Something to Think About*

Are you aware of the science sites in and around Washington, D.C.? *This is from Science Newsletter No. 70 for January 1999.

Note from the Editor

Please send us items for future newsletters and share your teaching experiences with a note to us. If you know of anyone who would like to read the Newsletters, please inform them about the web address below. (You can use e-mail to stumpf@ohio.edu.) Your comments or suggestions are also welcome. Hard copies are no longer available. You can see the Newsletter on the web at www.phy.ohiou.edu/stnl. Look for it in September and January. It is listed in the Ohio University Department of Physics and Astronomy home page.

Why don’t you write or e-mail Burt Stumpf and tell me if these newsletters are helpful and how you use them? Any comments are welcome! Please let me know if you wish a previous newsletter.

Announcements

- The 2013 Southeast Ohio District Science Day will be held on Saturday, March 16, 2013. It will be held at Ohio University in Athens, Ohio. Judges are needed. Would you volunteer? Let Dr. Elizabeth Gierlowski-Kordesch know if you can help. Her email is gierlows@ohio.edu. The web address is www.ohio.edu/scifair/
The **2013 State Science Fair** will be held at Ohio State University in Columbus, Ohio, on Saturday, May 11, 2013.

For the next **Women in Science and Engineering Workshop** at Ohio University in Athens, Ohio, please write to Dr. Tong or call him for information and application blanks. His number is 740-593-1733. [www.ohiou.edu/wise/](http://www.ohiou.edu/wise/)

The **Ohio Chemistry Contest** will be held in October 2013. For information, call Dr. James Tong in the Ohio University Chemistry Department at 740-593-1733. [www.ohiou.edu/chemcontest/](http://www.ohiou.edu/chemcontest/)

The **International Science and Engineering Fair** will be held in May 2013.

**The AMERICAN ASSOCIATION OF PHYSICS TEACHERS APPALACHIAN SECTION** (Southeast Ohio, West Virginia and Western Maryland), will hold a **FALL 2013 MEETING** at Marshall University in Huntington, West Virginia. All school and college physical science and physics teachers are welcome. Why don’t you consider joining this AAPT Section or the Ohio Section or the Southern Ohio Section? There are contributed and invited papers, tours, demonstrations, etc. that are included in the meeting. The meetings are an opportunity to meet colleagues (network) and to learn about new developments in physics and physics teaching.

**Teaching Materials Available**

**Books and Publications**

- **The Fact of Evolution**: by Cameron M. Smith is published by Prometheus Books at $18. The author, an anthropologist, discusses evolution and why it is necessary for life on Earth.

- **The Philosophical Breakfast Club – Four Remarkable Friends Who Transformed Science and Changed the World**, by L.J. Snider. This is a book about these four men: Charles Babbage (mathematician), John Herschel (astronomer, chemist, inventor), Richard Jones (curate, government official), and William Whewell (polymath). It has 439 pages and is
published by Broadway Books at $27.


- **Nanoscale**: Visualizing an invisible world. The authors are K.S. Deffeyes and S.E. Deffeyes. There is a text with pictures. In paperback, the cost is $12.95. There are 144 pages and the publisher is MIT Press.

- The John Hopkins University Press publishes these paperbacks at $24.95 each:
  
  - Fishes
  - Small Wild Cats
  - Bats of the United States and Canada

**Demonstrations, Equipment, Software, Conferences, Tours, etc.**

- 3B Scientific offers electron diffraction equipment and equipment for the Frank-Hertz experiment. Use [www.A3BS.com](http://www.A3BS.com) or 866-448-5846.

- **PASCO** sells a new system for studying statics. The system has equipment to study: the balance beam, force table, forces on an inclined plane, and others. Use 1-800-772-8700 or [www.pasco.com](http://www.pasco.com).

- For professional development for teachers of physical science and physics, AAPT has the Physics Teacher Resource Agent (PTRA) program. Use [www.aapt.org/ptra](http://www.aapt.org/ptra).

- **Texas Instruments TI-Nspire** is a handheld computer that can be used with up to five Vernier sensors when doing physics experiments. The software used is Vernier Data Quest. See [www.education.ti.com/us](http://www.education.ti.com/us)
Vernier Software and Technology sells the Advanced Physics with Vernier-Mechanics Lab Book. They also offer a central force apparatus. For information use www.vernier.com or 888-837-6437.

AAPT has the Physics Store, which has books and other items at www.aapt.org/store/. AAPT has its headquarters at One Physics Ellipse in College Park, MD. Use www.thephysicsstore.com or 301-209-3333.

You might like to explore the online physics library call comPadre. It has support for K-12 teachers, tutorials, open source physics, physics careers resources, and others. Use www.comopadre.org.

Adiabatic Compression Equipment with a compression igniter is available from PASCO. Provided also are instructions and the theory. Use www.pasco.com.

Tours for Middle and High School Students. The Department of Physics and Astronomy at Ohio University in Athens offers tours for classes and individual students (especially juniors and seniors visiting colleges to attend). Call Wayne Chiasson at 740-593-1712 or use chaisson@ohio.edu. We welcome teachers, parents, and students.

New Developments in Science and Science Education

Exoplanets. Some astronomers have discovered 50 or more exoplanets. They think that most stars have planets and these planets mostly are of low mass. These planets are detected with the Doppler Effect associated with the star’s motion caused by the attracting planet. See Science News, October 22, 2011 on page 18 for a full explanation.

Stone Age Humans used a complex several-step process in making an iron-based red paint. These were humans who lived 100,000 years ago. This is a very recent discovery by archeologists in a cove on South Africa’s coast. The discovery is described in Science News, November 19, 2011 on page 16.
Preparing Students for Science and Engineering Careers is the subject of an article in The Physics Teacher for October 2011 on pages 418 to 420. It discusses the following: the worth of a bachelor’s degree in several fields, preparation for college readiness based on math taken in high school, state ratings using the Science and Engineering Readiness Index, and other topics.

Vibration Analysis and the Accelerometer is the subject of an article in the November 2011 issue of the Physics Teacher. This was an experimental study of the vibrations of a loud speaker and a box fan using an accelerometer and FFT analysis. These are experiments that were performed in a high school. The article is found on pages 505 to 507.

There is a substantial article in the American Scientist Volume 99, 2011 entitled, “Whatever Became of Holography.” It discusses the history and development of holography and the current research. This research involves: computers with holograms (synthesis of holograms using computers), data storage using holograms, and other research. This article is on pages 482 to 489 and contains several figures.*

Note see the Feature Article in the next section on Acoustic Holography. This is taken from the Science Teachers’ Newsletter number 87 for September 2007.

Arizona State University offers a Master of National Science degree. Physics and Chemistry teachers can profit from this MNS program. The courses are described at: www.modeling.asu.edu/MNS/MNS.html

Convincing US States to Require Physics is an article in Physics Today for July 2011 on pages 29 and 30. This is a study done concerning the readiness of high school graduates for the study of STEM courses in college. A method to study readiness is SERI- Science and Engineering Readiness Index. States were ranked according to a scale that went from Best to Worst. Much improvement is needed by many states. Some don’t require physics.
Feature Article

Acoustic Holography

This article was written by Dr. F.B. Stumpf, an emeritus professor of physics at Ohio University in Athens. He is a member of the Acoustical Society of America and the Appalachian Section of the AAPT. He graduated from North Canton H.S. in North Canton, Ohio. His B.S. is from Kent State, M.S. from Michigan, and Ph.D. from the Illinois Institute of Technology. Dr. Stumpf taught undergraduate and graduate courses in physics. He also wrote the text *Analytical Acoustics*, published by Ann Arbor Science.

It is possible to study the internal structure of the body and other objects using acoustic holography.\(^1\)\(^2\) This is attractive in medicine since it offers a safe method to differentiate and study body tissues such as muscles, tendons, blood vessels and tumors. Equipment for acoustic holography is available commercially. One experimental arrangement for acoustic holography produces a sound hologram on a liquid-air surface and then reads the sound hologram with a laser. Figure 1 shows the method\(^3\) to obtain a sound hologram by producing on the water surface the interference of the reference sound beam in water with the sound beam in water scattered from the immersed object under study. The interference pattern or sound hologram on the water surface is read with a laser. The holographic image shows the structure of the object similar to an x-ray photograph. Typical values for the frequency are several megahertz.
Sound wave holography may also be used in probing the sea in seismic prospecting for oil and gas. In these applications, arrays of transducers sample the interference pattern at various points in its plane. The signals from the array are then processed.³

There are other helpful references on holography.⁴⁵

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5. Giancoli, D.C. Physics, 806-807 (2005)
Answer to Something to Think About

The science sites in and near Washington D.C. are:

1. National Science Foundation in Arlington, Virginia. It is in downtown Arlington near a Metro station.

2. National Academy of Science. It has a sculpture of Einstein in its’ garden. The Academy is on Constitution Avenue near the mall.

3. The Smithsonian Institution has 3 museums on the mall;
   a. National Air and Space Museum
   b. National Museum of Natural History
   c. National Museum on American History

4. Goddard Space Flight Center in Greenbelt, Maryland.

5. The American Center for Physics in College Park, Maryland at One Physics Ellipse. It is located near a station of the Metro subway.

6. The National Geographic Society has its building with public exhibits at 17th and M streets, NW.

If you visit Washington, try to visit some of these. Google would have more detailed information on them.