

A Fascinating Review of the Emerging Science of LENRs

by George H. Miley

The Science of Low Energy Nuclear Reaction: A Comprehensive Compilation of Evidence and Explanations about Cold Fusion

Edmund Storms

London: World Scientific, 2008

Hardcover, 340 pp., \$85.00 (www.worldscientific.com/physics/6425.html)

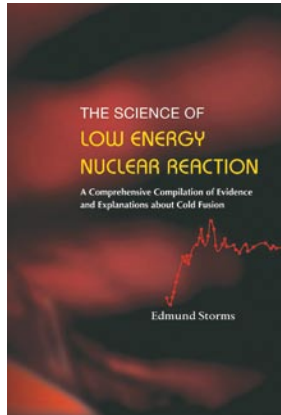
World Scientific's advertisement for this book explains that, "One of the most important discoveries of this century—cold fusion—was summarily rejected by science and the media before sufficient evidence had been accumulated to make a rational judgment possible. Enough evidence is now available to show that this rejection was wrong and that the discovery of a new source of clean energy may help solve some serious problems currently facing mankind. The book catalogues and evaluates this evidence and shows why the initial reaction was driven more by self-interest than fact."

This very astounding summary provides a powerful inducement for anyone with any scientific curiosity to read Dr. Storms's new book.

As this ad and the subtitle of the book make clear, this book is about cold fusion. However, experiments over recent years have shown that nuclear reactions such as transmutations can also occur in loaded solids, so the broader term, "Low Energy Nuclear Reactions" or LENRs, is used in the main title. I too prefer the term LENR, since it best encompasses the field.

I am pleased to serve as a reviewer. I have worked in this field ever since the dramatic press announcement of fusion in a test tube by Pons and Fleischmann almost 20 years ago. Still by reading the book I gained new scientific insight, as well as new views of some of the bizarre behavior of individuals, scientists, journalists, reporters, governmental organizations, and companies that started soon after the 1989 press announcement, and has continued up to today.

Why has this happened? I can only



conclude that when a new discovery with such high stakes comes about, greed and self interests unfortunately take front stage.

An Amazing Range of Data

From the title, I had anticipated that this book was a textbook. However, it is



Courtesy of Edmund Storms

A calorimeter for use in LENR, constructed by Edmund Storms. A DieHard® battery, lower right, that serves as an uninterruptible power supply; a power failure can ruin an experiment.

something quite different. Indeed, it is difficult, if not impossible, to prepare a text for a field which is "still emerging," to the extent that the reader is asked to form an opinion about its validity. Indeed, the book brings out many scientific facts and insights supported by one of the most extensive bibliographies of the field available anywhere (78 pages, roughly one-quarter of the book, covering 1,070 citations).

In the preface, the author sets as his goal to show that agreement exists among many well documented studies, thus convincing the reader of the validity of the field. In the process, the book provides data about an amazingly wide range of experiments that have been performed worldwide. In view of this wealth of information, I enthusiastically recommend this book to workers in the field, and anyone else who has an interest in cold fusion, i.e. LENR—plus those who just have a scientific curiosity.

After a brief historical review, Dr. Storms moves on in Chapter 3 to describe his personal experiences in cold fusion studies, mainly involving tritium production in LENRs at the Los Alamos National Laboratory. He ends that chapter with a description of a wider range of experiments that he has been carrying out in his own well-equipped laboratory in Santa Fe, after his retirement from Los Alamos.

These studies are very interesting and provide important background about the history of the field, as well as insight about how to run experiments, measure reaction products like tritium, prepare electrodes, measure energy flows with calorimetry, and so on. Dr. Storms concludes the discussion by stating that, "Nature has seemed content to give just enough encouragement to keep a person interested without allowing the effect to be understood."

The next chapters deal with: what is known or believed (including myths about cold fusion); and where reactions occur, and what influences their behavior. Those chapters lead into the next, which discuss

possible reaction-initiating conditions, for example, laser simulation, and detection methods.

These chapters are extremely instructive about the LENR phenomenon. Yet, it is made clear that we still do not fully understand this phenomenon.

The Nuclear Reactive Environment

For example, Dr. Storms continually talks about reactions occurring in a Nuclear Reactive Environment (NRE), presumably a localized region or regions created on an electrode surface. While much evidence is presented for the existence of NRE states, there is not a prescription for creating one at will. Nor is it quite clear what the Nuclear Reactive Environment state consists of.

For example, in some cases, impurities plating out on non-reactive platinum electrodes seem to produce such states. However, it is made clear that NRE states are created in a variety of ways that, as of yet, cannot be purposely designed into the experimental procedure in advance. Thus the author lays down a gauntlet for the researcher to define and learn how to cause and control these NREs.

Dr. Storms defends such ambiguities in the field by summarizing: "Rather than going away, as 'pathological' observations are said to do, the evidence is only growing stronger." Gaining an understanding of the Nuclear Reactive Environment in LENRs represents a key next step needed for this emerging field to move ahead.

The next chapter, titled "Explanations, the Hopes and Dreams of Theoreticians," may be one of the more provocative ones, especially for theoreticians in the field. It briefly outlines a number of proposed theories and notes the author's concerns about each. These concerns are then nicely condensed into a section titled "Limitations to Theory." There the author raises four overarching limitations for LENR theories in general, stating that these must be addressed in any "successful" theory.

The initial discussion of individual theories appears, on the surface, to be quite confrontational. While the author's criticisms are clearly developed with much thought, the scientists proposing the theo-



Dan Chicea

High school student Corissa Lee and Prof. John Dash, of Portland State University, with a cold fusion electrolytic experiment that demonstrated excess heat. Dash runs a summer internship program for high school students in cold fusion.

ries did not have an opportunity to respond prior to publication of the book. Indeed, prior attempts to discuss limitations of the various theories in conferences and on websites have generally failed to reach any conclusions. Thus, the discussion may appear to pass judgment prematurely.

Still, the issues raised are good ones and the chapter serves its purpose. As stated by the author, "Hopefully, the summary of observations provided here combined with the Limitations listed ... will help the effort [to develop a fundamental theory]."

Two brief closing chapters provide a "summary" along with comments on "what should happen next." In that respect, it is stated that, "The cold fusion saga has revealed serious flaws in the way science and the media, both popular and scientific, handle new ideas." This book certainly provides ample examples backing up this assertion. But the reader focussed on learning science may become impatient with this discussion of people and events. It does emphasize, however, how science and the personalities involved often become so intimately intertwined that they are almost inseparable.

In closing, Dr. Storms emotionally states: "Surely these [... exhaustion of oil fields and global warming] are sufficient reasons to explore a new source of energy no matter how difficult it is to understand. Future generations will have little sympathy for a society that allowed these condi-

tions to become worse when a better alternative might have been available, but was ignored." The implication, left to the reader to decide, is that the data presented in the book are ample evidence to conclude that cold fusion is a "better alternative."

Breadth and Depth of Coverage

One might ask if this book does a better job of convincing and explaining cold fusion than do the more than half-dozen earlier books, plus the many conference papers in the field.

First, with so many skeptics among the mainstream scientists saying that the field does not even exist, it seems amazing to have so many books in print. Most, though,

are nontechnical, intended to review the history and politics of this turbulent saga. Only recently, two researchers, Dr. T. Mizuno and Dr. H. Kozima published books (Infinite Energy Press, 1998, and Elsevier Scientific, 2006, respectively) that focus on the science over history and politics. Both authors, however, come at the subject with some biases that have grown out of their own research (but still, these books too should be read by anyone serious about the field).

While Dr. Storms devotes a whole chapter to his own research history, he also provides amazing breadth and depth of coverage of the field beyond that. His views are insightful, although at times controversial. He is not afraid to bring in subjects sometimes thought to be taboo (even by cold fusion researchers), such as the role of hydrinos in reactions and biological cold fusion. Some colleagues have even stated that the inclusion of these subjects might drive readers away from the book. To the contrary, I believe this will demonstrate to the reader that Dr. Storms tries to follow his own logic regardless of where it leads.

In conclusion, it seems appropriate to return to the author's stated goal of this book to convince the reader that the data available show that LENR is real. Certainly we cannot ignore the massive number of observations cited. Something must be happening! However, the question of re-

producibility comes back to haunt us, in terms of what is meant by “reproducibility.” Dr. Storms cites many experiments in different labs that report positive results within the various classes of phenomena attributed to LENR—for example, excess heat, tritium, radiation emission, etc. But, the reproductions in different labs use different techniques, and what is observed usually varies over wide ranges. Further, differences are frequently observed from one experiment to another within the same laboratory. Thus, the reader who expects to be shown a single experiment which has been precisely replicated in several laboratories around the world will be disappointed.

It must be recognized that this picture has been improving, however, as experimentalists learn more about what the crucial parameters requiring control are and how to measure them. For example, many early experiments were done in haste without even measuring the loading obtained, so it is not surprising to see variable results without any clues about why this may have happened. Consequently, the question of proving LENR is real remains for one’s interpretation of the vast amount of data (facts) gathered over the past 20 years.

Indeed, this book is the best source to date for providing the facts that must be mulled over by anyone wrestling with this issue. By doing this, it provides a much

needed unifying insight to this struggling, but emerging, field.

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The Vision, Determination, and Science to Feed the World

by Gregory Murphy

The Man Who Fed the World: Nobel Peace Prize Laureate Norman Borlaug and His Battle to End World Hunger, an Authorized Biography

by Leon Hesser

Dallas: Durban House Publishing, 2006
Hardcover, 297 pp., \$24.95

This biography of Dr. Norman Borlaug by a friend and agricultural colleague captures the high points and the struggles of Borlaug in his leadership of the wheat program that was set up in Mexico in 1944. The book also highlights Borlaug’s efforts to build an international grouping of institutions for research and training of agricultural scientists that would provide the research and manpower needed for what was called the “Green Revolution” in India and Pakistan. In all, it is refreshing in outlook and conveys the excitement and passion of Borlaug to use his science to feed the world.

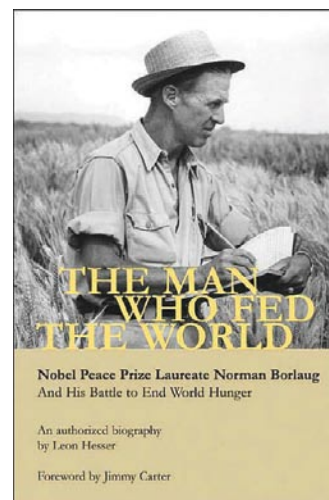
The real story of the book is about how human creativity and scientific progress can solve any problems that arise. The reader will gain a sense of optimism in the face of great challenges, such as fighting world hunger. As the world today is in the greatest financial meltdown in human history and a great crisis in food produc-

tion—caused in part by speculation and the cutting of funds to agricultural research—we need the optimism that Borlaug’s work demonstrates, to give us the hope of finding solutions to our current problems and to the new challenges that we will have to face in the future.

Wheat in Mexico

The wheat program in Mexico was a result of the vision of Henry Wallace, President Franklin Roosevelt’s Vice President. Wallace had the uncanny ability to see beyond the hunger problem in Mexico and envision a future made brighter by focused agricultural research. He envisioned a program that centered on developing technologies for producing more and better food that would guarantee adequate food supplies for all peoples of the world.

With this vision in mind, Wallace approached the Rockefeller Foundation with the idea of setting up a wheat program in Mexico. The Mexican government welcomed the idea, and the Mexican Government-Rockefeller Foundation Cooperative Agricultural Program was then created. This was the first U.S. agricultural assistance program. Mind you that this was being done while the world was at war.



In 1944, Dr. Norman Borlaug, then 30, was recruited to the program by Wallace and Rockefeller Foundation president George Harrar, at the recommendation of the renowned plant biologist E.C. Starkman, who said that Borlaug was the perfect choice to be the program’s plant pathologist because he had shown a keen interest in plant diseases and would not be defeated by difficulties.

He “burns with missionary zeal,” Starkman said.

In the early field trials, Borlaug had the idea of having two planting seasons, one in southern Mexico and another in northern Mexico. When he presented this idea to the Rockefeller Foundation board of directors, there was a lot of resistance to the idea. Even the former head of the wheat program in Mexico said that it would not work—that it had already been considered and rejected because it was deemed that it would fail.