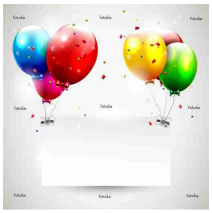
PRCST
Pittsburgh Regional Center
For Science Teachers

LASER

Volume 12 Online, Issue 2, Summer 2015

LOCAL ACCESS TO SCIENCE EDUCATION RESOURCES

CELEBRATE – 30 YEARS FOR PRCST



PRCST is undergoing a transition. Details will be determined later.

Meanwhile – the PRCST website and LASER Newsletter will remain available to everyone.

Do stay in touch with us. If you wish to have the LASER emailed to you, please send your email address to konrad@pitt.edu

What's Happening

*** 25 years for the Hubble Space Telescope ***

* * * 2015 International Year of Soils * * *

The new, interactive map lets you compare current snowpack data to historical records. - See more at: http://blogs.usda.gov/2015/05/08/interactive-map-compares-past-and-present-snowpack-western-snowpack-levels-very-low/#sthash.RqteRFIS.dpuf

Western snowpack, where it remains, is in full melt. All along the Cascades and Sierra Nevada are ski courses that never opened, bare mountains and snowless SNOTEL sites where snowpack is measured. Where snow accumulated, it melted prematurely during a warm March. One of the most common questions for snow surveyors has been: how does this winter compare to the past? A new, interactive map shows you exactly how it compares. The online map, just released by the USDA's Natural Resources Conservation Service, shows regularly updated current

conditions – alongside historical records – for the entire NRCS snow survey network. During a brief demonstration, NRCS Hydrologist Cara McCarthy put the map through its paces. Zooming in, we saw a table detailing current conditions at a SNOTEL site in Montana; next, a map comparing California precipitation, April 2015 and April 1993; then, a color-coded view of the entire West, ranking current conditions with respect to historical averages. Each transition just took a couple of clicks. Snowpack data in the new map is also more accurate, as it's updated several times a day with edited information. Previously, static snowpack maps were posted with raw data and were not updated even if data changed. Now, when snow surveyors review the data and account for errors resulting from malfunctioning equipment, that new information will soon be available. "With this map, there are so many ways to look at the data," McCarthy said. "It's easy to customize your search and compare different areas, or different years. You can focus in on a single county, or look at the entire West." This information used to be hard to find, cumbersome to extract and inconvenient to calculate. Now, it's presented in an intuitive map that lets users quickly sort through a wealth of current and historical records. Whatever you're looking for, with respect to NRCS snow survey data, there's a great chance you'll find it here. - See more at: http://blogs.usda.gov/2015/05/08/interactive-map-compares-past-and-present-snowpack-western-snowpack-levels-very-low/#sthash.RqteRFIS.dpuf

EDUCATION

The Federal Role in Education

The federal government has had a role in education since the founding of the nation.

The Northwest Ordinance in 1787, which created the first states beyond the original 13, required that every township set aside land to support education in that community.

*(**The Progress of Education Reform: The Shaping of Education Policy over Time**, **Christopher T. Cross**, Education Commission of the States, Volume 16, #2.)*

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SYSTEMS APPROACH

The notion of "growth which enhances life" is what is meant by qualitative growth — growth that enhances the quality of life. In living organisms, ecosystems, and societies, qualitative growth includes an increase in complexity, sophistication, and maturity. Unlimited quantitative growth on a finite planet is clearly unsustainable, but qualitative economic growth can be sustained if it involves a dynamic balance between growth, decline, and recycling, and if it also includes the inner growth of learning and maturing.

The focus on qualitative growth is fully consistent with the systems view of life. As we have emphasized several times in this book, the new science of life is essentially a science of qualities. This is relevant in particular to the understanding of ecological sustainability, since the basic principles of ecology — principles like interdependence or the cyclical nature of ecological processes — are expressed in terms of patterns of relationships, or qualities.

In fact, the new systemic conception of life makes it possible to formulate a scientific concept of quality. It seems that there are two different meanings of the term — one objective and the other subjective. In the objective sense, the qualities of a complex system refer to the properties of the system that none of its parts exhibit. Quantities like mass and energy tell us about the properties of the parts, and their sum total is equal to the corresponding property of the whole — e.g., the total mass or energy. Qualities like stress or health, by contrast, cannot be expressed as the sum of properties of the parts. Qualities arise from processes and patterns of relationships among the parts. Hence, we cannot understand the nature of complex systems such as organisms, ecosystems, societies, and economies if we try to describe them in purely qualitative terms. Quantities can be measured; qualities need to be mapped (see Section 4.3).

excerpted from *The Systems View of Life: A Unifying Vision*, by Fritjof Capra and Pier Luigi Luisi (2014, Cambridge University Press). The book integrates the ideas, models, and theories underlying the systems view of life into a single coherent framework, exploring its implications for a broad range of endeavors, from economics and politics to medicine, psychology, and law.

Remote Labs - A Lab in Every Pocket

NSF Award #: IIS-1216389, OCI-0753324, DUE-0938075, DMR-1121262

Remote online labs, or iLabs, are experimental equipment that can be accessed through the Internet, allowing students and educators to carry out real experiments from anywhere at any time. This makes science labs more real, more engaging, and more accessible to students. Through using remote labs, students are able to access high-end equipment not typically available in the K-12 classroom because of high cost or safety concerns. Experiments can be completed on any device with an Internet connection, allowing students to design and run experiments on their own time and at their own pace. Remote labs are not simulations, and return real data with naturally occurring variability from run to run. These advantages, combined with the time savings afforded by eliminating the need to set or clean up the lab space, support in-depth classroom discussions of important scientific concepts such as sample size, experimental design, the reproducibility of experiments, data analysis, and more.
Dr. Kemi Jona of Northwestern University has led the development of a new user platform that improves the remote labs experience for both educators and students – ilabstudio.org. The features included in the new user platform were developed through an iterative design process involving both teachers and students. This allowed developers to identify and address common challenges that prevent the adoption of online labs, to improve the pedagogical value of lab investigations, and to reduce the administrative overhead associated with them. This may ultimately increase adoption rates for online lab platforms while increasing the pedagogical benefits to students.

By Fareed Zakaria **March 26**

Fareed Zakaria, a columnist for The Washington Post, is the host of "Fareed Zakaria GPS" on CNN and the author of ***"In Defense of a Liberal Education."*** *Exerpts:*

If Americans are united in any conviction these days, it is that we urgently need to shift the country's education toward the teaching of specific, technical skills. Every month, it seems, we hear about our children's bad test scores in math and science — and about new initiatives from companies, universities or foundations to expand STEM courses (science, technology, engineering and math) and deemphasize the humanities.

(This) dismissal of broad-based learning, however, comes from a fundamental misreading of the facts — and puts America on a dangerously narrow path for the future. The United States has led the world in economic dynamism, innovation and entrepreneurship thanks to exactly the kind of teaching we are now told to defenestrate. A broad general education helps foster critical thinking and creativity. Exposure to a variety of fields produces synergy and cross fertilization. Yes, science and technology are crucial components of this education, but so are English and philosophy. When unveiling a new edition of the iPad, Steve Jobs **explained** that "it's in Apple's DNA that technology alone is not enough — that it's technology married with liberal arts, married with the humanities, that yields us the result that makes our hearts sing." Innovation is not simply a technical matter but rather one of understanding how people and societies work, what they need and want. America will not dominate the 21st century by making cheaper computer chips but instead by constantly reimagining how computers and other new technologies interact with human beings.

5 Ways Technology is Changing Classrooms

Education May 9, 2015

Education extends beyond the classrooms
Textbooks are slowly becoming extinct
Change in teacher and student roles
Classrooms are becoming more collaborative
Technology allows more personalized learning

6 Key Skills for a Successful Career - Voniz Articles

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DIRECTIONS

June 12-18, coinciding with the National Maker Faire, the White House will celebrate a "**Week of Making**," lifting up makers and builders and doers of all ages who are funneling their ingenuity into amazing projects, developing creative solutions to important problems and bringing their innovations to the market.

World Hydrology Day

Each year, on June 21, we celebrate the international holiday of **World Hydrography Day**! Join in this celebration by showing your students the following video from NOAA on how we travel the seas with nautical charts: **http://oceantoday.noaa.gov/traveltheseas/**.

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The **PA Parks and Forests Foundation** is looking for 100 icons that best represent Pennsylvania's State Parks and Forest system.
Imagine it. A summer breeze begins to blow. You close your eyes and picture your visit to a State Park or Forest. What do you see? For you, that vision is an icon-- a widely known symbol of our public lands.
Throughout the summer PPFF will be looking for 100 State Park and Forest icons.
Nominate your icon by June 30 and then a select committee at PPFF will review the nominations and pick the winners.
Starting on June 21, PPFF will name the first icon and name them periodically through September 28. Shared images of these icons will be compiled into an album on the PPFF website.

Submit your nominations by email to: **100icons@paparksandforests.org**.

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Grant Deadline and Details

PLT's GreenWorks! grant application period is now open. **The deadline to apply is September 30th**.

In order to apply, applicants must have attended a **PLT professional development workshop**. If you have not yet attended a workshop, **view our calendar of events** or **contact your PLT State Coordinator** to find a training near you. Can't make it to an in-person workshop? PLT now offers an **online option**.
All GreenWorks! grant applications must be submitted through our website. Applications will NOT be considered if submitted via email.

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Summer Institute 2015

CLIMATE MINNESOTA
LOCAL STORIES, COMMUNITY SOLUTIONS

2 graduate credits (fee)
20 CEUS
$75 Early Bird Rate
Please join us for our 10th annual Summer Institute for Climate Change Education, June 15-17, 2015 at the School of Environmental Studies in Apple Valley, MN. Contact **Megan@climategen.org 612-278-7147**

John Kamman | Admissions Director
Ecology Project International

406.721.8784 t | 406.721.7060 f
www.ecologyproject.org | facebook.com/ecologyproject
Conservation for the next generation

For any environmental teachers looking for additional professional development opportunities, **Ecology Project International** (EPI) will have another round of Marine Education Fellowships opening up for application starting next month.; aiming to accept approximately 50 classroom teachers for an 8-day field research experience in Costa Rica or Mexico. All on-course expenses are covered by EPI. We will also be welcoming applications for our first ever wildlife ecology fellowship in Yellowstone National Park.
If you would like to be notified when the application opens please feel free to sign up for notifications here: **http://www.ecologyproject.org/fellowship**

Windows to the Universe Newsletter - Windows@windows2universe.org

Terrific site filled with database items, directions for educators, science snippets and amazing science and opportunities for educators and students.

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OUR EARTH THE WATER PLANET

Water is increasing in our sustainability. PRCST has long focused on the vital status of this Earth's resource. As population and water usage increases – it is more important than ever to explore actions we can take to conserve this vital resource – from personal use to agriculture, food production, land use, fossil fuel drilling and use, and contamination of our available water. Huge potential Problem Based Learning opportunities for students/classrooms in all of these areas. Will the next wars be "water wars". Is it already happening?

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The Learning Design Group at UC Berkeley's Lawrence Hall of Science
is excited to announce that we are currently accepting new participants for 2015-16 elementary (and middle school) science curriculum field trials!
The Learning Design Group's rich science curriculum, which is developed in partnership with Amplify Education, combines hands-on inquiry, the use of digital tools such as rich simulations, and support for disciplinary literacy (reading, writing, and talking about science).
Teachers receive all materials to teach the units as well as an incentive for participation. Technology must be provided by the school. Please see **learningdesigngroup.org/participate** for descriptions of the units available for field trial and a link to an application. You can contact
our field manager at **ldgstudies@berkeley.edu** with any questions.
Traci Wierman
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SCIENCE SNIPPETS

Front Endocrinol (Lausanne). 2015; 6: 29.
Published online 2015 Mar 4. doi: **10.3389/fendo.2015.00029**

PMCID: PMC4349159

Mechanisms Mediating Environmental Chemical-Induced Endocrine Disruption in the Adrenal Gland

Daniel B. Martinez-Arguelles[1,2,*] and **Vassilios Papadopoulos**[1,2,3,*]

Author information ► Article notes ► Copyright and License information ►

Abstract

Humans are continuously exposed to hundreds of man-made chemicals that pollute the environment in addition to multiple therapeutic drug treatments administered throughout life. Some of these chemicals, known as endocrine disruptors (EDs), mimic endogenous signals, thereby altering gene expression, influencing development, and promoting disease. Although EDs are eventually removed from the market or replaced with safer alternatives, new evidence suggests that early-life exposure leaves a fingerprint on the epigenome, which may increase the risk of disease later in life. Epigenetic changes occurring in early life in response to environmental toxicants have been shown to affect behavior, increase cancer risk, and modify the physiology of the cardiovascular system. Thus, exposure to an ED or combination of EDs may represent a first hit to the epigenome. Only limited information is available regarding the effect of ED exposure on adrenal function. The adrenal gland controls the stress response, blood pressure, and electrolyte homeostasis. This endocrine organ therefore has an important role in physiology and is a sensitive target of EDs. We review herein the effect of ED exposure on the adrenal gland with particular focus on *in utero* exposure to the plasticizer di(2-ethylehyl) phthalate. We discuss the challenges associated with identifying the mechanism mediating the epigenetic origins of disease and availability of biomarkers that may identify individual or population risks.

Colombia may recruit an unlikely ally in the fight to curb cocaine production: hungry caterpillars.

Stopping cocaine production at the source has been a problem the Colombian government has wrestled with for decades. For an issue that touches not only human and ecological health, but also political negotiations with rebel groups that guard and profit off some of the crops, a solution that pleases everyone has been understandably elusive.

Glyphosate is one of the most popular herbicides in the world, and is a key ingredient in Monsanto's popular Roundup weed killer. According to **Reuters,** more than 280 million pounds of glyphosate were used in US agriculture in 2012, the most recent year with available data, an increase from 110 million pounds in 2002.

The use of glyphosate to destroy coca plants in Colombia was a US-funded and operated initiative in place since the early 2000s. The spraying program – which covered 136,000 acres last year and over 4 million acres of land in Colombia since it began – is partly carried out by US contractors. Kevin Whitaker, the US ambassador to Colombia, said a decision on whether to use the chemical is a decision for Colombia and the US government respects it, according to **the Associated Press**.

The main alternative to glyphosate could be a special breed of moth native to the region that feeds on the cocaine-producing plants. The beige-colored Eloria noyesi moths lay their eggs on the leaves and, when they hatch about a week later, caterpillars emerge and devour the leaves. The moth solution has been proposed before, but met opposition in 2005 because experts were worried about the butterflies causing "ecological mischief."

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Ecological design

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John Todd a,b,∗, Erica J.G. Browna,b, Erik Wells b
Accepted 4 August 2003

Abstract

Over the past three decades ecological design has been applied to an increasingly diverse range of technologies and innovative solutions for the management of resources. Ecological technologies have been created for the food sector, waste conversion industries, architecture and landscape design, and to the field of environmental protection and restoration. The five case studies presented here represent applications of ecological design in five areas: sewage treatment, the restoration of a polluted body of water, the treatment of high strength industrial waste in lagoons, the integration of ecological systems with architecture, and an agriculturally based Eco-Park.

Wind Turbine with No Blades

That sounds like a joke, but that's actually more or less the model of a new wind turbine prototype. Instead of blades that turn in the breeze, the turbine is just a hollow straw that sticks up 40 feet from the ground and vibrates like a guitar string when the wind thrums by.

The Spanish engineers who founded **Vortex Bladeless** in 2010 said they were inspired by the Tacoma Narrows Bridge disaster. Here's how it actually works, **from** *Wired*:

Instead of capturing energy via the circular motion of a propeller, the Vortex takes advantage of what's known as vorticity, an aerodynamic effect that produces a pattern of spinning vortices. Vorticity has long been considered the enemy of architects and engineers, who actively try to design their way around these whirlpools of wind. And for good reason: With enough wind, vorticity can lead to an oscillating motion in structures, which, in some cases, like the … **Tacoma Narrows Bridge**, can cause their eventual collapse.

At the base of the cone are two rings of repelling magnets, which act as a sort of nonelectrical motor. When the cone oscillates one way, the repelling magnets pull it in the other direction, like a slight nudge to boost the mast's movement regardless of wind speed. This kinetic energy is then converted into electricity via an alternator that multiplies the frequency of the mast's oscillation to improve the energy-gathering efficiency.

The result is a turbine that's 50 percent less expensive than a bladed one, nearly silent, and, as one of the turbine's engineers put it, "looks like asparagus" (sorry, **Quixote**). And while each Vortex turbine is also 30 percent less efficient at capturing energy, wind farms can double the number of turbines that occupy a given area if they go bladeless. That's a net energy gain of 40 percent for you non-mathletes out there." Plus, the turbine has no gears or moving parts; theoretically maintenance could be much easier than a traditional bells-and-whistles spinning one. By **Amelia Urry** on 20 May 2015 GRIST.org.

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Newsweek:

Filed Under: **Tech & Science**, **Agriculture**, **GMO**, **Corn**

One of industrial agriculture's biggest GMO crops may have just backfired. Scientists have confirmed that corn-destroying rootworms have evolved to be resistant to the Bt corn engineered to kill them.

Bt stands for Bacillus thuringiensis, the name of the genetically modified corn's "donor" organism. Bacillus thuringiensis is a naturally occurring soil bacterium that produces protein crystals that bind to certain receptors in the rootworm's intestine, killing it. For years, farmers have planted Bt corn as an alternative to spraying insecticides. Bt corn accounted for three-quarters of all corn planting in 2013. That may have to change.

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DATABASE

Ag In the Classroom

The National Agricultural Literacy Curriculum Matrix is a collection of classroom-ready educational resources for K-12 teachers. Includes standards and objectives, lesson plans, companion resources, and assessments.

Bees and Climate Change

A NASA 5 minute video on the phenology of lants and bees to understand climate change effect on pollination. **http://1.usa.gov/1H692lc**

Fight Back

Safe Food Handling practices for MS and HS students-.10 least wanted pathogens.

http://bit.ly/1Fi0JDx

Teaching With Documentaries Large collection of nonfiction films in science, environment and others. Ex, Tesla: Master of Lightning; Cancer: The Forbidden Cures

http://topdocumentaryfilms.com

SSP Scholarships and Grants

SSP is dedicated to educating members of the scientific community, students, and teachers about spectroscopy and science. We achieve this goal by providing schools in need with equipment necessary to educate students on science. Below is a list of grants we are currently offering.

Each grant has it's own set of application guidelines, so make sure to review the application instructions. Check back often, as new grants will be continuously posted throughout the year.

SSP sponsors the following the grants:

Elementary School Science Olympiad Program (ESSOP)

High School Equipment Grants (HSEG)

Pittsburgh Conference Memorial National College Grants Program (PCMNCG)

College Equipment Grant Program (CEGP)

Scholarships & Grants

The SACP is dedicated to educating members of the scientific community, students, and teachers about spectroscopy and science. We achieve this goal by providing schools in need with equipment necessary to educate students on science. Below is a list of grants we are currently offering.

Each grant has it's own set of application guidelines, so make sure to review the application instructions. Check back often, as new grants will be continuously posted throughout the year.

SACP sponsors the following the grants:

ES/MS Equipment Grants Program
Pittsburgh Conference Memorial National College Grant (PCMNCG)
Elementary School Science Olympiad Program (ESSOP)
Starter Grant
College Chemistry Scholarship
Undergraduate Analytical Research Program (UARP) Grant

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The Clean Water Rule:

·**Clearly defines and protects tributaries that impact the health of downstream waters**. The Clean Water Act protects navigable waterways and their tributaries. The rule says that a tributary must show physical features of flowing water – a bed, bank, and ordinary high water mark – to warrant protection. The rule provides protection for headwaters that have these features and science shows can have a significant connection to downstream waters.
·**Provides certainty in how far safeguards extend to nearby waters.** The rule protects waters that are next to rivers and lakes and their tributaries because science shows that they impact downstream waters. The rule sets boundaries on covering nearby waters for the first time that are physical and measurable.
·**Protects the nation's regional water treasures.** Science shows that specific water features can function like a system and impact the health of downstream waters. The rule protects prairie potholes, Carolina and Delmarva bays, pocosins, western vernal pools in California, and Texas coastal prairie wetlands when they impact downstream waters.
·**Focuses on streams, not ditches.** The rule limits protection to ditches that are constructed out of streams or function like streams and can carry pollution downstream. So ditches that are not constructed in streams and that flow only when it rains are not covered.
·**Maintains the status of waters within Municipal Separate Storm Sewer Systems.** The rule does not change how those waters are treated and encourages the use of green infrastructure.
Reduces the use of case-specific analysis of waters. Previously, almost any water could be put through a lengthy case-specific analysis, even if it would not be subject to the Clean Water Act. The rule significantly limits the use of case-specific analysis by creating clarity and certainty on protected waters and limiting the number of similarly situated water features.
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PBS Learning Media

Robotic arms are cool, useful, and fun to make. In this video from *Design Squad Nation*, kids design and build controllable mechanical arms and use their "robo" arms to lift objects and to play a series of games. As they build their mechanical arms, the kids use the engineering design process, apply a variety of science concepts (e.g., levers and tension and compression), and learn how NASA uses robotic arms in many of its missions.

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USDA

Honeybees as pollinators.

https://flic.kr/s/aHsjGhVWHJ

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Kristof: Our water-guzzling food factory.

Let's start with a quiz. Which consumes the most water? A) a 10-minute shower. B) a handful of 10 almonds. C) a quarterpound hamburger patty. D) a washing machine load. The answer? By far, it's the hamburger patty. The shower might use 25 gallons. The almonds take up almost a gallon each, or close to 10 gallons for the handful. The washing machine uses about 35 gallons per load. And that beef patty, around 450 gallons. New York Times May 31

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NGSS Now: 10 Things to Know in June
Next Generation Science Standards [achieve@achieve.ccsend.com]

CALENDAR OF EVENTS

June 15-17, 2015 - 10th annual Summer Institute for Climate Change Education, at the School of Environmental Studies in Apple Valley, MN.

June 26–28, 2015 2015 ASCD Conference on Teaching Excellence
Pre-Conference Institutes: June 25, 2015
Gaylord Opryland Resort & Convention Center
Nashville, Tenn.

August 21, 2015

The Pittsburgh Region Clean Cities has scheduled a Petroleum Reduction Technology Bio-Fuels PRT Workshop (August 21, 2015). The workshop will be held at the Community College of Allegheny County – West Hills Center,1000 MckeeRoad, Oakdale, PA 15071. The workshops will be from 10:00am to1:00pm.

To register for the Bio-Fuels PRT Workshop go to https://docs.google.com/forms/d/1lLQu6BUHX8A8i7ojE2qZ-5zD9qtdDBjmCrGNLXbcjQg/viewform

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October 20-22, 2015
2015 National GroundWater Foundation Conference in Lincoln, Nebraska). **Registration** is now open . **Register now** and save - early bird rates available through September 1.

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NSTA Conferences

Oct. 22-24 Reno Nevada :Science and literacy: Creating Connections
Nov. 12-14 Philadelphia, PA: Revolutionary Science