iCampus Spring Review

Prepared By:
OpenWetWare Steering Committee
http://openwetware.org/wiki/Steering_Committee

iCampus PI:	Jason Kelly
iCampus Advisors:	Drew Endy, Natalie Kuldell

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Introduction

We are requesting further funding through iCampus in order to continue pursuit of the goals outlined in our iCampus proposal:

> "We propose to expand the OpenWetWare user community, develop tools to encourage contribution, and integrate content development with educational programs in the hope of creating a critical mass of users that will lead to a self-sustaining resource for the biological community."

We have already made significant progress towards these goals in the five months since receiving our iCampus grant, nearly tripling in size since January. Additional funding would enable us to maintain this rapid community growth throughout the remainder of the year.

Status of Spring Milestones

We have largely met our Spring milestones, as well as some of our one-year milestones. We set Spring goals of tripling our community size and site traffic to 30 academic labs, 750 users, and 3000 unique visits/day. **We currently have 55 academic labs, 743 registered users, and 2500 unique visits/day. There have been more than 35,000 page edits and 2.1 million page views to date.** Additionally, we pledged to send representatives to 2 conferences to promote OpenWetWare. We had representatives at International Conference on Systems Biology, MIT Biological Engineering department retreat, international Genetically Engineered Machines Competition instructor's workshop, and Synthetic Biology 2.0.

We also set spring goals to improve the content on OpenWetWare, including developing:

1. An automatic method to convert wiki->static webpage directly hosted on openwetware
    - **Status: Completed.** The method to "de-wikify" pages was developed successfully and is used by many labs on their homepages (see Figure 1)
2. Templates for protocols, equipment, materials, biologicals; Also, better organization scheme to encourage use and standardization of the shared information.
    - **Status: In progress.** Templates are still being developed, but significant work has gone into better organization of site discussions via development of a Community Portal to better coordinate activities among the more active OpenWetWare members. (see Figure 2) The bulk of the community portal design was done by a UROP student hired with funds from iCampus.
3. Integration of BE.109 (Laboratory Fundamentals of Biological Engineering) curriculum with OpenWetWare.
    - **Status: Completed.** BE.109 was hosted on OpenWetWare during Spring 2006 (see Figure 3). All students posted content regarding experimental results, and many students also contributed directly to improving the class content (such as fixing errors in experimental protocols and posting troubleshooting tips). This sort of active student participation in improving the course content is what we hoped OpenWetWare would provide to BE.109. Additionally, plans are underway to archive content from BE.109 Spring 2006 on MIT's OpenCourseWare. Another course, BE.180 (Biological Engineering Programming) also hosted its course page on OpenWetWare.

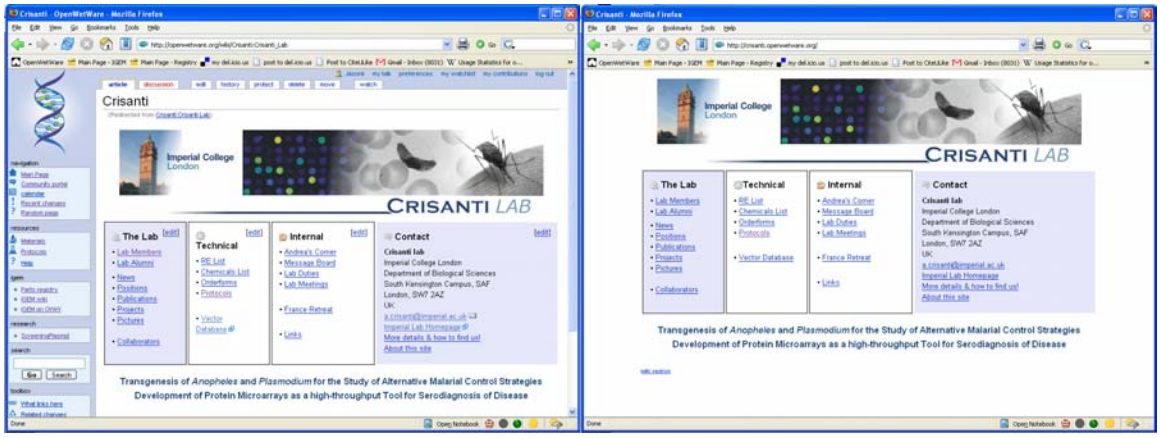


Figure 1: *The webpage on the left is the OpenWetWare wiki page for the Crisanti lab at Imperial College London (http://openwetware.org/wiki/crisanti). The page on the right is the "de-wikified" version found at http://crisanti.openwetware.org/. This feature is used by nearly every lab on OWW.*

Figure 2: *The community portal includes sub-areas: Community Development, Ideas, Design, Information Management, Courses, and Software. Active discussions and collaborations are highlighted here to encourage contribution.*

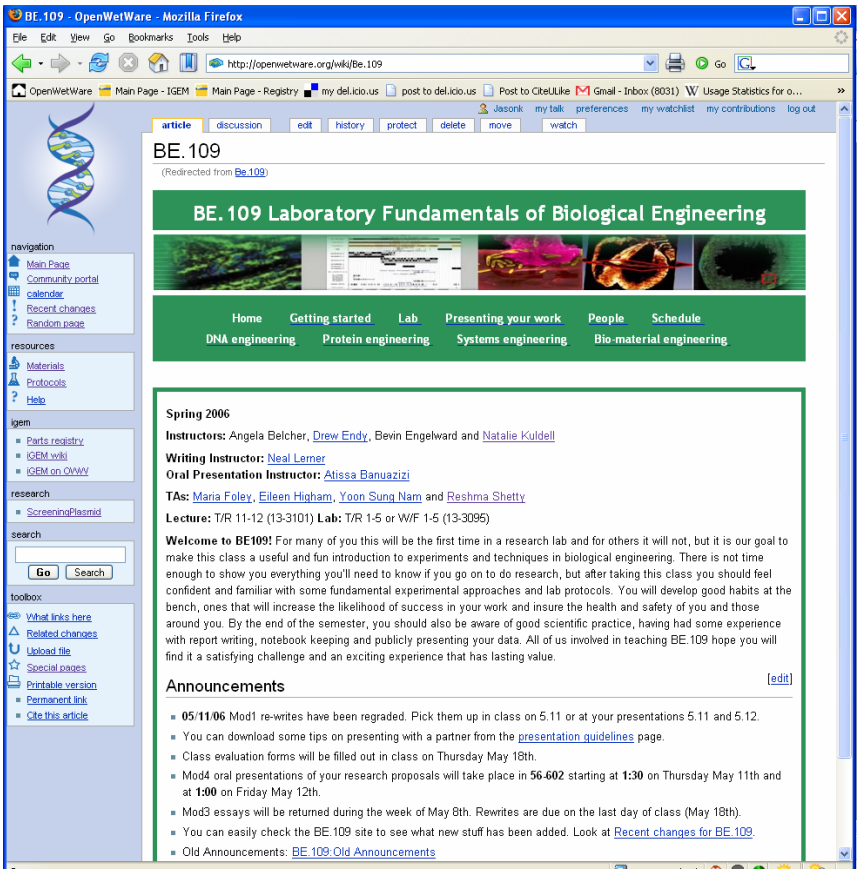


Figure 3: *The wiki for the Spring 2006 BE.109 course at MIT. All the students had accounts on OpenWetWare and could contribute to course materials.*

Additional Accomplishments

We undertook a number of other projects that were not officially stated in the milestones, but still contributed dramatically to the growth of OpenWetWare:

1. We commissioned a professional graphic artist to create a logo, site design, and advertising materials for OpenWetWare. We expect the professional site design will help new users navigate the site, and more easily find community areas where they can contribute.
2. One of the iCampus-supported UROP students developed a custom user management system to streamline the process of adding new members to the site. This system has dramatically decreased our turn-around time in responding to new user requests.
3. The first OpenWetWare Open Science Seminar at MIT was given by John Wilbanks of the Science Commons. The lecture was videotaped and is available on OpenWetWare. The seminar series serves to increase the visibility of OpenWetWare in the scientific community, as well as bring up issues related to the mission of OpenWetWare. Michael Eisen, co-founder of PLoS, has agreed to give the next seminar.
4. We have organized the OpenWetWare steering committee and hold monthly meetings (via teleconference) to help ensure community leadership continues after the iCampus grant expires.
5. The committee commissioned regular "OpenWetWare Highlights" to celebrate and encourage quality contributions by showcasing them on the main page.
6. We have developed a number of custom software extensions to the MediaWiki software specifically geared towards OWW users. These include extensions that:
    - Allow users to customize their recent changes to make it easier to track changes of a particular set of pages (e.g., changes on their lab webpages.)
    - Extend the existing ShowHide extension allowing showing/hiding all, enabling easier navigation of the site.
    - Allow users to change their personal default page to a page other than the general Main Page, so they could enter OpenWetWare on their lab page for instance.
    - Allow users to personalize their sidebar links enabling easier navigation of the site.
    - Make it easy to extract a portion of one wiki webstie, rewriting all page titles and links, and import it into another wiki. This is useful for *merging* an external wiki with OpenWetWare.

Publications

OpenWetWare currently consists of ~7200 total pages, more than 150 protocols, 75 materials pages, and 50 equipment pages. (Figure 4) Not to mention the large number of research pages posted by the 55 labs on OpenWetWare. The site itself is a dynamic, growing publication.

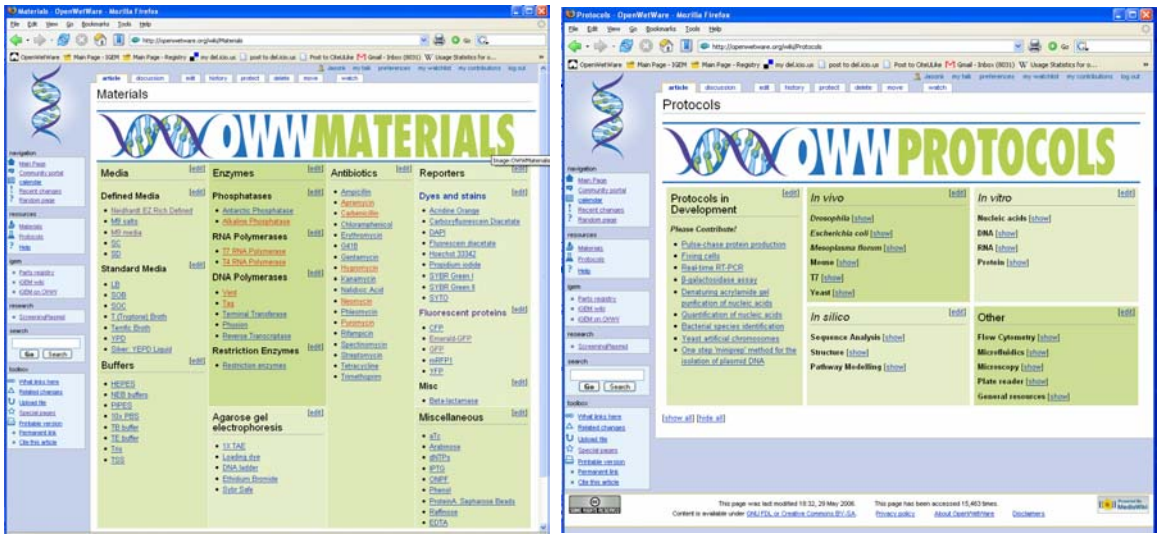


Figure 4: *Materials and protocols pages on OpenWetWare. All information contained here is generated by the community and is available freely.*

Posters and Presentations

We have presented a poster (Figure 5) at several academic conferences in order to recruit new users. We have given a number of presentations, typically to labs in the Boston area requesting a tutorial of the site. These presentations are given as a tour of the site rather than as a Powerpoint presentation, however you can find the walkthroughs here:
http://openwetware.org/wiki/OpenWetWare:Presentations

Figure 4: *OpenWetWare poster for recruiting new labs.*

News Articles

OpenWetWare has been featured in the following news articles. We have attached copies of each article at the end of this document.

Online methods share insider tricks Nature, June 7, 2006.

Wikis: Lab Partnering Science, January 6, 2006.

BLOG and WIKI your science Biotechnology Journal, December 27, 2005

Science in the web age: Joint efforts Nature, December 1, 2005.

Budget Review & Request for Continued Funding

- Materials & Services - $1315.11 (total)
    - Artist for site design, logo, poster - $1200
    - Printing posters, business cards - $115.11
- 2 UROP students working part-time in the spring - $2750.85
- Meetings (food,beverage,voice conference device) - $306.82
- OWW seminar series (A/V, speaker lunch) - $700
- Overhead - $3145.06
- Total: **$8217.73**

While we still have some of our current funding remaining, there are a number of projects that would be enabled by receiving further funding from iCampus.

1. OpenWetWare Mediawiki distribution
We have had requests from several labs for a packaged installation of the custom extensions for Mediawiki that were developed for OpenWetWare, so that they can install and run their own wiki. To answer these requests we would like to develop an OpenWetWare-branded distribution of the Mediawiki software for scientists. We also expect that the distribution could serve as a mechanism for driving more users to OpenWetWare, particularly those who may at first be hesitant due to the public nature of the site. We will include mechanisms such as a "publish to OWW"-button that would enable simple uploading of private wiki content to the public OpenWetWare site. Additionally, sharing a common Mediawiki distribution in the biological sciences would enable tools developed by various groups to be more rapidly distributed to the broader community.

2. Apply for 501(c)3 status
501(c)3 non-profit status will enable OpenWetWare to apply for further funding after the iCampus grant terminates.

3. Greater online advertising effort
The site has been growing "organically" for the first year of its existence, with little in the way of advertising beyond word-of-mouth. This approach enabled us to grow at a speed which was manageable, while at the same time fostering a core group of users dedicated to maintaining and supporting OpenWetWare. However, with the automated new user management system, as well as infrastructure developed on the wiki (in particular the community portal), we are now in a better position to increase our recruiting efforts. Targeted advertising via Google Adwords, as well as advertising on popular biology websites/magazines would greatly increase new membership on the site.

We have undergone tremendous growth in both user base and infrastructure over the past 5 months, while judiciously managing the resources we have received from iCampus. We expect that further funding in support of the goals highlighted above will allow similar rapid growth over the remainder of the year.

Nature
Published online: 7 June 2006; | doi:10.1038/441678a

Online methods share insider tricks

Wiki-style website allows tinkering with lab protocols.

Helen Pearson

Replicating controversial lab results or tricky methods could become easier, thanks to a new breed of websites where scientists share and edit each other's laboratory techniques.

It's all in the wrist: the finer points of experimental technique often never make it beyond scrawled notes or laboratory conversations.

CC STUDIO/SPL

Laboratory protocols in biology and chemistry — the step-by-step guide to, say, separating proteins or splicing DNA fragments — are conventionally published in research papers or books of standard protocols. The instructions should allow another researcher to copy and confirm an experiment.

But scientists know that these recipes are seldom enough. Journals are cutting their methods sections to save money. And printed protocols lag behind rapidly evolving and increasingly sophisticated techniques, such as the nuclear transfer used in cloning.

Perhaps more importantly, it is the subtle variations — the deftness of touch, the type of mixing tube, and a dash of hocus-pocus — that distinguish a successful experiment from a flop. But such details often exist only as scrawled footnotes or collective laboratory wisdom. "The art of the science really is not present in many of these protocols," says geneticist Garry Nolan of Stanford University, California, who has put his protocols online. "They don't tell people what the voodoo is."

The websites could help share the voodoo. They are loosely based on the online encyclopaedia Wikipedia, which lets users edit each other's entries. Unlike the protocols already available online, the idea is to create a repository of experiments and the tricks needed to do them, and allow users to add their own.

“Printed protocols lag behind rapidly evolving techniques such as those used in cloning.”

One burgeoning site, OpenWetWare, was set up just over a year ago by students at the Massachusetts Institute of Technology. The Wikipedia-style site, featuring methods and other scientific resources, had around 30,000 users last month. One of the most popular protocols, used to measure the level of protein production in cells, now includes experimental data posted by users to let others know what to expect.

"You can't find this information anywhere else," says one of OpenWetWare's founders, Sriram Kosuri, a graduate student in synthetic biology. The site is particularly popular among researchers in synthetic biology, who want to create standard tools for engineering biological systems.

Two other competing sites are starting up. One, from the Cold Spring Harbor Laboratory Press, launched last week, and one, from the Nature Publishing Group, publisher of *Nature*, is due to launch in June. Both will feature commissioned protocols, which users will be able to comment on and add to. Unlike Wikipedia, comments will be screened before they are published and some of the material will be available only to subscribers.

Advocates say the sites have several advantages. They help busy lab heads deal with enquiries about their protocols. By removing some of the mystery from methods, they could help researchers iron out flaws, and perhaps verify controversial results. They might also raise the profile of methods, often glossed over as the means to the more exciting results.

On the flip side, a laboratory worker could end up drowning in information. And the sites will be successful only if enough scientists embrace them. Researchers in competitive fields might hold back methods that they think give them an edge. "A lot of molecular biologists are not very comfortable on the Internet to begin with," says systems biologist Pamela Silver of Harvard Medical School, who uses OpenWetWare.

And even the sites' supporters admit that a written protocol still cannot compare to learning on the job from a lab veteran. "The very best way," says John Inglis, executive director of the Cold Spring Harbor Laboratory Press, "is to sit beside someone who's doing it."

RESOURCES

Sniffling Sheep and Coughing Cows

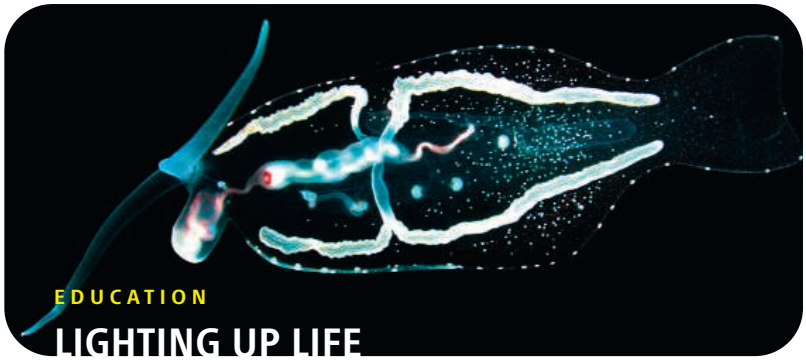
Avian flu has captured the headlines, but it's just one of the animal diseases on the loose. Honeybees can fall victim to mite infestations, for instance, and the viral disease yellowhead decimates farmed shrimp. To corral more information about these and other illnesses, visit the site of the Paris-based World Organization for Animal Health. Weekly announcements furnish the latest on outbreaks. Technical Disease Cards describe the cause, spread, diagnosis, and prevention of 16 major veterinary maladies, such as African horse sickness and vesicular stomatitis, a viral scourge of hoofed mammals. You'll find a list of international experts on particular illnesses and plenty of other resources, including conference reports and disease-prevention guidelines. Above, a cow with foot-and-mouth disease. >> www.oie.int/eng/en_index.htm

WIKIS

Lab Partnering

If you've whipped up an irresistible medium for rearing slime molds or collected some tips on performing flow cytometry, share your insights with other biologists at OpenWetWare. This wiki, or user-written collaboration, lets researchers craft virtual meeting places for their own labs or add to communal pages on methods and equipment. Started last year by scientists at the Massachusetts Institute of Technology, OpenWetWare now houses pages from more than 20 labs at 10 universities. Contributions include safety advice for working with ethidium bromide, a reagent for electrophoresis, and a simple protocol for mutating specific nucleotides in a gene. The pages often allow readers to choose among several labs' versions of the same technique. >> openwetware.org/wiki/ Main_Page

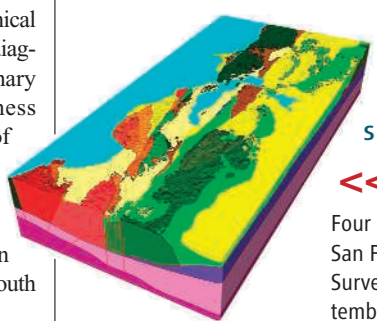
CREDITS (TOP TO BOTTOM): KIM KYUNG-HOON/REUTERS; STEVEN HADDOCK; USGS

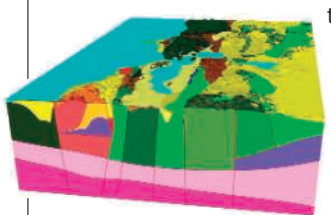


EDUCATION

LIGHTING UP LIFE

Long before Las Vegas imported its first neon tube, bioluminescent organisms such as this nudibranch (*Phylliroe*, above) were putting on the glitz. Find out which marine organisms generate light and how they do it at the Bioluminescence Web Page, hosted by marine biologist Steven Haddock of the Monterey Bay Aquarium Research Institute in Moss Landing, California, and colleagues. Ocean-goers from bacteria to fishes have mastered the light-emitting reaction, in which the enzyme luciferase oxidizes the molecule luciferin. Pages illuminate how some organisms exploit this skill, such as the deep-water fishes that scan their surroundings with red light, which their prey can't see. The site's gallery teems with photos of glowing creatures. For researchers, there's a forum for listing recent publications and announcements of upcoming conferences. Haddock plans to add a link to real-time measurements of bioluminescencing organisms off the California coast. >> www.lifesci.ucsb.edu/~biolum/





SOFTWARE

<< On Shaky Ground

Four earthquakes of at least magnitude six have rumbled through the San Francisco Bay area since 1979. A new model from the U. S. Geological Survey might help seismologists sharpen their predictions of the next temblor's damage. Unlike standard, two-dimensional shaking maps, the simulation renders the upper 32 kilometers of Earth's crust (left), incorporating measurements of the seismic properties of the area's rocks. Because it's three-dimensional, the model includes features such as faults and underground basins that can divert or concentrate a quake's force. Researchers can use the tool to estimate future ground trembling and gauge the power of past, unmeasured events. Download the model here: >> www.sf06simulation.org/geology/

TOOLS

Hooking Up With Antibodies

ExactAntigen can help molecular biologists, immunologists, and other researchers track down everything from samples of the cholera toxin to monoclonal antibodies against the appetite-adjusting hormone leptin. Created by Hanqing Xie of Synatom Research in Ringoes, New Jersey, the free site trolls thousands of Web sites—mainly from commercial suppliers—and other sources to locate providers of antibodies and reagents. Users can search by categories such as gene, organism, and disease. The results often list other molecular products, such as gene-blocking siRNA molecules, along with publications and relevant patents. >> www.exactantigen.com

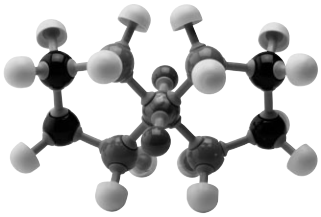
Send site suggestions to >> netwatch@aaas.org. Archive: www.sciencemag.org/netwatch

Websites

Pubchem with chemical compound structure

PubChem is organized as three linked databases within the NCBI's Entrez information retrieval system. These are PubChem Substance, PubChem Compound, and PubChem BioAssay. PubChem also provides a fast chemical structure similarity search tool. This new search tool at NCBI thus provides information on the biological activities of small molecules and will prove useful for any researcher looking for chemical structures, or working in the field of drug discovery.

http://pubchem.ncbi.nlm.nih.gov



The NCI Alliance for Nanotechnology in Cancer

To help meet the goal of eliminating suffering and death due to cancer, the National Cancer Institute (NCI), part of the National Institutes of Health, is engaged in efforts to harness the power of nanotechnology to radically change the way we diagnose, treat and prevent cancer.

The NCI Alliance for Nanotechnology in Cancer is a comprehensive, systematized initiative encompassing the public and private sectors, designed to accelerate the application of the best capabilities of nanotechnology to cancer.

Currently, scientists are limited in their ability to turn promising molecular discoveries into benefits for cancer patients. Nanotechnology can provide the technical power and tools that will enable those developing new diagnostics, therapeutics, and preventives to keep pace with today's explosion in knowledge.

To harness the potential of nanotechnology in cancer, the goals of the NCI Alliance for Nanotechnology in Cancer are to develop:

- Research tools to identify new biological targets
- Agents to monitor predictive molecular changes and prevent precancerous cells from becoming malignant
- Imaging agents and diagnostics to detect cancer in the earliest, most easily treatable, pre-symptomatic stage
- Multi-functional targeted devices to deliver multiple therapeutic agents directly to cancer cells
- Systems to provide real-time assessments of therapeutic and surgical efficacy
- Novel methods to manage symptoms that reduce quality of life

http://nano.cancer.gov

BLOG and WIKI your science

Blogs and wikis are websites that any visitor can add to and edit. Outside academia, blogs are taking off in a big way. A study published in October by the Guidewire Group, a research firm in new media, says that 90% of marketing communication companies have either launched, or intend to launch, internal blogs. There are now some 20 million blogs, permeating almost every sector of society. But science is a glaring exception, and today there are still only a few dozen scientific bloggers.

The emerging web is largely being shaped by dynamic interactions between users in real time and could be used to enhance science communication. But many researchers still see publications in the formal scientific literature as 'the' means of scientific communication. Although the traditional published paper is accepted as the undisputed information of record, younger researchers, in particular, are concerned that scientists are missing out on new ways to communicate with each other and the public.

Blogs might really take off once scientists come up with some sort of peer-review mechanism for blogs that increase their credibility.

Scientific BLOG sites:
pharyngula.org/index/science
www.nodalpoint.org
www.wikipedia.org
openwetware.mit.edu/wiki
contentious.com
effectmeasure.blogspot.com
blog.bioethics.net
www.realclimate.org
cancerdynamics.blogspot.com
www.facultyof1000.com/start.asp

Summary from Nature 2005, *438*, 548–549, doi:10.1038/438548a

Joint efforts

At its best, academia is a marketplace of ideas. But many scientists are reluctant to embrace the latest web tools that would allow them to communicate their ideas in new ways, says **Declan Butler**.

When Tim Berners-Lee invented the World Wide Web in 1989, he saw it as a collaborative workspace for his fellow scientists at CERN, the European particle-physics lab near Geneva, and beyond. His creation went on to surpass his prediction that "the usefulness of the scheme would in turn encourage its increased use". But in the rush to develop the web as a flexible way to find information, the original concept of users interacting in real time was largely forgotten. Fifteen years later, the web seems to be returning to its roots.

For most users, the web in its first decade was like a big online library, where they mainly searched for information. Today it is undergoing a subtle but profound shift, dubbed Web 2.0, to become more of a social web, not unlike Berners-Lee's original vision. Yet scientists are largely being left behind in this second revolution, as they are proving slow to adopt many of the latest technologies that could help them communicate online more rapidly and collaboratively than they do now.

"I find it ironic that science is about the adoption, discovery and exploitation of new knowledge and techniques, yet the biggest revolution on the web is passing us by," says Greg Tyrelle, a bioinformatician at Chang Guan University in Taiwan. He has been experimenting with blog (short for web log) software for five years to interact with a growing audience of his peers and the wider public.

The emerging web is largely being shaped by dynamic interactions between users in real time. But many researchers still see publications in the formal scientific literature as 'the' means of scientific communication. Although the traditional published paper is accepted as the undisputed information of record, younger researchers, in particular, are concerned that scientists are missing out on new ways to communicate with each other and the public.

They recommend the use of collaborative technologies such as blogs and wikis, websites that any visitor can add to and edit. Supporters say these offer a forum for broader and more timely discussion, to complement the existing system of peer-reviewed journals. This could enhance science communication, both before publication, when generating ideas, and after publication, when discussing results (see 'Open house', opposite).

"Until blogging is seen as normal, worries about what your supervisors think will continue to be a problem."
— Gavin Schmidt

C. DARKIN

Blogs are just one example of new social technologies that are allowing more people to publish more easily and in more diverse ways on the web. By allowing reader feedback and syndication feeds, blogs create an instant online community. "Blogs can offer any kind of content — from peer-reviewed articles to sheer speculation to rants, and everything in between," says Amy Gahran, an expert in new media and editor of Contentious.com.

The write stuff

The best-known wiki is the online encyclopaedia, Wikipedia, which has grown to almost a million entries since its launch in 2001. Scientists at Harvard and the Massachusetts Institute of Technology (MIT) recently started their own wiki, OpenWetWare, to apply the same approach to sharing lab protocols and data among biology groups worldwide.

C. FIELD

Outside academia, blogs are taking off in a big way. A study published in October by the Guidewire Group, a research firm in new media, says that 90% of marketing communication companies have either launched, or intend to launch, internal blogs. There are now some 20 million blogs, permeating almost every sector of society. But science is a glaring exception, and today there are still only a few dozen scientific bloggers.

Scientists who blog see their activities as a useful adjunct to formal journals, not a replacement. "The standard scientific paper is irreplaceable as a fixed, archivable document that defines a checkpoint in a body of work, but it's static, it's very limited," says Paul Myers, a biologist at the University of Minnesota, who blogs at Pharyngula.

"Put a description of your paper on a weblog, though, and something very different happens," says Myers. "People who are very far afield from your usual circle start thinking about the subject. They bring up interesting perspectives." By sharing ideas online, you get feedback and new research ideas, he says.

A senior US epidemiologist who blogs once or twice a day under the pseudonym 'Revere' on his public-health blog Effect Measure, has attracted a diverse readership. "About 1,500 people visit each day," he says. "If someone told me that I could show up at a lecture hall every day and deliver a short opinion, and that 1,500 people would show up to hear me, I'd be pretty satisfied — 1,500 is twice the subscription of many speciality journals."

But for most scientists and academics, blogs and wikis remain unattractive distractions from their real work. Many consider them an online version of coffee-room chatter, background noise that goes against the very ethos of heavily filtered scholarly information.

Opinion pieces

Scientists who frequent the 'blogosphere' see it differently. The dynamic hierarchy of links and recommendations generated by blogs creates powerful collaborative filtering, they argue. Blogs may create noise, but they are a great way of keeping up with what's hot in your field, says Tyrelle, who blogs at Nodalpoint.org. He believes that the more bloggers there are in a particular community, the more efficient this filtering becomes, so — counter-intuitively — reducing information overload.

Tyrelle suggests that this is not so different from BioMed Central's Faculty of 1,000, a popular fee-based service that highlights biology papers according to recommendations from a subset of 1,000 scientists. But in the blogosphere, this service is free and could marshall input from a subset of 10,000 scientists or more.

Yet even the most web-savvy scientists remain unconvinced that blogs have any useful role in science. "I have my doubts that blogging reduces information overload, but blogging will survive as it appeals to all the exhibitionists," quips Rolf Apweiler, a bioinformatician at the European Bioinformatics Institute in Hinxton, UK, and head of the UniProtKB/Swiss-Prot protein-sequence database.

Others disagree. "Science is too hung up on the notion of 'the paper' as the exclusive means of scientific communication," says Leigh Dodds, a web expert at the publisher Ingenta. Publication and research assessments are more geared to measuring a researcher's standing than communicating science, he claims.

Open house

Online pioneers they are not, but traditional publishers are not entirely stuck in the past. Publishing online often means bundling supplementary information with a mirror copy of the print article, but the web is now being used to open up some journals to more interactive discussions — previously only possible at conferences.

The *BMJ* website led the way in allowing readers to post 'rapid responses' to published articles. But in June this year, the *BMJ* changed its criteria for accepting online contributions — adding heavier moderation. Journals thinking of adding companion blogs (see main text) will also want to moderate comments.

Atmospheric Chemistry and Physics (*ACP*), published by Copernicus, uses online discussion to open up the peer-review process. Papers are published online quickly and referees post comments online, anonymously if they wish. Authors, and other researchers, can chip in as long as they identify themselves. After the discussion is closed, editors use it to shape the final version of a paper.

Advocates say the online debate improves the final product. "It lets others see what the leading people in the area are thinking and forces editors, referees and authors to work at a higher standard," says Scot Martin, an environmental chemist at Harvard University and an editor at *ACP*.

Arne Richter, managing director at Copernicus, has high hopes for the journal, which has gained a healthy impact factor of 2.7 since its 2001 launch. But Richter admits that of six Copernicus journals with online discussion, not all have been welcomed by users. *Hydrology and Earth System Sciences* added open peer review seven years after its launch. "A tribe of very conservative scientists keeps asking why there has to be a discussion feature," says Richter. "They just don't want it."

The editors of a new online journal to be published by BioMed Central think biologists are ready for open peer review. *Biology Direct* authors have to solicit their own reviews from an editorial board, and the comments appear online for all to see.

"In many areas of biology there's roughly a one-in-three chance one of your reviewers just won't like your point of view," says editor-in-chief David Lipman. If that were to happen to a *Biology Direct* paper, it would still be published. But anyone could read the naysayer's comment.

Tom Simonite

Jennifer Hallinan, a biologist at the University of Queensland, Australia, who runs the blog Cancer Dynamics, agrees with him. The web is providing a hierarchy of sources, she says, including useful blogs and wikis. "Each level of the hierarchy has its own sources of error, its own strengths and weaknesses," she explains, "but these are known and can be taken into account when using them."

Blogs associated with traditional journals may help bridge the gap between the literature and blogs, says Glenn McGee, editor-in-chief of *The American Journal of Bioethics*. The leading journal in its field, it was the first to create a companion blog, Blog.Bioethics.Net.

"Put a description of your paper on a blog, and people far from your usual circle start thinking about the subject."
— Paul Myers

S. MYERS

The bioethics blog allows the journal to respond faster and in different ways to public controversies, says McGee. The blog has high impact, he adds, often influencing reporting on ethical issues by the mainstream media.

Print journals cannot keep up with developments in certain fields, adds Gavin Schmidt, a researcher at NASA's Goddard Institute for Space Studies in New York, who blogs at RealClimate.org with other climate scientists. The blog helps to reduce noise by setting the record straight, says Michael Mann, another RealClimate blogger and director of Pennsylvania State University's Earth System Science Center, citing as an example a recent post on whether hurricanes are linked to global warming (see www.realclimate.org/index.php?p=181).

McGee and Schmidt have permanent jobs, and both agree that many scientists don't blog because they fear it has a poor image and could damage their careers. Most younger biologists blog anonymously, says Roland Krause, a researcher at the Max Planck Institute for Molecular Genetics in Berlin and a bioinformatics blogger. "Many fear that their superiors consider it a waste of time, or even dangerous," he says. Schmidt agrees: "Until blogging is seen as normal, this will continue to be a problem."

Others fear being scooped by rivals. "In many institutes it's just way too dangerous to discuss work in progress with the people across the floor," regrets Krause — let alone on a blog.

Such fears are dated, argues Jason Kelly, an MIT graduate student involved in OpenWetWare. The upcoming generation, he says, believes that excessive competition can harm science; they see the benefits of brainstorming their research ideas on blogs as far outweighing the risks.

Kelly admits some may regard this view as naive. But Schmidt suggests that once scientists come up with some sort of peer-review mechanism for blogs that increase their credibility, without diminishing their spontaneity, blogs will take off. ■

Declan Butler is a senior reporter at *Nature*.