THE SCIENCE CREATIVE QUARTERLY ISSUE ONE PART THREE OF SIX MAY 9TH 2005 AAHHHHHH!

Our masthead is still evolving, although at present we have two Daves, a Bethany, a Caitlin, a Stephen, a Claire, a Russell and also an exotic sounding Azar.

Tom, Moebius and Richard are happy to help.

We haven't had the time to ask Chris and his friends yet, but we will.

Email us at **tscq@interchange.ubc.ca**

A SUBMISSIONS EXPERIMENT

Dear Reader,

Recently, for kicks, we decided to take a great leap of faith and simply accept (without review or hesitation) the next submission that appeared in our email inbox. Fortunately for us, the writing was reasonable, tantalizing even, and as an added bonus, the science content was sufficiently sound. It is presented below:

Hello,

Try this revolutionary product, CIALIS Soft Tabs.

Cialis Soft Tabs is the new impotence treatment drug that everyone is talking about. Soft Tabs acts up to 36 hours, compare this to only two or three hours of Viagra action! The active ingredient is Tadalafil, same as in brand Cialis.

Simply dissolve half a pill under your tongue, 10 min before sex, for the best erections you've ever had!

Soft Tabs also have less sidebacks (you can drive or mix alcohol drinks with them). No prior prescription needed.

You can get it at: http://sheenier.net/soft/

World RX Direct can bring you quality Generic Drugs for a fraction of the cost of the expensive Brand Name equivalents. Order our Tadalafil pills today and save 80%. We ship worldwide,and currently supply to over 1 million customers globally! We always strive to bring you the cheapest prices.

No thanks: http://sheenier.net/rr.php

In any event, our point is this: we are still absurdly new to this, so take advantage of our easy-going submissions guidelines. Glory is only around the corner.

ABOUT SUBMISSIONS:

Anything will do, but if you like more direction, we are happy to look at:

Things with some link (however weak) to science.

Things in English.
Things in other languages that are more or less readable when translated with Google tools.

Things with many words.
Things with few words.
Things with pictures.

Things that are news worthy.
Things that are not terribly so.

Things that educate.
Things that entertain.
Things that both educate and entertain.

Things that are important to ones well being, or perhaps to the global community at large.
Things that (at the end of the day) are really only there for the sake of being there.

Things from famous people who think that this is a pretty neat thing going on here.
Things from infamous people - they're interesting too.
Things from everyone else.

And things whose copyright ultimately remain with the author, although it would be nice to be acknowledged as being involved in presenting it to others.

Submissions are preferred as attached word documents, or text pasted directly into the body of the email. Please send us your good work to **tscq@interchange.ubc.ca**

AND COMMENTS ALWAYS WELCOMED...

LEARNING BY PURE OBSERVATION

BY DAVID SECKO

Simply observing a person in the act of learning to move in a new environment is enough to help you unconsciously learn those movements, says new research by Canadian scientists.

More specifically, Andrew Mattar and Paul Gribble, from the University of Western Ontario (UWO), recently found that individuals who watched a video of a person learning to move a robotic arm, performed this same task better than those who didn't observe the learning process.

This may not come as a surprise to anyone who has learned by watching a professional athlete or expert craftsman. However, what is unexpected is that this learning of complex motor behaviors appears not to be based on conscious thought. Instead, learning through observation involves *implicit* actions of the brain—a finding that tells us a lot about how we absorb the actions of others.

"One really cool thing this tells us, is that when you're watching things going on in the world, your brain is always working," says Gribble, an assistant professor of behavioral and cognitive neuroscience at UWO. "So, even though you don't know it, your brain is forming internal representations of how things function."

Mattar and Gribble asked 84 people to sit at a desk in front of a robotic device shaped like a human arm. The 84 subjects were then asked to perform a task involving holding the robotic device while moving towards circles that appeared on the desk. "It was like they were shaking hands with the robot while making rapid movement to new positions," says Gribble.

However, during the movements, the robot was programmed to apply forces to a person's arm. "As you tried to move, the robot would push you from your normal straight trajectory," says Gribble. This produced curved trajectories that the researchers could measure. But, over time people would learn to compensate for the applied forces and make straighter trajectories, a process that involves the brain learning to re-map its control of muscles.

Mattar and Gribble then went on to show a video of people learning to move the robotic arm to a sub-set of subjects. People who watched the video were then tested and found to produce straighter trajectories more quickly than people who didn't get to see the video. The results are published in April 7, 2005, issue of Neuron.

Interestingly, subjects who were shown a video of people learning unrelated motions did worse, presumably due to their having mentally mapping an inappropriate representation of how the robotic arm worked.

"This really implies that people are building up an internal model of the task," says Gribble.

To see if this learning by observation was a conscious strategy, Mattar and Gribble made subjects perform math while watching the video, with the intention of distracting their conscious thought patterns. However, this did not reduce their performance, implying that conscious thought is not required.

"In a nut-shell, this suggests that conscious systems are not necessary for someone to

improve by observing," says Mattar, who completed the current study as an undergraduate project at UWO and is now at McGill University.

However, making people move their arms while watching the video did impair their subsequent performance. This finding points to the need for motor systems to be unoccupied for observational learning to occur.

Mattar and Gribble's findings come on the heels of a recent movement in neuroscience that links motor control - the ability to generate accurate movements under varying conditions - with the observation of actions. This theory has come to life with the discovery of "mirror neurons", which are activated by both performing and observing the same action.

"Mirror neurons point to a connection between our neural systems for observation and action," says Mattar. "So we did the experiments because we were interested in whether the link between observation and action could facilitate motor learning," says Mattar. Motor learning is essentially the ability to adapt to new mechanical environments, like learning to ride a bike. Such learning is thought to involve acquiring neural representations of the way in which mechanical forces affect muscles.

Together the work does raise an intriguing question of whether people need to observe mistakes in order to learn. "My gut instinct is that you probably get more benefit from watching a person progress from being unskilled to skilled," says Gribble, "but we're testing this now."

In the end, "what it all implies is that if you want to maximize your learning you should stay still and let your motor system absorb information," says Gribble.

References

UWO Motor Control Lab
http://spindle.ssc.uwo.ca/

Mattar A. A. and Gribble P. L. "Motor learning by observing," Neuron, 46(1):153-60, April 7, 2005.

PHYSICS ENVY AMONG BIOLOGISTS: FACT OR FICTION?

by T.J. Nelson

Physicists often state their belief that all biologists would rather be physicists, but became biologists only because they were not very good at math. As evidence for this, they point to such findings as the fact that the vast majority of published studies in virology, cell biology, endocrinology, and even microbiology, use few if any partial differential equations or elements of number theory, and only one paper written by a biologist in the past 25 years (in the field of neurophysiology) has ever used tensor calculus.

On the surface, this would seem to be a damning indictment of biology. Why, physicists ask, do biologists seem unable to utilize such simple concepts as the Riemannian-Christoffel curvature tensor or Galois fields in their work?

I discussed this issue of alleged innumeracy among biologists with a physicist friend of mine a few weeks ago while he was driving me to the airport in his cab. Inevitably, however, the discussion turned to possible collaborative experiments which would combine physics and biology.

In one such experiment, we considered the possibility of accelerating two rats to relativistic velocity, and smashing them together and counting the rat particles that would be emitted. For a time, there appeared to be the exciting possibility of discovering a new elementary particle, which would be found only in living matter, and which could tie the field of quantum mechanics with the emerging biological science of consciousness. However, with the help of the formidable mathematical skills of another physicist friend, we were able to estimate that the number of rat particles emitted would probably be too large to count [1], even if we put all our NIH postdocs on the problem. In fact, it would be too many even if our Howard Hughes fellows and all of our Summer Students pitched in and contributed their formidable math skills as well to the project. Thus, the elusive consciousness particle would have been impossible to detect.

The great enthusiasm expressed for this experiment by my physicist friend, however, revealed an important and surprising fact. When pressed, many physicists will reveal in confidence that they would actually rather have been biologists, but for the unfortunate fact that they were unable to keep anything alive long enough to study it. This is particularly true of subatomic physicists. Many researchers in the physical sciences in particular seem to be genuinely distressed about this, and in some cases their work reveals subtle psychological doubts, conflicts, and uncertainties about their inability to keep things alive. The well-known case of Schrodinger and his cat provides a perfect example.

But is there any real scientific truth to the assertion that physicists have trouble keeping things alive? In a famous study [2], the ability of prominent physicists from various subdisciplines to

maintain a culture of bacteria was studied. The physicists were instructed to streak an agar plate with E. coli bacteria. The cells were then analyzed at different times and the percentage of bacteria still alive were counted using a computer program. The parts of the program that had math that was too hard were written with the aid of an ex-physicist. Although bacteria are hardy creatures, and tend to grow in great abundance without assistance, the longest survival time of any bacterium in the hands of a nuclear physicist was only 17 minutes and 18 seconds. Solid state physicists performed better, at 21 min 45 sec, while bacteria in the hands of astrophysicists survived a mere 12 minutes and 58 seconds. These are dismal numbers indeed, and point to a widespread incellularosity among all branches of physics.

It has been proposed that the roots of this phenomenon of incellularosity may be found in the early education of physicists. Indeed, in a follow-up study [3], a detailed analysis of the ill-fated Petri plates showed that, in many cases, the tragic deaths of all those millions of E. coli could be attributed to what, to biologists, may seem like relatively simple errors. For example, in one case, the plate was incubated at 1,700,000 degrees, a temperature far in excess of the optimal growing temperature for bacteria of 37 degrees Centigrade. In another case, it was found that the plate had not been streaked at all. The bacteria from this plate have never been recovered, and it is still not known precisely where the physicist streaked his bacteria. Unfortunately, the physicist in question could not be queried on this point, as he has sadly passed away after a sudden and unexpected illness.

A significant statistical problem encountered during this study, however, was that several of the physicists, rather than remaining to complete the test, made what the authors termed "disparaging remarks" about the authors' experimental design, and returned to their laboratories, where they wrote detailed papers describing the mathematical underpinnings of bacterial cell division. Even worse, two of the physicists subsequently went on trips to Oslo, Norway as a result of this, and the remainder refused to return phone calls from the authors. Thus, the results were skewed in favor of slightly "less-obnoxious" physicists.

Another statistical problem that was noticed was that no theoretical physicists had been included in the experiment. In fact, the authors, after desperate attempts to locate some theoretical physicists, ultimately concluded that such physicists did not, in fact, exist. The existence of such scientists had been postulated years earlier by Ashimoto et al.[4], but as of this writing, none has ever been observed. Thus, this branch of physics remains largely theoretical. As a famous biologist once remarked, "this is just as well, as theoretical physics is mostly just a bunch of complicated math stuff anyway."

Yet as revealing and touching as these anecdotal stories may be, the grim spectre of incellularosity needs to be taken seriously. Therefore, we will leave this topic for someone else and switch back to our original topic, that of the mathematical abilities (or absence thereof) in biologists.

Many anthroponumerical studies have focused on biologists, particularly in relation to their difficulties with left-brain skills such as mathematical reasoning and 3D spatial ability. Zubiaga et al. [5] reported that biologists, accustomed to rounded, natural shapes, had great difficulty in tasks requiring strong 3D visualization of flat, rectilinear-shaped objects, such as assembling cardboard

broken glass disposal boxes. Their photos of tragically misshapen biohazard boxes assembled by frustrated and exhausted biologists, and broken-glass boxes assembled upside-down and held together with autoclave tape, are quite revealing. Zubiaga, a renowned particle physicist himself, speculated that other similar complex three-dimensional objects, such as lawn chairs, could well suffer a similar fate.

In actuality, the unfortunate fact that cell division and multiplication are synonymous has long been a cause of great mathematical angst among biologists, who after a long day watching cells increasing in number after dividing, often find themselves getting the x and / keys on their calculators confused.

Russell[6] documented the now well-accepted finding that biologists rarely use integers per se, particularly when making chemical solutions. When they believe themselves to be unobserved, biologists prefer to use their own unique counting system consisting of the following quantities:

1. Some.
2. A bunch.
3. A whole bunch.
4. All of it.
5. See if somebody else has any.
6. We'll have to buy some more.
7. Let's write a new grant.

These quantification terms are roughly delineated by increasing powers of 10. The biologists' counting system was compared to the primitive counting system used until quite recently in Samoa. However, Rascher[7] has claimed that subsequent interviews with the native subjects who had provided cultural information in the initial Samoan study, revealed that the Samoans actually thought the original anthropologist was just 'kidding around', and were merely cracking jokes about their counting system. According to Rascher, Samoan society did not use a primitive counting system after all but were in fact mathematically highly advanced, having actually developed differential calculus over 500 years before Newton.

The biologists' counting system has been defended by Baber, who noted that the system used by biologists is significantly more accurate than calculations performed on advanced state-of-the-art software such as Microsoft (TM) Excel [8]. Baber also claimed that, like the ancient Mayans, biologists appeared to have developed their own calendar, which was more accurate than the calendar on some modern-day computers (e.g., the AT&T 6300). However, no additional details of this potentially important finding were provided in Baber's book[8], and other researchers have recently disputed this claim.

Footnotes:

[1] Using the biologists' numbering system, he estimated that the total number of particles would be

$$\text{whole bunch} * \frac{\text{rat}^3}{\text{mv}^2} - \text{some}$$

This is obviously higher that we, as mere biologists, could possibly count, and the sight of the exponent in this very complicated-looking equation served to dissuade us of the entire concept.

[2] Rosenberg, J. et al., Soc. Psych. Biol. Phys. 1, 14 (1996).

[3] Rosenberg, J. et al., J. Unpublished Results 33, 14705 (1998).

[4] Ashimoto, Watashino, personal communication.

[5] Zubiaga, T., Lebovic, V., and Vlasek, P., Czech. J. Unpub. Results 22, 143 (1988).

[6] Russell, R., personal communication.

[7] Rascher, R. and Nolan-Rascher, B., personal communication.

[8] Baber, B., in Excel for Blithering Morons, Wipburn Press, p. 1479 (1999).

A CHEMIST RESPONDS TO "A SCIENTIFIC EXPERIMENT."

by W. Stephen McNeil

(A review and/or rebuttal to "A Scientific Experiment" by Jaime J. Weinman, Issue One, Part II)

Well, it's a good thing that science experiments on webpages aren't subject to the traditional anonymous peer review process. It they were, Jaime would probably get a reply something like this:

"Dear Mr. Weinman,

"We regret that we cannot accept your manuscript for publication in its current, or likely any, form. The reviewers have pointed out a number of glaring deficiencies and omissions, briefly summarized below.

"Although your scientific curiosity is to be applauded, your experimental methodology seems exceedingly limited, and lacks many important details. Your report describes only a single experiment, with no repetition or statistical analysis, and no meaningful description of the nature of the sample (beef or pork? smoked or unsmoked? jumbo or regular?). Similarly, your description and discussion of results is purely qualitative and exceedingly terse. What mass of fluid was extracted from the hot dog? What was the initial mass and volume of the sample? The fluid is characterized solely as "fat", but no analytical details are provided to support this conclusion. Your characterization of the final product as "literally, a stick" was met with particular disbelief from one reviewer, who points out that a microwave-induced transformation of protein to cellulose would defy all known laws of chemical and biochemical reaction. Finally, your conclusion seems to be little more than "hot dogs have a lot of fat in them", a conclusion of little or no scientific merit in that it would be immediately apparent to any numbskull who reads a nutrition label.

"In conclusion, we feel that your experimental design and implementation would rank well below par at any high school science fair, and recommend that for your next project, you try building a trebuchet. Because trebuchets are freaking cool."

But that's mostly because the anonymous peer reviewers for scientific manuscripts can sometimes be real pricks. Truth be told, there are actually some cool things to be learned from this. I'm not sure "don't eat hotdogs because they're, like, all fatty and gross and stuff" is one of them (because you should already have known that) but it's a nice experimental confirmation of that nutritional info, which, to be fair, is something that nobody ever bothers to read and doesn't actually tell you what you should know, unless you've taken a fair amount of biochemistry.

In brief, meat is pretty much just protein, fats/oils (aka lipids), and water. The microwave heats up the water, which heats up the rest of it, which once the temperature gets hot enough will then melt all the fatty material. (How does the microwave work? You should ask How Stuff Works, of course - http://home.howstuffworks.com/microwave.htm) This, of course, is when the now liquid mixture of fats, oils, and water starts oozing out. Repeated enough times, this will extract all the fluid, and the remainder will be overcooked zero-moisture hardened protein. - with, you know, some onion power and stuff.

Which would actually happen with any kind of meat. Zapping anything in the microwave for long enough makes it unappetizing. Starting with something already unappetizing doesn't help. Besides, if you were in the mood to watch oozing fat, it seriously doesn't get much better than hotdogs.

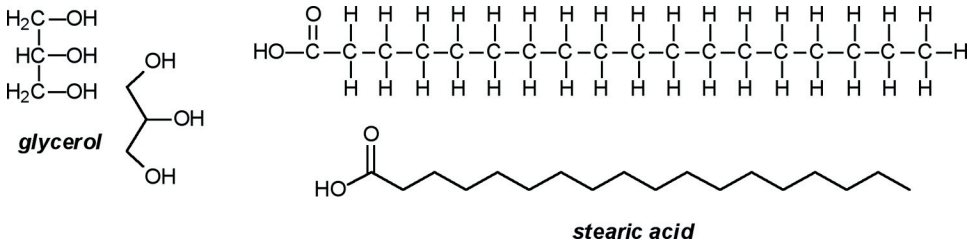
A random hot dog package I looked at yesterday more or less broke it down as follows:

A typical hot dog is about 35 to 40g, and supplies your body with about 100 calories of energy. (Except that they aren't really calories; they're kilocalories. That is, every nutritional "calorie" is actually 1000 calories, equivalent to the amount of energy it takes to increase the temperature of one litre of water by one degree Celsius. Why or how this stupidity arose has never been explained to me.) Of that mass, 8.5g is fat, or about 20-25% by mass. However, fat supplies your body with about 9 calories per gram (more than twice as much as a gram of protein), which means that the fat represents something like 75% of the total calories. "A stick injected with fat" has it backwards. More like "fat wrapped in sausage casing for your dining convenience".

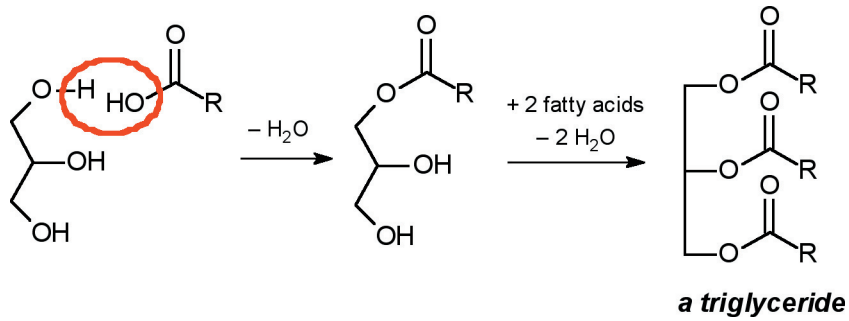
Of that total fat, there are about 3.7g of *saturated* fats (the really bad stuff), about the same of *mono-unsaturated* (much of which may be trans fats, which are almost as bad as the fully saturated and will most likely soon be listed separately on the label to help you avoid them). Notably, hardly any of it is the (relatively) healthy oils, the *polyunsaturated* fats.

Which is just about the point at which your eyes start to glaze over and you quit trying to sort out what the nutrition label tells you, and instead you get distracted by the next package of hotdogs, because those ones have *!!!omigod cheese right inside the wiener!!!* and you buy those instead. Which is a shame, because there's some cool and pretty easy-to-grasp chemistry on that label.

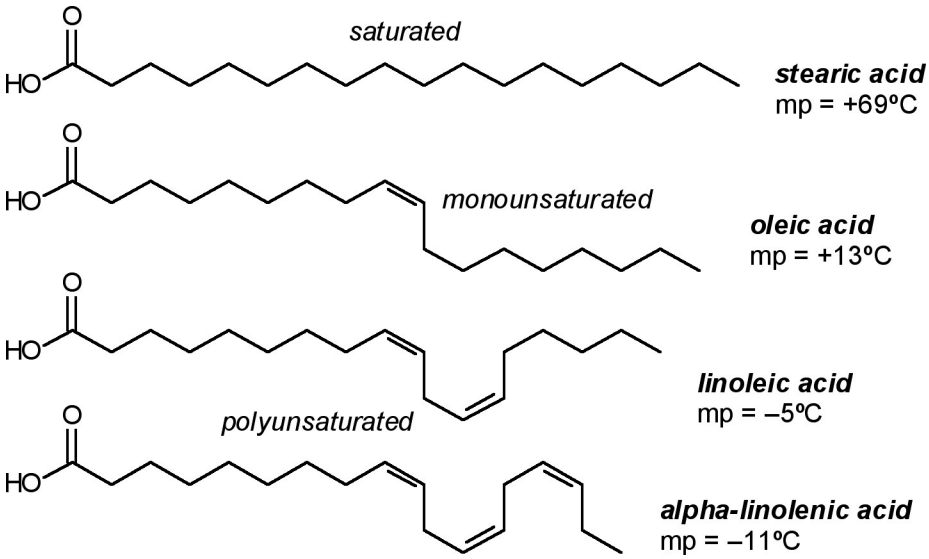
Fats and oils are triglycerides. They are compounds that arise from a reaction of glycerol with three molecules called fatty acids. Fatty acids are long chains of carbon atoms, most of which are connected to hydrogen atoms, except for one at the end of the molecule, which forms a carboxylic acid group, COOH. Below are two depictions of both glycerol and a fatty acid called stearic acid, which has eighteen carbon atoms. In the first drawings, all the C and H atoms are shown explicitly, but writing them all out like that is a giant pain, so nobody does it. In the second drawings, a standard shorthand is used, where lines represent bonds between carbon atoms at the vertices, and the Hs connected to those C atoms are omitted. They're still there, and we can infer their presence because each carbon atom forms four bonds -- if you don't see four bonds explicitly drawn, the missing ones are connecting to H atoms.



Glycerol reacts with a fatty acid in a condensation reaction, where the two molecules join together and a molecule of water is lost. The H and O atoms that generate the water are circled in red, and the long carbon chain of stearic acid is represented by R. If that reaction happens three times, you get a triglyceride: or a glycerol condensed with three fatty acids. The three R chains don't have to be the same, but the properties of the resulting compound depend a lot on what those R chains look like.



Stearic acid is a *saturated* fatty acid. It's saturated because every carbon on the chain is holding as many H atoms as possible, and no more could be added. If we remove two H atoms from two neighbouring C atoms, the C atoms must now form a second bond to one another, because each has lost a bond to the missing H. You get a double bond (represented by a double line), and the acid molecule is now *monounsaturated*, because there is one point of unsaturation, one point on the chain to which those two H atoms could be added back. If there is more than one double bond, the chain is *polyunsaturated*.

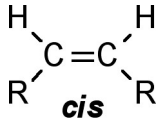


Note what happens to the structure when the double bonds appear. A saturated chain can extend out in a relatively linear shape, and if you get three of them next to each other in a triglyceride, that's exactly what they do. This makes it easy for the chains and the molecules to pack together and stay next to each other, so triglycerides with saturated chains tend to be solids at room temperature, and we call them fats. In contrast, the double bonds put kinks in the chains, so they can't line up as efficiently. Less efficient packing requires less heat to separate the molecules and allows them to flow past each other. Consequently, triglycerides composed primarily of unsaturated chains tend to be liquids at room temperature, and we call them oils. You can see the same trend in the melting points of the above series of the acids themselves, which change dramatically even though these acids all have eighteen carbon atoms in the chain. As the degree of unsaturation increases, the melting point drops.

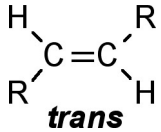
Now, to a point, fats are good. You need fats to live. Dietary fats supply your body with energy, they're required to transport fat-soluble vitamins, and they get incorporated into your cell membranes. But if you live in North America, you're almost certainly eating far more than you need, and most of what you're getting comes from animals. Just like in the hotdog, that means a lot of saturated fats, which is bad for you. Saturated fats raise your cholesterol, increase your LDL:HDL ratio, and lead to coronary heart disease. Vegetable oils and fish provide you with a greater ratio of unsaturated fats, and they tend to do the reverse. You need more salmon and sunflower oil, less beef and butter.

What about *trans* fats?

Note the arrangement of the chain about the double bonds. In the unsaturated fatty acids, each C atom in the double bond is connected to one H atom and one C atom that continues the chain to each side. Normally, the C chains (labeled R again) are on the same side of the double bond, which is called a cis arrangement. But there's another possible configuration, where the chains are on the opposite sides, called the *trans* arrangement.



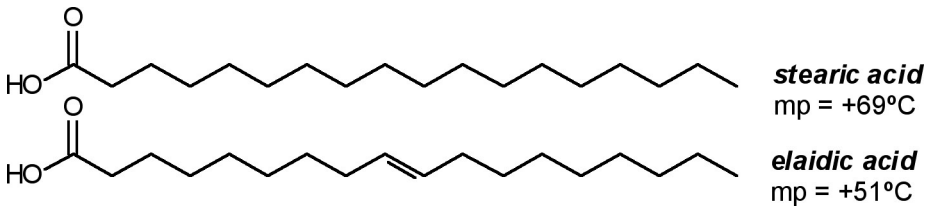
cis



trans

Often, your food contains "partially hydrogenated vegetable oils", in which H atoms are added to some of the double bonds of a polyunsaturated fat to reduce the number of unsaturations. This extends the shelf life of the product, because double bonds are the initial site of oxidation reactions that lead to fats going rancid. But another effect is that the double bonds that remain can get converted from *cis* to *trans*. This in turn affects the structure of the chain – the *trans* fatty acid doesn't have a kink in the chain like a normal unsaturated fat does. Instead, it can line up nice and snug with nearby chains just like it were saturated. Not surprisingly, the melting point comes

back up, and *trans* fats pretty much cause all the same health problems that saturated fats do, even though they get listed on the nutrition label as unsaturated. (Compare the structure and melting point of the trans elaidic acid, below, with the cis oleic, above.)



So, bottom line, yeah, hot dogs are bad for you. No kidding. Hot dogs are little happy heart-attacks-on-a-bun with mustard and relish. Oh, and let's not forget the super-duper nitrite content. (Goodbye botulism, hello colon cancer! I should, in the interest of scientific precision, point out that a diet high in nitrates (commonly added to red meats so that the Clostridium botulinum don't kill you) has never been definitively shown to cause cancer in humans, despite much in the way of tantalizingly correlative data. But that likely does not mean it isn't true, only that the study has never been done. Strangely, the funding agencies won't give you money to try, on purpose, to give people cancer by forcing them to eat nothing but hotdogs for six months in a double-blind crossover study. Go figure.) Anyway, bottom line is this: reduce your fat intake, especially the saturated and trans fats, and use more sunflower and canola oil. Go eat some blueberries, an apple, anything. And while we're at it, why not drag your lazy ass up from in front of your computer and go outside already. Just wear sunscreen.

OF EVOLUTION AND THE BIBLE

by Timon P. H. Buys

"I'm ahead, I'm a man/
I'm the first mammal to wear pants"
- Pearl Jam, "Evolution"

In the Beginning…

Many people believe that there is a conflict between science and religion when it comes to the question of how life began on Earth. While only a minority of people situate themselves squarely on one side of this debate, the topic tends to draw the attention of everyone. This is because the answer to the question of where we came from serves as the jumping off point for defining our morality and our purpose here on Earth. Quite simply, once we know what brought us into being, we know where to ask for instructions. Consequently, any explanation put forward, especially one that purports to be absolute, must be able to withstand an enormous amount of scrutiny.

Perspectives from Science

Scientific method – A method or procedure… consisting of systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses.
- The Canadian Oxford Dictionary [1]

As a model, the scientific method has served as the basis for every major scientific discovery for the last several hundred years. It is supposed to be a means of obtaining unbiased responses to answerable questions. The most validation any scientist can hope to receive from it is when its application fails to refute his ideas – no finding is infallible and anyone who suggests that it is

does not understand how to apply the scientific method.

(Theory of) Evolution – A process by which different kinds of organism come into being by the differentiation and genetic mutation of earlier forms over successive generations, viewed as an explanation for their origins.
- The Canadian Oxford Dictionary [1]

As applied to the origin of life on Earth, the scientific method has brought forward the theory of evolution to explain how life has come to exist in its present form. In the 18th and early 19th century, European thinkers such as Georges Louis Leclerc de Buffon, Erasmus Darwin, and Jean-Baptiste Pierre Antoine de Monet de Lamarck began interpreting the fossil record as evidence that organisms change over time to form new types (or go extinct) and that different types may have evolved from a common ancestor [2]. Charles Darwin (grandson to Erasmus) and Alfred Russell Wallace later advanced the idea that these changes over time were due to selective pressures within the environment that favoured one type over another [3]. This theory of evolution by "natural selection" saw changes in organisms over time as a byproduct of competition between life forms.

Since then, an additional century and a half of experimentation and imagination has refined and re-vamped evolutionary theory. Concepts such as the Big Bang, continental drift, and punctuated equilibrium have allowed the understanding of the mechanisms of evolution to mature [2, 4]. The Miller-Urey experiments and subsequent work have shown how constituent components from life can emerge from primordial conditions, offering some support for the idea of abiogenesis [5, 6]. Enhanced methods of genetic analysis have led to further inquiry into evolutionary topics such as the "endosymbiotic" theory for the origin of mitochondria and chloroplasts in eukaryotes [7] and the mechanisms of speciation [8].

When examining the bigger picture, it is interesting to note that there are some who suggest that the scope of the Darwinian model is too narrow, that the idea of evolution by natural selection fails to sufficiently address the "co-evolution" of the environment and the multiple organisms within it. These same individuals also take issue with the limited commentary on the extensive evolution of chemicals that pre-dated the formation of even the earliest life [2, 9]. In the last thirty years, unifying theories taking into account these and other aspects have emerged. One example of this is the "Gaia Theory" [10]. In brief, this theory states that Gaia is "the superorganismic system of all life on Earth [that] hypothetically maintains the composition of the air and the temperature of the planet's surface, regulating conditions for the continuance of life" and that give and take within this system leads to the evolutionary processes that we observe [2]. In a similar vein, Fritjof Capra's "Deep Ecology" – which incorporates, amongst other things, Gaia theory, chaos theory, and systems thinking – delineates a "web of life" where all living and non-living components on Earth have changed with each other through time [11].

The above examples highlight the diversity of evolutionary research that continues today and demonstrate that there are still many unresolved questions that scientists are pursuing answers for. Contrary to what some anti-evolutionists claim, the level of disagreement between scientists on these topics is not evidence of the shaky ground

upon which the idea of evolution stands. In actuality, these disagreements serve as evidence of the vibrancy of the idea and highlight how its continued malleability has allowed it to flourish and take hold.

Genesis for Dummies

The world abounds with creation stories, too many to recount here. The theme common to them all is that a divine force served as the wellspring of life on Earth. In the interests of brevity, I will discuss only the Biblical story of Creation since Catholicism and Protestantism account for a combined 80% or more of the stated religious affiliation of North American citizens [12]. In addition, because the strongest criticism of evolutionary ideas has, by numbers anyways, been levelled by Christians, it becomes necessary to offer a Genesis-based counterpoint in this debate.

Creationism – a theory attributing all matter, biological species, etc. to separate acts of creation, esp. according to a literal interpretation of Genesis, as opposed to evolution.
- The Canadian Oxford Dictionary [1]

In brief, Chapter 1 of Genesis states that God made everything from nothing in less than a week and that after that week the story of life began to unfold [13]. This is termed ex nihlo creation. On the first day, God made light and separated light and dark into day and night. He spent days two through four creating and separating water, dry land, and sky, creating fruit-bearing plants, and creating the sun, moon, and stars (the latter group brought forward so that time could be measured). On the fifth day God made life in the ocean and invented birds, encouraging them to increase their numbers. God created the creatures on dry land on the sixth day, including humans, who were told that they had been made in God's image and that they were to "fill the earth and subdue it" (Genesis 1:28). On the seventh day, God rested.

Given that there are some who see Genesis as the blow-by-blow account of the creation of the Earth and everything in it, we can see why there are people who take issue with the theory of evolution. Evolution not only offers an account of the earliest days that is at odds with a literal interpretation of Genesis, it can also be described as undermining the Bible's anthropocentric premise – that is, that mankind was given dominion over all living things and represents the highest form of living being.

The Sometimes Tortured Relationship between Religion and Science, Existing Creationist Factions, and the Beefs with Evolution

Looking beyond the issue at hand, it is fair to say that Christianity has had a difficult relationship with science (Note: I will, at my own peril, use the term "Christianity" to encompass both Catholics and Protestants. I do this because of the similar perspectives on science and evolution that have, at one point or another, been held by factions within these two groups). Copernicus, Galileo, Descartes, and Newton were some of the more prominent individuals that were assailed by forces within Christianity [14]. Church positions on issues such as the Earth's revolution around the sun and the laws of gravity can now be seen as wilfully ignorant, though at the time they justified the Inquisition and similar cheery events.

Because evolutionary thought did not begin

to coalesce until a few centuries after the Inquisition, "common descent" proponents were able to avoid the persuasive techniques that had been previously employed by the religious hierarchy. However, from the initial Church protest against Darwin's ideas, to the Kansas "Scopes Monkey Trial" of the 1920s, to the efforts of the Intelligent Design (ID) movement of the present, there has been a concerted effort by elements within Christianity to undermine evolutionary thinking [15].

At this point it is important to note that a continuum of creation/evolution stances has been characterized, with "Flat Earthers" being the group most adherent to a literal interpretation of the Bible and "Materialist Evolutionists" accepting a completely non-theistic explanation for the origins of life [16]. This continuum includes numerous other groups: "Young Earth Creationists" (YECs) who believe that the Earth is merely thousands of years old and that the "days" described in Genesis were actual 24 hour events; "Old Earth Creationists" (OECs) and related groups who believe that the Earth is ancient, that the "days" of Genesis were not necessarily 24 hour events (thus accounting for the Earth's antiquity), that "microevolution" – change within an existing group – can occur, and that mankind was made by God in His image; and "Theistic Evolutionists" (TEs) who believe that the world is ancient, that God has created all life through evolution, that Genesis is an allegorical account of creation, and that God has provided a guiding hand during the process of evolution (especially when it comes to the development of man).

Materialism – the doctrine that nothing exists but matter and its movements and modifications.
- The Canadian Oxford Dictionary [1]

Contemporary incarnations of Creationism exist. The ID movement, mentioned above, is an umbrella group that encompasses multiple Creationist factions. Its stated goal is to drive a "wedge" between science's "materialist philosophy" and the population of the Western world [15, 17]. According to fans of ID, establishing this "wedge" will lead to a "cultural renewal" via a return to Christian principles. ID has led members of different anti-evolution factions (such as YECs and OECs) to put aside their differences in interpretation to provide a unified front against evolution. Organizations such as the Institute for Creation Research or Answers in Genesis are the leading proponents of this movement and they continue to attempt to "debunk" evolutionary theory and re-introduce Creationist teaching into classrooms via grassroots political movements [15].

One argument brought forward by ID proponents and other Creationists is that the process of evolution violates the 2nd law of thermodynamics. This law states that "no process is possible in which the sole result is the transfer of energy from a cooler to a hotter body" [18]. Creationists interpret this as saying that things will always progress from order to disorder here on Earth [19]. Unfortunately, the fact that the Earth is not a closed system affects the ability to make this claim, as does the fact that order has been observed coming from disorder on numerous occasions in nature [20, 21].

Another flaw in evolutionary thinking, according to Creationists, is that transitional fossils that would characterize the progression of one form to another do not exist. There are multiple flaws with this argument, including a) the fact that transitional fossils have been observed and

therefore some avenues of common descent have been characterized [22], b) the idea of "punctuated equilibrium" can account for instances where there are no transitional fossils [4, 23], and c) new fossils are uncovered all the time, some of which will undoubtedly provide evidence of transition.

A third argument made by Creationists, this one often specifically targeted at the theory of evolution by natural selection, states that evolution is a tautology (that is, it has a circular definition). These claims are largely based on work from Karl Popper [24]. The Talk.Origins website summarizes the Creationist stance succinctly: "[n]atural selection is the survival of the fittest [and the] fittest are those that survive" [25]. However, many people, including Popper himself, have refuted this over-simplification on the grounds that the term "fitness" refers to more than just survival (e.g. organisms deemed "fit" are constrained by laws such as those pertaining to chemistry and genetics) and therefore the definition is not circular [26, 27].

For individuals interested in a more in depth analysis of the above arguments and additional points of contention between evolutionists and creationists, it is worth noting that there are on-line resources providing exhaustive details on all facets of the creation/evolution debate. I would encourage anyone interested in this topic to thoroughly mine this resource – to check claims vs. counter-claims, etc. – before coming to any conclusions (I would recommend the Talk.Origins website as a jumping off point for the evolutionist perspective [25] and the True.Origins website as a jumping off point for the creationist perspective [28]). In my opinion, many of the arguments put forward by Creationists rely on selective referencing, oversimplification of concepts, and outright falsehoods that are easily contradicted and I feel that careful critical examination of the literature bears this out. More than anything else, it is frustrating that evolutionists are far more willing to point to the gaps in their model than Creationists. This failure to be self-critical about the literal interpretation of Genesis undermines their position.

Cockiness (or: Overstating the Case for Evolution)

I would be remiss if I failed to point out some of the shortcomings in the evolutionist argument. Most problems with the evolutionist perspective arise because proponents make over-reaching claims about evolution. The evidence can be oversimplified or misrepresented by individuals unfamiliar with some of the nuances of the actual research and this sloppiness yields mistakes that then become fodder for Creationist attacks against evolution [29]. Ultimately someone is left to clean up the mess made by others, but this becomes a daunting task since misconceptions will persist in the literature for years [30].

Another problem for evolutionists is the tendency to dismiss elements of the Creationist model automatically, without even attempting to disprove it via the scientific method. This reactionary approach is counter-productive as it undermines the logic that is supposed to drive evolutionist thinking. And while evidence in many instances does favour the evolutionist perspective, in other instances it is difficult, at present, to make a solid claim either way. Creationist interpretations, even if they defy Occam's razor at its dullest, should not be discounted until a) they have been tested themselves and b) a falsifiable evolutionary

alternative is available. Evolutionists would be wise to note that decidedly long leaps have sometimes been made by leading scientists, one example being Francis Crick's belief in "directed panspermia" (the belief that the building blocks of life have an extraterrestrial origin) [31]. This is not to say that Crick's theory is incorrect – it is just to point out that our present understanding leaves that theory about as falsifiable as the Genesis story.

Fish in a Barrel – Finding Flaws in the Literal Interpretation of Genesis

I would also be remiss if I failed to subject the Genesis story to the logical scrutiny that has thus far only been applied to the theory of evolution. However, Creationist precepts, as far as we can tell in the present, are not based on observable phenomenon and are therefore unfalsifiable. Hence application of the scientific method to Genesis is impossible. Nonetheless, if the first section of the Bible is to be taken literally (as is the case, to differing extents, in both the YEC and OEC factions), numerous problems emerge. We can ask how plants (created on day three, Genesis 1:12) managed to flourish in the absence of the sun (created on day four, Genesis 1:16). Did God have an alternative means of ensuring the plants' survival while their chloroplasts were rendered useless? If so, how come it was not mentioned? In the same vein, we can also ask how God managed to have light (created on the first day, Genesis 1:3) show up three days before the sun arrived. Moving in another direction, we can ask if Genesis tells us that God thinks incest is a good thing. The question arises because a) humanity was encouraged by God to "be fruitful and multiply" (Genesis 1:28) and b) humanity consisted only of Adam and Eve, so any multiplying in subsequent generations would have to arise through the pairing of their children. Of course, the incest question becomes moot in light of the fact that Adam and Eve never produced any female offspring, however one is left wondering how humanity managed to continue beyond Cain, Abel, and Seth.

Contradictions and conundrums abound in Genesis and the issue for Biblical literalists then becomes this: how do you explain these contradictions without attempting to view the text through an interpretative prism? A literal take on Genesis cannot be done piecemeal as that would go against the notion that the entire Bible is God's absolute, inflexible word. However, the gaps mentioned above can only be explained through interpretation and speculation, and once that is allowed, equal value must be attached to every other interpretation of the Bible on the creation/evolution continuum.

Something tells me that this would not be an attractive option for some.

One Last Thing (or: Can't We All Just Get Along?)

In the final analysis, I do not believe that God and evolution have to be viewed as mutually exclusive. There is no proof that a supreme being did not guide evolution, so it makes sense that people are able to reconcile their suspicion that life developed through evolution with their belief in the human soul. The fact that science does not enter the dominion of religion and faith by tackling issues of morality also helps bridge the gap. In 1996, Pope John Paul II re-affirmed the Vatican position that evolution does not necessarily conflict with Christian beliefs [32]. I am sure that there are

millions of people who read the Bible for inspiration and moral guidance who agree with the assessment of His Holiness.

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EUPHEMISMS THAT ALSO SOUND LIKE STRANGE TISSUE ENGINEERING PROJECTS.

by David Ng

Banjo On My Knee
Bleeding Heart
Foot In Mouth
Dick Head
Shit for Brains
Get this Monkey off my Back
He's a Leg Man
Space Between The Ears
Baby Snacks
White Meat Only
Biggest Asshole

IN WHICH OUR PROTAGONIST LEARNS THE IMPORTANCE OF THE BASE CASE.

by Moebius Stripper

I was three years old. By this point in my life, the residents of Sesame Street had educated me about as well as any community of puppets could reasonably be expected to educate any small child. Family legend has my father holding me, age fifteen months, as he selected an ice cream treat from the Dickie Dee vendor outside our Virginia home. I don't know if I recognized the varieties of snacks, but apparently I could make some sense of their names. "I," I enunciated, pointing. "C. E. C…"

Incredulous, my father informed my mother, "She knows *letters*." Since neither of them had thought to teach me the alphabet by that point, Cookie Monster and his friends were quickly credited with this development. I soon learned the rest of the alphabet with the aid of refrigerator magnets and blocks. A few months later, I was reading.

With the alphabet under my belt, I turned my attention to the Count's endless enumeration of everything under the sun, and within less than a year I could rattle off the integers from one to two hundred in sequence. Two hundred exactly, by the way, and no further. Why I knew that *one hundred and one* came right after *one hundred* but was unable to extrapolate any further I have no idea, but my parents had good reason for not furnishing that connection: so proud was I of my ability to count to two hundred that I would count to two hundred on the telephone, to my grandparents, every single time they called. Long distance. And this was back in the olden days when long distance cost an arm and a leg, so when it became clear that I was not to tire of my long distance counts to two hundred, my mother gently pointed out that maybe my grandparents didn't want to hear me count to two hundred over the phone anymore. I threw a fit; didn't they love me? By the way, Mom and Dad, I stand by that tantrum, because what the hell is the point of grandparents if not to have someone to listen to - *and enjoy listening to* - some two-and-a-half-year-old kid count to two hundred over the phone, even if it's costing them fifty cents a minute to hear it?

Anyway, my point here is, by the time I was three I already knew how to read and how to count, so I guess I was old enough to learn computer science - specifically, recursion - and fortunately, Big Bird was on hand to teach me.

Big Bird was painting a bench. He'd just finished applying the last coat of paint, and his friends were admiring his handiwork. As he replaced the paint brush, he explained - concerned citizen that he was - that it was necessary to warn any passers-by that this was a freshly-painted bench. This made sense to me, because I remembered a previous episode in which whatshisface, the mime, sat down on a freshly-painted bench and got white stripes all over his black suit. Big Bird would have none of that, so he produced a blank piece of paper and wrote WET PAINT on it, and hung it by the bench. His only writing implements, however, were the paint and paintbrush he'd brought with him, so after creating the WET PAINT sign he realized that the *sign itself* contained wet paint, and so he needed to create *another*

WET PAINT sign, to warn people about the first sign. So he created the second sign, and - apparently having learned nothing from his experience with the first sign - realized that he'd need a new one.

I watched this intently, and suddenly it dawned on me: every WET PAINT sign demanded another. I got it, but Big Bird didn't. I got worried; would he be doing this forever? Or would someone give him a crayon and tell him to use it for the next sign?

Soon the scene ended, and I distractedly watched for the next few minutes as the mime explained the WALK/DON'T WALK signs, and as the Count showed that it doesn't matter how you arrange the blocks because you still have the same number of them, and as someone didn't want to share his cookie with Cookie Monster until Kermit came by to teach a lesson about sharing. Whatever. I didn't care, because I was concerned that Big Bird was still making WET PAINT signs.

Cut to the next scene: Big Bird surrounded by *hundreds* - maybe even *two hundred* - WET PAINT signs, happily making another one because the last one was still wet. And no one handed him a damned crayon, and the episode ended right there.

I burst into tears.

My mother, startled (her toddler was bawling at the end of *Sesame Street*, after all), hurried into the family room and asked me what was wrong, and I blubbered something about the endless production of WET PAINT signs and how Big Bird would be making them forever because each sign told him to make another one. FOREVER. I couldn't think of anything worse than spending one's entire life making WET PAINT signs, and I worried that that was to be Big Bird's fate. It troubled me more than I could put into words. That happy yellow bird, doing this for the rest of his life. And he showed such promise! Would he never get to have a family? go to the park again? And what of Snuffleuppagus?

Mom obviously hadn't been expecting this, but she quickly assured me that no, Big Bird wasn't going to spend his whole life making WET PAINT signs. As a matter of fact, he stopped soon after that episode of Sesame Street ended. Because, uh, Grover told him he didn't have to make the signs anymore. *In fact*, just you wait, honey, tomorrow on Sesame Street Big Bird will be doing something completely different.

Will he really? I sniffled.

Yes, honey, he will. I promise.

How do you know?

Because, said Mom, I know all of the people on Sesame Street and they told me what they were going to be doing tomorrow.

And you know, I may have known how to read and count to two hundred, and I may have known all sorts of shapes - not just the easy ones like circle and square and triangle, but also trapezoid and pentagon and parallellogram - by the time I was three, but let me tell you, I ate that shit right up. Okay, cool. Big Bird wouldn't be making WET PAINT signs forever. Mom said so herself. I could sleep at night.

The next day, I saw that Mom had been right, because there on TV was Big Bird singing a song about cooperation and there were no WET PAINT signs anywhere in sight. Good old Grover. Mom knew every-

thing, apparently.

It wasn't until several years later that I learned that the sort of structure displayed by the self-producing WET PAINT signs - a set of instructions that includes the instruction to follow itself - had a name: *recursion*. During my first year of university, some boring CS prof whose name I forget explained this all in the most monotonous way imaginable, and told us that if we wrote a recursive function then it would call itself until it had a good reason not to, that is, a base case that ensured it would stop, infinite loops are bad, yadda yadda, blah blah.

And all I could think of was a computer that would be making WET PAINT signs forever and ever because there was no IF CRAYON branch to lead into a ALL SIGNS ARE DRY base case.

It still bothered me, a decade and a half later, and I took pains to ensure that all of my recursive functions would terminate in good time.

That was Sesame Street's contribution to computer science. Its contribution to real analysis, unfortunately, had not been subjected to peer review: I remember the Count arranging ten blocks in a row, in a pyramid, in a square, informing us that no matter how you placed them, they'd add up to the same number.

Sure, Count. With a series that converges absolutely.

MYSTERY ORGANISM BAFFLES GIRL ADVENTURER.

by Bethany Lindsay

I'm a girl that likes to know what she's looking at.

I have a degree in biology, and I've spent the past few summers exploring Eastern North America, learning about the wildlife there. Those trips left me with an urge to identify every interesting plant, animal, or mineral I see, so that I can play the role of Madame Know-it-all the next time I see it.

When I'm on a hike, I want easy access to a field guide, or better yet, an expert naturalist—that way I don't have to remember how to use those complicated identification keys in field guides

But last week, I found myself resource-less. I was on a poorly planned and hastily packed road trip down the West Coast of California. No National Geographic bird guide, no Peterson guide to trees, no National Audubon book of reptiles and amphibians

I braced myself for a lot of hikes, wandering clueless through the wild, with nary an opportunity to prove my biological superiority to my traveling companion.

For the first few days, I had it easy.

Those giant trees in Redwood National Park were giant redwoods (I guess). Interpretive signs on the beach at Monterey Bay helped me figure out the difference between the seals and sea lions out on the rocks.

Then came Santa Cruz, and the beach with thousands of little aberrations. No field guide. But at least I had a camera.

Even if I had a university library at my disposal, I wouldn't know what field guide to look in. I was raised inland, and these coastal beasts were entirely outside of my frame of reference.

My first (extremely uneducated) guess was razor clams, something I'd never seen, but had heard lived on the West Coast. I assumed were named for their sharpness. That little flap sticking up from my mystery creature looked like a jagged piece of broken glass.

"Don't take your shoes off on this beach!" I yelled to my companion. "There are razor clams everywhere!" I chose to disregard the fact that the tiny monster didn't seem to have a shell, or resemble a clam in any way.

The razor clam theory was tossed after one touch. The flaps feel a lot like rubber, and nothing

like razors. (Later, I'd discover that razor clams aren't actually razor-sharp, they're just shaped like old-fashioned straight razors. Whoops.)

Well then, I reasoned, what about that dark blue stuff along its edges? Looks a bit like ink, and the only thing I could think of that produces ink is a squid. Unfortunately, these little guys didn't have any visible legs or tentacles. Lucky for me, I'd kept my mouth shut this time.

Though I was disheartened by my ignorance, I let it go. I knew the pictures I had taken would help me solve the mystery when I returned to Vancouver.

Once home, I rushed to crack open my bible—*The Variety of Life* by Colin Tudge, a book that surveys all things that have ever lived. The problem was that I couldn't even guess where to begin.

I decided to flip through the 150 pages of invertebrates, hoping that something would catch my eye. Within seconds I found my answer, wedged between Hydra and box jellyfish.

The little creatures are called "by-the-wind sailors," or *Velella velella* if you're fancy. They belong to the phylum Cnidaria, which is better known for its corals and jellyfish.

I turned to a *Velella*-centric website by Dave Cowles at Walla Walla College in Washington. The flaps are made of chitin, and act as little sails, keeping the sailors moving at a 45-degree angle to

the wind's direction. Strong westerly winds can drive them to shore, like the ones that I saw.

They do have tiny tentacles and a mouth on their underside to catch and eat zooplankton. Rings of concentric gas-filled inner tubes keep them floating on the water's surface, and the blue colour is caused by a pigment caused astaxanthin.

Ah, that wonderful feeling that comes with a new piece of knowledge. I want to drive back down to Santa Cruz, stand on the beach and yell, "This is *Velella velella*!" What a rush.

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Velella velella
http://homepages.wwc.edu/staff/cowlda/KeyToSpecies/Cnidaria/Class-Hydrozoa/Chondrophores-Siphonophores/VelellaVellela.html

ELSEWHERE AND OVERHEARD

by Caitlin Dowling

Overheard

"It is kind of like finding Elvis."
Frank Gill of the Audubon Society, an American bird conservation group, on the sighting of a woodpecker, thought to have been extinct for 60 years. (Scientific American)

"You see the toads crawling along the ground, swelling and getting bigger as they go until they are like little tennis balls, and then they suddenly explode."
Vet Otto Horst on the rather mysterious spectacle of exploding toads in Hamburg. (ananova.com)

"She was able to look at them and apparently see what the problem was. Her ability is not x-ray vision, but she definitely has some kind of talent that we can't explain yet."
Professor Yoshio Machi at Tokyo University, who specialises in studying apparent superpowers in human beings. The subject, Natalia Demkina has been undergoing tests in Japan into her apparent x-ray vision which has enabled her to diagnose medical conditions. (ananova.com)

"If you get Martian soil on your skin, it will leave burn marks," believes University of Colorado engineering professor Stein Sture, who studies granular materials like Moon- and Martian soil for NASA. New findings show toxic irritants in moondust and martian matter. (nasa.gov)

"It is nice to know that society has now embraced the technology to cure the sick and take away the pain. It has been a long and hard battle for all the family and we have finally heard the news we wanted to hear."
Mrs Shahana Hashmi, on the court ruling in the UK that means she can design her next baby to be able to help cure her six-year-old son's Thalassaemia major, a serious genetic disorder. (UK's Medical News Today)

Elsewhere

Dragging politics into entomology… Slime-mould beetles named after Bush, Rumsfeld and Cheney are "not meant to be controversial"

How goldfish could save Britain's cities from flooding.

US Government trying to block production of a new abortion pill, which the World Health Organisation hope will stop 68,000 women dying of unsafe practices in poor countries each year.

HIPPOPOTAMUS

by Carolyn Beckman

Many years ago, a hippopotamus decided to learn typing. As you may imagine, the task was difficult and discouraging. The hippopotamus however was unusually persistant. First she learned the parts of the typewriter, then she studied all available typing manuals, (even one for an antique which had neither name nor function in any western language; It could best be likened to a linotype machine which set type for haiku poetry in Japanese.) and finally she enrolled in a good secretarial school. In spite of her diligence, there were some practical difficulties; in fact so many that the best of her efforts resulted only in broken typewriters. Nevertheless, in due course she graduated from secretarial school. Some say. this event was precipitated by the unusual number of typewriter repair bills that the school received. We all know that this assertation is a big lie. In fact it is an enormous lie. She graduated because, in spite of her poor technique, she was a brilliant theoretician.

Now that she had graduated, the logical next step was to find a job and become a contributing member of society. Of course, all this happened many years ago when there was a definite moral obligation to become a contributing member of society. Alas! No one wished to hire her as a secretary. Whenever she appeared for an interview, even the lowest jobs in the typing pool had just been filled. Certain people make insinuations which would be classified as racist if we were dealing with a lesser biological difference. As the matter stands, their statements become even more than racist. They said that she could not find employment, because the amount of methane produced by large grass-eating animals became intolerable in closed spaces such as offices. We all realize that this was not the issue. Her problem was simply that she could not type.

After much despair she consulted a vocational counselor. Vocational testing finally revealed the truth. She was strongly interested in methods of typing. Naturally, the vocational counselor suggested that she become a typing teacher. Unfortunately, again her efforts to find a job were futile. The school authorities told her that she was overspecialized. They realy needed a typing teacher who was very ordinary, but one who also possessed a good general education and a teaching credential. In other words they need someone who could also teach welding, calculus, Russian grammar, sex education, music, sewing and girl's P.E. Furthermore, they always had such a backlog of qualified applicants that it was unlikely that they could consider her for a position that year. There are those who say that she was not welcome because of certain engineering problems. Schools are not built to support hippopotami. Nevertheless, we all know that this opinion is weighted with prejudice. In fact it is overweighted. If the simple truth be known, she was refused because none of her applications were typed.

Eventually, her failure to find employment became unbearable and as a last resort she consulted a psychiatrist. She complained that she could find no place to fit into the world. Her psychiatrist noticed that she did not fit into his office, hence he reassured her and sent her on her way with the suggestion that she become a university professor. We all know the rest of the story. Since she was the world's authority on methods of teaching hippopotami to type, she was hired immediately.

Only minor difficulties remained. There was no typing program for hippopotami however the administration held a special meeting to deal with the oversight. Admission standards were changed, the publicity department began a recruitment campaign and maintainance crews reinforced the floors of all classrooms.

Even so, we were hardly prepared when the new students arrived. They were practical and enthusiastic students with very little interest in typing. Typically they came from families who had had very little opportunity for education, hence they were determined to do well. As their numbers swelled, our university began to resemble the institution that we see today. The new classrooms were larger and better ventilated, course offerings became more diversified, more salads were sold at the cafeteria, and restrooms became enormous. Hence we have a much bigger and better institution.

Nevertheless some difficulties remain. Of course some say that the problem is tradition, one of the most powerful forces in our history. We cannot change: We only add to tradition. Of course this is a big rationalization, in fact it is an enormous rationalization. The simple truth is that in some secret way we are all hippopotami trying to type, and that is why we spend so much time trying to find new methods for finding new methods to teach hippopotami to type.

NEW (THIS TIME AROUND) CONTRIBUTORS

Carolyn Beckman is an associate emeritus prof of biology at Concordia University. She is a linux system administrator for her department. Since she is on pension, she is her own boss and takes the time to write a little.

Timon Buys is currently a graduate student at the BC Cancer Research Centre. His Ph.D. work has thus far involved attempts to identify genomic signatures of drug resistance in lung tumours. A product of Vancouver Island, he cannot understand why his fiancé hates Birkenstocks so much. Timon highly recommends that readers visit www.bedroomstudio.cc, a place with tunes that the kids will enjoy.

Thomas Nelson is a biochemist and a research associate professor studying memory and Alzheimer's disease at the Blanchette Rockefeller Neurosciences Institute in Rockville, Maryland. He spent his early years performing brain surgery on his friends and blowing things up.

Moebius Stripper is a twentysomething math geek currently between teaching jobs. In her free time, she enjoys pottery, hiking, biking, and writing. A curmudgeon before her time, she documents her misadventures at Tall, Dark, and Mysterious (http://talldarkandmysterious.ca).