

# FUSIONfacts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

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*Fusion Facts* Now Reports on Both Cold Fusion and Other Enhanced Energy Devices.

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***JOURNAL OF NEW ENERGY***

Volume 2 now available

## A. ARTICLES

### HYDROSONIC POWER GENERATION

Dr. Harold Aspden

In view of the recent flurry of interest in sonoluminescence, thanks to C. Eberlein, *Physical Review Letters*, vol 76, pp 3842-45, (1996), we find that not only the journal *Nature* vol 381, pp 736-7, 27 June 1996, but other news media are referring to **Casimir forces** and **zero-point energy** and are now even suggesting that there really is a mysterious vacuum energy source which deserves our attention. It appears that a bubble of water expanding and contracting at about 25 kHz will emit light in time with the sound pulses.

Now I am not at all convinced that pointing the finger at **Casimir forces** is a sufficient solution to the mystery. As I see it, **Casimir forces** evidence the existence of an underlying energy activity in the microcosmic field environment, but I cannot relate that to the prospect of generating power. To me, that activity is a kind of aether noise that exists just as tidal motion ripples in the sea. Yet we do not sit by the sea shore with buckets to tap its energy activity by collecting water lifted to a higher energy potential by the surging motion of the sea.

The sonoluminescent light pulses last less than 50 picoseconds and they imply the sudden release of energy concentrated at pinpoint sources of high temperature. This has to be an electrical effect and, given that I have explained several anomalous energy phenomena by my vacuum spin theory, it is logical to interpret sonoluminescence in the same way. My theory explains why aether energy is shed by the setting up of an electric

field radially directed from a point center or from an axis of spin, optimally aligned with the preferred spin direction of local space. Incidentally, space magnetic anisotropy, meaning a preferred spin direction in the aether, has been discovered experimentally by Yu A. Baurov, et al., *Physics Letters*, vol A162, pp 32-34, (1992) and vol A181, pp 283-88, (1993) and Baurov now claims to have built a power generator which runs on **physical vacuum energy** with an excess power gain of 0.5 kW.

In the case of sonoluminescence in water each air bubble provides a focal point for radial compression as water under pulsating pressure converges on that point. Water is partially dissociated into positive hydronium ions and negative hydroxyl ions, the latter having the lower mass. Therefore, the pressure pulse will displace the negative ions towards the center of the air bubble at a faster rate than the more sluggish positive ions. Here is the process setting up the radial electric field. What then happens is that the aether responds by spinning to set up its own compensating electrical displacement but, owing to a phase-lock condition prevailing in its energy system, it asserts forces which augment the energy stored by that displacement of ionic charge. In effect, for every unit of energy put in by the sonic pressure another unit of energy is provided by the reacting aether spin state.

In physics as applied to linear harmonic systems there is equipartition of energy as between dynamic motion and static potential. In the sonoluminescent activity the sonic pulsations input energy stored by the electrostatic displacement and the aether adds the dynamic vacuum spin energy. This action hold the displaced charge in a quasi-stable state so that when the sonic pressure relaxes the hydronium and hydroxyl ions are driven again towards the focal point in that air bubble and separate further to increase the radial electric field. The cycle then repeats as field and the compensating aether charge displacement increase whilst the vacuum spin builds. This is a pumping action that occurs at the 25,000 Hz sonic frequency as more and more energy is tapped from the aether.

However, there is a limit because the aether sphere in spin builds up in radius with the increase of energy. **Periodically, at moments when the inward pressure pulses are occurring, the aether spins of two adjacent bubbles will crash as their surfaces come into contact.** This initiates what is, effectively, the discharge of a charged capacitor and I see that as the feature that may well account for the luminescence.

The practical implication is that ionized water containing small air bubbles subjected to sonic frequency pressure pulsations will exhibit anomalous energy properties, and deliver up to twice as much heat as the energy consumed. Another such implication is that the radial electric field pulsations can cause more of the water to dissociate naturally, perhaps even cooling the water if set up with electric power input rather than by pressure pulsation. **That effect gives scope for separating hydrogen and oxygen from water to provide a combustible product of higher energy potential than the electric input consumed.**

In these circumstances I suggest that the physics of the several known phenomena we can relate to the above is a lot easier to understand than the theory of **Casimir forces**. My new book, [Aether Science Papers](#), gives the full account of the physics scientists will need to study if they are to make sense of this new-energy source. (A review of Dr. Aspden's new book is presented in this issue of the newsletter. Cost and ordering information is also provided.)

[Readers invited to respond to Dr. Aspden's [Aether Spin Theory](#) with supporting or contrary experimental data. Ed.]

## PIONS AND THE NEW ENERGY SCENE

Dr. Harold Aspden

Having read Mark Goldes' story about the research of Robert L. Carroll (*New Energy News*, July 1996, pp 13-15), and having seen an advance copy of my new book [Aether Science Papers](#), a colleague sought my reaction. He could see there is a parallel connection. I too, have had "a lifelong argument with relativity theory" and that "is one reason why my work has been largely ignored". That is what my new book is all about, plus predicting why antigravitation is on the horizon as an aftermath to the exploitation of the new energy resource. I even point to the connection with the neutral pion and very much more.

My book is aimed at presenting the physics underlying the **free energy resource** as a preliminary to my next work, with will present the technological details of my research aimed at tapping that resource. I explain in my book how protons are created in space as if from nowhere, but I do not mention Robert A. Millikan's account of cosmic radiation, as exploited by Carroll. Rather than imagining proton-antiproton annihilation to create neutral pions and so shed energy in empty space, I see the aether as alive with muon pairs which combine to fuse into neutral pions as well as creating protons and electrons.

However, on the Millikan theme there are four items listed below that *Fusion Facts* readers will find of interest if I quote them from my copy of a 1935 book in the University of Chicago Science Series, Millikan's Electrons (+ and -), Protons, Photons, Neutrons and Cosmic rays. I note that these were early days to be writing about neutrons, days before our modern scientists carved their interpretation of nuclear structure in tablets of stone!

1. On page 207, after explaining on page 206 that a proton is **charged with one positive electron**: "In uranium, for example, since its atomic weight is 238, we know that there must be 238 positive electrons in its nucleus. But since its atomic number is but 92 it is obvious that  $(238-92=)$  146 of the 238 positive electrons in the nucleus must be neutralized by 146 negative electrons which are also within that nucleus. That these negative electrons are actually there within the nucleus is independently demonstrated by the facts of radioactivity, for in the radioactive process we find negative electrons, so called  $\beta$ -rays, actually being ejected from the nucleus."

**On this basis, Millikan would not have denied heat generation from cold fusion of deuterium owing to there being no neutron emission!**

2. On page 376, in **The Neutron** chapter: "By such an **artifice** one might be able to retain the conception of the electromagnetic origin of mass and with it Chadwick's conception of the neutron as a mere combination of a proton and a negative electron."

**The artifice was the assumption that under suitable conditions the proton could blow itself up into a free positive electron with the attendant release of energy accounting to the  $E = Mc^2$  formula.**

3. On page 377 this theme was developed to account for cosmic rays, which if confirmed as having the 500 MeV photon levels of energy "would merely be evidence in favor of the annihilation of hydrogen atoms throughout the heavens, and would decisively differentiate between the relative claims of the neutrons and the proton as primordial entities."

4. Millikan ends his book on pages 455-456 by reciting "the correct position of science" on the subject of whether the universe has regenerative energy properties as that of G.W. Lewis: "Thermodynamics gives no support to the assumption that the universe is running down. Gain in entropy always means loss of information and nothing more."

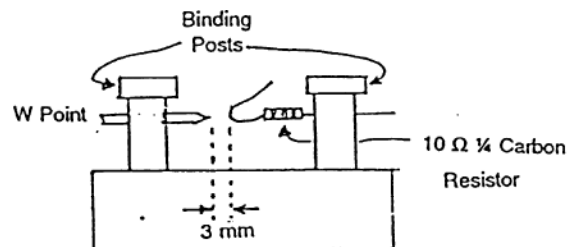
I conclude by noting that on the last page of my own book Modern Aether Science, I referred to a 1970 report of the problem of understanding the **kink or break** in the cosmic X-ray spectrum occurring at 20-40 keV which was said to correspond to the break at 2-5 GeV in the parent electron spectrum. These two energy ranges correspond to the muon and graviton energies that feature in my aether theory, but cosmic rays are not something we can harness to propel us into space. By extracting aether energy by the other methods now known to us we can exert force on the aether itself and take off from there. We can either develop a spin reaction or a linear thrust depending upon the methods we use. Mark Goldes account is an early chapter in this story.

## EXPLODING RESISTOR EXPERIMENT "8 cm Diameter Fireball"

Nicholas Reiter

In light of Dr. Samuel P. Faile's recent carbon resistor experiments, I attempted a duplication using a 15 kV DC supply, a tungsten electrode and a 0.5 uF capacitor assembly.

A 10  $\Omega$ , 1/4-Watt carbon resistor was mounted in the spark gap holder as shown below:



A three millimeter arc gap was set.

When the circuit was energized, the high voltage held off for perhaps 3 seconds, and then produced an arc.

The arc was accompanied by a loud bang (like a .38 calibre handgun or louder!) and an orange flaming fireball about 8 cm across. The effect was unnerving, to say the least.

The forward pointing wire lead of the resistor, and the body of the carbon resistor itself, were utterly disintegrated. Only a portion of the rear-ward wire remained. This

experiment was repeated three times with the same dramatic effect and identical results.

It seems as though the light, sound, and flame produced are anomalous in intensity in these tests. Would calorimetric analysis confirm this? Can the effect be enhanced even further by adding H<sub>2</sub>O or NH<sub>3</sub> to the resistor region?

## COLD FUSION & CONSUMING PALLADIUM

Hal Fox

Two recent papers by Bockris & Minevski [1] and by Mizuno, Ohmori, & Enyo [2] have announced an unexpected proliferation of nuclear reactions within the palladium cathode on the electrolysis of palladium in heavy water. A survey of four different groups working with light-water cold fusion electrochemical cells found that two of the four were observing similar and unexpected nuclear reactions.

Two important questions arise:

- ◆ Can cold fusion reactions be controlled so that the consuming of the palladium is avoided?
- ◆ Can the process be applied to other heavy metals such as found in radioactive wastes?

### CONSUMING PALLADIUM

If it were discovered that nuclear reactions in the typical Pons-Fleischmann type of cold fusion cell preferentially consumed the palladium by unexpected nuclear reactions, then it would appear to be an additional operational cost. The impact could be to increase the cost of the production of thermal energy in commercial cold fusion systems. One would like to design the cells so that the palladium served as a catalyst for thermal-producing nuclear reactions rather than having the palladium consumed in the process of producing thermal energy.

Due to the cost of palladium in either the Pons-Fleischmann type of cell or in the Patterson Power Cell™, the consumption of the palladium is to be avoided, if possible. It is hoped that this topic will be treated extensively in the forthcoming technical conferences.

### HEAVY-METAL NUCLEAR REACTIONS

In this bad news, good news scenario, it would be of great economic importance if the nuclear processes that appears to consume the palladium [1,2] could be applied to other

heavy metals. To indicate the importance of this possibility, the following table of data was obtained from a new book, Nuclear Wastes, Technologies for Separations and Transmutation [4]. The initial source is Boomer, et al. [3].

See Book Review by Hal Fox, page 12 for the **Table of Radioactive Nuclides in Tanks Stored at Hanford Site** (Some of the tanks are not leaking into the subsoil.)

In addition to the above isotopes, the tanks contain an estimated 830 kilograms of Thorium. A total volume of radioactive slurries is 78,000 cubic meters with a total mass of 120,000 metric tons. The amount of water is 110,000 metric tons.

In the recently completed study of the economics of providing a combination of chemical separation and transmutation [4] it was suggested that the expenses of **currently-known means for transmutation were not an economic alternative to geologic storage**. The currently-known methods for transmutation considered were subjecting selected isotopes to the high-neutron radiation of a specially-designed nuclear reactor or to bombardment by a high-energy beam device.

The costs of specially-designed reactors or high-energy beam devices range from \$2 to \$10 billion. Hopefully, the unexpected nuclear reactions reported [1,2] can become the basis for the scientific investigation of methods by which nuclear modifications of radioactive elements can be achieved.

The discovery or development of methods by which radioactive elements, especially heavy metals, can be stabilized by low-energy nuclear reactions has enormous potential both for humanitarian and economic rewards. For example, the cleanup of the radioactive wastes at the Hanford Site in the state of Washington is estimated at over \$50 billion. The estimated costs of packaging, transporting, and storing of spent fuel pellets from commercial nuclear power reactors is estimated at well over \$30 billion just for the United States nuclear power plants. From the humanitarian view, it is reported that only ten percent of the children of the Republic of Belarus are healthy. Ninety percent suffer modestly to severely from the radiation effects of the Chernobyl disaster. Whether for profit or humanitarian benefits, the amelioration of radioactive wastes is a compelling challenge.

## References

- [1] J. O'M. Bockris & Z. Minevski (Dept of Chem, Texas A&M), "Two Zones of 'Impurities' Observed After Prolonged Electrolysis of Deuterium on Palladium," *Infinite Energy*, Vol 1, No 6, 1996, pp 67-69, 8 refs, 3 figs, 2 tables.
- [2] T. Mizuno, T. Ohmori & M. Enyo, "Anomalous Isotopic Distribution in Palladium Cathode after Electrolysis", *Journal of New Energy*, Vol 1, No 2, June 1996, 5 figs, 17 refs.
- [3] Initial Source: Boomer, et al., "Tank Waste Technical Options Report. WHC-EP-0616. Richland, Wash. Westinghouse Hanford Co. 1994. Also printed with some typographic errors in reference [4].
- [4] Nuclear Wastes, Technologies for Separations and Transmutation, National Research Council, published by National Academy Press, Washington, D.C. 1996.

## THOMAS THE DOUBTER AND TODAY'S SCIENCE

Hal Fox

Thomas lived about two millennia ago. His close friend was crucified but later reported to have returned. Thomas declared that unless he saw the nail holes in his hands he would not believe. Thomas lives in our literature and our sayings as "Thomas the Doubter" and we apply this term to those whom we find it hard to convince.

As applied to science, when should we be doubters and when should we be believers? In science education, we are taught from books and from laboratory experiments in our undergraduate years. As we progress we go on to designing our own experiments and striving to gain new knowledge. As graduate students or as scientists we individually, collectively, and incrementally advance knowledge.

In our learning and in our doing, we have collected groups of scientific information that we categorize in terms of hypotheses, theories, facts, and even **laws**. We are taught that there is a basic foundation of science that we can depend on and that we can use to evaluate new information. Collectively, and many years ago, scientists adopted a working agreement that the **supernatural** would not be used to explain the **natural**. "The Devil made me do it," is not an acceptable explanation for a scientist.

About once a decade, an important new discovery is made that brings serious questions about the accuracy of some pieces of our almost universally-accepted scientific foundation. It may take a decade to get such a new discovery accepted, the foundations restructured, and the new explanation printed in college textbooks. This process of discovery, agonizing acceptance, and the rewriting of some pages or chapters of our physics (and chemistry) texts books is again lurking in the background.

The study of science is too vast and too complicated for students to question every statement from professor or text. **When should we, as students of nature, be acceptors of "received scientific knowledge" and when should we question our scientific models?** Some comments on this question follows.

First, we must be acquainted with and use the "scientific method." We must begin with scientific facts. (Definition: A scientific fact is the close agreement of a series of observations of the same phenomena.) From facts we build models of processes or events. We must remember that **no model is a complete explanation of physical reality**. From a succession of models, **hypotheses**, experiments, measurements, we refine the sequence until we have a close agreement between experimental evidence and predicted results. The next step is to graduate the hypothesis into a **theory**. [There is not a universal agreement about the difference between hypothesis and theory. Some use the words in an inverted sense. For this discussion, we quote and use the following selected definitions from Noah Webster. A **hypothesis** is a tentative assumption made in order to draw out and test its empirical consequences. A **theory** is a plausible or scientifically acceptable general principle or body of principles offered to explain phenomena. A **law** is a statement or an order or relation of phenomena that, so far as is known, is invariable under the given conditions.]

For an example, let's use the model of an atom. The sequence of historic learning has included the following models: An atom is the smallest indivisible part of matter. The atom is the smallest particle of an element that retains its identity. The atom contains a nucleus surrounded by electrons (like the earth-moon system). The electrons form in somewhat spherical (or even elliptical shells) around the nucleus. The nucleus is composed of neutrons and protons (a combined neutron plus electron) with a specific number to match the atomic weight and atomic number. The nucleus is indestructible. Some nuclei are unstable and break down into daughter elements. There is a **strong nuclear force** that in small distances exhibits stronger

attractive force than provided by the electric charge repulsive force. Only high-energy particles can cause a stable nucleus to fission. **This is about where we are in the college textbooks of the 1990s.**

**Please note the many changes that have occurred in the atomic model just in one long lifetime.** Should any of these models have been stubbornly defended against the onslaught of new evidence? The concept that a **known-to-be-stable element** could disintegrate and give out strange X-rays was hard for many scientists to accept. It took several years before the atomic model was changed to include **spontaneous fission.**

Currently there is strong evidence (so new that it has not experienced **a series of observations of the same phenomena**) that under special electrolytic processes, nuclear fission and fusion take place. The recent papers by Bockris & Minevski [1] and by Mizuno, et al.[2] (See Refs. in article "Cold Fusion & Consuming Palladium" pg 4-5) are two dramatic papers that report the first evidence of an extensive number of anomalous nuclear byproducts. These experiments are a continuation of over seven years of experiments with cold fusion (new hydrogen energy). Several new papers to be presented in the September 13-14, 1996 second Low-Energy Nuclear Reaction conference will provide additional dramatic evidence of anomalous nuclear reactions. **How should the scientific community respond?**

This author suggests that the scientific learning and experience of all scientists should be considered as an **impediment** to unusual new theories but not as an **impenetrable barrier.** An accumulation of scientific knowledge, **especially if proclaimed as a scientific law,** should be respected in the face of anomalous experimental evidence. However, when competent (or especially renowned) scientists present experimental data **and, especially, where the same or similar experimental data has been replicated,** it is time for careful re-evaluation. The scientific method does not include funding a science journalist to write a highly-biased book nor the use of professionally-accessible media sources to tout the book as evidence against a new scientific discovery. The discussions should be made either in scientific meetings or in appropriate scientific journals **where competent professionals examine all aspects of the experimental data.** It is too much to suggest that this discussion should be unemotional, but certainly spoken or written personal attacks on the integrity of members of either party are unprofessional.

If a non-scientist inventor makes an important new discovery that is obviously highly anomalous when viewed by current scientific models, what should the inventor do? This editor has been approached on several occasions by such inventors. The policy that has been followed is to investigate before rejecting. The next step is to help ensure that the scientific method is learned, adopted, and used in obtaining experimental data. If warranted, visits by one or more scientists have been arranged to evaluate the discovery and advise the inventor. Over the past several years this process has resulted in a few modest successes and one **fundamentally new and patentable major discovery.**

It is suggested to all scientists to be more reserved in either ignoring or condemning new discoveries, inventions, or experimental data. We should all play the role of "Thomas the Doubter," but within limits. There is time enough to be friendly and helpful to struggling students and inventors. If you are fortunate (as this editor has been) you might just have an opportunity to be involved in a major new scientific breakthrough. Two of the papers to be presented in the September 13-14, 1996 second Low-Energy Nuclear Reactions conference are the result of just such a procedure. In both cases, these are the initial publications of fundamentally new scientific discoveries. These papers will be published as Volume 1, Number 3 of the *Journal of New Energy*. Publishing will be accomplished immediately after the conference.

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## B. LOW-ENERGY NUCLEAR REACTIONS CONFERENCE - A PREVIEW

**Joint Chairmen: J.O'M. Bockris & G.H. Miley**

The **Second Conference on Low-Energy Nuclear Reactions** will be held at the Holiday Inn, College Station, Texas on September 13-14, 1996.

**Attendance:** Conference space is limited. The meeting is restricted first to participants on the basis of their contribution.

**Proceedings:** Conference papers will be printed immediately after the conference as Vol 1, No. 3, of the *Journal of New Energy*. This journal is abstracted by *Chemical Abstracts*.

**Conference Cost:** \$ 100 per person is charged to cover facilities expenses and a copy of the proceedings. For further information contact Dr. Lin at 409-845-3661 or Fax 409-845-4205.

**Tentative Conference presentations** (Presentations will begin at 8:30 a.m. September 13, 1996 and conclude at 12:05 p.m. September 14, 1996):

FRIDAY, SEPTEMBER 13, 1996:

J.O'M Bockris: Introduction.

George Miley: "Nuclear Reaction in Palladium-Hydrogen System."

T. Mizuno: "The Reaction Products Induced by Isotopic Changes of Electrolysis."

J. Dash: "Excess Heat and Unexpected Elements from Electrolysis of Acidified Heavy Water with Titanium Cathodes."

S. Szpak: "Nuclear and Thermal Events Associated with Pd + D Codeposition."

Minevski: "New Elements Formed in the Electrolysis of Light Water on Palladium."

M. Swartz: "Deuterium Production and Light Water Excess Enthalpy Experiments Using Nickel Cathodes."

R. George: "Isotopic Ratio Anomalies Induced in Palladium by the Application of Intense Ultrasound."

R. Bass: "Low-Energy Nuclear Reactions in an Electrolytic Cell."

R. Bush: "Nuclear Reaction in Pd and Ni System."

R. Notoya: "Evidence of Nuclear Reactions found by Measurement of Radioactivity in Electrolytic Cells."

T. Claytor: "Tritium Production from Palladium and Palladium Alloys."

T. Ohmori: "Isotopic Distributions of Heavy Metal Elements."

Y.E. Kim: "Nuclear Physics Mechanisms for Gamow Factor Cancellation in Low-Energy Nuclear Reactions."

Y. Kucherov: "Lattice-Phonon Resonance and Energy Transfer at a Nuclear Level."

A. Cau: "Natural Nuclear Synthesis of Superheavy Elements."

H. Fox: "Possible Palladium-Related Nuclear Reactions."

SATURDAY, SEPTEMBER 14, 1996:

G.H. Lin: "Anomalous Radioactivity and Unexpected Elements as a Result of Heating Oxide Mixtures."

K. Shoulders: "Observations of the Role of Charge Clusters in Nuclear Cluster Reactions."

Bauer & Monti: "Variations of the Half-Lives of Radioactive Elements and Associated Cold Fusion and Cold Fission Reactions."

A. Michrowski: "Advanced Transmutation Processes."

J. Miley: Chairing Open Discussion & Conclusions.

## C. NEWS FROM THE UNITED STATES

### CALIFORNIA - LIGHT & ELECTRICITY

Thomas J. Brown, "Some Observations on the Relationship Between Light & Electricity," *Borderlands*, Vol 52, No 2, Second Quarter, 1996, pp 24-31, 10 refs.

#### EDITOR'S SUMMARY

Brown informs us that Johann Wolfgang von Goethe, the well-remembered German poet, was most impressed with his experimental work on light. Goethe is quoted as saying: "But in my century I am the only person who knows the truth in the difficult science of colors--of that, I say, I am not a little proud, and here I have a **consciousness** of a superiority to many." Try this experiment yourself: Let light through a slot and onto a prism and note the prismatic colors. Now introduce an opaque band (the reverse of a slot) and observe the change of colors produced.

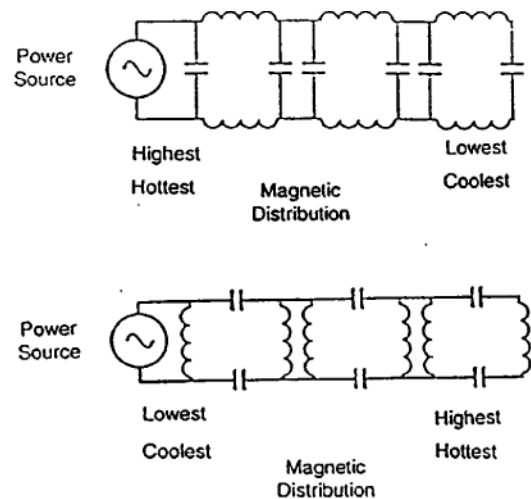


Figure 2. TEM and LMD Circuits

Brown describes two types of circuits: The first is series inductors with parallel capacitors. The second is series capacitors with parallel inductors. The author states that the heat generated in these circuits is different. These two circuits can be used to study the characteristics of TEM (transverse electromagnetic) and LMD (longitudinal magneto-dielectric) waves. See Fig. 1 above.

## CALIFORNIA - PUSH-GRAVITY VIDEO TAPE

W.C. Wright has recently completed a video tape explaining how his Push-Gravity Tide Model demonstrates the Earth's 14 tides and operates under its own mutual repelling energies. This video has received very flattering comments, such as: Excellent, A-Plus, Outstanding, Terrific, etc.

For several years Wright has had a physics major at Yale University receiving his Push-Gravity material. In the student's own words - "I really tried to have you as a guest speaker, but my profs were adamant." That has been the kind of negative attitude shown by the scientific community for over 25 years. If you buy his Push-Gravity Tides video you will see what, in his opinion, they have been trying to hide. View the tape, then you be the judge.

The video tape, as well as his book Gravity is a Push, sells for \$12 each, including P/H, USA. If you would like to have either one or both, send your order and applicable fee to the following address and he will promptly fill your order:

W.C. Wright, 732 Ohio Street, Fairfield, CA 94533 (707) 429-0598

## FLORIDA - ELECTRIC CARS - RUNNING ON EMPTY

Courtesy of the author.

Bonne W. Posma, "Running on Empty," *AtE (Access to Energy)*, May 1996.

### EDITOR'S SUMMARY

Bonne Posma has written about one of the great disadvantages of electric automobiles: the small amount of energy contained in batteries as compared to the energy contained in a gallon of gasoline. Using the EVI, the first production electric car announce by General Motors, Bonne analyses the power contained in the 320-volt array of batteries and compares the energy available with that of a gallon of gasoline. The following figure, reproduced by permission, gives a graphic impact of the amount of energy in one gallon of gasoline compared with the energy of the EVI's **entire battery**.

When subtracting the amount of energy in a gallon of gasoline that is lost as heat, the energy actually converted to mechanical energy about 11.25 kilowatt hours. This

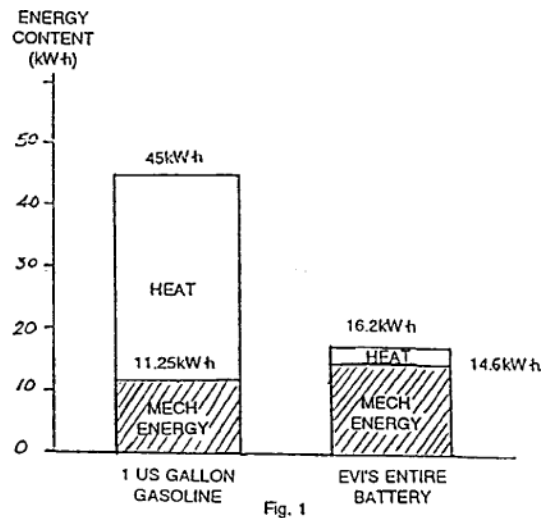


Fig. 1  
Energy content of 1 gallon of gasoline compared to the energy content of the EVI's battery

amount of energy is compared to the 14.6 kilowatt hours in a freshly-charged total set of EVI batteries. Because the amount of gasoline left in the tank of a standard U.S. automobile when the gasoline gauge reads **Empty**, is 1.5 to 2.5 gallons, **Posma suggests that operating an electric automobile in equivalent to running on empty with your standard car.**

The message is: **To make electric cars more competitive, we must either have much better batteries or design and use a space-energy powered On Board Battery Charger.** This editor firmly believes that there is now, under laboratory development, space-energy technology that will provide for the design of an on-board battery charger that will greatly extend the distance that an EVI can be driven. **This type of new technology will make the electric vehicle the personal vehicle of choice in the future.** In addition, the combination will meet the most stringent of the zero-emissions standards.

## HAWAII - WEATHER ENGINEERING

Trevor James Constable, "Whither Weather Engineering," *Borderlands*, Vol 52, No 2, Second Quarter, 1996, pp 6-11, 5 illus.



## EDITOR'S SUMMARY

**Michael Theroux, the editor of *Borderlands*, starts out this issue with a comment on Trevor James Constable's article, "Whither Weather Engineering":** "Trevor's outstanding work in the field of weather engineering has proven without a doubt that the ether does exist and is directly accessible with simple geometric instruments." Trevor's article is about aetheric weather engineering. The author makes the following statements: "Practical airborne tests in Hawaii using the new **Bull** etheric translators, have shown that a light aircraft so equipped and appropriately used, can produce more etheric response, faster, than any other development thus far of this engineering art." In discussing applications for weather control: "Influencing wind direction and humidity levels to bring forest fires under control is a case in point. **This is a here-now capability ready for practical trial and further development, at nominal cost.**"

Near the end of the article, Trevor reports the following: "First, the ancient Aeronca [aircraft used] transited the target area on a standard rain engineering pass. A sailplane with unrestricted forward visibility was later used to record from 2,000 feet, that part of the stunning results accessible to this remarkable aircraft. The combination of TV weather forecast clips, contra-forecast deluges, and aircraft and sailplane documentation made a compelling case. All this can and will be improved into an evidential bolus that will silence any skeptic living."

## MARYLAND - PHYSICAL MODEL FOR ATOMS

Joseph Lucas (Student, Oxon Hill High School, Temple Hills, MD), "A Physical Model for Atoms and Nuclei," *Galilean Electrodynamics*, vol 7, no 1, Jan./Feb. 1996, pp 3-12, 11 refs, 13 figs, 5 tables.

## AUTHOR'S ABSTRACT

A physical, geometrical packing model for the structure of the atom is developed based on Bergman's new physical model for elementary particles. From the physical characteristics of real electrons, this work derives, using combinatorial geometry, the number of electrons that will pack into the various shells about the nucleus in agreement with the observed structure of the *Periodic Table of the Elements*. The constraints used in the combinatorial geometry derivation are based upon my fundamental ring dipole magnet experiments and spherical symmetry. From a magnetic basis, the model explains the physical origin of

the valence electrons for chemical binding and the reason why the periodic table has only seven periods. The same geometrical packing model is extended to describe the physical geometrical packing of protons and neutrons in the shells of the nucleus. It accurately predicts the nuclear "magic numbers" indicative of nuclear shell structures as well as suggesting the physical origin of nuclide spin and the liquid drop features of nuclides.

## MASSACHUSETTS - COLD FUSION TIMES EDITORIAL

Mitchell Swartz, "Quality Reports Continue to Confirm Cold Fusion," *Cold Fusion Times*, vol 4, no 3, Summer 1996, pg 1.

## COLD FUSION TIMES EDITORIAL

[Reprinted by permission.] Several organizations, including US government agencies, have now reported confirmation of the cold fusion phenomena. In this issue of the *COLD FUSION TIMES*, we present reports which demonstrate the salient accumulation of new information from NASA, from Los Alamos, and from EPRI (the Electric Power Research Institute) consortium in California. This is remarkable because it is corroboration by conservative, serious-minded scientists, which will spotlight cold fusion to receive further attention by the scientific community. Also, this further increases the number of quality positive reports. Incredibly even as this progress continues, the cold fusion skeptics and some hot fusion scientists, editors, and US Patent Office bureaucrats continue to deliberately stall development in this field; their hands still desperately cling to stale out-of-date newspapers and papers with scientific errors from 1989-90. Such stonewalling maliciously impedes progress in the field of energy production and nuclear physics within the United States. This may only be the second time in history that the United States has stopped scientific progress for political reasons. The first was the rebuff to Dr. Teller to develop the hydrogen bomb which would be reversed when the Soviets finally achieved detonation of an atomic bomb.

## MASSACHUSETTS - GARY TAUBES GETS AWARD

Mitchell Swartz, "COLD FUSION WRITER AT MIT," *Cold Fusion Times*, vol 4, no 3, Summer 1996, pg 5.

[Reprinted by permission.] Cambridge, MA - Congratulations Gary Taubes, author of "Bad Science: The

Short Life and Weird Times of Cold Fusion, who is one of eight journalists awarded the auspicious 1996-1997 Knight Fellowships at the Massachusetts Institute of Technology. This honor was originally named the Vannevar Bush Fellowships (inaugurated in 1983), but changed in 1987 when the Knight Foundation (Florida) became the principal sponsor. Judges included Jerry Bishop and five other editors, correspondents and reporters.

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#### NEW MEXICO - TRITIUM FROM CF

Mitchell Swartz, "Los Alamos Nat'l Lab Reports Tritium From CF," *Cold Fusion Times*, vol 4, no 3, Summer 1996, pg 1.

#### EDITOR'S SUMMARY

As reported previously in *COLD FUSION TIMES* (vol 3, 2-3), Los Alamos National Laboratory has committed itself to continue research in this field. Los Alamos has now confirmed the generation of minute amounts of tritium in some cold fusion systems.

The excess heats ranged between 4 to 44 MJ/mole of palladium, which was well above the largest known heats of chemical transformation in this or any other metal. The largest heat of chemical transformation in palladium is to the bromide at 0.9 MJ/mole.

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#### NEW MEXICO - CLAYTOR REPORTS TRITIUM

T.N. Claytor, D.D. Jackson and D.G. Tuggle (Los Alamos Nat'l Lab., New Mexico), "Tritium Production from a Low Voltage Deuterium Discharge on Palladium," *COLD FUSION TIMES*, vol 4, no 3, Summer 1996. Also, *Infinite Energy*, vol 2, no 7, March/April 1996.

#### AUTHORS' ABSTRACT

Over the past year we have been able to demonstrate that a plasma loading method produces an exciting and unexpected amount of tritium from small palladium wires. In contrast to electrochemical hydrogen or deuterium loading of palladium, this method yields a reproducible tritium generation rate when various electrical and physical conditions are met. Small diameter wires (100 - 250 microns) have been used with gas pressures above 200 torr at voltages and currents of about 2000 V at 3-5 A. By carefully controlling the sputtering rate of the wire, runs have been extended to hundreds of hours allowing a

significant amount (>10's nCi) of tritium to accumulate. We will show tritium generation rates for deuterium-palladium foreground runs that are up to 25 times larger than hydrogen-palladium control experiments using material from the same batch. We will illustrate the difference between batches of annealed palladium and as received palladium from several batches as well as the effect of other metals (Pt, Ni, Nb, Zr, V, W, Hf) to demonstrate that the tritium generation rate can vary greatly from batch to batch.

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#### OHIO - NASA & NYMA REPLICATE CF

Janis M. Niedra (NYMA) and Ira T. Myers, Gustave C. Fralick and Richard S. Baldwin (NASA), Technical mem. (#107167), *Cold Fusion Times*, vol 4, no 3, Summer 1996, pg 5. Also, *Infinite Energy*, vol 2, no 7, March/April 1996, pg 62-68, 27 refs, 7 figs.

#### AUTHORS' ABSTRACT

Replication of experiments claiming to demonstrate excess heat production in light water-Ni-K<sub>2</sub>CO<sub>3</sub> electrolytic cells was ground to produce an apparent excess heat of 11 W maximum, for 60 W electrical power into the cell. Power gains ranged from 1.06 to 1.68. The cell was operated at four different DC current levels plus one pulsed current run at 1 Hz, 10% duty cycle. The 28 liter cell used in these verification tests was on loan from a private corporation whose own tests with similar cells are documented to produce 50 W steady excess heat for a continuous period exceeding hundreds of days. The apparent excess heat can not be readily explain either in terms of nonlinearly of the cell's thermal conductance at a low temperature differential or by the thermoelectric heat pumping. However, the present data does admit efficient recombination of dissolved hydrogen-oxygen as an ordinary explanation. Calorimetry methods and heat balance calculations for the verification tests are described. Considering the large magnitude of benefit if this effect is found to be a genuine new energy source, a more thorough investigation of evolved heat in the nickel-hydrogen system in both electrolytic and gaseous loading cells remains warranted.

**TEXAS - OPEC OIL PRODUCTION TO DOUBLE**

Courtesy of Gordon Moody

Gordon Moody, "OPEC Oil Production to Double by Year 2015 to Meet World Demand," *Global Energy Outlook*, Vol 1, No 6, July 1996, pg 6.

**EDITOR'S SUMMARY**

Current oil consumption in the United States is about 17.5 million barrels per day and forecast to rise by another million barrels per day in 1997. In May, 1996 the U.S. imported 10.5 million barrels of oil per day. When the increasing oil consumption of the western world is added to the more rapidly increasing oil consumption of some of the Pacific Rim countries and India, **OPEC will have to double its oil production by the Year 2015.** That is the conclusion of Charles Curtis, Deputy Secretary of Energy. At least that is the prospect if there were no new energy developments to replace the burning of oil. Readers of this publication are aware of the current development of three new-energy discoveries: new hydrogen energy devices for thermal energy; super magnets & super motors for mechanical energy; and solid-state devices for electrical energy. The use of these three major new-energy developments are expected to have a major impact on the demand for oil long before 2015.

**WASHINGTON - TRANSACTIONAL QUANTUM MECHANICS**

Courtesy of Dr. Samuel P. Faile

John G. Cramer (Univ. of Washington), "The Transactional Interpretation of Quantum Dynamics", *Reviews of Modern Physics*, Vol 58, No 3, July 1986, pg 647ff.

**AUTHOR'S ABSTRACT**

The interpretational problems of quantum mechanics are considered. The way in which the standard Copenhagen interpretation of quantum mechanics deals with these problems is reviewed. A new interpretation of the formalism of quantum mechanics, the **transactional interpretation**, is presented. The basic element of this interpretation is the **transaction** describing a quantum event as an exchange of advanced and retarded waves, as implied by the work of Wheeler and Feynman, Dirac, and others. The transactional interpretation is explicitly nonlocal and thereby consistent with recent tests of the Bell inequality, yet is relativistically invariant and fully causal. A detailed comparison of the transactional and Copenhagen

interpretations is made in the context of well-known quantum-mechanical *Gedankenexperimente* and "paradoxes." The transactional interpretation permits quantum-mechanical wave functions to be interpreted as real waves physically present in space rather than as "mathematical representation of knowledge" as in the Copenhagen interpretation. The transactional interpretation is shown to provide insight into the complex character of the quantum-mechanical state vector and the mechanism associated with its "collapse." It also leads in a natural way to justification of the Heisenberg uncertainty principle and the Born probability law ( $P = \Psi\Psi^*$ ), basic elements of the Copenhagen interpretation.

**D. NEWS FROM ABROAD****CANADA - CAN MIDDLE EAST PRODUCE FOREVER?**

Courtesy of Warren Hunt

Robert F. Mahfoud and James N. Beck (professors of earth sciences and chemistry at McNeesh State Univ., Lake Charles, Canada. Mahfoud worked during the uranium boom in northern Saskatchewan for Hudson Bay Oil and Gas), "Why the Middle East Fields May Produce Forever," *Offshore Magazine*, April 1995 issue, pp 56-106.

**HUNT'S COMMENTS**

The authors pose the problem:

"Inexhaustible reserves: Why are yearly oil reserves increasing steadily despite the 10-20 million barrels of oil that have been pumped daily from the Gulf area?"

They support the statement of increase with a bar diagram showing Saudi Arabian reserves rising biannually from 110 billion barrels in 1977 to 260 billion barrels in 1993.

They go on to answer their original question:

"From a scientific point of view, one can deduce that organic sources alone are not enough to explain [the rise in reserves] with satisfaction," and "...Hydrocarbons in the Middle East can originate from organic and inorganic sources, [and] should be continuously forming in the Persian/Arabian Gulf area to account for the annual increase in oil reserves,"

The evidence for copious oil generation in the Ft. McMurray area make it quite possible that Alberta has a similar regenerative capability.

/s/ C. Warren Hunt

[Hunt edited the Russian-to-English translation of Vladimir Larin's book Hydridic Earth, which provides a theoretical background for oil-field replenishment. Ed]

## JAPAN - MAGNETIC REVOLVING MACHINE

Courtesy of Takeo Sawaii

Staff, "A Great Invention of the Century, 'A Permanent Magnet Revolving Machine' Will Save the World?" Japanese magazine, in Japanese, translated by Sawaii.

### TRANSLATOR'S SUMMARY

Kohei Minator is the father of a famous Japanese female singer, Hiroko, who runs a music production company at Yotsuya in Tokyo. He claims to have invented a motor that runs with permanent magnets only. Using opposing polarity of the magnets in slant positions allows the motor to run perpetually. Minato claims that his working motor uses the electromagnet to control the motor, without which, the motor runs continuously without control.

Minator has made some 600 prototypes in the past 20 years, and does not know why his motor works. The positions of the magnets are not based on any mathematical equation, positioning is a matter of trial and error. The article pictures seem to indicate that the motor is connected to a generator by a shaft. Kohei Minator claims input of six volts and an output of thirty volts. Patents have been granted in the U.S., Australia, Japan, and European countries.

[This motor seems to have about the same function as the Troy Reed motor. However, we have not seen either of them. Ed.]

## SRI LANKA - THE SPACE AGE BEGINS -- WHEN?

Courtesy of Hal Puthoff

Arthur C. Clarke, "When Will the Real Space Age Begin?" *Ad Astra*, May/June 1996, pp 13-15.

### EDITOR'S SUMMARY

The science fiction writers of the past have predicted the coming space age for a few generations, however, Clarke notes that their estimates of costs and time-scales have been wildly inaccurate. To put this comment in proper

perspective, Arthur C. also notes that the Astronomer Royal, Richard Woolley, when taking up his new appointment in 1956 was quoted as saying, "Space travel was utter bilge" and the **Sputnik** was launched the following year. Clarke corrects this mis-quote with what Woolley really said, "All this writing about going to the Moon is utter bilge -- it would cost as much as a major war."

Clarke is confident that the space age can and will begin. He suggests that a good place to start is to get some bright young men to study the mathematical work of Hal Puthoff, et al. Clarke states, "Frankly, I think the rocket has about as much future in space as dog sleds have in serious arctic exploration." In this regard, Arthur C. Clarke will enjoy this issue's report on Harold Aspden's new book, which among other things, provides some insight into where we may discover some of the fundamentals for antigravity.

[Editor's Note: Arthur C. Clarke receives this newsletter every month at his home in Sri Lanka. His most recent fax was to humorously berate this editor for not spelling his name correctly. **He threatened to sic his lawyers, Messrs. Geldsnatch and Blubberclutch on us.** Hal Fox sent the immediate reply: "This error may be a Freudian slip in retaliation to what you did to **HAL**." However we do apologize publicly and trust that the mistakes we make in the future will not be to drop ending e's. Sorry, Arthur C. Clarke. We have corrected our database.]

## E. BOOK & MOVIE REVIEWS

By Hal Fox

### HYDROGEN-ENERGY MOVIE REVIEW

"**Chain Reaction**", starring Rachel Wiesz, Keanu Reeves and Morgan Freeman is a 20th Century Fox movie, directed by Andrew Davis and rated PG-13. The movie has a little science and a lot of action. The plot is that Keanu Reeves, a student, is working (as a machinist) with scientists (including a physics Ph.D. played by Rachel Wiesz) and the head of the funding foundation (Morgan Freeman) have developed a clean source of hydrogen energy. After the bad guys destroy the lab and several square blocks of Chicago, the story unfolds. The story is one of government agencies involved in promoting or destroying new energy with a few statements on the need for new energy sources. The action is excellent. The science leaves something to be desired. We wonder why such a simple process of creating anomalous thermal energy required such a huge amount of scientific equipment. We seem to detect the presence of

support from the tobacco industry as Morgan Freeman is seldom on screen without a big cigar. Maybe the next science movie will be on transmutations.

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### AN AETHERIC STUDY FOR NEW ENERGY

Harold Aspden, Aetheric Science Papers, published by Sabberton Publications, P. O. Box 35, Southampton SO16 7RB, England, c1996, 168 pages, figs, numerous references, ISBN 0 85056 015 2, page size 8.25 x 11.75 inches.

#### AUTHOR'S INTRODUCTION

[The following author's remarks are printed on the back cover of book.] The author has, for some 40 years now, sought to interest the world of science in his discoveries concerning the nature of the force of gravitation. His contribution has not been heeded because the research findings have not developed from the conventional theoretical stream. Yet, from his Ph.D. research at Cambridge on anomalous energy activity in ferromagnetism, Dr. Aspden could see so clearly where the mathematical philosophers had erred drastically in replacing the aether by mathematical symbols before they had fully understood how it stores energy. The aether plays a creative role, besides constituting a universal energy bank, giving us the means to deposit and withdraw energy. Left to its own devices it even absorbs the energy we shed as waste and which we write off under the heading "entropy," but it also does something our textbooks say is impossible. It thrives on that energy and regenerates it in a material form by creating the particles we know as protons and electrons.

However, scientists have become blind and cannot "see" such an aether in their vision of things. They look only at how created matter evolves and see no creative source. So they devise computer programs to test their imagination of a universe in a notional Big Bang scenario, with scant regard to the simple problem of how the energy of electromagnetic induction is actually stored in "empty" space in our laboratories here and now on earth. In so doing they create obstacles in science where none exist, imposing their will on Nature's province and missing key issues which should be obvious to any mechanic. They use equations to represent electrodynamics, say energy has mass, introduce a quantum jitter which makes the position and momentum of that mass uncertain, and then forget to look for whatever it is that accounts for dynamic mass balance and so keeps their jittering wave mechanical universe from tearing itself into pieces. They try to understand gravity as a property of matter and cannot see

that it is a property of the aether by which it responds to the presence of matter to keep it in dynamic balance. They complicate gravitation by declaring it to be a distortion of 'space-time' by matter but still cannot reach their objective of field unification.

In adopting Einstein's theory, mathematicians have confounded our understanding of physics, without realizing that there is a better way forward by which to solve the mystery of unification of gravitation and electrodynamics. Although this unification is of clear record in the scientific literature, one needs a guide map to find a way to the relevant clearing in the jungle of periodicals which line university library shelves. This book provides that guidance and goes further in presenting the full text of fourteen of the basic papers. The reader will see from these papers how easy it is to derive the constant of gravity in terms of the electron charge-mass ratio and determine by simple theory the precise value of the proton-electron mass ratio. Given this unifying connection between gravitation and matter creation, one can see a way forward by which to tap some further energy from the same source as that which fed the creation of the universe. We are now on the brink of a technological revolution that will deliver us energy in abundance with no risk of pollution, but we need to understand its source, that real medium, the aether, that so many think of as a mere vacuum.

#### REVIEWER'S COMMENTS

On the last page Aspden observes, "If we could see the system of particles which constitutes the aether that fills all space, we would find that its form depends upon whether there is any local matter present which comprises heavy atoms." In one sentence this is a summary of the nature of the aether that produce gravitational attraction between massive particles. On page ii (preceding page 1) Aspden forecasts, "Very soon now, the world at large will need to face up to the discovery of new ways in which we can generate energy that has no pollution risk." In between these two statements Aspden presents and defends his theory of the aether and how it can be both the source of energy and antigravity.

Dr. Harold Aspden, scientist, inventor, patent agent, professor, and writer summarizes his life's work in determining the underlying nature of physics with special regard to an understanding of the long-abandoned aether. Here, in one volume, is an excellent essay urging the reader to delve into and question the relativistic and quantum mechanical interpretation of matter, energy, electromagnetism, and gravity. In addition, fourteen of

Aspden's most important writings have been republished in this important volume.

This reviewer shares the view that Aspden has been essentially correct in his acceptance of and study of aetheric science. This book is not destined to become a dusty memorial to a student of reality. Events in the new-energy world are accelerating and therefore the interest in this type of publication will also increase. Many of the readers of this periodical will be wise to read this book. Although not written for the lay person, it can be read by the intelligent lay person. The book is an important contribution to the engineer or scientist who desires to have a background review of the science that **should be the framework upon which new technology is built**. One of the many messages of this book is that **science** has wandered off into the lands of relativity and quantum dynamics with their obscure and difficult mathematics and **has ignored simpler paths to scientific understanding of nature**.

If you are an engineer or scientist, **or if you plan to gain the education in math and physics to qualify you to read the technical literature**, this book should be yours. If you do not understand all of the concepts presented in Aspden's lucid, technical style, you will be able to use it as a study guide for further study of those concepts that you do not, on the first reading, fully understand.

About half of the book is a tutorial on various aspects of **aether science**. The other half of the book consists of the following Aspden papers, previously written, peer-reviewed, and published from 1986 through 1995:

1. The Theoretical Nature of the Neutron and the Deuteron.
2. Meson Production based on Thomson Energy Correlation.
3. An Empirical Approach to Meson Energy Correlation.
4. The Physics of the Missing Atoms: Technetium and Promethium.
5. Synchronous Lattice Electrodynamics as an Alternative to Time Dilation.
6. Instantaneous Electrodynamic Potential with Retarded Energy Transfer.
7. The Theory of the Proton Constants.
8. Conservative Hadron Interactions Exemplified by the Creation of the Kaon.
9. A Theory of Proton Creation.
10. The Theory of the Gravitation Constant.
11. A Theory of Pion Creation.
12. Standing Wave Interferometry.
13. The Theory of Antigravity.

#### 14. Retardation in the Coulomb Potential.

In paper 4, Aspden discusses the physics behind the scarcity of technetium and promethium. They appear capable of assuming supergravitational or antigravitational properties and therefore scarce (they went elsewhere). However, from this view, Aspden suggests closely associated elements that may form the basis for antigravity devices.

In paper 5, Aspden discusses an alternative to the idea of relativistic time dilation. The simple concept is that the clock is modified. That is a much simpler explanation than the one offered by the theory of relativity.

In paper 9, Aspden provides a theory by which a sea of primordial muons can produce proton-electron pairs. With the statement, "...involve a concentrated muon field and a critical threshold at which muons can combine with a degenerate electron state to form a proton and an electron." Our readers will want to determine if this concept fits the **Rowe Effect** where the vacuum (the aether) is caused to produce hydrogen by an explosive force.

Paper 10 presents a summary of Aspden's theory of gravitation.

Paper 12 reviews some of the experimental techniques used to determine if there is an aether and some of the misconceptions that were adopted. A relatively simple experiment is discussed by which any well-equipped laboratory should be able to make definitive measurements of the aether.

Paper 13 is Aspden's 1991 contribution to extend his own principles of gravitation theory. Anomalous gravitational effects, reproducible in the laboratory, reveal the potential of antigravity devices or systems.

[This book is available directly from the author. U.S. buyers can obtain a copy by sending a check drawn on a U.S. bank for \$25 U.S. dollars (\$33 for airmail) made out to Harold Aspden. Send to address shown in the bibliography at the top of this review.]

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### BOOK REVIEW

K.T. Thomas (NRC Study Director, Board on Radioactive Waste Management), Nuclear Wastes, Technologies for Separations and Transmutation, National Research Council, pub. National Academy Press, Washington, D.C. c1996, 571 pages, indexed, extensive bibliography. ISBN 0-309-05226-2

This book is the result of an extensive study contract to the National Research Council from U.S. DOE. The contract and report were under the aegis of the Commission on Geosciences, Environment, and Resources; Board on Radioactive Waste Management; Committee on Separations Technology and Transmutation Systems.

This extensive work consists of 130 pages of the formal report in six chapters preceded by an Executive Summary. In addition there are Appendices A through P.

The following are the chapter and appendix titles:

Executive Summary.

1. Introduction.
2. Summaries of S&T [Separation and Transmutation] Proposals and Radionuclides Release Scenarios in Repository.
3. Separations Technology.
4. Transmutation Systems.
5. Defense Wastes.
6. Analysis of the Issues.

Appendices:

- A. Statement of Work.
- B. List of Committee and Subcommittee Activities.
- C. Base Case Once-Through Uranium Fuel Cycle for Light-Water Reactor with Geologic Repository.
- D. Separation Technology.
- E. Defense Wastes -- Additional Information.
- F. Transmutation Concepts.
- G. Effects on Repository.
- H. Nuclear Proliferation Issues.
- I. Health and Safety.
- J. Fuel Reprocessing Economics.
- K. Summary of International Separations and Transmutations Activities.
- L. Interim Report of the Committee on Separations Technology and Transmutation Systems.
- M. Biographies of the Committee on Separations Technology and Transmutation Systems.
- N. Glossary of Terms.
- O. Acronyms and Abbreviations.
- P. General Bibliography.

The following are some of the important concepts made in the Executive Summary:

"Currently, DOE is examining a site at Yucca Mountain, Nevada, to determine if it can be licensed as the first HLW [high-level waste] repository. The U.S. Nuclear Regulatory Commission (NRC) regulations for a licensed repository require that the encapsulation of the spent fuel remain effective for at least 300 to 1,000 years, which is a

subordinate requirement to the longer limits on release rates-- typically 10,000 years or more." Page 1.

"The committee has reviewed the three principal transmutation concepts for commercial reactor spent fuel for which considerable information is available." ... "The committee found no evidence that applications of advanced S&T [chemical separations and transmutation] have sufficient benefit for the U.S. HLW program to delay the development of the first permanent repository for commercial spent fuel." Page 2.

In describing the current-best transmutation system (the Light Water Reactor), the following comment is made: "Current LWR designs could be modified for transmutation of most actinides and the more troublesome fission products. This system has the shortest time and lowest cost to complete development and full-scale demonstration of technical performance and system costs -- about 8 to 10 years at a level of effort very roughly estimated at perhaps \$50-\$100 million per year, exclusive of the costs of construction of any major test facilities." Page 5. **Note that elsewhere in this book, the test facilities are shown to range in cost from \$2 to \$10 billion for each of the several facilities that would be required.** The method developed by the Cincinnati Group would be a small fraction of that amount.

"Conclusion: The excess cost for an S&T disposal system over once-through disposal for the 62,000 MgHM [million grams of heavy metals] of LWR [light water reactor] spent fuel is uncertain but is likely to be no less than \$50 billion and easily could be over \$100 billion if adopted in the United States. The additional cost of generating wholesale electricity could increase from 2 to 7% for a total increase of about \$25 to over \$80 billion<sup>7</sup>. [Footnote 7]: "The current charge of the repository program is approximately 1 mil/kWh [\$0.001 per kilowatt hour of electricity generated by a nuclear power plant] or about \$30 billion for the current fuel cycle." Page 7. In other words a minimum of \$30 billion, **probably much more**, is allocated for the packaging, transporting, and storage of spent-fuel elements. The discovery made by the Cincinnati Group could probably reduce this amount by **at least half**.

Under **Principal Recommendations** is the following final paragraphs in the Executive Summary:

The committee recommends the following:

- ◆ None of the S&T [separation and transmutation] system concepts reviewed eliminates the need for a geologic

repository. DOE should continue efforts to develop a geologic repository for spent LWR [Light Water Reactor] fuel.

◆ The current policy of using the once-through fuel cycle for commercial reactors, with disposal of the spent fuel as HLW [High Level Waste], should be continued.

◆ Fuel retrievability should be extended to a reasonable time (on the order of 100 years) to avoid foreclosing alternative fuel strategies that may be in the national interest.

◆ Research and development should be conducted on selected topics to support the cost-effective future applications of S&T of commercial spent fuel and separations for defense waste applications.

"A sustained, but modest, and carefully focused program of research and development over the next decade could prepare the technical basis for advanced separation technology for the radionuclides in spent LWR fuel and for decisions on the possible applications of S&T [separation and transmutation] as a part of the more efficient future use of fissionable resources. The research and development effort should focus on the factors that strongly influence fuel-cycle economics, especially the costs of reprocessing spent LWR fuel, minimalization of long-lived radionuclides to secondary wastes in the reprocessing cycle, and on the need to minimize the possible increase in proliferation risks that could result from the commercial use of plutonium in recycle fuels." Page 10.

**The reviewer assumes that the phrase "possible increase in proliferation risks" has to do with getting plutonium into the hands of terrorists to be used in making H-bombs.**

The essence of this study is that **at the time of the study there were no known methods of transmutation that would be cost effective.** However, the book makes a clear case for the dramatic need for a cost-effective method of stabilizing radioactive wastes. The "Cincinnati Group" has discovered (invented and applied for a patent) and developed a cost-effective transmutation process. This process has the potential of being highly acceptable in terms of both politics (who wants nuclear waste materials transported through or stored in their state?) and economics (at least an estimated saving of \$15 billion to American taxpayers.)

To illustrate the magnitude of the DOE radioactive waste problem (the biggest of many such government facilities problem areas in the U.S.) the following is a summary of information from Table 5-1 of Chapter 5, Defense Wastes:

## HANFORD TANKS - CHEMISTRY OF NUCLEAR WASTES

MATERIAL TYPE	TANK WASTE
-----	-----
Total Volume (cu.m.)	78,000
Density	1.55
Total Metric Tons:	120,000

### CHEMICALS - Element-atomic number (kg.)

#### Anions are underlined

Beryllium-4	10
Boron-5	2,600
Carbon-6	810,000
<u>Fluorine-9</u>	<u>1,190,000</u>
Sodium-11	68,000,000

Magnesium-12	5,400
Aluminum-13	4,400,000
Silicon-14	60,000
<u>Chlorine-17</u>	<u>490,000</u>
Potassium-19	1,400,000

Calcium-20	147,000
Titanium-22	450
Chromium-24	164,000
Manganese-25	134,000
Iron-26	730,000

Cobalt-27	810
Nickel-28	191,000
Copper-29	390
Zinc-30	2,300
Arsenic-33	840

Selenium-34	1,400
Strontium-38	36,250
Zirconium-40	560,000
Niobium-41	5.4
Molybdenum-42	8,400

Technetium-43	2,340
Ruthenium-44	550
Rhodium-45	440
Silver-47	440
Cadmium-48	10,700

Antimony-51	1,900
<u>Iodine-53</u>	<u>290</u>
Cesium-55	390
Barium-56	1,800
Cerium-58	230,000

#### *Rare Earths-59-71* 120,000

Samarium-62	31
Mercury-80	12,800

Lead-82	3,700
Bismuth-83	260,000



Thorium-90	830
<b>Following Actinides in centigrams:</b>	
Uranium-92	1,436,000
Neptunium-93	8.8
Plutonium-94	540
Americium-95	4.3
Curium-96	0.02

<sup>239</sup> Pu	31,200
<sup>240</sup> Pu	8,000
<sup>241</sup> Pu	50,000
<sup>241</sup> Am	145,000
<sup>243</sup> Am	19
<sup>243</sup> Cm	trace
<sup>244</sup> Cm	1,569

Following additional Anions in kilograms:

Carbonate - CO <sub>3</sub>	2,800,000
Fe(CN) <sub>6</sub>	323,500
Nitrite-NO <sub>2</sub>	9,800,000
Nitrate-NO <sub>3</sub>	11,100,000
Phosphate-PO <sub>4</sub>	9,020,000
Sulfate-SO <sub>4</sub>	1,980,000
Hydroxide-OH	15,300,000

Water	111,000,000
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**Radionuclides****(Curies)\***

<sup>3</sup> H - Tritium	530
<sup>14</sup> C	5,300
<sup>60</sup> Co	98,700
<sup>63</sup> Ni	292,400
<sup>79</sup> Se	810
<sup>90</sup> Sr	61,000,000
<sup>90</sup> Y	61,000,000
<sup>93</sup> Zr	4,300
<sup>95</sup> Zr	0.00026
<sup>93</sup> Nb	0.0005
<sup>99</sup> Tc	40,000
<sup>106</sup> Rh	19,000
<sup>106</sup> Ru	19,000
<sup>125</sup> Sb	69,000
<sup>126</sup> Sn	570
<sup>129</sup> I	51
<sup>135</sup> Cs	73
<sup>137</sup> Cs	46,000,000
<sup>137</sup> Ba	44,000,000
<sup>144</sup> Ce	2,100
<sup>147</sup> Pm	1,100,000
<sup>151</sup> Sm	700,000
<sup>154</sup> Eu	53,000
<sup>155</sup> Eu	43,000
<sup>226</sup> Ra	trace
<sup>235</sup> U	20
<sup>238</sup> U	460
<sup>237</sup> Np	62
<sup>238</sup> Pu	860

NOTE: Missing elements may imply lack of information rather than absence of element.

Initial Source: Boomer, et al., "Tank Waste Technical Options Report. WHC-EP-0616. Richland, Wash. Westinghouse Hanford Co. 1994. Also printed with some errors in Nuclear Wastes, Technologies for Separations and Transmutation, National Research Council, published by National Academy Press, Washington, D.C. 1996.

\* The unit Ci (Curies) is being phased out and the unit Bq (Bequerel) is being used. 1 Bq = one disintegration per second. 1 Ci = 3.7 x 10<sup>10</sup> Bq. 1 Bq = 2.7 x 10<sup>-11</sup> Ci.

**LIVING ENERGIES - A BOOK REVIEW**

Callum Coats, LIVING ENERGIES, 331 pages, illus., indexed, ISBN 0-946551-97-9, Gateway Books, Bath, U.K., c 1996, \$19.95 paperback.

Callum Coats is a former architect who has devoted several years of his life to collecting and translating the works of Viktor Schauberg (1885-1958). Schauberg was an independent, essentially self-taught from being an intense student of nature. Schauberg became intimately acquainted with pure, cold water while he served as a forest warden in his country of Austria. His intense and diligent observations of nature, especially the energetic flow of water, led him to his life-long motto and standard: "Comprehend and copy nature."

Using his studies of nature as an inventor he contributed many inventions to river and flood management, soil fertility, water-purification, new methods for producing energy including home power generation, and water-fueled devices for transport. Schauberg was a maverick in a society trying to become scientifically oriented. As Coats has struggled to collect and understand Schauberg's work, he has organized the body of writings and discoveries into 22 chapters. The presentation is a mix of history, discovery, and lectures on the importance of using rather than abusing nature.

For the science history buff, the book can be exciting. For one well trained in science the book is both disturbing and challenging. Some of the nature models Schauberger used to pattern his thought processes seem to not be germane to many technological problems. Coats present a wide array of topics that were of interest to Schauberger ranging from vortex flow (a favorite topic) to agriculture; from the organization of body functions to energy devices; and from strange nomenclature of physics to intricate studies of liquid motion.

The chapter headings of this book indicate the wide interests of the author and his subject:

Who was Viktor Schauberger?

Energy.

New Dimensions of Energy.

What is Motion?

The Sun.

Earth's Atmospheric Envelope.

Temperature.

The Nature of Water.

The Hydrological Cycle.

The Formation of Springs.

Floating Stones and the Stationary Trout.

The Log-Flume.

The Dynamics of Flow.

Water Supply.

Drinking Water Supply.

Trees and Light.

Forestry - a Noble or Ignoble Art?

The Metabolism of the Tree.

Agriculture and Soil Fertility.

The Generation of Fructigenic Energies.

Implosion.

Last Thoughts.

Some idea of the author's purpose in writing this book is gained by reading the Dedications: *This book is dedicated to my sons ANGUS and OLIVER and to all those of their generation, who will require enormous courage and perseverance to tackle the Herculean task of cleaning up the awesome legacy of environmental destruction, that we and previous generations have ignobly bequeathed them. It is my earnest hope that the information contained in this book will contribute to the changes that are now so urgently necessary and will provide present and future generations with some of the wherewithal with which to restore the Earth and health, wealth and well-being of its human family.*

You won't read this book in one sitting. The strange nomenclature, a different way of viewing the physical

world, the frequent lectures on ecological topics, and the wide range of topics will give the reader, pause, encouragement, challenges, but best of all a look through another pair of eyes using a mind unfettered with scientific dogma to explore the world about us in a new way of viewing.

## F. LETTERS FROM READERS

### LETTER FROM PAKISTAN

Hello. My name is Adnan Siddiqui. I'm from Pakistan. Few days ago I read a very interesting article in the *DAWN* newspaper, Pakistan, I'm sure all those who are, by any way, concerned about the present inefficiency of resent sources of fuel would like to know about it too.

*DAWN*, Saturday 13 July 1996

#### Engineer Invents New Auto Technology

"ISLAMABAD, July 12: A vehicle developed by a Pakistani engineer needs no fuel to run as it runs on gravitational pull, heralding a revolution in the automobile technology and many other fields. Sirajuddin Zafar of Faisalabad was running from pillar to post to introduce this technology in the country with the official approval and commercial production, but he could not get attention.

"At last, he was spotted by the Japanese ambassador who offered him 100,000 dollars for the sale of his technology, but he refused. This inexpensive technology is useful not only for buses and trucks, but could also be utilized in the railway engines, planes and even tube-wells could be operated without costing a single penny of the fuel.

"Siraj said this technology was the end result of his 20 years efforts. The technology is based on profusely available power of gravitational pull, saving energy. It is free of noise and smoke pollution. This technology can also be used in the running of tube-wells through gravity water elevator. Thus thousands of acres of land lying barren for want of water could be brought under the plough, Siraj claimed.

"He said this technology is the answer to ever-increasing power crisis in the country. It can be employed in the construction of dams and the transmission of power. He said that in his technology only one acre pond of water was needed to construct power plant for the generation of power equal to Tarbela Dam, Besides, same formula is applicable

in the manufacturing of generators to give light to the houses at local level.

"The power generation is generally based on running water. However, his technique could produce power on the stagnant water. The power generated through this formula does not need any network of transmission lines. Anybody could get power for his house only through the installation of water tank at the roof-top. He demonstrated his formula before various experts of the field. Seeing this, one university chancellor said, "This formula has totally revolutionized the energy equation in the world."

"Siraj said the present automobile technology is based on light weight for more speed, but his formula envisages more weight and more energy. He said he approached many influential persons to help him get an appointment with the Prime Minister, but failed. "Whosoever I briefed on this technique, he first asked to install it in his vehicle," he added.

"Once he met the former chairman of WAPDA (Water & Power Development Authority, Pakistan), Gen Safdar, who appreciated the technology but said the introduction of this formula meant the closure of many department. Therefore, it cannot be applied in Pakistan. "I am surprised that the people who claim to change the fate of the poor, did not give me even a patient hearing," Siraji deplored.

"He said he was not in a position to develop the technology on commercial level. *"I just wanted government's helping hand to show the world that Pakistan is also blessed with fertile brains."* He said if the government used my technology on commercial level, it will be the greatest reward for him. The introduction of this formula will prove a harbinger to many similar new technologies for the progress and prosperity of the mankind, Siraji added."

Please, give me feedback. What do you think about it?

This technology requires no fuel to run an automobile, so can this take over the current fuel technologies, even though millions of Dollars are being spent to develop the most efficient EV cars.

Thanks, /s/ Adnan Siddiqui

## G. MEETINGS

### THE ELECTRIC CAR SHOW

They are not waiting for our on-board battery charger. The NESEA SUSTAINABLE TRANSPORTATION group presents **THE ELECTRIC CAR SHOW**. The show will be held Wednesday, September 18th, 1996 from 9:00 am to 2:00 p.m. at Madison Square Garden in New York City.

### The **SECOND CONFERENCE ON LOW-ENERGY NUCLEAR REACTIONS**

will be held at College Station, Texas  
on September 13-14, 1996.

Papers addressing issues of Low-Energy Nuclear Reactions will be presented at the conference.

**Attendance:** Conference space is limited. The meeting is restricted first to participants on the basis of their contribution.

**Proceedings:** Conference papers will be printed immediately after the conference as vol 1, no 3, of the *Journal of New Energy*. This journal is abstracted by *Chemical Abstracts*.

**Conference Cost:** \$100 per person for conference attendees. For further information contact Dr. Lin at 409-845-3661.

### THE GERMAN ASSOCIATION OF VACUUM FIELD ENERGY

plans a conference in the Singapore Hyatt, Singapore, in early **October 1996**. Inquiries may be directed by Fax to Germany (05 11) 31-84-17.

### INTERNATIONAL SYMPOSIUM ON CONSCIOUSNESS, NEW MEDICINE AND NEW ENERGY Yomiuri Hall, Tokyo, Japan November 21-22, 1996

UPDATED RELEASE: AUGUST 6, 1996

Dr. Shiuji Inomata has announced a symposium to present research results and to discuss issues in broad areas such as consciousness phenomena, holistic medicine, integration of Western and Eastern Medicine, and New Energy.

**Technology.** Paramahansa Tewari has been chosen as the key note speaker for the New Energy Section of the symposium

The Participation Fee is Yen 20,000 (Yen 108 = \$1.00) or approximately \$185 US. For participation, contact Mr. Tetsu Nagano, Japan Green Cross Society, 10th Floor Takanawa-chuo Bldg. 2-20-23 Takanawa, Minatoko. Tokyo 108, Japan, Tel 81 03-3442-7521, FAX 81 03-3442-7651. For academic information, contact Dr. Shiuji Inomata, 2-2-2 Sekigawa-cho, Arai-shi, Nigata 944 Japan, tel/fax 81-0255072-0558.

The official languages are Japanese and English, and simultaneous translation will be provided.

The conference site is at Yomiuri Hall in the center of Tokyo. Yomiuri Hall is located at 1-11-1 Yuraku-cho, Chiyody-ku, Tokyo, and seats 1100. (Tel +81 03-3231-0551, FAX +81 03-3231-4847)

Contact: Mr. Tetsu Nagano, Japan Green Cross Society  
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## Commercial Column

The following companies (listed alphabetically) are commercializing cold fusion or other enhanced energy devices:

### COMPANY: PRODUCT

**American Pure Fusion Engineering and Supply:** Information and troubleshooting for the fusion research and development industry. Developing "Fullerene Fusion Fuel™." Salem,

Oregon. The president, Warren Cooley, can be reached at 1-800-789-7109 or 503-585-6746. Email to: Coolwar@aol.com

**CETI** (Clean Energy Technologies, Inc.): Developers of the Patterson Power Cell™. Dallas, Texas. Voice 214-982-8340, FAX 214-982-8349.

**Clustron Sciences Corp.:** New energy research consulting and information. Contact: Ron Brightsen, 703-476-8731.

**ENECO:** Portfolio of intellectual property including over thirty patents issued or pending in cold nuclear fusion and other enhanced energy devices. Salt Lake City, Utah. Contact Fred Jaeger, Voice 801-583-2000, Fax 801-583-6245.

**E-Quest Sciences:** Exploring The Micro-Fusion™ process. Seeking qualified research partners for their sonoluminescence program. Contact Russ George, FAX 415-851-8489.

**Fusion Information Center (FIC):** Research and development of new energy systems. The world's most complete resource depository for cold fusion research information, as well as other new energy research including zero-point energy; space energy research; electronic, electromagnetic, and mechanical over unity devices and more. We are the publishers for *Fusion Facts*, *New Energy News*, and *the Journal of New Energy*. Voice 801-583-6232, Fax 801-583-2963.

**Holotec AG,** Clean Energy Technology, contact André Waser, Gen. Mgr., Bireggstrasse 14, CH-6003, Luzern, Switzerland. Phone 011 41-41 360 4485, or Fax 011 41-41 360 4486.

**Hydro Dynamics, Inc.:** Hydrosonic Pump, heat-producing systems using electrical input with thermal efficiencies of 110 to 125 percent. Rome, Georgia. Contact James Griggs, Voice 706-234-4111 Fax 706-234-0702.

**International Management Systems Co. (IMSC):** Technical project/program management assistance, and technology development and commercialization assistance. Contact Mark Harris or Richard Youngs, Phone 801-583-6232, Fax 801-583-2963, or Phone/Fax 801-255-3000.

**JET Energy Technology, Inc.:** Design and manufacture of  $\pi$ -electrode systems, calorimeters, and associated equipment and systems. Consulting regarding radiation, materials, and other scientific and engineering issues. Weston, MA. Contact Dr. Mitchell Swartz, Voice 617-237-3625. Fax 617-237-3625.

**Labofex, Experimental and Applied Plasma Physics:** R&D of PAGD (Pulsed Abnormal Glow Discharge) plasma technology. Applications under development include portable power supplies, electric vehicles and autonomous housing. Licensing. Ontario, Canada. Contact Dr. Paulo N. Correa. Tel 905-660-1040 Fax 905-738-8427

**Magnetic Power Inc.:** Supermagnets and supermotors; Solid-state, heat to electric transducers, for temperatures up to 300°F (cold fusion, waste heat, etc.). Featuring Ultraconductors™

under development by ROOTS, a subsidiary. Sebastapol, CA. Contact Mark Goldes, voice 707-829-9391, Fax 707-829-1002.

**Nova Resources Group, Inc.:** Design and manufacture ETC (Electrolytic Thermal Cell); EG (commercial power cogeneration module); and IE (integrated electrolytic system). Denver, CO. Call Chip Ransford, Phone 303-433-5582.

**UV Enhanced Ultrasound:** Cold Fusion Principle being used for an ultrasonic water purifier. Hong Kong. FAX 852-2338-3057.

**"YUSMAR"- Scientific-Commercial Company:** manufacture, licensing, research and development of water-based generators: thermal (5 sizes), electrothermal (up to 2 MW), and 'quantum' types. President: Dr. Yuri S. Potapov, 277012 Kishinev, Moldova, Phone and Fax 011-3732-233318.

**Zenergy Corporation:** Founded in 1996 to facilitate the introduction of commercially viable energy alternatives. Chandler, AZ. Contact Reed Huish: 602-814-7865, Fax 602-821-0967, e-mail: reedh@indirect.com

Note: The Fusion Information Center has been acting as an information source to many of these companies. We expect to augment our international service to provide contacts, information, and business opportunities to companies considering an entry into the enhanced energy market.

## INFORMATION SOURCES

Academy for New Energy (ANE) is a subsidiary organization to the International Association for New Science, which has specific goals directed toward the field of alternative and "New" energy research. 1304 S. College Ave., Fort Collins, CO 80524. Tel. 970-482-3731

*ANE Newsletter*, quarterly publication of ANE, providing an open forum for discussion, and disseminating newsworthy and inspirational information on invention and new energy. Edited by Robert Emmerich.

*Advanced Energy Network Newsletter*, quarterly, a reprint of articles and papers from other energy publications, with book reviews and worldwide conference list. Advanced Energy Network, P.O. Box 691, Rondebosch 7700 Capetown, Rep. South Africa.

*"Cold Fusion"*, monthly newsletter, edited by Wayne Green, 70 Route 202N, Petersborough, NH 03458.

*Cold Fusion Times*, quarterly newsletter published by Dr. Mitchell Swartz, P.O. Box 81135, Wellesley Hills MA 02181. Home Page: <http://world.std.com/~mica/cft.html>

*Cycles*, a R&D newsletter, published by Dieter Soegemeier, Editor, GPO Box 269, Brisbane, QLD.4001, Australia. Phone/Fax: +61 (0)7 3809 3257.

*Electric Spacecraft Journal*, quarterly, edited by Charles A. Yost, 73 Sunlight Drive, Leicester, NC 28748.

**Fusion Facts monthly newsletter.** Salt Lake City, UT. 801-583-6232, also publishes Cold Fusion Impact and Cold Fusion Source Book. Plans on-line database access.

*Fusion Technology*, Journal of the American Nuclear Society, edited by Dr. George Miley, publishes some papers on cold nuclear fusion. 555 N. Kensington Ave., La Grange Park, IL 60525.

*Infinite Energy*, new bi-monthly newsletter edited by Dr. Eugene Mallove (author of **Fire from Ice**), P.O. Box 2816, Concord, NH 03302-2816. Voice: 603-228-4516.

Fax: 603-224-5975 E-mail 76570.2270@compuserve.com

Institute for New Energy (INE), organization to promote and help find funding for new energy research.

Home Page: [www.padrak.com/ine/](http://www.padrak.com/ine/) contains many important scientific papers and current reports on all areas of research.

E-mail: [ine@padrak.com](mailto:ine@padrak.com) Salt Lake City, Utah.

Voice 801-583-6232, Fax 801-583-2963.

*New Energy News* monthly newsletter for INE, highlighting the research and development in the worldwide new energy arena. Edited by Hal Fox.

*Journal of New Energy*, quarterly, presenting papers representing the new areas of energy research, leading-edge ideas in the development of new energy technology, and the theories behind them. Published by the Fusion Information Center, Inc., for the Institute for New Energy. Editor: Hal Fox.

KeelyNet BBS - Science and health oriented information exchange that specializes in nonstandard research, much of it on new energy. Jerry Decker, 214-324-3501

Internet: [www.keelynet.com](http://www.keelynet.com) E-mail: [jdecker@keelynet.com](mailto:jdecker@keelynet.com)

*Planetary Association for Clean Energy Newsletter*, quarterly, edited by Dr. Andrew Michrowski. 100 Bronson Ave, # 1001, Ottawa, Ontario K1R 6G8, Canada.

Now available: *Clean Energy Review*, a technical and scientific discussion on nuclear fuel wastes disposal. Discusses transmutation as one possible solution. \$5 U.S. and Canadian, \$7.50 other countries.

*Space Energy Journal*, quarterly, edited by Jim Kettner & Don Kelly, P.O. Box 1136, Clearwater, FL 34617-1136.

*21st Century Science & Technology*, P.O. Box 16285, Washington, D.C., 20041. Includes cold fusion developments.

The above list of commercial and information sources will be growing. New listings will be added as information is received. Send information to *NEN*, P.O. Box 58639, Salt Lake City, UT, 84158.

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