

# THE NEW WANDERINGS

No. 12

01 March 2012

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<http://citizenscientistsleague.com/>

Please take a few minutes and send me an e-mail and let me know:

- Where you are located
- What you are your interests
- What you would like to see in *Wanderings*
- What you like about *Wanderings*
- What you do not like about *Wanderings*

One thing --- Please put "TNW" in the Subject Line so that my spam filter won't bump you.

Thanks

Ralph

## **Feature:**

### **The Promises, Demands, and Risks of Garage Biology**

Eric Sawyer looks at the rewards and dangers of “garage biology”.

### **Garage Biology**

“Amateur scientists who experiment at home should be welcomed by the professionals.”

### **DIY Biotech Hacker Space Opens in NYC**

A New York group recently opened [Genspace](#), the world's first government-compliant community biotech laboratory.

### **DNA Extraction and the Strawberry Smoothie**

*Genspace* shows us a super easy way to extract DNA from strawberries.

### **Open PCR**

The Open PCR project is offering a 16 sample thermocycler in kit form. With this device the researcher can produce millions of copies of a DNA sequence in a few hours.

### **Russell Durrett's Light Bulb PCR Machine**

This Arduino controlled Light Bulb PCR machine uses a light bulb and an old computer fan as its heating and cooling elements.

### **CheapStat: A DIY Potentiostat**

The CheapStat is an inexpensive DIY potentiostat, suitable for both analytical and educational applications that can be built for under \$80. This device supports cyclic, square wave, linear sweep and stripping voltammetry over the potential range -990 to +990 mV and over frequencies from 1 to 1000 Hz.

### **Cheapass Science – How to Build a \$21 Gel Box**

Joseph Elsbernd shows us how to do gel electrophoresis with a DIY gel box.

### **The \$2 DIY Centrifuge**

George M. Whitesides and his colleagues, at Harvard University, designed a centrifuge by modifying a manual egg beater.

### **The Quest for the \$500 Home Molecular Biology Laboratory**

John Brunstein set out to see if it was possible to set up a complete molecular biology laboratory for \$500.

### [A DIY Stir Plate](#)

A muffin fan and a couple of magnets are about all you'll need to construct this stir plate.

### [Indie Biotech](#)

"Tutorials, Kits, Equipment and community for the DIY biologists and small Biotech start ups."

### [DIY Bedbug Detector](#)

Dry ice is used as the heart of this bug trap.

### [Black Light Flashlight Hack!](#)

Kip Kay shows us how to modify a LED flashlight so that it can be used to locate "Nasty Stains". ☹

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## **Wanderings:**

### [Sixty Symbols](#)

In my opinion, this site from the University of Nottingham, featuring videos about physics and astronomy, is probably one of the best science resources on the Web.

### [More Symbols](#)

These other symbols were moved off of their Home Page.

### [Test Tube](#)

Videos from behind the scenes in the *World of Science*

### [Citizen Science Goes Extreme](#)

In the 17 February 2012 issue of Nature.com, a weekly on-line science journal, Katherine Rowland reports that "Researchers push for wider use of community-generated data in science and policy-making."

### [The Public Laboratory](#)

"*The Public Laboratory for Open Technology and Science (PLOTS)* is a community which develops and applies open-source tools to environmental exploration and investigation."

### [Video Spectrometer](#)

I am very disappointed that I did not find this site earlier, as it would have been a good addition to the Feb '12's Feature on spectrometers.

### [Introduction to Spectral Workbench](#)

*The Spectral Workbench* is the free software package that accompanies the Video Spectrometer.

### [Wine Tasting Spectroscopy](#)

Adam Hasler is experimenting with the possibility of using the PLOTS Video Spectrometer to analyze wine.

Note: *The Public Laboratory* is an open source program and therefore they invite you to join and take part in their projects or to submit your own.

### [Northern Colorado Earth Magnetism Observatory](#)

Joseph A. Diverdi describes his observatory that is based around Roger Baker's design of a torsion balance magnetometer.

### [The Tekatch-Welch Magnetometer](#)

Here is a magnetometer design that is based on the FGM-3h flux gate sensor.

### [Göte Flodqvist's Compass Magnetometer](#)

By adding a ADC, to this simple DIY magnetometer, your computer will be able to record the magnetic variations.

### [Crayon Physics](#)

I do not generally play video/computer games. In fact I find that they can't keep my interest for very long. But not so with *Crayon Physics!* This "is a 2D physics puzzle / sandbox game, in which you get to experience what it would be like if your drawings would be magically transformed into real physical objects. Solve puzzles with your artistic vision and creative use of physics." There is a free trial version, but with its \$19.95 price it's well worth it.

### [The Virtual Astronomical Observatory](#)

Matthew T. Dearing posted this link for us on the CSL Facebook page. "The Virtual Observatory (VO) embodies the concept of large scale electronic integration of astronomy data, tools, and services on a global scale in a manner that provides easy access by individuals around the world."

### [Printed Circuit Boards with Fritzing](#)

What a superb tool! Fritzing is an open-source initiative that enables designers, researchers and hobbyists to develop their own electronic circuits. Fritzing allows you to switch among bread board, schematic and PCB views.

### [Create Your Own PCB](#)

For those of us who don't want to invest too much into PCB design tools, this may be right up your alley.

### [Making PCB's With Windows Paint](#)

Here is a more detailed version of the method.

### [Electronics-DIY](#)

*Electronics-DIY* looks like a great source of schematics, tutorials and downloads. In addition they have a wide selection of cost effective electronic kits. I might even consider purchasing a few.

### [Stepper Motors](#)

This is a tutorial on stepper motors from the University of Iowa

### [A Novel AM radio](#)

A 555 timer chip is the only active component in this novel AM radio receiver.

### [Falstad's Math and Physics Applets](#)

I've listed [Paul Falstad's](#) site in the past. This time I'd like to show you his on-line java-based [circuit simulator](#).

### [Processing](#)

Processing is an open source programming language and environment that can be used the Arduino.

### [Molecular Expressions](#)

"Welcome to the *Molecular Expressions* Website featuring our acclaimed photo galleries that explore the fascinating world of optical microscopy."

### [How to Measure the Diameter of the Sun](#)

I originally posted this link in the Feb '12 column but I just found out that the URL has been changed. In this link, Rick describes a simple method of "*Measuring the Sun's Diameter with a Cardboard Rug Tube*".

This is an EXCELLENT example of how things on the Web are not always permanent. If you come across something that really interest you --- SAVE IT or PRINT IT OUT! --- because it may not be there when you go back to it.

### [How to Make a Three-Pendulum Rotary Harmonograph](#)

"A harmonograph is a mechanical device that uses swinging pendulums to draw pictures, believed to be originally invented in 1844 by Scottish mathematician Hugh Blackburn." This design uses a simple bearing & gamble system.

### [Dynamic Periodic Table](#)

Ptable's *Dynamic Periodic Table* is probably one of the best on the Web! Be sure to look at their "About" and "Demo"

### [Uranium Chemistry](#)

In his Blog, Carl Willis brings Uranium Chemistry to the amateur scientist.

### [Carl's Farnsworth Fusor](#)

Carl Willis' Blog, also, includes an account of his work with his DIY [Farnsworth Fusor](#)

### [The Gyrocompass](#)

This article shows how a spinning rotor can be made north seeking.

### [Dirac Delta Science and Engineering Encyclopaedia](#)

What is a **Quintic**? Find the answer of this and other useless and useful information in the Dirac Encyclopaedia.

### [Robert A. Paselk Scientific Instrument Museum](#)

This museum at the Humboldt State University contains a large collection of antique scientific instruments.

### [The Museum of the History of Science, Oxford, UK](#)

Several years ago I was fortunate to be able to visit this museum which "houses an unrivalled collection of early scientific instruments in the world's oldest surviving purpose-built museum building."

### [The Cyberneticzoo](#)

Come and visit Reuben Hoggett's site depicting the history of cybernetic animals and early robots.

### [List of Impact Craters on Earth](#)

This is a list of the largest Earth Impact Craters (20 km or more) as listed in the [Earth Impact Database](#).

### [Lab Tube TV](#)

The YouTube for scientists

### [On Being a Scientist: Responsible Conduct in Research](#)

I found this link in a post by Forrest Mims to the CSL Face Book Page.

### [On Being a Mentor to Students in Science and Engineering](#)

This e-book can be found on the same site.

### [Sugars and Bacterial Growth Kill Off Coral Reefs](#)

“Bacterial growth, stimulated by the presence of simple sugars in untreated sewage and agricultural runoff, can now be added to the list of things contributing to the demise of coral reefs.”

### [White-Nose Syndrome](#)

*White Nose Syndrome* is a devastating fungal disease that is killing North American bats.

### [Symmetry](#)

“*Symmetry* is a magazine about particle physics and its connections to other aspects of life and science ...”

### [The Feynman Lectures on Physics](#)

Michael A. Gottlieb set up this site in order to share information about *The Feynman Lectures on Physics*. Of special interest may be the math and physics exercises (with answers ☺).

### [Einstein's 23 Biggest Mistakes](#)

“The man with the big ideas wasn't so good with the details. Hans Ohanian writes that Albert often let his intuition overrule flawed proofs and shaky math.”

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## **From Instructables, YouTube & Make:**

### [YouTube: DIY BIO Plastic](#)

Brandon Smith shows how to make BIO Plastic.

### [YouTube: DIY Paddlewheel Wind Cart](#)

This is a very short clip but it gives you a pretty good idea on how to duplicate the car.

### [YouTube: Make An Amazing Magic Ball!](#)

Most people will probably accuse you of having magnets hidden somewhere in the setup.

### [YouTube: A Feynman Sprinkler Demonstration](#)

Is this video real or a hoax?

### [YouTube: The Vacuum Cannon](#)

Professor Philip Moriarty, at *Sixty Symbols*, plays with a vacuum Cannon.

**[YouTube: Who Was Louis de Broglie](#)**

[Louis de Broglie](#) was a French physicist who managed to win a Nobel Prize with his PhD thesis.

**[YouTube: Steam Engine Made From Junk](#)**

This air operated engine, is a great improvement over the *Toilet Paper Tube Engine* that has been a well tried and tested design.

**[Instructable: Toilet Paper Tube Engine](#)**

The author uses this simple model engine as an activity for his shop students.

**[Instructable: How to Smell Pollutants](#)**

This Arduino based pollution detector is able to “smell” various gases just by changing the [Figaro gas sensor](#).

**[Instructable: Air Quality Balloons](#)**

A group of Carnegie Mellon students installed a PICAXE micro controller, [Figaro gas sensor](#) and a tri-colour LED in helium balloons.

**[Instructable: An Arduino Controlled Toy Car](#)**

A toy car is modified so that it may be controlled by a micro controller.

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**The Kids Room:**

**[Home Testing for Endocrine Disruptors](#)**

[The Public Laboratory](#) presents an interesting project that could provide the ground work for your next year’s science fair entry.

**[The Vector Snowflake Generator](#)**

[The Evil Mad Scientist](#) has a free application that enables you to draw your own snowflakes and save them in PDF format.

**[Science Experiment Booklet](#)**

This printable booklet will allow your child to record the steps and results for any science experiment that they are working on.

**[Science Notebooking](#)**

Here are some other science note boor resources.



### [Darwinbots](#)

Darwinbots is an open source simulator which attempts to simulate artificial life and evolution.

### [The Science Project Lab](#)

This is a selection of science projects, ideas, procedures and techniques for Grades 1 to 8.

### [Google International Science Fair](#)

Google has launched their second annual *Google International Science Fair* which encourages students between the ages of 13 to 18 to be curious, ask questions, and perform science experiments to answer those questions.

### [The Canada Wide Virtual Science Fair](#)

The Canada Wide Virtual Science Fair is an annual online science and technology contest open to all Canadian students in grades K-12.

### [Lego Man in Space](#)

Two teens launch a LEGO man into near space.

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## **Random Samples:**

### **!!! Happy St. Patrick's Day !!!**

#### [Famine Soup](#)

I saw this receipt at the Strokestown Famine Museum in County Cork, Ireland. It looks like it had about as much nutritional value as flavoured water.

#### [Bacon and Cabbage](#)

On St. Patrick's Day many people eat a traditional Irish dish --- Corn Beef and Cabbage. The only thing is, the Irish did NOT eat beef, that is until they immigrated to North America and had a supply of beef, from the west. "Back home" they ate Bacon and Cabbage! --- Yum!!! ☺

#### [The Time Line of Ireland](#)

[Time Lines of History](#) maps out the history of Ireland through the ages.

#### [An Educational Road Trip With Richard Feynman](#)

This is one of the stories that can be found on the [Web of Stories](#) Web site.

### [The Online Gallery](#)

The British Library has a wide variety of virtual books available on line. The collection includes extracts from Capt. R.F. Scott's Diary, the draft score of Handel's *Messiah*, 29 sketches by Leonardo da Vinci, highlights of Audubon's *The Birds of America* and an Ethiopian bible that was commissioned by Emperor Iyasu around 1700.

### [Inkscape](#)

Inkscape is a free open source vector graphics editor, with capabilities similar to Illustrator or CorelDraw.

### [The Open Clipart Library](#)

This is largest collection of public domain clipart that may be used in any project for free and with no restrictions.

### [Clipart ETC](#)

This is an on-line collection of free clipart provided to students and teachers by the Educational Technology Clearinghouse at the University of South Florida.

### [The Photography of Yann Arthus Bertrand](#)

Take some time out and enjoy viewing the collection of over 2000 spectacular photographs by the talented photographer, Yann Arthus Bertrand.

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## **Suppliers and Stuff:**

### [Scientific American's "The Amateur Scientist" \[CD-ROM\]](#)

This CD contains the complete The Amateur Scientist columns from Ingalls to Carlson.

### [ModKit](#)

Modkit is a browser based "Drag & Drop" programming environment for the [Arduino](#) that allows you to program by using simple graphical blocks and/or traditional text code. Modkit's graphical blocks are heavily inspired by MIT's [Scratch](#) programming system.

### [Harris Educational](#)

Harris Educational's goal is to inspire people of all ages to discover science, technology, engineering, and mathematics through their various resources including their best selling science kits.

**Framsticks**

*Framsticks* is a three-dimensional artificial life simulation project that allows body structures and the brain functions of the creatures to be modeled.

**8-Pin Programming Shield**

You can program ATtiny series chips using your Arduino and then incorporate them into any project that you want.

**Educational Innovations, Inc.**

This company has a wide selection of products, information and ideas that should prove useful to the amateur experimenter or teacher.

**DIY Gold Mining**

There is a river, about 2 km from my camp, that has had reports of gold being found. Hmm --- I wonder if I could find some. With gold prices exceeding \$1500US/oz it might be worth my looking around a bit. ☺  
*Mygoldpanning.com* has plans for a selection of DIY gold recovery devices plus some information on where and how to find gold.

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**On The Lighter Side:**

**The Dangers of Dihydrogen Monoxide**

We've seen this before. But it's always a source of a good chuckle.

**Lists Galore!**

You name it and it's probably on some list!

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**From The Far Side:**

**The Final Theory: Rethinking Our Scientific Legacy**

Are you tired of the endless science mysteries? Finally, solid answers have arrived! ☺

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