchers claim that they have improved their abilities to distinguish genuine neutrons from spurious signals in their detectors.

One new twist did appear at the meeting, however. Researchers at both the Naval Research Laboratory and the Colorado School of Mines said his group has seen charged particles emitted from cold fusion cells. David Beddingfield, one of the Colorado researchers, said they have seen bursts of thousands of charged particles, which might be tritium ions. However, Kevin Wolf at Texas A&M said he had tried and failed to replicate these results.

The results were provocative to at least one meeting participant who paints himself as a cold fusion skeptic. "The evidence presented there made me think that possibly there may be bursts of neutrons," says Walter Meyerhof, a Stanford physicist. "I think there's a possibility that it's real."

A second skeptical observer was less impressed, however. Douglas Morrison, a physicist at CERN who has followed cold fusion closely since its start, said the meeting was "interesting, but there was nothing that changed my opinion that the negative evidence is stronger." His conclusion about why it's taking so long for some scientists to give up: "It's normal pathological science."

Cold Fusion Follies

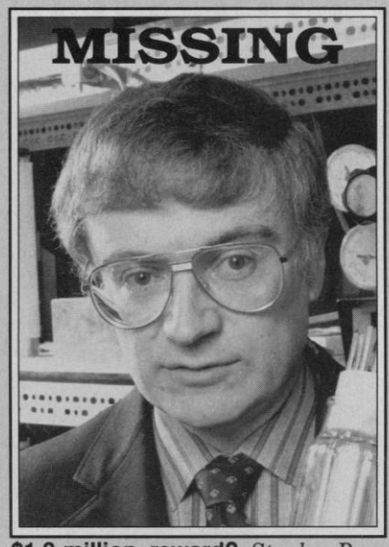
In Salt Lake City, the cold fusion saga took yet another unexpected twist late last month. What started as high drama is turning into madcap comedy, though some scientists in the audience don't know whether to laugh or cry.

The latest surprise came as Utah's Fusion/Energy Advisory Council was preparing to meet on 25 October. The council, which oversees the state-funded National Cold Fusion Institute, was expecting either University of Utah chemist Stanley Pons or his colleague Martin Fleischmann to present recent data and convince the panel to release the final $1.3-million installment of the $4.5 million granted to the institute. Fleischmann, however, was at home in Southampton, England, receiving medical treatment, and 2 days before the scheduled meeting, the local newspapers discovered that Pons was missing. His phone had been disconnected and his home was up for sale. Friends and neighbors said they thought he had taken his family to France—either Nice or Paris, but no one was too sure.

Pons' employer, the University of Utah, didn't know much more. According to Hugo Rossi, dean of the College of Science, Pons wrote chemistry department head Peter Stang a month ago to say that he had arranged for someone else to teach his classes and that he would be away the rest of the quarter. Then on 24 October, the day before the advisory panel was to meet, Stang got a fax from Pons' lawyer, C. Gary Triggs. The one-sentence transmission, signed by Pons and sent from Triggs' office in North Carolina, requested a sabbatical beginning 15 November. Stang and Rossi responded by fax to Triggs, saying they would need more details of Pons' plans before granting his request. As *Science* went to press, they had not heard back from him.

One person did manage to get hold of Pons—again through his lawyer. Utah Assistant Attorney General Joseph Tesch called Triggs, who set up a conference call with Pons. Pons promised to be in Salt Lake City on 7 November for an independent scientific review of the cold fusion institute. The state-chartered advisory council will meet the following day to mull over continuing the support of the institute.

Although Pons has never freely shared details of his cold fusion experiments with fellow scientists—to protect patent rights, he explains—he is now virtually incommunicado. "[Going through his lawyer] seems to be the only route to contact him," Rossi says, adding that since June his only contact with Pons has been second-hand through the National Cold Fusion Institute. But even institute director Fritz Will has communications problem with Utah's best-known scientist. Pons has informed him, Will says, that he will answer certain scientific questions only through his lawyer. Since Will won't hold scientific discourse through an attorney, he just doesn't get those details, he says. Who does Pons talk to? "I would presume he talks to his son," Will says. (Pons' son is a Utah student working under Pons at the institute and is apparently now in France with his father.) "He gives the necessary instructions to the [five other] people in his group." However, Pons has ordered those co-workers not to talk to anybody else about their work.



$1.3-million reward? *Stanley Pons failed to appear at a meeting of the committee that will determine future funding of cold fusion in Utah.*

Pons' disappearing act is just the latest in a bizarre series of twists and turns surrounding cold fusion at Utah. In April, Triggs wrote a letter to University of Utah physicist Michael Salamon demanding that he retract a scientific paper that cast doubt on some of Pons' cold fusion claims and threatening legal action to protect Pons' "interests in this matter." Salamon had reported in *Nature* that he had kept detectors around one of Pons' cold fusion cells for several weeks and that he had found absolutely no sign of nuclear activity; Pons had said the same cell had produced excess heat at one point during that period. Pons and Triggs later backed away from their threat after the tactic created an uproar among scientists.

Then in June, a Salt Lake City newspaper reported that an "anonymous" $500,000 donation to the National Cold Fusion Institute had actually come from a research fund at the financially strapped University of Utah. University president Chase Peterson, who had arranged the gift, agreed to step down at the end of the 1990–91 academic year after outraged faculty members demanded his resignation.

As one scientist said, if a Hollywood writer had produced this script, it would be rejected for being too unrealistic. ■ **R.P.**

For instance, during the investigation of the illusory polywater in the early 1970s, some researchers continued to study it long after most of their peers had decided the results were more likely due to contamination than a novel phenomenon.

What drives researchers to keep going in the face of disbelief and often ridicule from other scientists? Many researchers, like Wolf at Texas A&M, remain skeptical but just can't seem to let go as long as they see some effects that they can't explain with normal science. "It's an interesting physical phenomenon," he says. "Early on, we had a cell that produced neutrons one time," and that got him started. More than a year later, Wolf still detects more neutrons coming from his cells than he can explain, but not enough to convince him that he is seeing some new nuclear process and not just some aberration in his measurements. But he says he "went through all the grief of setting up the experiments," and now he has too much invested in the cold fusion field to drop out just yet.

Jones is also unwilling to throw in the towel. "I've had a lot of ridicule. So what? What's the job of a scientist?" To Jones, a scientist cannot drop an interesting line of inquiry simply because of worries about his reputation. "I don't think I'm going to get any prizes for this, but knowledge is a worthwhile goal."

There are enough researchers who feel like Wolf or Jones to have convinced the Electric Power Research Institute to fund this conference, and now Jones says they are planning to make it an annual affair. Next year's edition will be held in Italy, he says. Perhaps by then the cold fusion cat will have vanished, or perhaps the grin will have gotten wider. ■ **ROBERT POOL**