NMSR *Reports*
The Newsletter of the
New Mexicans for Science and Reason

NO JULY MEETING:
NEW MEXICANS FOR SCIENCE AND REASON ARE
ON VACATION!
Next Meeting August 8th, 2018!
==>CNM MAIN CAMPUS, Student Resource Center<==
==>Room 204<==
Bring a friend!

FUTURE MEETINGS ANNOUNCED

No NMSR Meeting in July!

NMSR is on vacation in July, and there won't be a meeting on the 2nd Wednesday.

August 8th, 2018 NMSR Meeting:

Skeptical Inquirer managing editor **Benjamin Radford** will discuss "**The Blue Whale Game: Moral Panic or Public Threat?**"

In 2016 scary warnings circulated on social media asking parents, teachers, and police to beware of a hidden threat to children: a sinister online "game" that can lead to death. Many panicky social media posts plead for parents to take action against the "Blue Whale" suicide game believed to be a hidden online social media group whose goal is encouraging children to kill themselves. One warning from the British government explained that "members have to do different tasks for 50 days. They include self-harming, watching horror movies and waking up at unusual hours, but these gradually get more extreme. But on the 50th day, the controlling manipulators behind the game reportedly instruct the youngsters to commit suicide." The Blue Whale Game has many hallmarks of a classic moral panic, including "Stranger Danger" fears, concerns over new technology, and references to an evil conspiracy. While most of the reports of teen suicides were from Russia, Benjamin Radford investigated news reports of the first two alleged victims of the Blue Whale game in the United States: a fifteen-year-old boy in San Antonio, Texas and a sixteen-year-old girl in Atlanta, Georgia.

Join us at 7:00 PM August 8th, 2018, CNM MAIN CAMPUS, Student Resource Center, Room 204.

September 12th, 2018 NMSR Meeting: Larry Crumpler, with News from Mars

Our Sept. 12th speaker will be scientist Larry Crumpler of the NM Museum of Natural History and Science. Larry will talk about the accomplishments of the rovers he helped to deploy, and also what's ahead for humans regarding the Red Planet.

Correction: In the June issue's article on Fort Stanton Cave, the natives occupying the cave in ancient times were *indigenous*, not *indigent*. Sometimes, spell checkers let you down.

DIGITAL DOODLES Measure the radius of the earth, with just a yardstick and a stopwatch! **See page 3.**

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 CNM's Student Resource Center, room 204 (@ Richard Barr Boardroom). NMSR Reports is its official newsletter.

NMSR officers:

Dave Thomas, President
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Membership: $25/year (hardcopy newsletter), or **$15**/year (downloadable PDF), make your check **payable to NMSR**, send to treasurer (Debbie Thomas).

NMSR Advisors:

• *Mark Boslough,*
  Physicist (Impacts, Climate Change,
  Global Warming). Sandia National Labs.
• *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: Z = V, Y = C.

Bonus Puzzle Clue: Find speeds of escalator with and without climbing, in terms of the unknown height, H. Find speed of climber, in steps per second. The climber's speed on the moving escalator = the escalator's speed, plus the climber's speed. Solve for H, then for time.

WANTED: READER ARTICLES & COMMENTARY

Got something to share with NMSR members? Send it in! ATTN: Dave Thomas, Editor, NMSR Reports.

REMEMBER, our next NMSR meeting is at 7 PM on **WEDS., AUGUST 8th, 2018**, at Student Resource Center, room 204 **at CNM!**

PUZZLE TIME!

[Please send solutions to Dave Thomas at: nmsrdave@swcp.com, or at 801 Fitch Ave., Socorro NM 87801.]

Cyber-Cypher: JULY PUZZLE

(Submitted by Dave Thomas)

The following letters are a simple substitution cypher. If R stands for L, R will stand for L everywhere. Your Cyber-Cypher Clue: Clue? Oh, well - if you must, see p. 2.

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" B    T I   Y J K Z B K Y V U    R D T R    B R

A B G G    K J R    O V    G J K X    O V E J S V

R D V       A D J G V       A J S G U

T Y L K J A G V U X V C    R D V    S V C F G R C

J E   I P   A J S L . "   -   X V K V R B Y B C R

X S V X J S   I V K U V G
```

SUPER SECRET WORD!

However you prefer to do the cypher itself (above or below), simply duplicate those actions on the alphabetized row of cypher letters below. You'll build an answer key, and you'll also reveal - the Super Secret Word!

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

JUNE CYPHER SOLUTION

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"IF YOU KNOW YOU ARE ON THE RIGHT TRACK, IF
YOU HAVE THIS INNER KNOWLEDGE, THEN NOBODY
CAN TURN YOU OFF ... NO MATTER WHAT THEY
SAY." - BARBARA MCCLINTOCK
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Esteemed June Code Crackers: Terry Lauritsen*, Mike Arms*, Austin Moede* and George Egert*.
*Secret Word: "DOUBT SEARCHINGLY"

SOCORRO STUMPER

Need more Secret Word Cryptograms?

New puzzles every week at
www.nmsr.org/SocorroStumper.htm

July Bonus: "Powered Ascent"

Submitted by Dave Thomas

A bored convention-goer decided to deduce how many steps were found from the bottom to the top of the up escalator in the lobby. She found that by simply standing on the same step, she would ascend to the top in 35 seconds. When she walked up the moving escalator at her normal pace, however, the ascent only took 15 seconds,

with a total of 23 steps climbed.

The July Bonus: If the power was switched off, and the escalator became mere stairs, how many steps is it to the top? And how long would it take our subject to make the ascent?

The June Bonus: "Emoji Maths"

Submitted by Dave Thomas Given:

The June Bonus: Solve for 🇦🇺 + 🎃 + ⚽

🇦🇺🇦🇺 +	🎃 +	⚽	=	17
🇦🇺 +	🎃 +	⚽⚽	=	23
🇦🇺 +	🎃 -	⚽	=	2
🇦🇺 +	🎃 +	⚽	=	?

ANSWER: 10; just add the 1st two equations, and divide by 4. The individual values are 2, 3, and 5. **Congrats**: Earl Dombroski (NM), Rocky S. Stone (NM), Mike Arms (NM), Keith Gilbert (NM), Gene Aronson (NM), Mark Maravetz (NM), Allen Robnett (NM), and Eiichi Fukushima (NM)!

DIGITAL DOODLES

by Dave Thomas

Measuring the radius of the earth, with just a yardstick and a stopwatch!

Some math preliminaries:

$$(x+y)^n = \binom{n}{0}x^n y^0 + \binom{n}{1}x^{n-1}y^1 + \binom{n}{2}x^{n-2}y^1 + ... + \binom{n}{n}x^{n-n}y^n$$

$$n! \equiv n(n-1)(n-2)...(3)(2)(1)$$

$$\binom{n}{k} \equiv \frac{n!}{(n-k)!k!}$$

$$\binom{n}{0} \equiv \frac{n!}{(n-0)!0!} \equiv 1$$

$$\binom{n}{1} \equiv \frac{n!}{(n-1)!1!} = \frac{n(n-1)!}{(n-1)!} = n$$

$$\binom{n}{2} \equiv \frac{n!}{(n-2)!2!} = \frac{n(n-1)(n-2)!}{(n-2)!2} = \frac{n(n-1)}{2}$$

$$(1+y)^{\frac{1}{2}} \approx \binom{\frac{1}{2}}{0}1^{\frac{1}{2}}y^0 + \binom{\frac{1}{2}}{1}1^{(\frac{1}{2}-1)}y^1 + \binom{\frac{1}{2}}{2}1^{(\frac{1}{2}-2)}y^2 + ...$$

Because y is small, terms with y^2, y^3 *etc.* $\to 0$

$$(1+y)^{\frac{1}{2}} \approx 1 + \frac{y}{2}$$

The preceding development shows how the Binomial Formula can be used to derive an approximation for $\sqrt{(1+y)}$. This can be used to derive a small-angle formula for $\cos(\theta)$, as shown below.

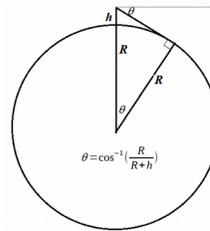$$(1+y)^{\frac{1}{2}} \approx 1 + \frac{y}{2}$$

$$For\ y=-z^2, (1-z^2)^{\frac{1}{2}} \equiv \sqrt{(1-z^2)} \approx 1 - \frac{z^2}{2}$$

$$\cos^2(\theta) + \sin^2(\theta) \equiv 1, so, \cos(\theta) = \sqrt{1-\sin^2(\theta)}$$

$$for\ small\ \theta, \sin(\theta) \approx \theta, so$$

$$\cos(\theta) \approx \sqrt{1-\theta^2} \approx 1 - \frac{\theta^2}{2}$$

What is this good for? How about an easy way to measure the radius of the Earth, using a yardstick and a stopwatch! Imagine a 2-meter tall person, laying on their side on the seashore at sunset. Just as the sun sets, the person stands up, and finds that the sun comes back into view. By measuring the interval Δt between the first sunset (lower position) and the second sunset (higher position), and the vertical difference in positions, h (i.e. the person's height), the radius of the Earth can be obtained as given below. The key to the solution is that the ratio of the small time interval between sunsets to the number of seconds in a day is equal to the ratio of the small angle the earth rotates through in time Δt seconds to the amount of rotation in a day (360°, or, for math purposes, 2π radians). Results are rough for short times (a one-second error for a 2-meter-tall person can make for 20% off the actual radius), but can be improved with larger heights and times. If an observer from a hillside, perhaps 100 meters above the ocean, were to start a stopwatch the moment a second observer, down on the beach, phoned to report the sun just set, and then measured the time interval till the hillside observer's sunset, that interval (new Δt) and the height h (100 m) would yield a far better estimate of Earth's radius.

$$\cos(\theta) = \frac{R}{R+h}$$

$$\to R(1-\cos(\theta)) = h\cos(\theta), \to R = \frac{h\cos(\theta)}{1-\cos(\theta)} \approx \frac{h\cos(\theta)}{(\frac{\theta^2}{2})}$$

$$\to R \approx h\frac{1-\frac{\theta^2}{2}}{(\frac{\theta^2}{2})} \approx \frac{2h}{\theta^2} as\ \theta\ is\ small, so\ 1 - \frac{\theta^2}{2} \to 1.$$

$$R \approx \frac{2h}{\theta^2}$$

$$R \approx \frac{2h}{\theta^2}$$

$$\theta = \cos^{-1}(\frac{R}{R+h})$$

$$\frac{\theta}{2\pi} \equiv \frac{\Delta t}{86,400\ sec}, where\ 1\ day = 24\ hours = 1,440\ minutes = 86,400\ seconds$$

$$So, R \approx \frac{2h}{(\frac{2\pi\Delta t}{86400})^2} \approx \frac{h}{2}(\frac{86400}{\pi\Delta t})^2$$

$$So, R \approx \frac{h}{2}(\frac{86400}{\pi\Delta t})^2, where\ h\ is\ distance\ (meters, feet), and\ t\ is\ time\ (seconds).$$

JUNE MEETING: DAVE STRAUB ON MODEL-MAKING

Our June 13th speaker was Dave Straub, formerly of Sandia National Labs, and a member of the International Plastic Modelers Society (IPMS), and its local affiliate, the Albuquerque Scale Modelers (ASM). Straub spoke on "Building Models of Historic Structures."
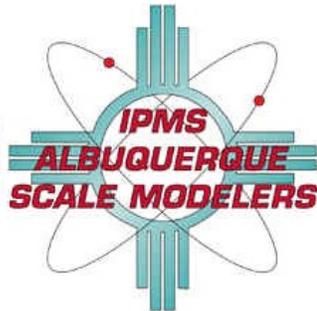
Dave described how he got interested in making scale models, and of his interest in aircraft and dirigibles. Making precise models is a painstaking craft. Some of the models Straub has made took several years to complete. A project starts with basic research. Blueprints and other plans are obtained through several means, including taking photographs of a microfiche display. Model makers go to great lengths to make their models accurate replicas of the originals, in dimensions and structure. He hand-crafts small parts like struts or panels in wood or clay, and then makes molds from those, which are used to produce one or many plastic copies of the given part. The parts are carefully assembled and painted. Straub has won several national and local awards for his amazingly accurate and artistic models.

U.S.S Los Angeles Dirigible, U.S. Navy Flying Boat NC-4

NMSR thanks Dave Straub for a fascinating presentation.

DUES - check the date on your mailing label. If it's time for you to renew, or to make a contribution, please send a check payable to **NMSR, ATTN: DEBBIE THOMAS, NMSR Treasurer**, 3205 Alcazar NE, Albuq., NM 87110
Name _____
Address_____
Membership $25 per annum (hard copy newsletter), or $15 per annum (online newsletter).

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 Covan, Eddy Jacobs, Debbie Thomas, and all our Puzzlers!

NO MEETING IN JULY