



NMSR Reports

The Newsletter of the
New Mexicans for Science and Reason

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NMSR Reports, David E. Thomas, Editor, P.O. Box 1017, Peralta, NM 87042

AUGUST MEETING:

NEW MEXICANS FOR SCIENCE AND REASON WILL HEAR

**Benjamin Radford on
“Scientific Paranormal Investigation”
WEDS., AUGUST 11th, 2010, 7 PM**

==>UNM Law Building <==

==> 1117 Stanford NE, ROOM 2402 <==

Bring a friend

JULY 2010 – NO NMSR MEETING: SUMMER BREAK

Our July meeting has been cancelled, as Dave Thomas will be in the field in Wyoming. Have a Safe and Happy Summer!!

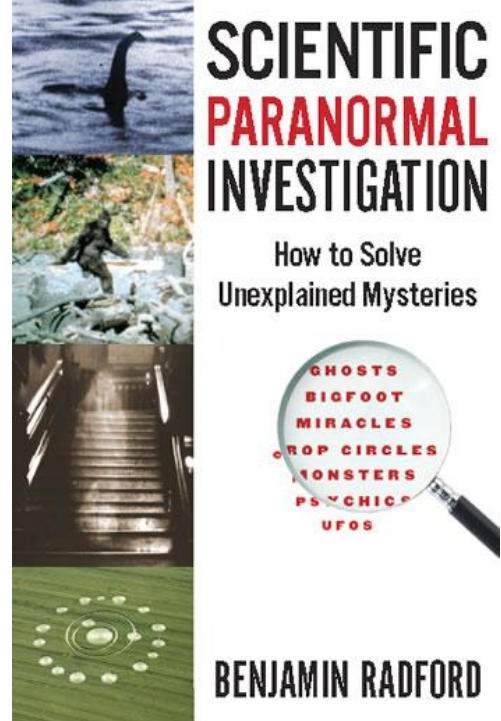
August 11th, 2010 NMSR MEETING: Benjamin Radford, on “Scientific Paranormal Investigation”



The August NMSR meeting will feature Skeptical Inquirer's managing editor Benjamin Radford, talking on his new book, “Scientific Paranormal Investigation:How to Solve Unexplained Mysteries.” We'll be testing the water for a possible workshop on skeptical investigations, in conjunction with other local skeptic groups. Of his new book, Ben says

“Scientific Paranormal Investigation is the first book to give the public an inside look at the life, methods, and work of a real-life scientific paranormal investigator. I have pursued 'unexplained' phenomena for over twelve years - not just read or written about them, but actually gone out to see what's there. In a nutshell, Scientific Paranormal Investigation is the literary equivalent of The X-Files meets CSI: Crime Scene Investigations: applying scientific methods and principles to real-life mysteries, and

coming up with explanations when it seems none are possible. Whether the subject is a crime scene or a haunted house, the questions are the same: What did eyewitnesses see? What does the evidence show? For the millions who have an interest in the paranormal but who are not necessarily familiar with what skeptics are or what they do, this book provides an understanding of skepticism and how science can be applied to modern mysteries and the paranormal.”



Features 80 illustrations and photos.

With contributions by James Randi, Joe Nickell, Martin Gardner, Susan Blackmore, Ray Hyman, David Clarke, David E. Thomas, Richard Wiseman, Karen Stollznow, James Underdown, Daniel Loxton, Gary P. Posner, Massimo Polidoro and Blake Smith.

New Mexicans for Science & Reason (NMSR)

NMSR is a non-profit group with the goals of promoting science, the scientific method, rational thinking, and critical examination of dubious or extraordinary claims. NMSR meets at 7 PM on the second Wednesday of each month, in Albuquerque, New Mexico, at the UNM Law Building (1117 Stanford NE, Room 2402, toward the west [golf course] side of the building). *NMSR Reports* is its official newsletter.

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Membership: \$25/year, includes newsletter, check payable to NMSR, send to treasurer (Shelton).

Newsletter subscription: \$15/year (12 issues)

NMSR Advisors:

• *Robert Cormack*

Professor of Psychology, NMIMT

• *Kendrick Frazier*

Editor, *Skeptical Inquirer*

• *John Geissman*

Professor of Paleomagnetism, UNM

• *Alan Hale*

Southwest Institute for Space Research

• *Randy Thornhill*

Professor of Biology, UNM

Cyber-Cypher Clue: C = F

Bonus Puzzle Clue: Moment of Inertia.

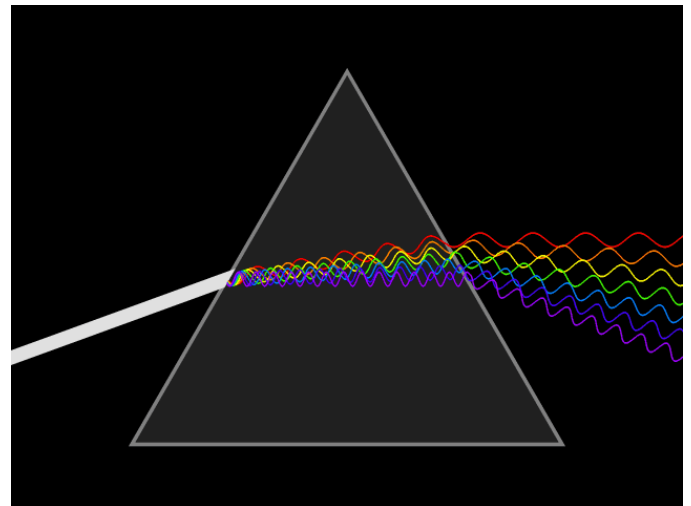
Wonder Quest by April Holladay



Glass Transparency

Q: *Why is glass transparent even though it is made of sand?*

Light is an electromagnetic wave that rips through space — interacting with everything it encounters. In space, light meets little. A dense material like, glass, however, slows light as the wave 'decides' how to interact with the material. But decisions aren't easy and there are many. The quantum-mechanical rules light follows are rigid, allowing only discrete answers: 'yes' or 'no.' The rules forbid 'almosts.'



A glass prism separates light into its color components much as rain and sunlight can form a rainbow.

Why is glass transparent even though it is made of sand? *Abhishek, Bhiwani, India*

The wave's electrical and magnetic fields oscillate back and forth, and when the light wave hits a pane of glass, the wave's oscillations cause charged particles (primarily electrons) within glass molecules to vibrate back and forth as the electrons 'try' to absorb the light. Can they do it? Well, it depends.

If the 'light' is high-energy (deep ultraviolet, for instance), yes glass molecules can absorb light. Glass, therefore, blocks deep ultraviolet and glass is not transparent to those rays.

"Glass is almost perfectly opaque to deep ultraviolet,

which is why it's hard to get a tan through a window," emails physicist Louis A. Bloomfield (<http://rabi.phys.virginia.edu/lab3e/home.html>) of the University of Virginia. "By deep ultraviolet, I mean UVB and UVC."

But if the 'light' is visible, then the answer is *no*. Pure glass cannot absorb visible light. Light merely slows (as glass molecules decide what energy contained in visible light, if any, matches an energy level of an atom in the glass molecules). In fact, the speed of light through glass is 66% of its speed through a vacuum.

A little background: Molecules are a group of atoms held together by electro-static forces. An atom is a speck of matter consisting of a dense positively-charged nucleus surrounded by a system of tiny negatively-charged electrons.

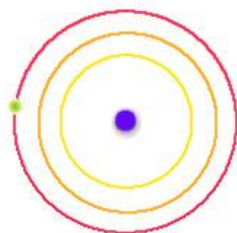
Visible light from the Sun is made of light waves with many colors (which we see displayed in a rainbow, for example). Each color has a particular frequency and that frequency has an energy level proportional to that frequency, says Bloomfield.

Now the electrons of an atom also have discrete energy levels. What has to match is an electron's and a color's energy levels. If any of the energy levels of the light matches any of the energy levels of the electron, the electron absorbs that energy and the glass heats up.

It turns out none of glass electron energy levels match any of the energy levels in the colors of visible light. So light passes through glass. Thus, sun-illuminated pure glass doesn't get hot while the opaque frame around it does.

The electron decision process is almost a scene from science fiction. "In effect, the charged particle 'plays' with the photon of light, trying to see if it can absorb that photon," writes Louis A. Bloomfield in *How Everything Works* (<http://www.howeverythingworks.org/page1.php?QNum=1304>). "As it plays, the charged particle begins to shift into a new quantum state — a 'virtual' state."

Trying to decide if it can absorb the light, the electron tries an energy state (actually a light-wave color, say purple) on for 'size', so to speak.



Electrons have associated discrete energy levels called 'orbitals'. The higher the orbital-energy level, the farther the orbital is from the nucleus. The drawing depicts energy levels of a hydrogen atom (innermost is lowest energy, outermost highest). The nucleus is shown as the center blob, and an electron (small blob) is shown at its highest energy state, farthest from the nucleus. It will not last long in this state; soon it will emit a photon (a light particle), and return to its

lowest energy state (yellow ring).

The electron shifts to a higher energy level, say a state between the outer circle and the middle one shown in the hydrogen-atom figure. The electron realizes it's in a new 'virtual' state (between the outer two circles) and wonders, "do I get to stay here?" No, it concludes as it consults its list of allowable states. I'm between two allowable states (shown by the outer two circles) so my virtual 'purple' state doesn't match. Oops. The electron quickly returns to its original state (innermost circle). It can't stay in virtual reality long. To do so would violate the rules of quantum mechanics.

As the electron returns to its original state, the electron reemits the photon it was playing with, says Bloomfield, unchanged. That's why glass is transparent — glass can't absorb any frequency (color) of visible light. So it ends up reemitting the same light.

Sand isn't transparent partly because it does absorb some light colors (tiny grains of basalt, for example, absorb all frequencies so basalt sand appears black). Also, sand (tiny quartz grains for instance) has "countless tiny surfaces" that reflect about 4% of the light trying to pass through those surfaces, says Bloomfield. The small surfaces also bend the light as it exits the grain's surface so the light then travels in a different direction. The net result is that the grain doesn't reemit the light unchanged. Instead the grain's surface scatters light, so those sand grains appear white. Similarly, clear, crushed glass dust appears white.

I am indebted to physicist Louis A. Bloomfield (<http://rabi.phys.virginia.edu/lab3e/home.html>) of the University of Virginia for his discussion of how light passes through matter.

More exploring

Where does an atom get its energy?
<http://www.wonderquest.com/atom-energy.htm> WonderQuest, February 2006

Further Reading:

How Everything Works: Making Physics Out of the Ordinary
<http://www.amazon.com/gp/product/047174817X> by Louis A. Bloomfield, Wiley (April 21, 2006)

Speed of Light in Transparent Materials
<http://micro.magnet.fsu.edu/primer/java/speedoflight/index.html>,
Interactive Java tutorial by Michael W. Davidson, Thursday, Jun 15, 2006

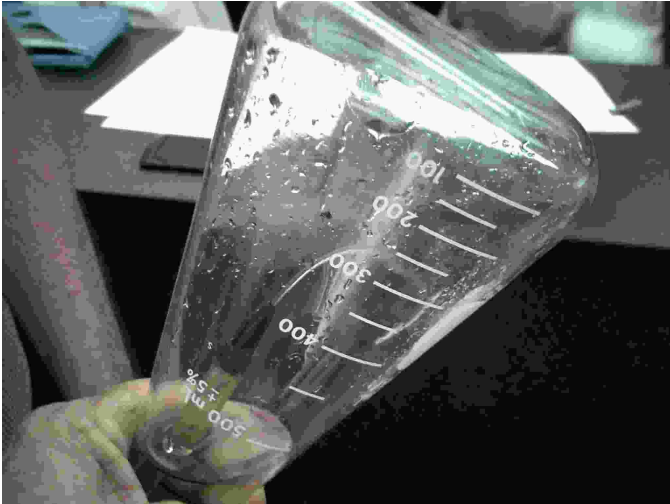
(Answered 14 June 2010)

<http://www.wonderquest.com/>

Find Wonder Quest at USA TODAY's site!

To read April's past WonderQuest columns, please check out her site, www.wonderquest.com. If you have a question for April, visit this informational page: www.wonderquest.com/AskQuestion.htm.

REMEMBER, our next regular NMSR meeting is at 7 PM on **WEDNESDAY, AUGUST 11th, 2010**, at the **UNM LAW BUILDING (2402)**!



After the show and tell session, a business meeting was held to discuss bylaws, dues, and elections. Some suggestions to the bylaws were made, and these are being considered by the Board. Here follows the proposed revision to NMSR's bylaws. The most significant change discussed was adoption of a uniform rate - \$25 per annum – for all types of subscriptions (hard-copy versus internet), since trying to split up costs between internet expenditures and newsletter printing fees and donuts turned out to be fairly difficult and subjective. Comments are welcomed!

Proposed Bylaws of the New Mexicans for Science and Reason (NMSR), July 2010 version

In pursuance of its goals, New Mexicans for Science and Reason shall have the following specific objectives:

- I. To promote appreciation of science by obtaining fascinating local and international speakers for meetings, and publishing accounts of such events.
- II. To serve as a local source of information for the public and the media concerning allegedly-paranormal phenomena and pseudo-scientific claims.
- III. To work with local schools in promoting the methods of scientific inquiry and in discouraging the uncritical acceptance of pseudoscientific and paranormal claims.
- IV. To monitor local news media and encourage them to give paranormal and pseudoscientific claims fair, accurate, and critical coverage.
- V. To conduct investigations of alleged paranormal phenomena and make the results of these investigations known to the public.
- VI. To cooperate with CSI (The Committee for Scientific Inquiry) and other pro-science or pro-reason groups.

MEMBERSHIP

Membership is open to all persons who share the goals of the organization.
Membership is contingent upon the payment of annual dues, \$25 per annum.

Members shall not speak for the New Mexicans for Science and Reason unless authorized to do so by the Board of Directors. Members shall not distribute letters or articles on NMSR letterhead or under NMSR's aegis unless authorized to do so by the Board of Directors.

MEETINGS

Meetings will be held at 7:00 PM on the second Wednesday of each month. The speaker and/or topic for the meeting will be announced in advance in the monthly Newsletter, and on the NMSR website.

OFFICERS

Officers shall be chosen by a majority vote of the membership.

Officers shall consist of president, vice-president, secretary, and treasurer.

The PRESIDENT shall preside over meetings, sign official organizational correspondence, and ensure that official resolutions and decisions of the organization are executed. Additionally, the PRESIDENT shall record and maintain minutes of all meetings, and prepare meeting agenda.

The VICE-PRESIDENT shall assist the president and serve as acting president in his absence, and maintain membership rolls..

The TREASURER shall disburse funds, maintain financial records, and report to the Board and membership on financial matters.

Vacancies in any office resulting from resignation, removal, or disability shall be filled by majority vote of the Board of Directors.

BOARD

The Board of Directors shall conduct the affairs of the New Mexicans for Science and Reason and shall consist of the officers and other members elected by majority vote of the general membership. The board consists of the Officers and up to five Member-At-Large positions, which are appointed at the discretion of the Board.

Officers and Board members shall be elected for 2-year terms. Meetings of the Board of Directors shall be called at the discretion of the president or upon the request of any member of the board.

Any decision of the Board of Directors may be repealed by majority vote of the general membership.

AMENDMENTS AND PROCEDURES

Amendments to these bylaws may be proposed at any meeting of the Board of Directors. A two-thirds vote of all members of the Board shall be required for passage.

Rulings on any point of procedure not provided for in these bylaws shall be made by the President.

9-11 Follow-Up: DEBATE on Coast-to-Coast AM coming up July 31st, 2010

By Dave Thomas

Preparations continue for the twice-delayed “9-11 Truth Debate” on the internationally-syndicated talk radio program “Coast-to-Coast AM” (formerly hosted by Art Bell). The program will run from 11:00 PM MDT on Saturday, July 31st, through 3:00 AM on Sunday, August 1st. The host will be Ian Punnett. The 9-11 “Truther” team will consist of Richard Gage, founder of Architects and Engineers for 9-11 Truth, and one other person. (Initially, Gage wanted *four* additional debaters on his side: Kevin Ryan, B.S. Chem, Michael Donly, P.E., Niels Harrit, Ph.D. Chemistry, and Erik Lawyer, Firefighter. But, the producers didn't want that large of a crowd.) Gage has also proposed the structure and topics of the entire four-hour debate, in down-to-the-minute detail. Of his 16 proposed discussion topics, fully 10 involved various aspects of World Trade Center 7, which was not hit by a plane, and which collapsed late on the afternoon of 9-11 (after hours of intense fires Gage dismisses as “minor.”)

Unsurprisingly, the Coast-to-Coast producers have *not* agreed to let Gage micromanage the entire affair, and have further asked that each side have just two representatives. A to-be-determined individual and I will be supporting the mainstream consensus (that 9-11 was done by terrorists using airplanes).

I was fairly laid back in my letter to the radio producers, saying I was willing to expound on various topics, such as “*The Truth Movement adopts mutually contradictory positions: thermite was used because explosives would have been too loud; explosives must have been used because beams*

were flung hundreds of feet.” It turns out that the “lateral ejection of beams hundreds of feet.” can be explained by gravity, collisions and momentum, with no need to invoke high explosives. Likewise, a good explanation of the towers' fall times and speeds does *not* require thermite cutting of beams, but only gravity and momentum instead.

This should be an interesting encounter.

Correction: in the June 2010 NMSR Reports, we wrote “Before 19-mph impact, the top 14 floors of Tower 1 (North), i.e. a mass of 14M, was falling at $v=8.3$ m/s (~19 mph). ...” This should have said the mass was falling at **8.63 m/s**, which makes the math following that come out right.

The NMSR e-mail list is fun! It's an e-mail list with news announcements of interest to NMSR members, discussions about news of the times, and more. To join, send a request to nmsrdave@swcp.com.

Thanks to: John Geohegan, Ross Goeres, April Holladay, Debbie Thomas and our Puzzlers!

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<p>NMSR Reports Vol. 16 No. 7 July 2010 David E. Thomas, Editor (505) 869-9250 P.O. Box 1017, Peralta, NM 87042-1017</p>	<p style="text-align: center;"><i>IN THIS ISSUE:</i></p> <p style="text-align: center;">Upcoming Meetings Wonderquest Transparent Sand? Puzzles 9-11 Debate on Coast-to-Coast Radio, 31 July 2010 11 PM+</p>
<div style="border: 2px solid black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center; font-size: 1.2em;">July 2010 No Meeting</p> <p style="text-align: center;">Law Building Room 2402</p> </div>	<div style="border: 1px solid black; height: 100px; width: 100%;"></div>