# Meta Research Bulletin

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# IN THIS ISSUE

- The cover image is the rising "blue Moon" of 2007 May 30, taken by David F. Putnam of Sequim WA. See the article about blue moons (described below) for a discussion of the origin and evolution of that expression.
- We are often asked when Meta Research will organize a conference for its Members and supporters. But they are spread all over the world and have a variety of interests. Now an occasion has arisen to make that happen. Meta Research and two other organizations have come together to sponsor an international meeting about problems with the Big Bang and viable alternatives. It will be held next September (2008) in Port Angeles WA on the Olympic Peninsula, a beautiful place to visit. Our first article is the invitation and call for papers. We very much encourage our Members to attend this major event, even if only as Observers.
- The recent lunar eclipse and the recent publicity given to this year's "blue Moon" led to the second article, very much one of the kind of topics Meta Research covers, where the original meaning and the history of a term has become lost.
- Neil DeRosa is the author of our third article in this expanded issue, which takes full advantage of the lack of a length limitation for such articles that our electronic medium affords. The direct subject is "black gold" or petroleum. But there are several astronomical tie-ins, and the case is another example of how minority viewpoints with considerable support struggle against an entrenched mainstream position. One reviewer said: "It just seems that everyone has their comfort level of how much they are willing to believe at the fringes; but showing that some of those beliefs are well crafted while some are unsupportable might help us all with our reasoning skills."
- *Meta Science in the News* catches up with five items. The black axiom states that the distribution of black, carbonaceous material around the solar system is in accord with the spreading of a blast wave from an exploded planet throughout the solar system. Our first item describes the discovery that another body, Saturn's moon Hyperion, conforms to the black axiom. And in breaking news, the latest images from half-black, half-white Iapetus are the closest look yet at the transition region on that Saturnian moon. We also have a news note about a new NASA office to study cosmic phenomena, all of which have very different natures in mainstream science and Meta Science. A note about quasar light curves virtually proves they cannot be at distances suggested by their redshifts. And finally, the EPH's satellite model for comets has made another successful prediction of a meteor outburst. This is the first time such a prediction has been applied to a long period comet.

# 2008 Conference: "Challenges to Consensus Cosmology and the Quest for a New Picture of the Universe"

**(2008 September 7–11, Port Angeles, Washington, USA)**
**** NOTIFICATION AND CALL FOR PAPERS ****

The Alternative Cosmology Group, in collaboration with the International Academy for Cosmological Studies and with Meta Research, cordially invites everyone interested in the history and nature of the universe to attend this conference, and invites qualified colleagues to participate in the talks, panels, and discussions. Registration and participation forms are available at http://metaresearch.org or http://www.cosmology.info/2008conference/.

## Scientific Program

The conference will be opened Sunday evening, 2008 September 7, with Halton Arp as our keynote speaker.

Monday through Thursday, CCC2 will continue the theme successfully established at CCC1 in 2005. The conference will consider the present state of understanding of the universe in light of the increasing number of observations that challenge the conventional cosmological model, the Big Bang.

The conference seeks to:

- Assess key observational challenges and problems confronting the existing "consensus cosmology" to ensure the scientific community is aware of them and can contribute to their solution.
- Assess the state of alternative cosmologies in general and innovative theories for various particular phenomena, including the Hubble relation, cause of redshift, light element abundances, microwave radiation, large-scale structure, "missing matter", and "dark energy".
- Promote more dialogue between Big Bang advocates and alternative cosmology advocates so that the best cosmology for representing nature emerges.

As papers are contributed, conference sessions will be organized into panels, one per session. Each member of the first set of panels will focus on specific observational challenges to or problems with the consensus cosmology. Examples are the lack of Gaussianity or isotropy in the microwave radiation, the excessive apparent ages of high-z galaxies, the early formation of large-scale structure, discordant results for light element abundances, the surface-brightness / redshift relation, etc. Each member of the second set of panels will focus on a particular alternative cosmology, or on alternative explanations for the key phenomena of the universe, such as the origin of redshift, the microwave radiation, large-scale structure, gravitational forces, light element abundances, quasars, dark matter, and dark energy. Each session's panel will present its papers; an informed responder will review them; and general discussion among the conference participants will ensue. This structure will encourage the preparation of multi-author review papers for publication, based on each of the panels.

Prospective participants are encouraged to plan their contribution early to assist in organizing the program optimally. A conference banquet will be held on Wednesday evening, 2008 September 10. This will feature an invited speaker (TBA).

## Participation

We seek to bring together as wide a range as possible of researchers in Cosmology and related fields with the aim of furthering our understanding of astrophysical phenomena, and the chronology and evolution of the Universe, particularly in the light of ongoing, growing challenges to the current model. We invite presentations and discussion from both sides of the debate that address some challenge to contemporary Cosmology, from those who do and those who do not perceive a current crisis.

Attendees wishing to present a paper are invited to submit to the Conference Committee a title, a short abstract of < 60 words for the program preview, and a full abstract of 200–500 words with citations giving a complete overview of their planned presentation and conclusions (to be distributed to participants about a month before the conference). Participants may present only one invited and one contributed paper, but may be a co-author on other papers. The Conference Committee reserves the option to admit a second contributed paper for presentation by one participant, but would allow this only in compelling circumstances and not as a ploy to get more time for a single presentation.

The deadline for submissions is 2008 July 25, but might be cut off sooner for topics that are already well-covered. Session organizers and responders will be selected from among early submissions. Late papers will be accepted only as a replacement if someone else's scheduled paper is cancelled. The Conference Scientific Committee will review the full abstracts and include those that qualify in the final on-line program. Participants are encouraged to familiarize themselves with the full abstracts in advance, especially those in their own session, to improve the quality of the exchanges. Authors are encouraged to join multi-author submissions to a major journal. They may also submit a full-paper version of their presentation for publication of the proceedings on a DVD that will be sent to all registrants. The closing date for submissions for the DVD will be 2008 December 12.

Authors may elect oral or poster presentation as their preferred choice. In either case, their full abstracts should provide citations. All presenters are encouraged to prepare self-explanatory, quality graphics and to minimize equations and technical concepts, which should appear only in the technical paper written for publication. Speak as you would to the public rather than to a colleague. In fact, many non-colleagues, including media reps, teachers, and members of the science-interested public, will attend as Observers. Non-technical oral and poster presentations are consistent with successful communication with participants in other areas of specialization, as well as Observers. Use of a presentation graphics program is encouraged. Avoid reading bullet points or text from the screen, and use those as one would use an outline.

Please use the abstract submission form to provide title, authors & affiliations, short abstract, and full abstract.

Another category of participation is "Observer". These will be primarily media representatives, local teachers, and some members of the science-interested public. They will not be participating in the formal discussions. Observers will mingle with participants during breaks, where they might have the opportunity to engage the scientists in one-on-one conversations.

Please forward this information to interested persons and colleagues.

**Location**

Port Angeles is located on the north coast of the Olympic Peninsula in Western Washington State. A small city of about 15,000, its climate is relatively dry, sunny, and mild in the summer months compared to much of the rest of Western Washington because it is near a climate anomaly known as the “blue hole”, the rain shadow of the Olympic Mountains. It is within a few miles of both magnificent mountains and scenic seashore, yet only 70 miles from the world’s northernmost rain forest. Wildlife is still present in abundance outside city limits. For example, nearby Sequim has a resident elk herd. And it is just 22 miles across the Straits of Juan de Fuca (100 minutes by ferry) to the beautiful city of Victoria, Canada with its famous gardens and historic Victorian architecture.

We anticipate that all participants will be accommodated in the Red Lion Hotel, where the conference will be held. Several nice restaurants are within walking distance. We have arranged a special hotel accommodation rate for conference participants at a substantial discount: Water-view rooms are $119 per night for double occupancy plus $10 per additional person. Regular rooms are $109 plus $10 per additional person. We recommend arrival on Saturday 2008 September 6 and departure on Friday September 12 to minimize travel stress and get the most out of your time at the conference. Side trips to scenic locations will be planned for the morning and afternoon of Sunday, September 7.

Travelers from most locations will opt to fly initially into Seattle-Tacoma ("Sea-Tac")International Airport (SEA). At Sea-Tac, you will still be about 90 miles from your destination, with several options for getting there. One of the easiest is to take a free ground Shuttle to nearby Boeing Air Field, then a Kenmore Express commuter flight to Port Angeles, which has a small airport for flights to and from Boeing Field. It is best to allow at least two hours between scheduled arrival at Sea-Tac airport and departure on Kenmore Express because of baggage collection, shuttle time, and the possibility of late-arriving flights. The commuter flight to Port Angeles takes about 30 minutes and is quite scenic on a clear day, with marvelous views of the Puget Sound, Hood Canal, and Olympic Mountain Ranges. Costs range from about $40 (internet fare) to about $90 per flight. Our travel agent (see below) can find the best match between these and your Sea-Tac flights. We will help arrange ground transportation via limo and ferry as an alternative.

One alternative option to the commuter flight is to travel by automobile. Cars can be rented at the Sea-Tac airport. It takes about three hours to reach Port Angeles by

auto, but one hour of that is waiting for and transiting on the automobile ferry across Puget Sound. So the actual driving time is about two hours (if Seattle rush hour is avoided) and is scenic.

## Social Program (Side Trips)

We will organize side trips for our guests on Sunday, 2008 September 7 to view some of the uniquely beautiful areas on the Olympic Peninsula while perhaps recovering from travel and jet-lag. This is also a chance to meet your colleagues, or perhaps to share quality time with spouses. Among the numerous possibilities are Hurricane Ridge and its Nature Center, the Hoh Rain Forest via beautiful Lake Crescent, or the Olympic Game Farm (wildlife) near Sequim. Your choice of one of these is included in a full-conference registration fee. Add an unregistered person for $60.

## Registration

Conference registration will be $90 USD per day, or $245 for the full conference. The full-conference registration includes a shuttle between the conference hotel and the Port Angeles airport for your particular flight; local transportation, refreshments and snacks at breaks, one side trip on Sunday; the banquet; access to the facilities for the entire conference; and A/V projectors and materials as needed for presentations. The daily fee excludes side trips and banquet and allows access and participation for just that day.

The full-conference registration fee is reduced by $50 to $195 for those attending but *not* presenting a paper, and who register with the conference and with the hotel before 2008 June 15. For those giving a paper, the same discount is available by registering early with both conference and hotel before 2007 December 15; or $25 discount (to $220) if before 2008 March 15. (This allows us to plan the conference program and hotel space reservations better. It is costly to reserve too much or too little space.) Although the conference registration fee is due with registration, the hotel requires only a credit card to hold your room, and does not charge you until you check out.

Travel to the conference, local accommodations, and meals (except as included in the full-conference registration) are at your own expense. Registration fees should be paid in USD by Visa / MasterCard / Amex / Discover credit card, on-line by PayPal, or by mailed cheque payable to "CCC2".

If you register but cannot attend and cancel before 2008 September 1, your registration fee is refundable except for $25 to cover administrative costs and credit card fees. Fees are non-refundable for later cancellations.

Presentation titles and abstracts may be revised or completed at a later date.

Step 1 Registration form (Participants & Observers)

Step 2 Presentation form (Invited & Contributed)

Step 3 Side Trips (Expressions of interest)

Step 4 Travel-Hotel-Auto arrangements / Travel Agent

## Observers

The fee for non-participating Observer badges is $25 USD for the entire conference, which requires registration. Observers do not participate in the program or discussions, However, they may meet and speak with the scientists at the breaks. Observers who register by 2008 August 31 will receive badges with conference insignia and their name and (optional) affiliation or city/state. The fee for registering accompanying persons for the Social Program, and for Observers adding the Social Program (banquet, a side trip, and local transportation), the total fee (including Observer badge) is $145. Unregistered Observers may also receive a generic admission badge at the door by paying a $10 fee each day attended.

## Contacts

E-mail inquiries may be sent to ccc2@wavecable.com. Registration payments by PayPal should be directed to this account: <tomvf@metaresearch.org>. Surface mail should go to
Meta Research / PO Box 3604 / Sequim WA 98382-5040.

Credit card payments will show as a charge by MetaResearch/EclipseEdge on your statement. Hotel reservations require a credit card to guarantee your room reservation and qualify for the conference rate, but no actual payment until you settle your bill.

The conference Red Lion Hotel is at 221 N Lincoln / Port Angeles WA 98362; phone 360-452-9215 or 800-RED-LION from within the U.S; fax 360-452-4734. Be sure to mention the "CCC2 conference" to get the special rate we have negotiated for attendees. Click here to see the view from one of the Hotel conference rooms' water-view windows.

## Media

Media inquiries may be directed to Dr. Tom Van Flandern at Meta Research, 360-504-1169 (9-6 Pacific Time).

## Travel Agent

We have retained Paula Foggo, a travel agent with Blue Ridge Travel, to assist participants with their flight, accommodation, rental car, and side trip reservations. Because airlines no longer pay travel agents, the cost of her services must be charged to the participants: $30 per person for as many service calls as are needed. Unless you are familiar with searching the internet for the best deals, we recommend you use her services.

For Paula's assistance, please make the initial contact with your basic information and needs via email, and include your phone number and the best time to call you. Her email is: <pafoggo@yahoo.com>. Her USA (Eastern Time Zone) cell phone is 828-768-2244. Be prepared to leave a voicemail message.

### Forms

Registration and participation forms are available at http://www.cosmology.info/2008conference/.

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***"There is a theory which states that if ever anybody discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened."*** – Douglas Adams, *The Hitchhiker's Guide to the Galaxy*

## Lunar Eclipses and Blue Moons

Tom Van Flandern / tomvf@metaresearch.org

*Abstract*. Total eclipses of the Moon are not really "total" because the Moon would disappear if they were. Illumination from light refracted by Earth's atmosphere remains visible. The amount and color of such light is a function of above-cloud atmospheric conditions at the time of the eclipse. Recent major volcanic activity can fill the atmosphere with enough debris to cause the eclipsed Moon's normal orange colors to turn dark blue, or even to cause the Moon to disappear from naked-eye view. This is a rare phenomenon, and was the origin of the expression "once in a blue moon". A recent perversion of the original meaning allows a phenomenon now called a "blue moon" to occur in some localities about once every other year on average.

### Solar eclipses

The disks of both the Sun and the Moon are about half a degree in diameter on the sky. When the Moon passes in front of the Sun, its disk may be slightly larger or slightly smaller than the Sun's. In the former case, a ring of sunlight remains visible all around the Moon's disk at mid-eclipse, and the event is called an "annular solar eclipse". In the latter case, the Moon's disk completely covers the Sun's disk, though not its glowing atmosphere, and the event is called a "total solar eclipse". If the disks are not well-aligned, a "partial solar eclipse" may occur.

At times of total solar eclipses, the Moon's disk reflects no sunlight and gives off no light of its own, and is therefore almost totally black. The only significant light it reflects is sunlight that first strikes the Earth, then reflects off the Moon's dark side and returns to Earth a second time. On average, we have about one total and one annular eclipse each year. But the path of totality is very narrow, so one must normally travel to see a total solar eclipse. However, as one of nature's greatest spectacles, total solar eclipses are usually well worth the effort and cost.

### Lunar eclipses

When the Moon passes into the Earth's shadow, we have a lunar eclipse. These occur with a similar frequency but are visible from large areas of the Earth, and are therefore seen more commonly. The view is also considerably less spectacular than a

total solar eclipse. Lunar eclipses come in a variety of flavors as well. The part of Earth's shadow for which the Sun's disk is only partially blocked by the Earth is called the penumbral shadow. When the Moon is in only the penumbral shadow, most people would not notice that anything was happening. This is because lots of sunlight shining into the penumbral shadow makes its boundaries indistinct, and the minor darkening of the Moon it causes is generally not noticeable.

However, as seen from locations within Earth's shadow, the geometric disk of the Earth covers the entire disk of the Sun. These locations comprise the umbral shadow. When some part of the Moon's disk crosses into the umbral shadow, that part of the Moon's disk appears at first quite black, and the circular shape of Earth's disk casting the dark shadow is plainly evident. This blackness of the umbral shadow, it turns out, is not so great as it appears. The brightness of the rest of the disk simply makes it appear black by comparison. But as the eclipse advances and the Moon's disk goes deeper into the umbral shadow, less and less of the disk remains bright (uneclipsed). The dark umbral shadow then begins to reveal details, including bright colors – typically red, orange, and yellow. These become stronger and more apparent, and dominate the eclipse if it reaches the total stage wherein the entire lunar disk is immersed in the umbral shadow. See Figure 1.

**Figure 1.** Photo of 2007 August 28 total lunar eclipse by David F Putnam of Sequim WA.

**Total lunar eclipses never happen!**

Two questions naturally arises: Why doesn't the Moon disappear when totally eclipsed? And what causes the colors in the light reflected by the Moon? The traditional answer to both questions in many older textbooks is that Earth's atmosphere filters and scatters predominately red-orange sunlight into the umbral shadow. The atmosphere is also responsible for the umbral shadow being about 2% larger in diameter than an airless Earth would cast at the Moon's distance. Yet at the corresponding altitude, 127 km above the Earth's surface, the air is so thin that scattering should be minimal. So why is the dark umbra that large?

The correct explanation is that the atmosphere bends the sunlight into Earth's shadow by refraction. Scattering is unimportant. The red coloration is then the same effect that the atmosphere has on the colors of sunlight in Earth's sky shortly after sunset. And the shadow enlargement is refractive defocusing of sunlight, which significantly decreases the amount of light getting through even when refractive bending is quite small. But the most important effect is ordinary bending of the Sun's direct rays by refraction, which is a banding angle of slightly over one degree at sea level. (This is an average of 34' bending of setting sunlight on its way to the sea-level observer, and another 34' bending from the observer back out the atmosphere on its way to the Moon.)

The bending of direct sunlight into the Earth's umbra means two things. (1) An observer of the Moon's surface would be able to see the Sun and its sunspots during a total eclipse, all squished into a bright ring of light surrounding the Earth's disk. And (2) because the Sun is only half a degree in diameter, but refraction is one degree on each side of the Earth's diameter, the Moon is too far away to ever be totally eclipsed; i.e., no direct sunlight reaches it. See Figure 2.

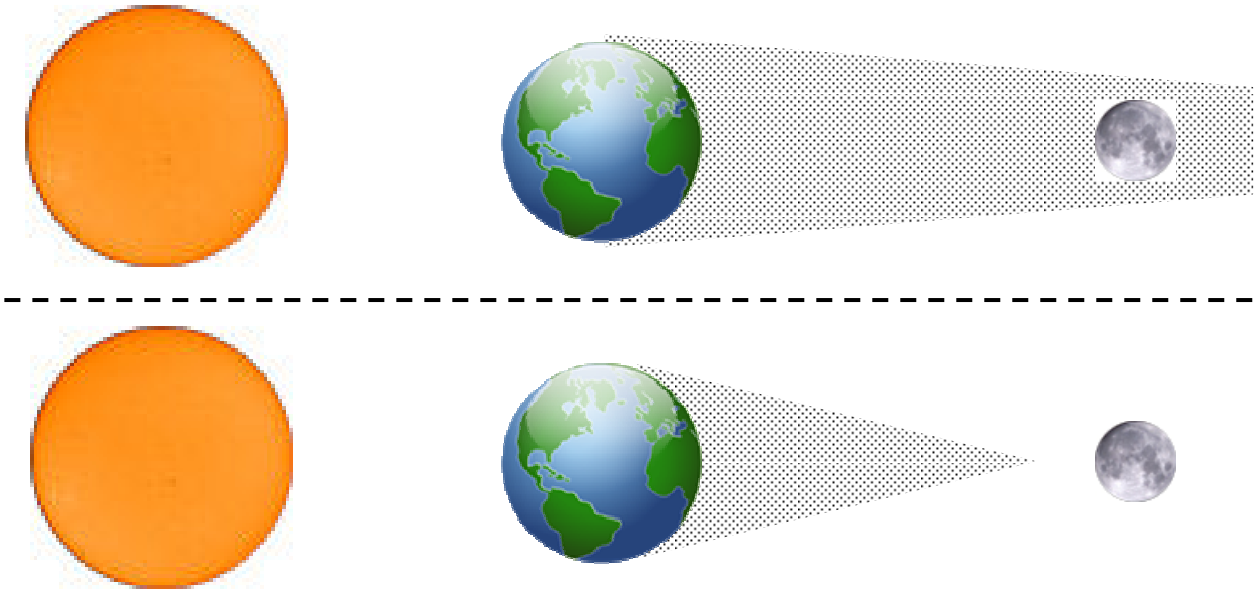

Figure 2. The umbral shadow. Upper: geometric lunar eclipse. Lower: atmospheric refraction added.

This means that, technically, the Moon can never be totally eclipsed. Artificial satellites of the Earth can be eclipsed, because they can enter the true umbra, where no sunlight penetrates. Again, technically, what we call the Earth's umbral shadow out at the Moon's distance and beyond is simply a zone where sunlight is greatly diminished by refractive defocusing. However, no terminology exists to distinguish the dark-but-colored shadow that falls on the Moon from the true shadow that reaches only to about 85% of the Moon's distance in which no direct sunlight is present.

We therefore propose here to respect tradition and continue to call the colorful middle shadow that falls on the Moon the umbra, despite the fact that "umbra" was supposed to mean "complete". And we further propose to use the common prefix "endo-" meaning "inner" when we wish to refer to the true, inner shadow where no direct sunlight reaches: the *endoumbra*. That particular prefix is used frequently with that meaning, for example in "endogenous" to contrast with its opposite "exogenous". The same prefix is also used in cases where it modifies a term starting with a vowel such as "endoenzyme" (an enzyme functioning inside a cell). So in accord with previous usages, no hyphen for clarity should be needed.

If the usage catches on, you saw it here first.

### Really dark lunar eclipses

Most but not all lunar eclipses show the red, orange, or copper coloration. Some lunar eclipses show darker colors. In extreme cases in history, the inner umbra was blue surrounded by black, or the Moon disappeared completely to the naked eye. The cause of these special eclipses was easy to spot because they occur only after major volcanic eruptions have spread their ash into the atmosphere around the globe, changing the transparency of the atmosphere and the sunset colors everywhere. Such events have a frequency of less than one per century, although the last one was the eruption of Mount Pinatubo in the Philippines in 1991. On that occasion, the eclipsed Moon was distinctly bluish and nearly disappeared from naked-eye view.

That was the origin of the expression "once in a blue moon", meaning an extremely rare event, the sighting of a literally blue Moon. However, in recent years, individuals impatient for more blue moons proposed a new definition. It was to be the event of a second Full Moon in a single calendar month. That happens on average about twice every five years. The most recent such occasion was in May, June, or July of this year, depending on what time zone you are located in. For a breakdown by time zone, see http://www.obliquity.com/astro/blue2007.html, which also explains why time zone matters.

Our cover photo with this issue is of the almost Full Moon on 2007 May 30, which qualified as a blue moon in the new sense for those in North America. However, for the astronomers among us, a blue moon will always be taken literally, a thrilling astronomical event so rare that many do not have the opportunity to see one in their entire lifetimes.

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***"The only difference between me and a madman is that I am not mad."*** – Salvador Dali

## Black Gold: Thomas Gold's Deep Hot Biosphere and the Deep-Earth theories of the Origin of Petroleum

An analysis by Neil DeRosa <neilderosa@verizon.net>

### Introduction

Petroleum, methane, and other hydrocarbons found on earth, are believed to be "fossil fuels," the remnant of decayed organic matter deposited in the sedimentary layers of the earth's crust for hundreds of millions of years. But for more than a half century, Russian scientists have been exploring an alternate hypothesis; that hydrocarbons existed prior to the formation of the earth, or were produced in the extreme pressure of the earth's upper mantle shortly thereafter. For many years, Thomas Gold, a well known scientist with many original contributions to his credit, has been proposing his own

synthesis of the Russian "abiogenic" theory. Through his independent formulations, research, and experiments, he has brought attention to it in Western academic and scientific forums, and thereby posed a significant challenge to the firmly entrenched but poorly substantiated fossil fuel theory. Gold therefore qualifies as the principal scientist for the theory in question, not the mere advocate of a theory fully formulated by others, and certainly not a theory that has been accepted by the Western scientific establishment. A resolution to this paradigm conflict in his favor would of course have momentous consequences, both scientific and macroeconomic, but in keeping with the theme of the present work, it is the scientific issue that concerns us most, and which will be the subject of this discussion.

## Early Accomplishments of the Scientist

Astronomer, Thomas Gold, is best known for his "steady state" theory of the universe, which he developed with H. Bondi and F. Hoyle in 1955, in opposition to the commonly accepted Big Bang (BB) theory. Although it did not succeed in unseating the BB theory, largely because of the indisputable astronomical red shift data provided by the famous Edwin Hubble, the steady state theory was (and in more up-to-date versions, still is) favored by many astronomers and physicists for a variety of reasons, but which are beyond the scope of the present discussion.

During WWII and its aftermath, Gold made important contributions to Doppler radar science and technology; and applying this theory, he made inroads into our understanding of human hearing, formulating a new theory of the structure and function of the inner-ear that was far ahead of its time, and also proposing medical uses of sonic radar, or sonography, which were later developed by others. Working as an astronomer at the Royal Greenwich Observatory, he conducted original research on the sun and magnetic fields, coining the word, "magnetosphere" to describe the magnetic field of a star or planet. This work led to another important contribution; namely that the earth's (or a planet's) rotational axis can be unstable over time, and can move with changes in the distribution of matter or angular momentum of the rotating planet, (caused by glaciers, the upwelling of mountains, or meteor impacts).

Throughout his career, Gold gained a reputation as an iconoclast for questioning the basic assumptions underlying the scientific dogmas of many fields in science. He endorsed an "interdisciplinary model" of science, in opposition to the "specialist model" supported by most scientists and philosophers of science today. In this respect his philosophical position resembles that of Thomas Kuhn who postulated that specialists practicing "normal science" are inherently incapable of challenging existing paradigms. Such challenges must come from either young scientists who are willing to risk all, retired scientists with less to lose, or what is more likely, from established scientists from other specialties or from another field altogether. The latter was certainly the case with Gold's challenge to the huge and entrenched petroleum industry and its scientific hierarchy, a challenge that was not successful during his lifetime. [1, 2]

## The Deep-Earth Gas Theory vs. the Fossil Fuel Theory

Petroleum, coal, and methane are the most commonly known of the hydrocarbons. Carbon and hydrogen combine in molecules in a variety of shapes and

sizes to form the hydrocarbons. Hydrocarbons are believed to be the decomposed remnants of life; dinosaurs, and of all the plants and animals that lived on the earth millions of years ago. High-carbon hydrocarbons form coal in sedimentary layers, believed to be the decomposed remnants of ancient swamps. Carbon in its purest form becomes graphite, and under extreme pressures, diamonds. In sedimentary strata deep and shallow, organic material and living organisms are found in petroleum and other hydrocarbons. Methane, the primary ingredient in "natural gas," and the simplest and most abundant of the hydrocarbons found on earth, is also thought to be solely the product of biological activity. Methane is known to be the by-product of the metabolism of certain animals and micro-organisms.

But astronomers have found methane to be abundant in the atmospheres of the gas giants, Jupiter and Saturn, where no life is known to exist. Moreover, spectral analysis reveals that methane is a commonly occurring substance in the universe, found in many planets and asteroids. Instead of serving as a reality check for the biogenic or "fossil fuel" theory for hydrocarbons on earth, which was formulated in the nineteenth century when much less was known about the formation and composition of other planets; this discovery prompted speculations that life must exist on Jupiter. Gold draws a different conclusion:

It would be surprising indeed if the earth had obtained its hydrocarbons only from a (biological source). While the planetary bodies bereft of surface life would have to receive their hydrocarbon gifts by purely abiogenic causes. (46, parenthesis added, all page references from, *The Deep Hot Biosphere*)

One of Gold's major premises, reflected in the title of his book, *The Deep Hot Biosphere,* [3], is that bacteria-like micro-organisms can live in the extreme pressures of the deep earth, and by extension, possibly also in the interiors of other planets as well, and that these bacteria can "eat" or metabolize *non-organic* hydrocarbons as an energy source, provided that oxygen is readily available. Moreover, he proposes that these organisms may have first evolved deep inside the earth, and may have been the progenitors of all life on the surface of the earth. Thus he offers two mutually interdependent paradigm challenging theories at once, which are synthesized and extended by him from preliminary work done by others. They are interrelated because organic residue, and even life, is known to be associated with hydrocarbons on earth.

*But the crucial question for us is which came first*: If hydrocarbons are the remnants of decomposed surface plant and animal life, then they should be found only in or near the sedimentary surface rock layers of the earth, and only in very limited quantities. But if Hydrocarbons are primordial and originally non-organic, that is, if they are naturally occurring molecular substances found in the universe, then the way we should search for them, where we should expect to find them, and in what amounts, will be very different. In the abiogenic theory there should be vast supplies of petroleum and almost limitless supplies of methane found in the deep reaches of the earth, far below the crustal sedimentary layers. And, of course, if the biogenic theory is correct, we should be running out of our preciously scarce "fossil fuels" very soon. In a candid world

of open-minded science, this should be a hot topic, and a key question in the forefront of scientific debate, but we rarely here of it.

**Five Assumptions of the Abiogenic Theory**

Gold begins with the assumption that the biogenic theory would not have been proposed in the 1870s had the presently accepted "accretion model" for the formation of the planets been understood at the time, since it was then thought that any primordial hydrocarbons would have been oxidized in the extreme heat "fire-ball" of the newly formed earth; meaning under the "fission model," which was the accepted paradigm at the time. (For a discussion of a modern version of that model see [4].) In the accretion model, the earth was formed out of cooler and smaller asteroids, and gases, which, as is now known, often contained hydrocarbons. But whether the fission or accretion model is correct, it is not difficult to postulate the formation of hydrocarbons, especially in their simplest form, methane ($H_4C$), under the right temperature and pressure conditions in the upper mantel of the earth. These hydrocarbons would then have gradually migrated upward, driven stepwise through the strata as a result of the pressure differential between the adjoining layers of rock.

Gold's second assumption is that the nascent earth was subject to only a partial melt, since a complete meltdown would have caused extreme temperatures that could oxidize all hydrocarbons. His first two assumptions for his deep-earth gas theory are therefore related to the accretion model of the formation of the earth, and are here deemed unnecessary, since hydrocarbons could have also formed by combination of the constituent elements under the correct pressure and temperature conditions in the upper mantel of a cooling earth, in either model. (43-48) Gold concedes this possibility in several instances, and moreover, that hydrocarbons may even now be forming (48, 50, 89, 90-91, 130).

The third assumption is that hydrocarbons are stable at great depth. It used to be thought that hydrocarbons would dissociate, or break down to their elemental components at between 300°C and 600°C. This can be demonstrated by a simple [and naïve] stovetop experiment. Moreover it is easily demonstrated that methane gas quickly oxidizes to $CO_2$ and $H_2O$ once it comes into contact with the abundant free oxygen of the earth's atmosphere. We placed the word "naïve" in brackets because in the deep earth, pressure increases with depth. It is a well known fact that the boiling point of water and other liquids increases in a direct proportion with an increase in pressure, and this applies to hydrocarbons as well.

Russian Geoscientist E. B. Chekaliuk's thermodynamic calculations indicate that methane could remain stable down to a depth of 300 kilometers, except in volcanic regions where the methane would oxidize into $CO_2$ and water; and Gold thinks the lower limit for stability for methane is around 600 km. Chekaliuk determined that methane, for example, would be stable at 300 km, provided the temperature (the geotherm) of the earth at that depth did not exceed 2,000°C (51). Other calculations made in Russia suggest that the heavier petroleum hydrocarbon molecules can remain stable under the pressure and temperature conditions found at depths of between 30 and 300 km, and

moreover that hydrocarbons could be *generated* by combination of hydrogen and carbon atoms at these depths (50).

The fourth assumption supporting the abiogenic or deep-earth gas theory is that the igneous rock at depths below the sedimentary layers is *porous*. An erroneous but widely held view found in geology texts is that the weight of the overburden rock would crush even the strongest rocks to a degree that no pores would remain. But Gold believes that this is like a schoolboy who wonders why he is not crushed by the weight of the atmosphere of 14.7 psi on his body. The reason is that the pressure is *equalized* throughout every pore and cell in our bodies, so that the same pressure obtains on the inside, in the body fluids and membranes as well as the outside. When deep sea divers experience "the bends," upon returning too quickly to the surface, it is because their body pressure has not had sufficient time to equalize, and cells begin to rupture as they resurface. Gold believes the same phenomenon exists in porous rock at depth, allowing ample pore spaces for large amounts of hydrocarbons to flow worldwide, under pressures equal to that of the surrounding rocks (53-54). At the same time, petroleum geologists were in part correct in that, starting from the surface, pressure from overburden rock causes some crushing of rock and diminishing of pores to a low permeability state at certain depths, causing layering, but this in turn allows higher pressures of fluids to build up beneath, and also higher porosity of the deeper rock (54).

The fifth assumption is that these high temperature and high pressure hydrocarbons are continually *upwelling* from the depths of the earth. There are several lines of evidence which support this theory, which will be discussed as we proceed.

## Evidence for the Deep Gas Theory

The deep-gas theory presumes that there are vast amounts of hydrocarbons in the earth at depths far in excess of the ability of man to drill for, or even sample them, but this is no obstacle to exploiting them, since these sources continually rise to the surface in metered amounts. Evidence for the abiogenic theory is of seven main types:

1. Reservoirs of hydrocarbons are generally found in geographical patterns in long lines or arcs sometimes extending for thousands of miles. These patterns were discovered by D. Mendeleyev in the 1870s, and confirmed many times since then (57).
2. Petroleum deposits follow Koudryavtsev's rule: hydrocarbon-rich layers tend to be consistently rich all the way down to the crystalline basement that underlies the sediment. Hydrocarbons in the basement rock, even when drilling has extended past the sedimentary layers and into the basement rock, can be better explained by vertical reach of hydrocarbons from below (57-58).
3. Methane is found in many areas where biogenic (fossil fuel) explanations are improbable. These locations include ocean rifts, depths far below sediment layers, areas such as the floors of large (ancient) craters with little or no sedimentary rock, and "methane hydrates," which are frozen bubbles of large quantities of methane found on ocean floors and under-glacier lakes (58).

4. Hydrocarbon deposits over a large geographical area often show a common chemical signature inconsistent with the geological formations in which they are found but consistent with a common, much deeper source (59).
5. Hydrocarbon reserves seem to be refilling as they are exploited. Pressure readings of working oil fields tend to drop as the reserve supply is depleted. But physical (and hence economic) predictions and projections (estimates based on a non-refilling biogenic principle) are almost never realized because the reserves refill unexpectedly, but in metered amounts over time. This is due to the caprock (basement rock) allowing passage of the hydrocarbons from below as the pressure differential increases (60). This effect is tantamount to tapping into deeper reserves without drilling. The phenomenon of oil wells refilling themselves is widely reported, especially in the Middle East and the U.S Gulf coast [5] (61).
6. The sedimentary layers of the earth contain around one hundred times more carbon than should be available from the grinding up of the basement rock from which the sedimentary layers are composed. This carbon enrichment must come from somewhere. Gold believes that the only logical explanation for the earth's present atmosphere is that it is the result of outgassing of carbon-containing volatiles from the earth's interior. The sedimentary record shows a continuous accumulation of carbonate deposits, as a result of oxidized carbon. "What is the origin of the supply that maintains atmospheric $CO_2$ at levels that result in the deposition of carbonates through all geological epochs and that maintains a supply rate sufficiently consistent to keep plants alive?" (63) The answer must be the upwelling of hydrocarbons from deep in the earth.
   Another important related but more technical line of evidence is found in the ratio of the two stable carbon isotopes; C-12 and C-13. The average ratio of these isotopes on earth is around one atom of C-13 to every one hundred atoms of C-12. During photosynthesis, a process call *fractionation* occurs, which results in a small deficiency in the heavier (C-13) isotope. This is caused by the slight disadvantage the heavier isotope has in passing trough cell membranes. This C-13 deficiency is thus a signature of plant life. Gold points out that another process can also cause fractionation but at greater values than those attributed to plants. Upwelling methane is subject to depletion of the heavier carbon isotope whenever it passes through a wet spot or a particularly tight network of porous rock. Precise measurements of these processes can reveal that abiogenic theory provides a better explanation and is a better predictor of the measured C-13 deficiencies (66-69).
7. Another line of evidence is the strong association of hydrocarbons with helium. "This association is so strong that in the commercial search for hydrocarbons, helium sniffing along the surface has been found useful" (72). This line of evidence is according to Gold probably the most significant factor that the biogenic theory fails to account for.

In the earth, helium is produced primarily through the radioactive decay of uranium and thorium. As was noted in the case of carbon (¶6 above), helium is found in sediments in amounts far in excess of what could have been produced by the radioactive components found there. This means that the helium also must have come from below

the layers of sedimentary rock. Moreover, helium is found in well defined mixing ratios along with methane and nitrogen. “Only a mix that had entered the sediment and its individual gas field from below could have achieved that effect” (73).

The deeper the source of the upwelling hydrocarbons, the greater the distance of porous rock it must pass through in its upward journey, the more opportunity there is to pass through radioactive rock and pick up radioactively derived helium atoms. Thus the concentration of helium in hydrocarbons is a good indicator of the depth from which it originated. But helium is too diffuse to build up sufficient pressure to force its way through the pore spaces in the rocks. Helium transport must therefore be driven by another more abundant gas, such as methane or nitrogen. These are precisely the indicators for helium found at or near the surface, and the reason why helium and methane show a close relationship even when found at shallow depths in farmers’ wells (75). To falsify this hypothesis helium would have to be found in similar amounts to that which is found in gas fields but in the absence of methane or nitrogen. But this is never the case (77). Gold believes that the deep-gas theory is made more compelling by the helium association, and this writer agrees with his reasoning.

An original extension of Gold’s hypothesis having to do with the formation of diamonds and the transport of heavy metals to the near surface deposits from which they are mined commercially, can only be mentioned briefly here. It is known that diamonds form out of pure or near-pure carbon in the extreme pressures and temperatures of the earth’s upper mantel approximately 150 kilometers deep. The way diamonds get to the surface or to the outer crust through “funnel fissures,” is both interesting and consistent with the deep-gas theory of hydrocarbons. Diamonds may actually be carried to the surface along with these occasional gas eruptions in the earth’s crust, and in effect become annealed, or “quick frozen.” This allows their crystalline structure, forged at great pressure, to remain intact in the lower surface pressure (128). A related process may carry leeched heavy metals from their original locations deep in the earth. The leeching agent may again be hydrocarbons, which carry the metals with them trough the porous rock to surface deposits where they can be mined. In conventional geology theory, the leeching agent is thought to be water, which Gold believes to be inadequate to the task because water can not exist at depths in excess of 10 km, whereas, as was mentioned above, hydrocarbons can remain stable at least down to a 300 km depth (125-139).

## The Petroleum Paradox

On the basis of the kinds of evidence seen thus far, it would seem that the deep-gas theory is correct and the fossil fuel theory is not only wrong, but woefully inadequate. However, it’s not that simple. There is an apparent paradox to contend with first. How do we explain the fact that these postulated non-biogenic gases, petroleum, and coal are teeming with life and the remains of living matter? Gold’s most important contribution to the deep-gas theory is perhaps in his proposed solution to this problem. As mentioned in the introductory comments above, the theory of a “deep, hot, biosphere” is the solution. But what is wanted is good evidence. Gold begins:

> The unrecognized assumption on both sides of the debate was the unquestioned belief that life can exist only *at the surface of the earth*. None of us had considered that a large amount of microbiology could exist *within the earth's crust*, down to the deepest levels to which we can drill. (81; italics in the original)

A persistent criticism of samples of microbial life brought up from deep wells was that they were not native inhabitants of the deep but opportunists introduced from the surface by contamination from the drilling equipment. But several scientific papers answered this objection by offering strong evidence in support of indigenous deep, hot biospheric life. Samples from a deep well in France in 1995 established the existence of indigenous thermophiles living at a depth of 1.6 kilometers. In Alaska the following year indigenous microbes were found at 4 km and at a temperature of 110°C. Soon thereafter microbial fossils were found imbedded 200 meters in granite; of which Gold contends; "fossils cannot be introduced by drilling into solid granite." (30) He proposes that a huge microbial biosphere exists at least down to 8 km. This is the depth at which petroleum in the deepest boreholes has been found (81)

A 1986 paper by G. Ourisson; et al, (83), showed that the quantity of biological life in petroleum was astonishingly large. "One molecular signature of life in oils came from a group of molecules that the Ourisson team had found and named *hopanoids*...Hopanoids are prominent in all of the numerous samples of petroleum that have been tested for them...And there is no dispute that these molecules are derived from membranes of once living cells" (84). Why does Gold think that this is evidence in favor of the abiogenic theory rather than the fossil fuel theory? Because, (and this was acknowledged by the Ourisson team), the trees and ferns, which supply the bulk of the living matter from which oil is supposedly formed in the biogenic theory, contain hopanoids at the lower end of the carbon-number chain. Whereas the bulk of the hopanoids found by the Ourisson team were at the high end of the carbon-number chain—the kind found in microorganisms. In the same study, another common molecule was found, (a terpenoid), known to be present in methane-eating bacteria (84).

In a 1963 paper by R. Robinson, (84), the author pointed out that it is unlikely that biological debris could decompose into hydrogen-saturated hydrocarbons. Robinson concluded decades before Gold proposed his theory that petroleum presents a picture of primordial hydrocarbons in which the products of biology have been added (84). And so it seems that questions of priority must take a back seat to the question of whether or not the theory is correct. It must be added that to this day, no one has ever synthesized petroleum from decomposed trees, algae, or ferns (85).

Gold explains that biological debris would be unlikely to lose their oxygen atoms and to acquire hydrogen atoms in their place. Instead, slow decomposition should produce further oxygen gain and hydrogen loss. "And yet a hydrogen 'gain' is precisely what we see in crude oils and their hydrocarbon volatiles. How, then, could biological molecules somehow acquire hydrogen atoms while, presumably, degrading into petroleum?" (85).

If the deep, hot biosphere is the solution to the petroleum paradox how extensive, how widespread is this biomass? With a presumed temperature limit for this subterranean microbial life of 110°C to 150°C, (well below the boiling point of water at the corresponding depths and pressures), the depth limit for the biosphere would be between 5 and 10 kilometers (85). Based on certain known and estimated parameters of available pore space world wide, and utilizing Ourisson's data, Gold calculates that the worldwide biomass would be somewhat greater than the existing flora and fauna on the surface of the earth (86).

The abiogenic theory then, combined with the deep, hot biosphere theory is as Gold succinctly phrases it; "not biology that has been reworked by geology but geology that has been reworked by biology" (86). One might expect coal to be the exception; surely coal is the result of degraded plant life and ancient swamps. No, says Gold, but he does make a partial exception for peat and lignite, which are indeed reworked plant life with some help from primordial hydrocarbons (87). But black coals come from the same upwelling of hydrocarbons as petroleum and methane, originating far below the sedimentary layers. The process is essentially a sequential loss of hydrogen atoms as hydrocarbons upwell through porous rock, and this is the primary reason why so many petroleum fields are configured in a "layer-cake" manner. Methane is at the lowest depth, layered on this is light crude, next come the heavier oils, and then often on top of all is black coal. This correlation of coal with petroleum fields can be seen in many parts of the world (98). The blacker the coal the greater the hydrogen loss and the greater the carbon to hydrogen ratio. How do the hydrocarbons lose their hydrogen atoms? Though many factors are involved, and we can go no further into the technical details here, there is a gradual process of oxidation as the hydrocarbons upwell, and carbon deposits left behind tend to be a catalyst for more carbon deposits, not unlike what happens in an internal combustion engine.

## The Worst of All Possible Prospects

The stature of the scientist and his potential capacity to unseat the formidable and firmly entrenched biogenic theory was demonstrated in the episode of the Siljan experiment. Since the evidence presented thus far, quantified, and of course in much greater detail in the original work by Gold, would not be sufficient to overturn the reigning paradigm, it would be necessary to provide indisputable proof. Hydrocarbons must be found in a place that is conceded to be the worst of all possible prospects for finding hydrocarbons, a location where such a discovery would not be explainable by the fossil fuel theory. Although even here there are Russian precedents; e.g., an eleven kilometer deep borehole in the Kola Peninsula in northern Russia found methane in the crystalline rock, where no downward seepage from the surface would seem a credible explanation (107).

The 44 km diameter Siljan Crater in central Sweden known as the Siljan Ring, so named for its surrounding ring of lakes, was an ideal place to test Gold's theory. In addition to being a large geographical area almost devoid of sedimentary rock, the ancient impact crater is also a region of porous rubble down to a great depth, in which fluids from below could ascend and collect (108).

After some lobbying, and with the help of influential friends, the Swedish parliament approved the project of drilling two boreholes in the Siljan Ring. Aside from pure scientific interest, Sweden's motivation was understandably economic. Being a country that imports almost all of its hydrocarbon energy needs, they wanted to investigate the possibilities for future energy independence. Drilling began in 1986 and ended in 1990 (111). The results were positive in terms of science, but the lack of an easy commercial success gave critics ample ammunition to claim failure, and hence the indisputable proof Gold sought eluded him. A brief recap of the results follows:

- The boreholes reached a depth of 6.7 kilometers. Samples showed the presence of methane, pentane, and highly saturated oils, all present deep in the granitic rock (111). Water solutions were used as drilling lubricants to eliminate the possibility of introducing hydrocarbons from above. Volumes of hydrocarbons in the samples increased with depth.

- Eventually a fine grained substance caused the oil to become so pasty that it became a great obstacle for prospects of commercial success without massive increased expenditures, which investors declined to underwrite. But ironically, the substance turned out to be magnetite, a form of iron often mined commercially, and produced by living microorganisms in the oil (116). Thus the magnetite was an indicator of petroleum reserves below. In addition, high concentrations of iridium were found in the magnetite, a heavy metal also of commercial value, and also likely to have been transported by the hydrocarbons from the depths (118).

- Accompanying the fine grained substance in the pasty sludge was a strong stench. Laboratory tests revealed this odor to be the result of the metabolic activity of a known methane oxidizing bacteria. These bacteria essentially draw oxygen from ferric iron and other mineral oxides, and use the hydrocarbons for food. The metabolic result is magnetite, which is an oxygen reduced form of iron with magnetic properties (magnetite contains 16 atoms of oxygen for every 18 atoms of oxygen in ferric iron). At least two other strains of thermophilic bacteria, previously unknown, were also discovered at the sampling depth (119).

- A final pumping operation in the test boreholes produced around 12 tons of crude oil, considered by the Danish Geological Survey to be "ordinary crude oil." Fifteen tons of fine grained magnetite was also pumped out (121). These were results that could not be dismissed as "trace amounts." Nevertheless that is what was claimed by critics. [6] No major western scientific journal reported Gold's analysis of the results, once again validating Kuhn's Law. Gold surmises:

> Eighty-four barrels of oil are meaningful, especially when they are found in a location where, in the conventional view, not a single drop of oil could have a rational explanation. The theory of the abiogenic origin of petroleum had thus been confirmed. (Dr. P. N. Kropotkin, a distinguished Russian petroleum geologist), wrote, in an issue of *The History of Science*, "The discovery of oil, deep in the Baltic Shield, may

> be considered a decisive factor in the hundred-year-old debate about the biogenic or abiogenic origin of oil. This discovery was made…on the initiative of T. Gold." (121-22, parenthesis added)

## Critics

A principle discussed more than once in [4], is that when a paradigm challenge increases in its credibility or gains momentum, it becomes an increasing threat to the entrenched scientists who are invested in the mainstream theory. When the challenging theory is perceived as making progress in its attempt to overthrow the old paradigm, the counter attack from mainstream scientists and their media (or academic) supporters heats up. This was certainly the case with Gold's challenge to the fossil fuel theory, especially in light of his well publicized near-success at Siljan. A few examples of the critics' claims follow:

Interestingly, Gold was accused of plagiarism on more than one occasion. This is curious because if the abiogenic theory is false, why worry about stolen ideas, since the theory ostensibly has no merit anyway. In one instance, C.W Hunt accuses Gold of stealing his idea that petroleum is methane acted on by microbes. [7] Which is not, incidentally what Gold claims in *The Deep Hot Biosphere*, his definitive statement on the subject; though he may have made that claim elsewhere. Another and more serious accusation of plagiarism was made by J. Briggs who solicited the assistance of Russian scientist V.A. Krayushkin in accusing Gold of stealing the abiogenic theory from a long list of Russian scientists who pioneered this idea during the Soviet era. [8] But, as noted above, Gold gives due credit to several Russian scientists for their contributions. If he did not include them all, that certainly doesn't constitute an infraction, merely a human limitation.

The Siljan Ring experiment brought out many critics. One of the most determined was R. Donofrio, who claimed in an extensive report to the Swedish *Vattenfall*, (public utility), and in subsequent letters, that Siljan was a complete failure, and that Gold had proved nothing. [6] Another mainstream geologist L. Pinsker, writing for *Geotimes*, a geology journal, makes the usual blanket criticisms of a reigning paradigm apologist, citing for instance the original research (of 1860) as unassailable proof of the fossil fuel theory. That critic also makes an interesting admission characteristic of paradigm debates; by stating that it is "known" that *some* hydrocarbons are formed geologically, but most of course are not. This is a tried and true tactic of mainstreamers who position themselves for the day that the new paradigm succeeds, and they can say—after the fact—"we knew it all along." [9]

## Conclusion

One does not have to accept Gold's speculations on the origin of life, nor any particular model for the formation of the planets in order to lean favorably toward the abiogenic theory of hydrocarbon formation; especially in light of Gold's competent reformulation of the Russian theory. Nor is it difficult to accept the theory of microbial life living at depth in the earth at greater pressures and temperatures than have been hitherto thought possible. But whatever the origin of life, it seems secondary to the much more immediate question. Obviously the one that affects human society in a very

profound way is the source, quantity and origin of hydrocarbons. Indeed the answer will impact the future of our civilization.

What of the deep hot biosphere? Our tentative conclusion is that this theory is correct, that it resolves the "petroleum paradox," and that it exemplifies the unique capacity of life to adapt to a great variety of conditions, both on the earth, deep within it, and also elsewhere in the universe.

Concluding chapters of *The Deep Hot Biosphere* deal with the origin of life, the cause of earthquakes, and other topics and suggestions for future research. Although some of these topics may seem tangential to the central theme, the significance may be in that here are testable (falsifiable) hypotheses which, if confirmed, would add significant weight to the abiogenic theory of petroleum origin. For instance, if complex organic molecules, proteins, or even RNA could be synthesized by simulating the extreme pressures, temperatures, and chemical conditions of the deep earth, (assuming primordial hydrocarbons), such a result would certainly support the deep hot biosphere model, in addition to being a momentous feat in itself. Similarly, if controlled tests confirmed that hydrocarbons under extreme pressures, upwelling from the upper mantel of the earth, are the cause of—or a contributing factor in—earthquakes, this would also support the abiogenic theory. If either of these ancillary theories proved to be correct in the future, it might be the next logical step to accept the deep gas theory as formulated by Thomas Gold. Like a good teacher, he generously offers many practical leads and suggestions for future research, with the full realization that paradigms change very slowly.

## References


1- Gold, Thomas. 2001. *The Deep Hot Biosphere: The Myth of Fossil Fuels*. Copernicus Books, NY, (Forward by Freeman Dyson, pp. v-ix)

2- Answers.com Biography, Thomas Gold; http://www.answers.com/topic/thomas-gold?cat=technology

3- Gold, Thomas. 2001. *The Deep Hot Biosphere: The Myth of Fossil Fuels*. Copernicus Books, NY

4- DeRosa, Neil. 2004. Apocryphal Science: Creative Genius and Modern Heresies. Hamilton Books, Lanham, Maryland; p. 99, in which is discussed Tom Van Flandern's fission model for the origin of the solar system. An in-depth elaboration of that theory can be found at: http://metaresearch.org/solar%20system/origins/original-solar-system.asp

5– Anderson, Roger, N. "Recovering dynamic Gulf of Mexico reserves and the U.S. energy future," Lamont-Doherty Earth Observatory of Columbia University; Most of paragraphs in this article were published in the week of April 26, 1993 by OIL&GAS JOURNAL. http://www.kressworks.com/Science/Recovering_dynamic_Gulf_of_Mexico_reserves.htm

6- Donofrio, Richard, R. 2005. "Siljan Crater Findings Reported to Vatenfall in 1984 remain unchanged." http://www.parwestlandexploration.com/docs/siljan.pdf

7- Hunt, C. Warren. Letter to *Infinite Energy*. http://www.gasresources.net/HuntLetter-InfiniteEnergy,ed.htm

8- Briggs, John. 1989. Letter to V. A. Ktayushkin and associated written matter. http://www.gasresources.net/Plagiarism(Overview).htm

9- Pinsker, Lisa, M. 2005. "Feuding Over the Origins of Fossil Fuels," *Geotimes*. http://www.agiweb.org/geotimes/oct05/feature_abiogenicoil.html


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*"Don't go where the path leads. Rather go where there is no path and leave a trail." –*
Ralph Waldo Emerson

# Meta Science in the News

### Hyperion: another example of the "black axiom"

From Nature 448:54-56 (2007). Hyperion, Saturn's eighth largest icy satellite, is a body of irregular shape in a state of chaotic rotation. The surface is segregated into two distinct units: a spatially dominant high-albedo unit having the strong signature of water ice; and a unit that is about a factor of four lower in albedo and is found mostly in the bottoms of cup-like craters. New observations of Hyperion's surface were made in the ultraviolet and near-infrared spectral regions by the Cassini spacecraft at closest approach during a fly-by on 2005 September 25–26. The low-albedo material has spectral similarities and compositional signatures that link it with the surface of asteroid-like outer moon Phoebe, and also with the hemisphere-wide dark coating on Iapetus. [TVF: Hyperion's rotation period is 21 days, as contrasted with 79 days for Iapetus. So the passing blast wave from the planetary explosion event (EPH) coated almost Hyperion's entire surface, but not uniformly. Part of the surface was coated as densely as that on Iapetus, while other parts were coated only sparsely. These findings support a common origin for this dark material, and the coating is consistent with a distant origin event arriving over 2-4 weeks, as in the EPH's "black axiom". See Dark Matter, Missing Planets and New Comets by T. Van Flandern, North Atlantic Books, Berkeley, 2nd ed. 1999.]

### NASA establishes new office to study cosmic phenomena

NASA HQ Press Release 07-1726, 2007 June 26: NASA has created a new office to study in more detail some of the universe's most exotic phenomena: dark energy, black holes and cosmic microwave background radiation. The new Einstein Probes Office will facilitate NASA's future medium-class science missions to investigate these profound cosmic mysteries. The office will be housed in the Beyond Einstein Program Office at NASA's Goddard Space Flight Center, Greenbelt, Md.

The Beyond Einstein Program consists of five proposed missions: two major observatories and three smaller probes. Technology development already is under way on the proposed observatories. The Laser Interferometer Space Antenna would orbit the sun measuring gravitational waves in our galaxy and beyond. Constellation-X would view matter falling into supermassive black holes.

The proposed probes would investigate the nature of dark energy, the physics of the Big Bang and the distribution and types of black holes in the universe. NASA previously has supported initial mission concept studies for the Dark Energy, Inflation, and Black Hole Finder probes. The agency currently is funding three other, more detailed, dark energy mission concept studies.

[TVF: The irony here is that, to the extent that Meta Science is an improvement over mainstream science, none of these missions can succeed as designed. In Meta Science, there was no Big Bang, so there was no inflation period; black holes cannot exist (collapsed stars become "Mitchell stars", not singularities); dark matter and dark energy are unnecessary fudge factors; and gravitational waves are spin 1 (photonic) rather than spin 2 (exotic).]

### Quasar light curves challenge cosmic distance scale

ApJ 553:L97-L100 (2001). Author: M.R.S. Hawkins, Royal Observatory, Edinburgh. Abstract: "The timescale of quasar variability is widely expected to show the effects of time dilation. In this Letter, we analyze the Fourier spectra of a large sample of quasar light curves to look for such an effect. We find that the timescale of quasar variation does not increase with redshift, as required by time dilation. Possible explanations of this result all conflict with widely held consensus in the scientific community." Two ways out of this conclusion were considered: (1) The timescale of quasar variations might be a function of wavelength. (But when the data is divided by color, the expected effect is not seen.) (2) The timescale of quasar variation decreases by a factor of (1+z) toward high redshift through some as yet unspecified physical process to exactly cancel out the time dilation. (But there is no independent motivation for such a "cosmic conspiracy", which would require a considerable degree of fine-tuning because of the non-trivial shape of the timescale-luminosity curve.) Given that no time dilation exists, three possible explanations arise: (1) The universe is not expanding. (2) Quasars are not at their cosmological distances. (3) The observed variations are not intrinsic to the quasars. (The author prefers gravitational microlensing as the explanation of choice. But this defies conventional wisdom that quasar variations are caused by instability of their accretion disks, and observational evidence exists for this mode of variability in active galaxies and gravitationally lensed quasars, where the presence of intrinsic variations cannot be in doubt. But perhaps this type of variability doesn't apply to the longer timescale variations used in this study.)

[TVF: Unless a fault with this analysis is found, this result squarely falsifies some accepted element in Big Bang cosmology. The simplest explanation is that the universe is not really expanding. The explanation most likely to prevail, in the light of other evidence, is that the assumption that the cosmological redshift of quasars is a distance indicator is invalid. It seems increasingly clear on many fronts that assumption is about to fall, and with it will go much of modern cosmology. It will be interesting to see how long the paradigm shift takes, and how deep it goes.]

### Aurigids meteor outburst happens as predicted

An outburst of the Alpha-Aurigids, a small annual meteor shower of about 5-10 meteors per hour that has experienced two or three previous unpredicted outbursts during the 20th century, was predicted to occur at ~ 11:20 UT (4:20 a.m. PDT) on the morning of Sept. 1. The prediction was made by Esko Lyytinen of Finland using the satellite model for comets, a corollary of the exploded planet

hypothesis. The predicted maximum meteor rate during the outburst was ~ 300/hour, but with an uncertainty of a factor of three. The peak time was also uncertain by ~ 20 minutes. These meteors are normally relatively bright and leave nice trains, so moonlight interference was not expected to spoil the show.

Preliminary results are now available. The first report to the International Meteor Association suggested an observed zenith hourly rate (ZHR) of 140 meteors at close to the predicted time. Meta Researchers Tom Van Flandern and Blaine Pugsley each independently observed the outburst from the North Olympic Peninsula in Washington State, which was well-situated for seeing the event at a high altitude in a dark sky. Their observed average meteor rate (ZHR) during the hour centered on the peak was about 50, showing that this year's shower rivaled the Perseids of August. However, the peak rate itself was sustained for only about five minutes, during which the *hourly rate* exceeded a few hundred (based on a much smaller number of observed meteors). The time of the peak in the Pacific NW was 11:32 UT. So both the rate and the time fell within the one-sigma uncertainty of the predictions.

This was the first successful prediction of a meteor outburst arising from a long-period comet. The standard dirty snowball model cannot make such predictions without a history of previous events to set several model parameters. This is because cometary "jets" supposedly responsible occur at unknown times, sending out meteoroids in unknown directions with unknown speeds. However, the satellite model for comets needs little more than the law of gravity, because the meteoroids originate from orbit around the nucleus, not by ejection from the nucleus. They therefore escape through the comet's Lagrange points at known times in known directions with known speeds as the comet approaches the Sun. And that has opened up the field of predicting meteor storms and outbursts since the model's first success in 1999.

Leaving the important implications for the origins of comets aside, this process is an amazing triumph of celestial mechanics. These meteoroids are too small to be seen or discovered before they burn up in Earth's atmosphere. Yet we now know enough about comets and gravity to predict their locations in space and the times and places when they will run into the Earth!

**Breaking news: the latest on Iapetus**

http://saturn.jpl.nasa.gov/news/press-release-details.cfm?newsID=774. "The *Cassini* spacecraft made its closest fly-by of Saturn's moon Iapetus on 2007 September 10, and took some fascinating new images of the black-white transition region on its surface. One of the important new results is that no clear evidence can be found that erupted fluids have resurfaced Cassini Regio, the blackened hemisphere. The high density of impact craters argues that the terrain underlying the dark coating is relatively ancient and has not been eradicated by its

emplacement." [TVF: Under EPH premises, it argues that the bombarded areas are the youngest.]

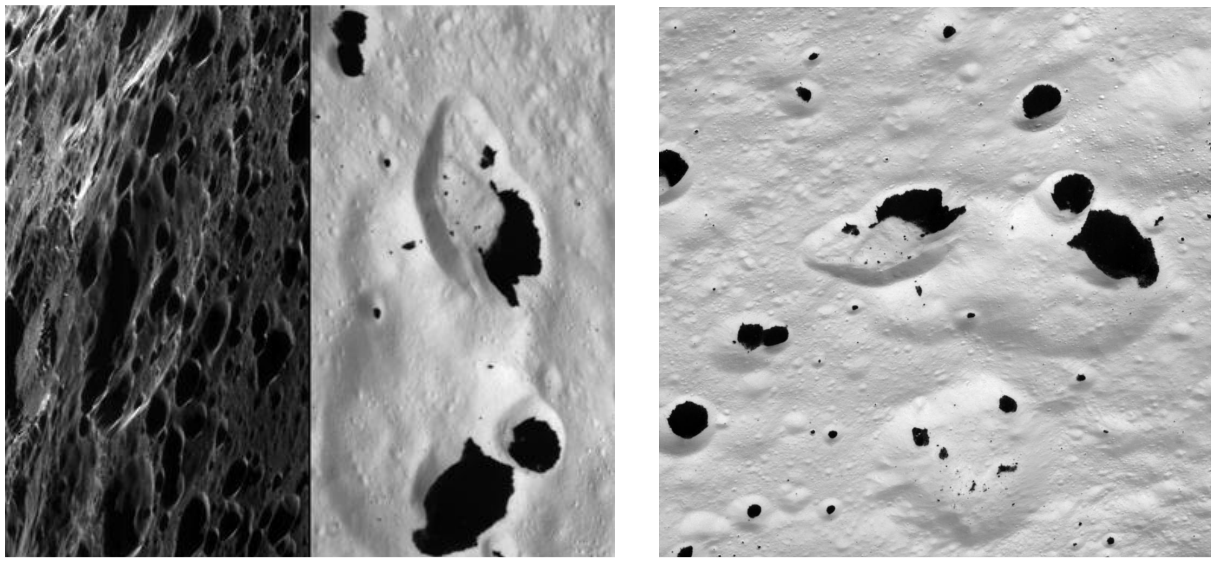

**Figure 3.** Hi-res *Cassini* spacecraft views of Iapetus. Left: brightness contrast of dark and bright surface regions. Right: another portion of the transition zone surrounding the entire dark hemisphere.

"Thus, Cassini Regio may have had its origin in plume-style eruptions in which dark particulate materials accumulated on the surface as fallout, perhaps in conjunction with the creation of the equatorial ridge. On the other hand, the dark deposits in Cassini Regio may be a surface coating consistent with, and perhaps more simply explained by, the fall of dark materials from outside."

[TVF: While we see here the usual attempt to salvage the mainstream explanation, the evidence is showing signs of converging on an exogenous origin, which leaves the source in doubt unless an EPH event is considered.]

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**Kids' quotes: Actual quiz answers –**

** ***"Homer was not written by Homer but by another man of that name."***
** ***"When you breath, you inspire. When you do not breath, you expire."***
** ***"H2O is hot water, and CO2 is cold water."***
** ***"Water is composed of two gins, Oxygin and Hydrogin. Oxygin is pure gin. Hydrogin is gin and water.***
** ***"Blood flows down one leg and up the other."***
** ***"The moon is a planet just like the earth, only it is even deader."***

# GENERAL INFORMATION

Pertinent articles and discussion of published articles, especially those related to Meta Science, are welcome. The preferred format is Microsoft Word. Appropriateness for this Bulletin is at the discretion of the editor; but if accepted by referees, articles will be published without significant editing of content. A response by the editor or a referee may then also be published. The first author is shown any such response and offered the opportunity to adjust his contribution in the light of the response. If time permits, this process is iterated until all parties are satisfied. Until the publication deadline, authors have the option to defer publication to a later issue to complete this process.

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# AUTHOR INFORMATION

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# TABLE OF CONTENTS