

# Yale Scientific 89.1 Articles

Thank you for your interest in writing for the Yale Scientific Magazine (YSM), Yale's premier science publication! The following articles are ideas that we have generated for the upcoming print issue Vol. 89, No. 1 to be published December 2015. Please read through this list, paying attention to content and the required word-lengths, and then select up to four articles that you would be interested in writing. Please use our Article Sign-Up survey, which you can access on our website, to make your selection.

Articles are divided into three sections: News, Full-Lengths, and Features. The News section covers the latest breakthroughs and discoveries occurring at Yale science research departments and highlights awards and other noteworthy accomplishments pertaining to the Yale science community. The Full-Lengths section delves into these exciting developments in greater detail. These articles are longer pieces that explore and explain the science behind professors' work, and require more in-depth interviews. Please note that to be assigned a full-length piece, you must have already contributed a news, feature, or online article to our publication. One full-length article will be chosen as the cover story for 89.1. Our Features section covers ongoing scientific issues or topics of interest from a broad range of fields, from global scientific phenomena to student profiles. The YSM also includes a section of articles published exclusively on our website. Topics for this wave of online articles are listed under the last section in this document.

The editorial staff cannot guarantee that you will receive your first-choice assignment, even if you have written for us before, so we recommend that you list your top four choices!

Our entire Masthead is eager to have you join our staff. If you have any questions, please do not hesitate to contact us. Welcome (back) to the Yale Scientific Magazine!

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## **NEWS**

### **News Byte: Alternative Number Systems in Indigenous Australia (240-260 Words)**

Linguistics and Biomedical Engineering researchers collaborated to use mathematical and linguistic methods to track the way in which alternative number systems in indigenous Australian languages evolved.

### **News Byte: Professor Dylan Gee Receives NIH Early Independence Award (240-260 Words)**

Professor Dylan Gee has received this prestigious NIH award for her work on how key neural circuits mature during development.

### **News Byte: Former Yale Radiologist Awarded 2015 Nobel Prize in Chemistry (240-260 Words)**

Aziz Sancar, a previous Fellow in Yale Radiology, has been co-awarded the Nobel Prize in Chemistry. The award was given for "mechanistic studies on DNA repair." While at Yale from 1977-1982 Sancar developed approaches to identify DNA repair genes and produce their gene products.

### **News Byte: Leptospirosis, a Neglected Tropical Disease, has an Unexpectedly Large Burden (240-260 Words)**

The global burden of the tropical disease leptospirosis is far greater than previously estimated, resulting in more than 1 million new infections and nearly 59,000 deaths annually, a new international study led by the Yale School of Public Health has found.

### **News Article: Beautiful, Simple, Exact, Crazy: Mathematics in the Real World (650-750 Words)**

In a new book, Professors Anna Lachowska of Yale and Apoorva Khare of Stanford explain the mathematics essential for understanding and appreciating the quantitative world. Their research shows that mathematics is a key tool in the creation and appreciation of art, music, and literature, not just science and technology.

### **News Article: How Does Latent HIV Reactivate? (650-750 Words)**

Professor Kathryn Miller-Jensen uses molecular biology methods to investigate how and why latent HIV is reactivated and what possible therapies may target this reactivation.

### **News Article: Is Healthy Early Childhood Development a Pathway to Peace? (650-750 Words)**

An interdisciplinary Yale team – including Catherine Panter-Brick from Anthropology and Jim Leckman from the Child Study Center – went to UNICEF on October 6th to debate the role of early child development programs in promoting peace and reducing violence. The team believes that ensuring healthy early childhood development may be a key way to promote peace.

## **News Article: Pig Out: The Importance of Hogs in Environmental History (650-750 Words)**

Professor James Scott studies political science as well as agrarian studies. He has researched the role of pigs in shaping the history of agriculture and will host a conference at Yale on this topic later in October.

## **FULL-LENGTH ARTICLES**

### **Short Full-Length: Stripping Down Pig Lungs Gently and Quickly (1100-1300 Words)**

A team of Yale biomedical engineers has discovered a novel technique to decellularize pig lung scaffolds, an important step in the development of effective lung transplants. Unlike previous techniques, this new technique decellularizes lungs much more quickly while preserving the structure and composition of the scaffold below.

### **Short Full-Length: Predicting Arctic Thickness (1100-1300 Words)**

A Yale duo has developed a new approach to predicting the thickness of sea ice by combining old theories with the concepts of molecular Brownian motion. Their predictive model matched NASA data remarkably well and could potentially be used to predict the trajectory of climate change's impact on the Arctic.

### **Long Full-Length: Overcoming OCD in Real Time (1400-1600 Words)**

A group of Yale scientists have developed a new way to treat Obsessive Compulsive Disorder. With the use of real-time fMRI data, patients can see how their brain responds to contamination-related OCD stimuli, and learn to temper their responses appropriately. This therapy has already proven more effective than some FDA approved drugs, and may shed light on the neuronal pathways associated with OCD.

### **Long Full-Length: Predator and Prey: Who's Changing Whom? (1400-1600 Words)**

Using a dammed lake as a lab of evolution, a Yale team has discovered that, in addition to the traditional top-down impact of keystone predators, there also exists a bottom-up evolutionary pressure from prey species on predators.

### **Long Full-Length: The Grassroots of Forestry (1400-1600 Words)**

Maintaining healthy forests is a major concern that influences us in myriad ways, yet it remains a challenge to supervise and provide this maintenance. Major efforts in developing these mechanisms at the grassroots level of citizens and landowners are under way in Connecticut and at Yale. In this investigative piece, talk to the environmentalists involved in these efforts and find out how they are changing the art of environmental conservation!

## **FEATURES**

### **Q&A: Why does caffeine offset your circadian clock? (200-250 Words)**

Almost every cell in your body keeps track of time through proteins that monitor circadian rhythms. And, as recent research from the University of Colorado at Boulder explores, caffeine disrupts this cellular time-keeping system. How are our cells supposed to keep track of time, and how does caffeine interfere in this process?

### **Q&A: How Is Dust Affecting The California Drought? (200-250 Words)**

As California gets drier, it also gets dustier — and when this dust lands in the Sierra Nevada, it causes snow to melt more quickly, reducing runoff and California's available water supply. However, dust can also boost water availability in California by encouraging raincloud formation. Tell us why dust seems to have a contradictory, two-fold impact on California's impact supply, and what scientists' expect of dust's future impact there.

### **Podcast: "Science vs." (350-450 Words)**

In "Science vs," journalist Wendy Zukerman tries to discern between science "fads" and "facts." The podcast, put out by the Australian Broadcasting Corporation, is highly-ranked on iTunes but only a few months into its first series. Do you think it's going anywhere? Listen to a few episodes and tell us what you think.

### **Podcast: "The Infinite Monkey Cage" (350-450 Words)**

Produced by the BBC, "The Infinite Monkey Cage" (which just completed its 12th series in August) claims to combine science and comedy. Listen to a few episodes and tell us whether it succeeds.

### **Alumni Profile: Richard Lethin '85 (650-750 Words)**

Richard Lethin '85 is a professor of electrical engineering at Yale and President of Reservoir Labs, a computing technology company based in New York City. Interview him about his scientific passions, work at Yale and Reservoir Labs, and his bright college years! Dr. Lethin is on campus to teach on Thursdays (a rare opportunity to source an alum profile in-person), and has also offered to invite the writer to visit Reservoir Labs in NYC.

### **Undergraduate Profile: Samantha Lichtin (ES '16, Geology) (650-750 Words)**

Samantha Lichtin, a senior in Stiles College, is a geology major who conducts research on campus and currently serves as co-president of Yale's geology club. She's passionate about how geology helps broaden her outlook on the world around her. In her free time, you'll find her playing viola and violin in the Yale Symphony Orchestra and other music ensembles on campus.

### **Debunking Science: *The Martian* (650-750 Words)**

The premise: astronaut Mark Watney (Matt Damon) is abandoned on Mars by his crew. While a host of top scientists on Earth try to figure out how to bring him home, Watney is left to try to survive in Mars' hostile territory — it's an affair that some reviewers have likened to Robinson Crusoe. In light of recent discoveries regarding the presence of water on Mars, is the science

behind Watney's story legit? Or is some DEBUNKING in order? Watch the film, read up on recent Mars discoveries, and let us know!

### **Science or Science Fiction?: Virtual Realities (650-750 Words)**

In a virtual reality, human physical presence is simulated in a computer-created world: it's not reality, but it sure feels like it is — think of Ender's Game, The Matrix, or even Aldous Huxley's Brave New World. As it turns out, science can generate virtual realities to some degree for a variety of medical uses. How far along is the science behind virtual realities, and what role may they play in the real world?

### **Short Feature: You Have a Microbial Cloud (650-750 Words)**

Researchers at the University of Oregon are investigating your microbial cloud — an aura of airborne bacteria emitted from your body. In a carefully-controlled experiment, they found that they could sometimes even detect a specific person's presence based on the content of the microbial cloud that individual had left behind. Still, the researchers aren't sure why some people's clouds are easier to detect than others. Tell us what it means to have a microbial cloud, how the University of Oregon researchers identified them, and why they might matter to science!

### **Short Feature: Scientists Move toward Nanocellulose-Based Materials (650-750 Words)**

Nanocellulose is a promising, new material, found naturally in wood — strong, tough, and transparent, it could replace kevlar or even prove useful in windows or eyeglasses. How are Northwestern researchers working to develop a material from cellulose nanocrystals, and what uses could it offer?

### **Short Feature: Portobello Batteries (650-750 Words)**

New batteries created with the skins from Portobello mushrooms have shown great potential, increasing battery-life and reducing production cost and potential environment damages.

### **Long Feature: Wasps Genetically-Modify Caterpillars to Save Butterflies From Disease (1000-1300 Words)**

Although parasitic wasps pose a lethal threat to caterpillars, a team of researchers recently found out that wasps may also genetically-modify caterpillars to protect them from diseases. These parasitic wasp genes are passed down through several generations of caterpillars. This isn't the first time that scientists have discovered naturally genetically-modified organisms — but this research does offer a window into understanding how such genetically-modified species can come about. How do wasps genetically-modify caterpillars, and what are the broader implications of this research?

### **Long Feature: Self-Propelled Particles Halt Hemorrhage (1000-1300 Words)**

Even chemically-induced bandages are not always sufficient to stop bloodflow after a wound (such as those received in surgery or combat). So, as described in a paper recently published in Science Advances, a team of researchers recently developed a self-propelled particle that can

surge through the bloodstream to halt traumatic bleeding. How does the particle work, and how could it prove useful in medicine?

### **Long Feature: Synthetic Magnetic Material Mimics Water Phase Changes (1000-1300 Words)**

Scientists from the Paul Scherrer Institute have engineered a magnetic material that changes its magnetic properties with temperature — just as water responds to temperature with phase changes. How does temperature cause magnetic properties to change in the team's material, and what uses could a magnetic material that emulates phase changes have?

## **ONLINE**

### **News Byte: How to Dose Antibiotics (250-300 Words)**

Microbial drug resistance is a major public health issue, but the most effective dose of antibiotics to prevent resistance is debated. A new study shows that the most effective dose will depend on the competition between drug-sensitive and resistant bacterial species within an individual.

### **News Byte: Cooperation in Children (250-300 Words)**

The prisoner's dilemma is a classic example for studying cooperation, especially with repeated rounds of play. Yale professor David Rand, in collaboration with Harvard and Boston University scientists, studied whether children also cooperate when faced with the dilemma. The team found that children do, but that boys and girls differ in their response after their partner defects.

### **News Byte: Trees, Trees, and More Trees! (250-300 Words)**

A new Yale-led study estimates that there are more than 3 trillion trees on Earth, about seven and a half times more than some previous estimates. However, the total number of trees has plummeted by roughly 46 percent since the start of human civilization.

### **News Byte: New Yale Computer Scientist Talks Program Obfuscation (250-300 Words)**

Professor Raykova, who will join the Yale Computer Science department in January, is working on hiding secrets in software by “obfuscating” the internal mechanisms of a program while preserving access to its functionality. Such capabilities would allow to implement proprietary algorithms, e.g., DNA analysis algorithms, in software that enables the use of the algorithm while protecting its inner workings.

### **News Article: ARMs Fight Cancer (450-500 Words)**

Technology developed by Yale Professor David Spiegel could provide a novel approach to the treatment of various forms of cancer. This technology, including an immuno-oncology platform and associated lead molecules-known as Antibody-Recruiting molecules (ARMs), are being further developed to treat diseases like prostate cancer.

### **News Article: Genetic Variation: Revealing the Human Catalogue (450-500 Words)**

A massive effort to study human genetic variation has ended with publication of two papers in the Sept. 30 issue of the journal Nature that catalogue the genomes of more than 2,500 people representing 26 different populations across the globe.

### **News Article: Science of Swarms (450-500 Words)**

Modeling how groups of animals work could lead to insights for engineering complicated systems. Yale researchers led by Prof. Nicholas Ouellette set out to map for the first time the activity of a disordered group - an insect mating swarm - as opposed to an ordered group like a flock of birds. Their results provide insight into how a large group of animals functions.

### **News Article: Transparent Batteries for Invisible Electronics (450-500 Words)**

A major obstacle in the development of transparent electronics is that thus far, batteries have been very difficult to make transparent. Research from the lab of Prof. Andre Taylor has resulted in a technique to make transparent electrodes for lithium ion batteries, allowing scientists to overcome this hurdle.

### **Feature: Styrofoam-eating Worms (500-550 Words)**

Styrofoam constitutes a huge source of plastic waste that is usually not recycled. Stanford scientists have now found that mealworms can safely eat and break down styrofoam, which could be immensely useful for dealing with styrofoam waste.

### **Feature: How Microbial Variation Affects the Taste Of Wine (500-550 Words)**

Winemakers often attribute the unique flavors of different vines to terroir, or the quality of the soil and climate in a region. A new study finds that using different strains of yeast during the fermentation process also changes the flavor of wine, highlighting a role for biological factors in a wine's distinctiveness.

### **Feature: Cognitive Computers: How Our Brains 'Compute' Meaning (500-550 Words)**

As the seat of both language and thought, the human brain must be capable of rapidly encoding the multitude of thoughts that a sentence could convey. How does this work? It seems the human brain encodes the meanings of simple sentences much like a computer, with distinct neural populations representing answers to basic questions of meaning such as "Who did it?" and "To whom was it done?"

### **Feature: Improving Drug Delivery with Shapeshifting Proteins (500-550 Words)**

Recent research has improved scientists' understanding of how proteins shift shapes within our bodies in response to external cues (such as temperature or the environment). In a paper recently published in Nature Materials, researchers released the sequence of amino acids sequences necessary to control protein shapeshifting. Among the possible applications for the research are improved drug delivery techniques. How do proteins change their shapes, and why could a better understanding of this process lead to more efficient drug delivery strategies?