



Infoteca's E-Journal



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Action urged on nature 'crisis'

By Richard Black

Environment correspondent, BBC News website

The UN has launched the International Year of Biodiversity, warning that the ongoing loss of species around the world is affecting human well-being.



Eight years ago, governments pledged to reduce the rate of biodiversity loss by 2010, but the pledge will not be met. The expansion of human cities, farming and infrastructure is the main reason.

Speaking at the launch in Berlin, German premier Angela Merkel urged the establishment of a new panel to collate scientific findings on the issue. Achim Steiner, executive director of the UN Environment Programme (UNEP), urged governments and their leaders to renew their commitment to curbing biodiversity loss even though the 2010 goal will be missed.

“ The big opportunity during the International Year of Biodiversity is for governments to do for biodiversity what they failed to do for climate change in Copenhagen ”

Simon Stuart Conservation International/IUCN

"The urgency of the situation demands that as a global community we not only reverse the rate of loss, but that we stop the loss altogether and begin restoring the ecological infrastructure that has been damaged and degraded over the previous century or so," he said.

The UN says that as natural systems such as forests and wetlands disappear, humanity loses the services they currently provide for free. These include purification of air and water, protection from extreme weather events, and the provision of materials for shelter and fire.

With species extinctions running at about 1,000 times the "natural" or "background" rate, some biologists contend that we are in the middle of the Earth's sixth great extinction - the previous five stemming from natural events such as asteroid impacts.

Cash log

The UN Convention on Biological Diversity (CBD) was agreed at the Rio Earth Summit of 1992, alongside the climate change convention.

But it acquired its key global pledge during the Johannesburg summit of 2002, when governments agreed to achieve a "significant reduction" in the rate of biological diversity loss by 2010. Conservation organisations acknowledge that despite some regional successes, the target is not going to be met; some analyses suggest that nature loss is accelerating rather than decelerating.

"We are facing an extinction crisis," said Jane Smart, director of the biodiversity conservation group with the International Union for the Conservation of Nature (IUCN).

"The loss of this beautiful and complex natural diversity that underpins all life on the planet is a serious threat to humankind now and in the future."

Mrs Merkel backed the idea of forming a scientific panel to collate and assess research on biodiversity loss, as the Intergovernmental Panel on Climate Change (IPCC) assesses evidence on climatic indicators.

"The question of preserving biological diversity is on the same scale as climate protection," she said.

"It would be sensible to have an interface between the politics and the science to integrate knowledge."

A large on-going UN-sponsored study into the economics of biodiversity suggests that deforestation alone costs the global economy \$2-5 trillion each year.

The UN hopes some kind of legally-binding treaty to curb biodiversity loss can be agreed at the CBD summit, held in Japan in October.

One element is due to be a long-awaited protocol under which the genetic resources of financially-poor but biodiversity-rich nations can be exploited in a way that brings benefits to all. However, given the lack of appetite for legally-binding environmental agreements that key countries displayed at last month's climate summit in Copenhagen, it is unclear just what kind of deal might materialise on biodiversity.

Political football

The UN has been pursuing new ways of raising public awareness on the issue, including a collaboration with the Cameroon football team taking part in the African Nations Cup finals.

Many environment organisations will be running special programmes and mounting events during the year. "The big opportunity during the International Year of Biodiversity is for governments to do for biodiversity what they failed to do for climate change in Copenhagen," said Simon Stuart, a senior science advisor to Conservation International and chair of IUCN's Species Survival Commission.

"They have the chance to make a major difference; and key to this will be halting species extinctions, the most irreversible aspect of biodiversity loss." WWF is highlighting 10 species it considers especially threatened, ranging from commercially significant ones such as bluefin tuna to the Pacific walrus and the monarch butterfly. In the UK, the national IYB partnership - hosted from the Natural History Museum (NHM) - is asking every citizen to "do one thing for biodiversity" in 2010.

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Missile Man

- Peter Scoblic
- December 5, 2009 | 12:00 am



A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon

By Neil Sheehan

(Random House, 534 pp., \$35)

In late March 1953, a colonel named Bernard Schriever sat in a briefing room at Maxwell Air Force Base in Alabama, listening as John von Neumann, the brilliant mathematician, and Edward Teller, the physicist, discussed the future of the hydrogen bomb, the far more powerful follow-on to the atomic bombs dropped on Hiroshima and Nagasaki eight years earlier. The United States had detonated its first hydrogen device the previous year in the Pacific, vaporizing a tiny atoll with a force of greater than ten megatons, or ten million tons of TNT. (In contrast, the weapon that destroyed Hiroshima yielded a mere twelve kilotons, or twelve thousand tons of TNT.) Whereas the A-bombs used against Japan had relied on the process known as fission, splitting atoms of uranium and plutonium, the new H-bomb used the power of a fission explosion to fuse isotopes of hydrogen, releasing even more energy in weapons of theoretically unlimited yield. The only problem, from the Air Force's point of view, was that the first fusion device was an impractical behemoth. It weighed eighty-two tons--hardly something one could load into the bay of a bomber.

This problem of "weaponizing" the H-bomb afflicted another deadly gadget as well: the missile. Hitler had made much use of V-2 rockets during World War II, but they had been expensive and militarily ineffective. Still, as the Cold War heated up, both the United States and the Soviet Union were conducting research--aided in no small part by documents and scientists extracted from occupied Germany--into making the missile a more useful weapon of war. But building a missile that could fly across the Atlantic and land anywhere near its target was a considerable challenge. Although accuracy mattered significantly less with atomic (as opposed to conventional) explosives, the warheads were still very heavy and difficult to lift into space. Few people--especially not General Curtis LeMay, the highly decorated bomber commander who was in charge of Strategic Air Command (SAC)--put much stock in such a contraption when an airplane could do the job more cheaply, more accurately, and with greater reliability.

In their presentation, however, von Neumann and Teller said quite confidently that scientists would soon be able to shrink the hydrogen bomb until it weighed just a single ton, while still yielding a megaton of explosive force. As Neil Sheehan recounts in his new book, Schriever immediately understood that, in predicting the imminent miniaturization of the hydrogen bomb, Teller and von Neumann were saying that it would soon be possible, in theory, to build an effective nuclear-armed missile. The blast of a one-megaton weapon would obliterate nearly everything within sixty square miles, to say nothing of the subsequent damage done by fire and radiation, meaning that a thermonuclear warhead could miss its target by a couple miles and still be obscenely effective. There would be nothing surgical about the strike, but the target would be destroyed. A revolution in warfare was in the offing.

In the history of the arms race between the United States and the Soviet Union, the genesis story told most often has been that of the nuclear bomb itself. With its cutting-edge physics, awe-inspiring pyrotechnics, and vivid consequences, known to all through the excruciating photos and stories that came out of Hiroshima and Nagasaki, the bomb's development has held much of the drama. Rocket science, by comparison, seems almost pedestrian. What is often forgotten is that, while the nuclear bomb may have changed the nature of warfare, it was the nuclear missile that lent the arms race much of its apocalyptic tension. Airplanes carrying nuclear bombs took hours to reach their targets; they could turn around if their commanders, or even their pilots, changed their minds; and they could be defended against with fighters and surface-to-air missiles. They were, in other words, understandable in their scale. Missiles, by contrast, were launched with the turn of a key, they were no more recallable than a bullet fired from a gun, and there was no defense against them. A Soviet intercontinental ballistic missile (ICBM) would take a mere thirty minutes to reach its target in the United States. Given the early limitations of radar and the time it took to convey news of an attack, an American president would have only a few minutes to decide whether to retaliate before he was himself killed. For nearly thirty years, the fate of humanity rested on such inhumanly compressed time scales. The potential for disaster was enormous.

The missile was to blame for this anxiety. Yet for the nuclear balance to be maintained--for peace to have the highest chance of success--both sides had to have similar capabilities. If nuclear missiles could be built, then both the United States and the Soviet Union needed to build them. Perhaps more than any single individual, Bernard Schriever ensured that the United States not only kept up but excelled in this contest. A protégé of the legendary Hap Arnold, the five-star general who in the waning days of World War II saw how integral technology would be to the postwar military, Schriever built the bridge to a new Air Force that was as exercised by research and development as by flying and fighting. He also helped to spur a change in thinking about the nature of strategic warfare--away from the primacy of manned bombers and from men like LeMay, who fought Schriever and his missile program--and so helped usher in the modern nuclear age.

Sheehan has written an exhaustively researched and reported book that details the tremendous scientific, managerial, and bureaucratic skill that it took to produce the first American missiles. Unfortunately, he has done so in the service of a thesis that makes little sense. For Sheehan, Schriever was not simply a talented man who saw the future of warfare. Schriever's efforts to build the ICBM, he claims, were "for the highest stakes--preventing the Soviet Union from acquiring an overwhelming nuclear superiority that could tempt Soviet leaders into international blackmail and adventurism with calamitous results for human civilization." By beating the Soviets--by "winning the race"--to the ICBM, Schriever helped to stave off the catastrophe that would have ensued if the Russians had gotten there first. That is Sheehan's argument. But it is untenable on theoretical and historical grounds, and Sheehan himself provides the evidence that undermines it. The result is a confused book that obscures rather than illuminates the nature of the arms race.

Born in Bremen in 1910, Bernard Adolph Schriever passed through Ellis Island with his family in 1917, just before the United States declared war on Germany. A reserved child who spent much of his adolescence playing golf--and getting very good at it--he ultimately matriculated at Texas A&M, where he majored in construction engineering. Unable to get a suitable job in Depression-era Texas after

graduating, he joined what was then known as the Army Air Corps. He earned his commission in 1933 and was assigned to a squadron at March Field in California, where Arnold was the commanding officer. He initially served as a pilot, but during World War II, which he spent in the Pacific, it was his engineering and managerial skill that got him noticed, and he spent much of the war keeping American bombers in the air.

After Japan surrendered and the American military establishment began to consider how best to defend the United States in the postwar world, a split opened in the Air Force between warriors such as LeMay, who simply believed in bringing as much brute force to bear on the enemy as possible, and visionaries such as Arnold, who believed that a smarter touch would be essential. Arnold tapped Schriever to work with civilian scientists considering the future of air power, and a few years later he was named assistant for development planning, essentially putting him in charge of figuring out what weapons the Air Force would need to fight the Cold War.

It was in this capacity that Schriever heard Teller and von Neumann speak. Determined that the United States needed to build an ICBM as quickly as possible, but aware that he was too low in the hierarchy of power to initiate such a massive undertaking on his own, he sought out allies at the Pentagon. He found one in Trevor Gardner, the special assistant to the secretary of the Air Force for research and development, and together they advocated a crash missile program, which Secretary of Defense Charles Wilson eventually approved. In 1954, Schriever decamped to California, where he and his engineers set up shop in an abandoned schoolhouse. Despite the evident importance of the endeavor, however, Schriever and his team were regularly beset by the bureaucracy. Ultimately, to complete the project, he was forced to appeal directly to Eisenhower, who granted the program top priority, while also ordering Schriever to build an intermediate-range ballistic missile, or IRBM, to counter those the Soviets were building to target Europe.

This mandate put Schriever in competition not only with the Soviet military, but with the U.S. Army, which was already pursuing its own IRBM, aided by Wernher von Braun, who had led development of the V-2, on which all rocket work was based. This inter-service rivalry--it later grew to include the Navy, which at the time was developing Polaris, a submarine-launched ballistic missile, or SLBM--needlessly duplicated weapons and fueled the arms race, but even the parsimonious Eisenhower was unable to eliminate the redundancy. As a result, in the 1950s the United States built two intermediate-range missiles that looked nearly alike. Starting in 1958, the "Thor" IRBMs developed by Schriever's team were deployed to Britain, and the "Jupiters" developed by von Braun were sent to Italy and Turkey.

At the same time, Schriever, convinced that delay meant disaster, hastily pushed ahead with two different ICBMs--"Atlas" and a backup known as "Titan." Within three years his team grew from fifteen people to nearly seven hundred, supported by another two thousand at the Ramo-Wooldridge Corporation, a private contractor providing technical know-how that would eventually grow into the aerospace giant TRW. Testing proceeded fitfully. The first Atlas test was conducted in June 1957, but the missile spun wildly out of control twenty-four seconds after launch. The second, three months later, failed as well. As Schriever's team grew frustrated, the pressure to succeed grew dramatically. That August the Soviets tested their first ICBM, and in October they launched Sputnik, triggering fears of a "missile gap."

In truth, the Americans were making great strides and would soon overtake their Soviet counterparts. By 1959, Atlas launches were not yet reliable, but Schriever went ahead with deployment anyway, scattering 132 of the Atlas missiles across six bases in the United States. The first Titans were deployed, with similar reservations, in April 1962. As Sheehan writes, "How many of these Titan and Atlas missiles would fly if doomsday arrived and the command to launch was given, no one really knew. But Nikita Khrushchev and the other leaders of the Soviet Union could not afford to bet on percentages of reliability. All they could do was to count missiles. . . . As Schriever was to say years later to a reunion of those who had participated in the race against the Soviets: 'We beat them to the draw.'"

That Schriever and his compatriots saw themselves in a race against the Soviets for the ICBM is completely understandable, given the fears of the day. Shaped and scarred by World War II, American policymakers feared a “nuclear Pearl Harbor” that, unlike the Japanese attack, would leave the United States in radioactive ruins, incapable of responding. This fear was compounded when the strategist and defense analyst Albert Wohlstetter (whose wife Roberta had written a definitive study of the strategic implications of Pearl Harbor) showed that SAC’s air bases could be decimated in a surprise attack. After all, when bombers were not in the air, they were on the ground, vulnerable to pre-emptive strike. These concerns were soon repeated and reinforced, most notably in the Gaither Commission report presented to Eisenhower in November 1957, which warned of the increasing threat and, when leaked to the public, amplified concerns about a missile gap.

Less understandable, though, is Sheehan’s embrace of this analysis of the danger. Over and over again, he argues that speed was of the essence in Schriever’s work, lest the Soviets gain a nuclear advantage. This helps to make Schriever seem more heroic, and his opponents more narrow-minded. But we know more now. The need to “win” the arms race is an odd conceit for a book published in 2009, especially one that repeatedly bemoans the fear-mongering that took place during the Cold War. For it soon became clear that there is no such thing as superiority in nuclear warfare. In the case of these hideous weapons, the deterrent capacity was well established, the notion of advantage was chimerical, and the race was never really about security. Except for his interest in drama, I do not see why Sheehan so willingly renounces the benefits of historical hindsight.

The nuclear balance between the United States and the Soviet Union rested, very simply, on the ability of each side to respond to a nuclear strike by inflicting unacceptable damage on the attacker. This is true of the nuclear balance between any two states. Since even a handful of nuclear weapons can inflict unacceptable damage, it takes only a modest nuclear arsenal to give you a deterrent capability. Beyond that, additional nuclear weapons do little, if anything, to increase a nation’s safety. As Bernard Brodie wrote in 1946, in his prescient book *The Absolute Weapon*, “superiority in numbers of bombs does not endow its possessor with the kind of military security which formerly resulted from superiority in armies, navies, and air forces.” In reality, the 1,769 bombers that the United States possessed in the late 1950s provided us with a devastating secondstrike capability. Given that a single weapon could obliterate a city, one needed only a handful of bombers to deal a devastating counterpunch. Ensuring that enough bombers would survive a Soviet attack was a relatively straightforward task: in the wake of the Gaither report, Eisenhower shrewdly ordered that one-third of the force be kept on fifteen-minute strip alert, and by 1961 some bombers were in the air twenty-four hours a day. Besides which, generals like LeMay had no intention of waiting to be hit before striking the Soviet Union. If it looked like war, he favored striking first. Indeed, the doctrine of “massive retaliation” called for being the first to use nuclear weapons if the Soviets launched even a modest conventional attack in Europe. All of which is to say that, whatever the fears of the 1950s, it is clear in retrospect that the stakes of the race to build an ICBM were much lower than Sheehan suggests. The United States had a secure retaliatory capability well before the first Atlas and Titan missiles were deployed.

That said, the perception--that fateful term in the history of these weapons--of Soviet nuclear advantage could indeed have been a problem, and Sheehan argues, not implausibly, that if the Soviets had gotten an ICBM first, their feeling of superiority would have encouraged aggression, perhaps even provoking “nuclear adventures.” The problem is that the Soviets did embark on a nuclear adventure, and they did so *after* the United States beat them to the ICBM. In fact, they embarked on a nuclear adventure precisely because the United States beat them to the ICBM. It was the feeling of nuclear inferiority triggered by the deployment of the missiles developed by Schriever that led Khrushchev to place nuclear missiles in Cuba, setting off the most dangerous crisis of all. And what is utterly incomprehensible about *A Fiery Peace* is that Sheehan himself makes this point with conviction and no small amount of evidence. By the second year of the Kennedy administration, thanks largely to Schriever’s efforts, the United States had attained what Sheehan calls an “awesome nuclear superiority.” The Soviets had made strides in their missile program, but were hampered by their late development of the hydrogen bomb. Instead of launching small but powerful warheads, they were trying to launch heavy ones, necessitating enormous rockets. Meanwhile, as Atlas and Titan were being deployed, one of Schriever’s underlings made another breakthrough, developing a missile that used solid, rather than liquid, fuel and therefore could be kept

ready to launch at any moment. It was a huge advance in reliability and speed, enabling the United States to launch an attack much more quickly; and in 1962 the United States began to deploy the aptly named “Minuteman.” In February of that year, Khrushchev met with his senior defense advisers and was informed just how far ahead the Americans were. Sheehan breaks down the tally at the time of the crisis:

By the end of the forthcoming October ... Khrushchev would possess a mere twenty unreliable ICBMs, along with a bomber force of fifty-eight Bison jets, limited to a one-way trip, and seventy-six Tu-95 turboprops, slow planes that were dead pigeons to the American jet interceptors and surface-to-air missiles. In contrast, Kennedy would flaunt ninety-six Atlas ICBMs, fifty-four Titans, ten Minutemen, forty-eight of the Navy’s new Polaris submarine-launched IRBMs hidden on station in the depths, and SAC’s bomber force of 1,741 B-47s, B-58s, and B-52s. Uncounted because of their joint control but also ready were the sixty Thor IRBMs in England, the thirty Jupiters in Italy, and the sixteen in Turkey.

By 1962, in other words, we had not simply won the race, it had been a total blowout. And just as the prospect of overwhelming Soviet advantage panicked Americans during the “missile gap,” spurring greater military spending and giving Kennedy an edge in the election of 1960, so it panicked the Soviets--into making possibly the most treacherous decision ever made. As Sheehan writes, “Khrushchev saw a way around this dilemma. The Soviet Union possessed plenty of well-tested IRBMs. If a substantial number of these were slipped into Cuba, their presence 90 miles from Key West would, as he put it in his memoirs, equalize ‘what the West likes to call ‘the balance of power.’” So that is exactly what Khrushchev did: he packed several dozen intermediate- and medium-range ballistic missiles onto freighters and shipped them to Cuba. Rather than deterring Soviet nuclear adventurism, the enormous success of the American ICBM program actually encouraged it.

It is difficult to overstate just how close the ensuing crisis brought us to apocalypse--and therefore just what a flaw it exposes in Sheehan’s belief that ICBM superiority made us safer. The reaction of the Joint Chiefs to the discovery of missiles in Cuba was to urge an air strike. An attack would likely have backfired horribly. Although Kennedy and his advisers were not sure of this at the time, the warheads for the missiles were already on the island, able to destroy numerous American cities. They were joined by some ninety tactical nuclear weapons designed for battlefield use. As Sheehan notes, the FKR cruise missiles, each with a range of one hundred miles and a blast of up to twelve kilotons, could have been used to take out an invading American fleet. Any of the dozen Luna missiles, which could travel thirty-one miles and explode with a force of two kilotons, could have taken out an American beachhead. Worse, for a time Khrushchev had delegated authority to his commanding general in Cuba, Issa Pliyev, to use the tactical nuclear weapons as he saw fit--and Soviet colleagues later said that he would have used them in self-defense. Castro had urged Khrushchev to use the ballistic missiles if the Americans attacked.

It was American nuclear superiority, in other words, that helped get us into the mess, and, once we were in it, nuclear superiority did not help get us out of it. Sheehan might have argued that American superiority gave Kennedy the confidence to face down Khrushchev and force the missiles’ removal from Cuba--but he doesn’t do so, and wisely, given that there is little evidence to support the proposition. Kennedy understood that an attack very well could have precipitated a nuclear war, which would have been devastating for the United States irrespective of our massive advantage. Ironically, it was the removal of the Jupiter missiles from Turkey, symbolically ratcheting back our nuclear superiority and providing a diplomatic tit for tat, that helped bring the crisis to a peaceful end. Sheehan recounts much of this himself, and yet less than ten pages after doing so he writes, without a trace of self-awareness, that “by starting in the mid-1950s, before it was too late, and then winning the race for a practical ICBM, they had warded off the possibility of blackmail ... and also discouraged nuclear adventures by the Soviets.” At this point it is simply impossible to take the book seriously, except perhaps as a good story.

What the ICBM did was more modest: it allayed our own post-Sputnik fears about nuclear inferiority, while helping to convince the Soviets that we would always be able to retaliate in response to an attack, because it gave us an additional way to do so. Yes, we already had a second-strike capability provided by

our bombers, but the ICBM strengthened deterrence on both sides by bringing perceptions closer into line with reality. In this sense, ICBMs did serve a useful purpose; but Sheehan exaggerates their contribution when he argues that they were an unalloyed good, and that Schriever's contribution was world-changing, taking us past the frightening possibility of nuclear war to the certain safety of nuclear stalemate.

That is a gross oversimplification. If ICBMs were in some ways stabilizing, they were in other ways destabilizing; and if at times they deepened the nuclear peace, at other times they made nuclear war more likely. Ultimately, the stalemate between the superpowers was best guaranteed by rough nuclear parity, which is what every arms control agreement, from SALT I to the "New START" being negotiated by the Obama administration, has tried to establish. But Sheehan misses that point, he contradicts himself, when he extols how much his hero did to "foster a nuclear stalemate" while simultaneously noting that "the creation of Minuteman now put the United States so far ahead in the strategic missile competition that the Soviet Union was confronted not with a gap but with a chasm." Chasms do not make stalemates. They are, in fact, temptations to dangerous ideas about use. Soviet feelings of inferiority were dangerous, leading not only to episodes such as the Cuban missile crisis, but also to Soviet nuclear build-ups, which in turn prompted American build-ups, and so on.

That is why it is absurd for Sheehan to claim, in another overstatement, that "Minuteman put an end to the fear of a nuclear Pearl Harbor." That fear never ended. If it had, we would never have built another nuclear weapon. But after taking office--and after learning that the missile gap was a fiction--Kennedy (and then Johnson) added to the arsenal more than 1,500 new ICBMs and SLBMs, carrying nearly 2,500 warheads, plus another five hundred warheads deliverable by bomber. And it was not just the numbers of weapons that mattered; it was also the types of weapons. Nixon may have negotiated the first agreements limiting nuclear arms, but he also proceeded with the development of multiple independently targetable re-entry vehicles, or MIRVs, which gave each Minuteman three warheads and therefore tripled their lethality. Carter not only moved to deploy more intermediate-range missiles in Europe, he also approved development of the mobile MX missile--effectively accepting the view of American hawks that the United States, with its stationary Minutemen, was entering a "window of vulnerability," in which it would be susceptible to a Soviet first strike. And Reagan authorized the deployment of an additional three thousand nuclear-armed air-launched cruise missiles and accelerated development of a new SLBM, new nuclear-capable sea-launched cruise missiles, and the B-2 stealth bomber, which could evade Soviet air defenses to deliver a nuclear payload.

We did all these things because we were constantly, inconsolably afraid of the effects of a Soviet numerical advantage in nuclear weapons, and even of the possibility of a "bolt from the blue." Once again, Sheehan himself acknowledges this, writing (in one of the book's more infelicitous sentences) that "technology was in the saddle of a horse named Fear in a race of human folly." That may be true, but it completely undercuts his own insistence that the ICBM brought some sort of serenity to American security policy.

The ICBM was many things. At their most stabilizing, the rockets that Schriever built provided both transparency and predictability--not through their ability to send warheads hurtling toward the Soviet Union, but through their ability to loft spy satellites into orbit, giving us a better sense of what weapons the Soviets had, a way to verify arms control agreements, and a look at preparations that could instigate, accelerate, or defuse a crisis. At the same time, ICBMs could provoke strategic instability: as critics of the Minuteman noted, it was even more stationary than a bomber on an airfield, making it an easy target and therefore important to get off the ground quickly during a crisis. This was particularly true of MIRVed missiles, whose lethality made them extremely attractive targets and whose accuracy made them useful for taking out enemy missile silos. They were, in other words, excellent war-fighting weapons--which is to say, they enhanced fear rather than abated it. And because solid-fueled missiles were fast enough to launch on warning of an attack, before enemy missiles had actually struck the United States, they were far easier to launch in error than other types of nuclear weapons.

After bombers, ICBMs became the second leg of the nuclear "triad"--the three delivery vehicles that, between them, were supposed to guarantee the ability to retaliate. But if Sheehan had really been

interested in the establishment of the nuclear balance, he might have looked at the creators of the third leg: the submarine-launched ballistic missile. Since submarines could lurk undetected, they were largely immune to the first-strike fears that plagued bomber bases and ICBM fields. Polaris, the first such American missile, was developed by the Navy at the same time that Schriever was building the ICBM for the Air Force, but Sheehan barely mentions it.

Perhaps the officers of the Polaris program simply were not as interesting. But Schriever, who died in 2005, was indeed a consequential figure. He did not simply build the ICBM. He changed the Air Force and spurred the creation of the American aerospace industry. His rockets did far more than carry warheads: by putting satellites into orbit, they enabled not only espionage, but also the communications revolution; and later they carried astronauts into space. But in the notes at the end of the book, Sheehan writes that in telling Schriever's story, he hopes to "distill the immensity of the Cold War and the Soviet-American arms race into a human narrative that a reader could identify with and comprehend." In this he has failed. His book does not accurately capture the immensity of the Cold War and the Soviet-American arms race. It is not even clear that Sheehan has fully captured the humanity of his subject.

We learn far less about Schriever the man--as opposed to Schriever the manager--than one would expect from a work of this ambition. The book is astonishingly detailed, but often meaninglessly so. Sheehan makes space for sentences such as this: "Their blue Air Force staff car had pulled up to the guard cubicle just inside the northwest gate to the White House off Pennsylvania Avenue at precisely 7:30 a.m." Yet there is little more than one single-page chapter about Schriever's relationship with his three children and their mother, who left him in 1968. It is not until the book's epilogue, in which Sheehan quickly skims the last forty years of Schriever's life, that we learn that the general was "an old-fashioned sexist ... [who] did not appear to regard any woman as an equal." That is not surprising for a man who was born in 1910 and spent his career in the mid-century military, but I finished the book wondering if Schriever was really more complex, and more flawed, and therefore more interesting, than I had been led to believe, which is not a question one should ask at the end of a vast biography.

For a book purporting to encapsulate the Cold War, we also learn little of its hero's foreign policy views. Sheehan spends an entire section taking us through the onset of the Cold War, the misunderstandings that occurred, and the unfortunate Manichaeism that gripped much of the American foreign policy establishment. But how Schriever felt about the Soviet Union and our responses to it, we are never told; and we get almost nothing on his beliefs about the utility of nuclear weapons. Contra LeMay, he clearly saw them as a deterrent that was never meant to be used. But there is quite a range of thought to the left of LeMayism, and where Schriever stands on the most important questions that were raised by his most significant accomplishment is unclear. Did he believe that nuclear superiority mattered? Did he believe the ICBM had closed the window of vulnerability? What did he think about arms control efforts that were designed precisely to enhance the deterrent capability he lauded, but which tended to confound military officers who were interested in fighting a nuclear war most effectively should the missiles start flying? The real developments in nuclear stability during the Cold War came less from the development of specific weapons than from how we conceived of their utility--from "massive retaliation" to "counterforce" to "mutual assured destruction." The decisive factors were intellectual, not mechanical. Bernard Schriever was not a thinker but an engineer, as were the men around him. (We meet an interminable number of such people in countless digressions.) As Sheehan writes, "Yet anxiety for the security of their nation and a race against opponents who would endanger it were only half of what drove them. These men were engineers. They built things. Theirs was a different ethos from that of operators like Power and LeMay, who got their adrenaline rush from the lure of aerial combat. The engineers' fulfillment came from creating the new, from bringing into being that which no one else had yet achieved." All that is admirable, and in the right hands it is even exciting. But without an explanation of why the talent mattered, we are left with an obsessive and melodramatic tale of gadgets and gadgeteers. Finally Sheehan's epic is empty. It is like *Apollo 13* without the moon.

J. Peter Scoblic is the executive editor of The New Republic.

<http://www.tnr.com/article/environment-energy/missile-man>

Breakthrough on Causes of Inflammatory Bowel Disease



Dr. Nicola Eastaff-Leung. (Credit: Image courtesy of University of Adelaide)

ScienceDaily (Dec. 18, 2009) — New research by the University of Adelaide could help explain why some people are more prone to Crohn's disease, ulcerative colitis and other autoimmune diseases.

A critical imbalance of the regulatory cells required to control the immune system has been revealed among people suffering inflammatory bowel disease.

In a paper published in the *Journal of Clinical Immunology* this month, Pathology researcher Dr Nicola Eastaff-Leung reveals that people suffering Crohn's disease and ulcerative colitis have fewer numbers of regulatory cells and more "attack" cells that cause inflammation.

"All the food that we eat is foreign to our body," Dr Eastaff-Leung says. "In healthy people the immune system has a mechanism to tolerate these foods and not react. But some people do not have enough of these regulatory cells and their body overreacts and goes into attack mode. That is where the inflammation occurs," she says.

Dr Eastaff-Leung says the results of her recently completed PhD at the University of Adelaide could help provide a diagnostic tool for gastrointestinal diseases, reducing the need for colonoscopies in future.

"If we can establish that all people suffering Crohn's disease and ulcerative colitis have an imbalance of these regulatory cells, we may be able to develop a blood test that confirms suspected cases of these diseases.

"The second, bigger challenge is to work out a treatment that can restore the balance of these cells and also to find out why this imbalance is happening in the first place."

Dr Eastaff-Leung, who has qualifications in both Pathology and Chinese medicine, says there is evidence to show that diet and lifestyle play a significant role in the development of gastrointestinal disease.

"Inflammatory bowel diseases and a lot of other autoimmune diseases are common in Western cultures but are rarely found in the developing or Third World countries.

"We need to look at our diet and also the obsession in Western countries with cleanliness and antibacterial disinfectants, which has gone overboard. Children need to be exposed to bacteria as they are developing in order to build their immune system naturally," Dr Eastaff-Leung says.

PhD supervisors Associate Professor Simon Barry, from the Discipline of Paediatrics at the University of Adelaide, and Dr Adrian Cummins from the Department of Gastroenterology at The Queen Elizabeth Hospital, believe the ongoing study of regulatory immune cells could help pinpoint the causes of a range of diseases, including multiple sclerosis, rheumatoid arthritis, Type 1 diabetes and even asthma.

"In all autoimmune diseases, the immune system accidentally starts to attack tissues and organs that it should normally leave alone. The regulatory cells are obviously not doing their job and we need to understand why," Dr Barry says.

Dr Eastaff-Leung will spend the next 12 months working with Assoc. Prof. Barry developing a novel biomarker for these regulatory immune cells in collaboration with Professor Heddy Zola from the Cooperative Research Centre for Biomarker Translation.

"We are going to see if we can add a new layer of sophistication to this research," Assoc. Prof. Barry says. "If the new biomarker is a protein that plays an important functional role we can work on that to restore the balance in the immune system."

Approximately 61,000 individuals are living with inflammatory bowel disease in Australia, costing the country about \$500 million per year in health fees and productivity loss, according to a 2007 Access Economics report.

Dr Eastaff-Leung's research was funded by The Queen Elizabeth Hospital Research Foundation and the Australian Crohn's and Colitis Association. Her other supervisor was Dr Angela Barbour from the University of Adelaide.

Story Source:

Adapted from materials provided by [University of Adelaide](#).

Journal Reference:

1. Nicola Eastaff-Leung, Nicholas Mabarrack, Angela Barbour, Adrian Cummins, Simon Barry. **Foxp3 Regulatory T Cells, Th17 Effector Cells, and Cytokine Environment in Inflammatory Bowel Disease.** *Journal of Clinical Immunology*, 2009; DOI: [10.1007/s10875-009-9345-1](https://doi.org/10.1007/s10875-009-9345-1)

<http://www.sciencedaily.com/releases/2009/12/091217094905.htm>

Stone Age Pantry: Archaeologist Unearths Earliest Evidence of Modern Humans Using Wild Grains and Tubers for Food



These are Middle Stone Age food processing tools recovered from the Ngalue cave site, Mozambique. (Credit: Grady Semmens, University of Calgary)

ScienceDaily (Dec. 18, 2009) — The consumption of wild cereals among prehistoric hunters and gatherers appears to be far more ancient than previously thought, according to a University of Calgary archaeologist who has found the oldest example of extensive reliance on cereal and root staples in the diet of early Homo sapiens more than 100,000 years ago.

Julio Mercader, holder of the Canada Research Chair in Tropical Archaeology in the U of C's Department of Archaeology, recovered dozens of stone tools from a deep cave in Mozambique showing that wild sorghum, the ancestor of the chief cereal consumed today in sub-Saharan Africa for flours, breads, porridges and alcoholic beverages, was in Homo sapiens' pantry along with the African wine palm, the false banana, pigeon peas, wild oranges and the African "potato." This is the earliest direct evidence of humans using pre-domesticated cereals anywhere in the world. Mercader's findings are published in the December 18 issue of the research journal *Science*.

"This broadens the timeline for the use of grass seeds by our species, and is proof of an expanded and sophisticated diet much earlier than we believed," Mercader said. "This happened during the Middle Stone Age, a time when the collecting of wild grains has conventionally been perceived as an irrelevant activity and not as important as that of roots, fruits and nuts."

In 2007, Mercader and colleagues from Mozambique's University of Eduardo Mondlane excavated a limestone cave near Lake Niassa that was used intermittently by ancient foragers over the course of more than 60,000 years. Deep in this cave, they uncovered dozens of stone tools, animal bones and plant remains indicative of prehistoric dietary practices. The discovery of several thousand starch grains on the excavated plant grinders and scrapers showed that wild sorghum was being brought to the cave and processed systematically.

"It has been hypothesized that starch use represents a critical step in human evolution by improving the quality of the diet in the African savannas and woodlands where the modern human line first evolved.



This could be considered one of the earliest examples of this dietary transformation," Mercader said. "The inclusion of cereals in our diet is considered an important step in human evolution because of the technical complexity and the culinary manipulation that are required to turn grains into staples."

Mercader said the evidence is on par with grass seed use by hunter-gatherers in many parts of the world during the closing stages of the last Ice Age, approximately 12,000 years ago. In this case, the trend dates back to the beginnings of the Ice Age, some 90,000 years earlier.

Mercader's work was supported by the Canada Research Chairs program, Canada Foundation for Innovation, the Social Sciences and Humanities Research Council of Canada, the U of C's Faculty of Social Science and the National Geographic Society.

Story Source:

Adapted from materials provided by [University of Calgary](#).

Journal Reference:

1. Julio Mercader et al. **Mozambican grass seed consumption during the Middle Stone Age.** *Science*, December 18, 2009

<http://www.sciencedaily.com/releases/2009/12/091217141312.htm>



New Study Turns Up the Heat on Soot's Role in Himalayan Warming



Tiny air pollution particles commonly called soot, but also known as black carbon, are in the air and on the move throughout our planet. The Indo-Gangetic plain, one of the most fertile and densely populated areas on Earth, has become a hotspot for emissions of black carbon (shown in purple and white). Winds push thick clouds of black carbon and dust, which absorb heat from sunlight, toward the base of the Himalayas where they accumulate, rise and drive a "heat pump" that affects the region's climate. (Credit: NASA)

ScienceDaily (Dec. 18, 2009) — Soot from fire in an unventilated fireplace wafts into a home and settles on the surfaces of floors and furniture. But with a quick fix to the chimney flue and some dusting, it bears no impact on a home's long-term environment.

A new modeling study from NASA confirms that when tiny air pollution particles we commonly call soot -- also known as black carbon -- travel along wind currents from densely populated south Asian cities and accumulate over a climate hotspot called the Tibetan Plateau, the result may be anything but inconsequential.

In fact, the new research, by NASA's William Lau and collaborators, reinforces with detailed numerical analysis what earlier studies suggest: that soot and dust contribute as much (or more) to atmospheric warming in the Himalayas as greenhouse gases. This warming fuels the melting of glaciers and could threaten fresh water resources in a region that is home to more than a billion people.

Lau explored the causes of rapid melting, which occurs primarily in the western Tibetan Plateau, beginning each year in April and extending through early fall. The brisk melting coincides with the time when concentrations of aerosols like soot and dust transported from places like India and Nepal are most dense in the atmosphere.

"Over areas of the Himalayas, the rate of warming is more than five times faster than warming globally," said William Lau, head of atmospheric sciences at NASA's Goddard Space Flight Center in Greenbelt, Md. "Based on the differences it's not difficult to conclude that greenhouse gases are not the sole agents of change in this region. There's a localized phenomenon at play."

Nicknamed the "Third Pole," the region in fact holds the third largest amount of stored water on the planet beyond the North and South Poles. But since the early 1960s, the acreage covered by Himalayan glaciers has declined by over 20 percent. Some Himalayan glaciers are melting so rapidly, some scientists postulate, that they may vanish by mid-century if trends persist. Climatologists have generally blamed the build-up of greenhouse gases for the retreat, but Lau's work suggests that may not be the complete story.

He has produced new evidence suggesting that an "elevated heat pump" process is fueling the loss of ice, driven by airborne dust and soot particles absorbing the sun's heat and warming the local atmosphere and land surface. A related modeling study by Lau and colleagues has been submitted to *Environmental Research Letters* for publication.

A unique landscape plays supporting actor in the melting drama. The Himalayas, which dominate the plateau region, are the source of meltwater for many of Asia's most important rivers -- the Ganges and Indus in India, the Brahmaputra in Bangladesh, the Salween through China, Thailand and Burma, the Mekong across Laos, Cambodia and Vietnam, and the Yellow and Yangtze rivers in China. When fossil fuels are burned without enough oxygen to complete combustion, one of the byproducts is black carbon, an aerosol that absorbs solar radiation (Most classes of aerosols typically reflect incoming sunlight, causing a cooling effect). Rising populations in Asia, industrial and agricultural burning, and vehicle exhaust have thickened concentrations of black carbon in the air.

Sooty black carbon travels east along wind currents latched to dust -- its agent of transport -- and become trapped in the air against Himalayan foothills. The particles' dark color absorbs solar radiation, creating a layer of warm air from the surface that rises to higher altitudes above the mountain ranges to become a major catalyst of glacier and snow melt.

Building on work by Veerabhardran Ramanathan of the Scripps Institution of Oceanography, San Diego, Calif., Lau and colleagues conducted modeling experiments that simulated the movement of air masses in the region from 2000 to 2007. They also made detailed numerical analyses of how soot particles and other aerosols absorb heat from the sun.

"Field campaigns with ground observations are already underway with more planned to test Lau's modeling results," said Hal Maring who manages the Radiation Sciences program at NASA Headquarters in Washington. "But even at this stage we should be compelled to take notice."

"Airborne particles have a much shorter atmospheric lifespan than greenhouse gases," continued Maring. "So reducing particle emissions can have much more rapid impact on warming."

"The science suggests that we've got to better monitor the flue on our 'rooftop to the world,'" said Lau. "We need to add another topic to the climate dialogue."

Story Source:

Adapted from materials provided by [NASA/Goddard Space Flight Center](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/12/091214173646.htm>

New Weapon in Battle of the Bulge: Food Releases Anti-Hunger Aromas During Chewing



A real possibility does exist for developing a new generation of foods that make people feel full by releasing anti-hunger aromas during chewing. (Credit: iStockphoto/Jan Couwer)

ScienceDaily (Dec. 17, 2009) — A real possibility does exist for developing a new generation of foods that make people feel full by releasing anti-hunger aromas during chewing, scientists in the Netherlands are reporting after a review of research on that topic. Such foods would fight the global epidemic of obesity with aromas that quench hunger and prevent people from overeating. Their article appears in ACS' *Journal of Agricultural and Food Chemistry*.

Rianne Ruijschop and colleagues note that scientists long have tried to develop tasty foods that trigger or boost the feeling of fullness. Until recently, that research focused on food's effects in stomach after people swallow it. Efforts now have expanded to include foods that release hunger-quenching aromas during chewing. Molecules that make up a food's aroma apparently do so by activating areas of the brain that signal fullness.

Their analysis found that aroma release during chewing does contribute to the feeling of fullness and possibly to consumers' decisions to stop eating. The report cites several possible applications, including developing foods that release more aroma during chewing or developing aromas that have a more powerful effect in triggering feelings of fullness.

Story Source:

Adapted from materials provided by [American Chemical Society](#), via [EurekAlert!](#), a service of AAAS.

Journal Reference:

1. Ruijschop et al. **Retronasal Aroma Release and Satiation: a Review.** *Journal of Agricultural and Food Chemistry*, 2009; 57 (21): 9888 DOI: [10.1021/jf901445z](https://doi.org/10.1021/jf901445z)

<http://www.sciencedaily.com/releases/2009/12/091216121502.htm>

Pollution Alters Isolated Thunderstorms: Wind Shear Strength Determines Whether Pollution Swells or Saps Storms



Under certain conditions, pollution can either strengthen or weaken thunderstorm clouds. PNNL researchers have figured out how to factor the effect into climate models. (Credit: UCAR/Carlyle Calvin)

ScienceDaily (Dec. 17, 2009) — New climate research reveals how wind shear -- the same atmospheric conditions that cause bumpy airplane rides -- affects how pollution contributes to isolated thunderstorm clouds. Under strong wind shear conditions, pollution hampers thunderhead formation. But with weak wind shear, pollution does the opposite and makes storms stronger.

The work improves climate scientists' understanding of how aerosols -- tiny unseen particles that make up pollution -- contribute to isolated thunderstorms and the climate cycle. How aerosols and clouds interact is one of the least understood aspects of climate, and this work allows researchers to better model clouds and precipitation.

"This finding may provide some guidelines on how man-made aerosols affect the local climate and precipitation, especially for the places where 'afternoon showers' happen frequently and affect the weather system and hydrological cycle," said atmospheric scientist Jiwen Fan of the Department of Energy's Pacific Northwest National Laboratory. "Aerosols in the air change the cloud properties, but the changes vary from case to case. With detailed cloud modeling, we found an important factor regulating how aerosols change storms and precipitation."

Fan discusses her results Thursday, December 17 at the 2009 American Geophysical Union meeting. Her study uses data from skies over Australia and China.

The results provide insight into how to incorporate these types of clouds and conditions into computational climate models to improve their accuracy.

A Model Sky

Deep convective clouds reflect a lot of the sun's energy back into space and return water that has evaporated back to the surface as rain, making them an important part of the climate cycle. The clouds

form as lower air rises upwards in a process called convection. The updrafts carry aerosols that can seed cloud droplets, building a storm.

Previous studies produced conflicting results in how aerosols from pollution affect storm development. For example, in some cases, more pollution leads to stronger storms, while in others, less pollution does. Fan and her colleagues used computer simulations to tease out what was going on. Of concern was a weather phenomenon known as wind shear, where horizontal wind speed and direction vary at different heights. Wind shear can be found near weather fronts and is known to influence storms.

The team ran a computer model with atmospheric data collected in northern Australia and eastern China. They simulated the development of eight deep convective clouds by varying the concentration of aerosols, wind shear, and humidity. Then they examined updraft speed and precipitation.

Storm Forming

In the first simulations, the team found that in scenarios containing strong wind shear, more pollution curbed convection. When wind shear was weak, more pollution produced a stronger storm. But convection also changed depending on humidity, so the team wanted to see which effect -- wind shear or humidity -- was more important.

The team took a closer look at two cloud-forming scenarios: one that ended up with the strongest enhancement in updraft speed and one with the weakest. For each scenario, they created a humid and a dry condition, as well as a strong and weak wind shear condition. The trend in the different conditions indicated that wind shear had a much greater effect on updraft strength than humidity.

When the team measured the expected rainfall, they found that the pattern of rainfall followed the pattern of updraft speed. That is, with strong wind shear, more pollution led to less rainfall. When wind shear was weak, more pollution created stronger storms and more rain -- up to a certain point. Beyond a peak level in weak wind shear conditions, pollution led to decreased storm development.

Additional analyses described the physics underlying these results. Water condensing onto aerosol particles releases heat, which contributes to convection and increases updraft speed. The evaporation of water from the cloud droplets cools the air, which reduces the updrafts. In strong wind shear conditions, the cooling effect is always larger than the heating effect, leading to a reduction in updraft speed.

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Story Source:

Adapted from materials provided by [DOE/Pacific Northwest National Laboratory](#).

Journal Reference:

1. J. Fan, T. Yuan, J. M. Comstock, S. Ghan, A. Khain, L. R. Leung, Z. Li, V. J. Martins, M. Ovchinnikov. **Dominant role by vertical wind shear in regulating aerosol effects on deep convective clouds.** *Journal of Geophysical Research*, 2009; 114 (d22): D22206 DOI: [10.1029/2009JD012352](https://doi.org/10.1029/2009JD012352)

<http://www.sciencedaily.com/releases/2009/12/091215145048.htm>

Ancient Origins of Modern Opossum Revealed



Restorations of (A) *Herpetotherium* and (B) *Mimoperadectes*. (Credit: Jorge González (La Plata, Argentina), courtesy Horovitz et al, *PLoS One*, doi:10.1371/journal.pone.0008278)

ScienceDaily (Dec. 17, 2009) — A University of Florida researcher has co-authored a study tracing the evolution of the modern opossum back to the extinction of the dinosaurs and finding evidence to support North America as the center of origin for all living marsupials.

The study, to be published in *PLoS One* on Dec. 16, shows that peradectids, a family of marsupials known from fossils mostly found in North America and Eurasia, are a sister group of all living opossums. The findings are based in part on high-resolution CT scans of a 55-million-year-old skull found in freshwater limestone from the Bighorn Basin of Wyoming.

"The extinction of the dinosaurs was a pivotal moment in the evolution of mammals," said Jonathan Bloch, study co-author and associate curator of vertebrate paleontology at UF's Florida Museum of Natural History. "We're tracing the beginnings of a major group of mammals that began in North America."

Opossum-like peradectids first appeared on the continent about 65 million years ago, at the time of the Cretaceous-Paleogene extinction event, which killed the dinosaurs.

"North America is a critical area for understanding marsupial and opossum origins because of its extensive and varied fossil record," said lead author Inés Horovitz, an assistant adjunct professor at the University of California, Los Angeles. "Unfortunately, most of its species are known only from teeth."

The study also analyzes two 30-million-year-old skeletons of Herpetotheriidae, the sister group of all living marsupials.

Based on fossil evidence from the skull and two skeletons, the study's authors concluded the evolutionary split between the ancestor of opossums and the ancestor of all other living marsupials occurred at least 65 million years ago, Horovitz said. Marsupials migrated between North and South America until the two continents separated after the end of the Cretaceous period. Marsupials in South America diversified and also migrated into Antarctica and Australia, which were still connected at that time, Bloch said.

North American marsupials went extinct during the early Miocene, about 20 million years ago. But after the Isthmus of Panama emerged to reconnect North and South America 3 million years ago, two marsupials made it back to North America: the Virginia opossum (*Didelphis virginiana*), a common resident in the Southeast today, and the southern opossum (*Didelphis marsupialis*), which lives as far north as Mexico. The study describes a new peradectid species, *Mimoperadectes houdei*, based on a relatively complete fossil skull. The high-resolution CT scan of the skull gave researchers a large amount of information about the animal's internal anatomy. The ear, in particular, provides researchers with information on skull anatomy and clues about the animal's locomotion, Bloch said.

The scan showed the new species shared enough common traits with living opossums to indicate an evolutionary relationship. Some predictions about that relationship could have been made from fossil teeth, Bloch said, "but this provides a much stronger foundation for that conclusion."

Most North American marsupials living in the Paleocene and early Eocene (56 million to 48 million years ago) were small-bodied animals. But *M. houdei* approached the body size of some opossums living today.

"You would probably recognize it as an opossum, but it wouldn't look quite right," Bloch said.

The skull came from the same limestone deposits in Wyoming as the primitive primate skull Bloch and other researchers used to map an early primate brain with CT scans in a study published earlier this year.

"In parts of North America today, opossums are one of the most commonly observed mammals around," Bloch said. "This fossil skull shows its roots going back to the extinction of the dinosaurs. This is literally the fossil that shows us the ancestry of that animal." The study's examination of the two skeletons gives a first glimpse into the form and structure of primitive marsupials and shows that they were more terrestrial than modern opossums. The skeletons came from the late Oligocene and were found in the White River Badlands of Wyoming.

The international research team also included Thomas Martin (University of Bonn, Germany), Sandrine Ladevèze and Marcelo Sánchez-Villagra (University of Zurich, Switzerland), and Cornelia Kurz (Natural History Museum, Kassel, Germany).

Story Source:

Adapted from materials provided by [University of Florida](#), via [EurekAlert!](#), a service of AAAS.

Journal Reference:

1. Inés Horovitz, Thomas Martin, Jonathan Bloch, Sandrine Ladevèze, Cornelia Kurz, Marcelo R. Sánchez-Villagra. **Cranial Anatomy of the Earliest Marsupials and the Origin of Opossums**. *PLoS ONE*, 4(12): e8278 DOI: [10.1371/journal.pone.0008278](https://doi.org/10.1371/journal.pone.0008278)

<http://www.sciencedaily.com/releases/2009/12/091215202320.htm>

Most People Should Not Automatically Opt for a Swine Flu Shot, Expert Suggests Based on Bacterial Decision-Making



TAU draws on bacterial decision-making success to guide human choices. (Credit: Image courtesy of American Friends of Tel Aviv University)

ScienceDaily (Dec. 17, 2009) — Bacteria inhabited our planet for more than 4 billion years before humans showed up, and they'll probably outlive us by as many eons more. That suggests they may have something to teach us.

New research from *Tel Aviv University* bacteria expert *Prof. Eshel Ben-Jacob* of the *Raymond and Beverly Sackler School of Physics and Astronomy*, grounded in the study of bacteria, presents compelling evidence to suggest there may be good reasons why most people should not automatically opt for the swine flu H1N1 shot.

In research published in the *Proceedings of the National Academy of Science (PNAS)*, Prof. Ben Jacob uses the decision-making of bacteria, an analogue of "game theory," as a model to make his case.

"Unlike our health authorities, bacteria would never panic," he says. "Bacteria don't follow the media or watch cable news. Instead, they send chemical messages to each other -- in a colony 100 times larger than the earth's human population -- to make their decisions. And based on what we've seen in bacterial colonies, I know they would be suspicious committing to swine flu shots. They wouldn't opt for a colony wide vaccination," Prof. Ben Jacob concludes.

The prisoner's dilemma

The new research, done in collaboration with Dr. Daniel Schultz, a postdoctoral fellow at TAU, and Profs. José Onuchic and Peter Wolynes at the University of California/San Diego, not only provides a paradigm for assessing responses to health emergencies, it may also provide investors with insight into how to manage stock portfolios.

In the *PNAS* paper, the scientists explored how microscopic creatures living in large colonies decide their fate in adverse times under complicated and life threatening conditions. They found that bacteria communicate through chemical signals and reach decisions in sophisticated ways, using an elaborate network of genes and proteins to calculate complex possibilities, as in game theory.

In essence, in life or death situations, bacteria employ more advanced tactics than those used to solve the classic problem known as "the prisoner's dilemma." This may account for their colony's resilience. In the classic problem, two prisoners are asked to betray each other. If one testifies against the other and the other remains silent, the betrayer goes free and the silent one (the prisoner loyal to his friend), will get 10 years in prison. If both remain silent (and cooperate with each other), they are sentenced to only one year in jail. If each one betrays the other, both will be sentenced to 5 years in jail. The temptation, of course, is to betray -- but neither prisoner can be sure what the other will say, and could risk five years in jail.

In the case of bacteria, there are not two but hundreds of billions of participants with a limited time to decide whether to deal with a stress situation by all turning into spores. Each bacterium has to decide whether it will cooperate or not. Unlike the prisoners, there is a clock ticking away. And each bacterium must quickly send out chemical messages to its peer cells about its intentions.

Bacteria "usually don't lie" about their own plans, Prof. Ben Jacob says, but the minority that do have a chance of surviving won't cheat to postpone the decision of others. The scientists' new article presents a model that decodes how bacteria use the gene-and-protein networks to calculate risks and the game theory principles they employ.

Maintaining a delicate balance

Americans uncertain about getting the H1N1 flu shot because they've heard about potentially dangerous side effects also face the prisoner's dilemma. Perhaps it's better not to get the shot, one may think, because if everybody else is vaccinated, the virus will be wiped out before it reaches me.

"The simple rule we learned from bacteria is that anybody who has to make an important decision -- especially one of life and death at times of stress -- should wait to see the trend of changes, process the risks and odds in depth, and only then decide," says Prof. Ben-Jacob.

Based on what he and his colleagues learned about bacteria, he imagines that bacteria might offer this counsel regarding the flu shot: "They might suggest that only people who have widespread and intense contact with many others, such as business travellers and teachers, should get the shot. Those who are most likely to spread the virus should be vaccinated.

"Bacteria don't take risks like we do and the results have paid off. They are super-successful, more than any creature on earth. They wouldn't abuse the stock market, and would never invest beyond their means. I am also pretty sure most would not rush to get the flu shot, if given the choice," he concludes. "They know how to keep a delicate balance."

Story Source:

Adapted from materials provided by [American Friends of Tel Aviv University](#).

<http://www.sciencedaily.com/releases/2009/12/091216104352.htm>

NASA Tech Zooms in on Water and Land



Peninsula College and Western Washington University students hike the Olympic Mountains to measure snowpack for the North Olympic Peninsula Solutions Network in January 2008. The network enters data from satellites, sensors, water gauges and snowpack sites into a new computer river model that quickly and more accurately monitors stream flow in the Dungeness River, near Sequim, Washington. (Credit: Photo by Dwight Barry/Peninsula College)

ScienceDaily (Dec. 17, 2009) — In a pilot project that could help better manage the planet's strained natural resources, space-age technologies are helping a Washington state community monitor its water availability. NASA satellites and sensors are providing the information needed to make more accurate river flow predictions on a daily basis.

"World leaders are struggling to protect natural resources for future generations," said Jeff Ward, a senior research scientist at the Department of Energy's Pacific Northwest National Laboratory, which is managed by Battelle. "These tools help us sustainably use natural resources while balancing environmental, cultural and economic concerns."

Ward manages a project on behalf of Battelle that is helping to better predict the flow of the Dungeness River, near Sequim, Wash., with data collected by NASA instruments. The project started by creating a new model that predicts river flows in the river's surrounding valley. It then expanded to help other communities in Kansas, Maine, Oregon and Washington state better manage their water and land resources with similar technologies.

The project -- called the North Olympic Peninsula Solutions Network -- is lead by the North Olympic Peninsula Resource Conservation & Development Council and supported by PNNL and others.

Lucien Cox of NASA will present the project's results Dec. 16 at the 2009 fall meeting of the American Geophysical Union in San Francisco.

The project will help regional natural resource managers assess the abundance -- or lack thereof -- of the Dungeness River. The river model was developed to show how NASA technologies like satellites, sensors and computational models could be used to improve short-term stream flow predictions. The river model relies on snowpack and temperature data collected from satellites, as well as real-time snowpack and water data collected by various agencies.

The new Dungeness River model's calculations can tell what kind of flow to expect -- from a trickle to a deluge -- on a daily and monthly basis. Before, resource managers primarily relied on either water levels physically measured at gauges or historical data to predict total expected water volume over two to six months. Neither method provided flow predictions as frequently as the new model.

Having more precise river flow predictions is especially important along the Dungeness River, where the towering Olympic Mountains create a drying rain shadow effect and steep slopes prevent above-ground water reservoirs. Sequim receives just 15 inches of rain annually. Water is so treasured that the agricultural city is home to a 114-year-old festival that celebrates a historic irrigation system.

"Improving the accuracy of stream flow predictions is important to a diverse group of water users, including irrigation-dependent farmers, planners making urban growth decisions and those concerned about salmon survival or water quality," said Clea Rome, North Olympic Peninsula RC&D coordinator. "Stream flow prediction tools can help us avoid a crisis by alerting us before droughts are in full effect, giving us enough notice to adjust water use."

But the practical use of NASA technologies isn't limited just to Sequim or river water. The North Olympic Peninsula Solutions Network is helping four other resource, conservation and development councils tackle their unique problems.

Another resource -- soil -- has the Solomon Valley RC&D in north central Kansas concerned about agricultural tilling and erosion. Striking a balance between agriculture and forestry is critical for the Threshold to Maine RC&D in southwest Maine. The Wy'East RC&D is looking to better manage water supply and demand in north central Oregon. And in Okanogan, Wash., the possibility of water shortages worries the North Central Washington RC&D.

"Space technologies can help us get the best science to the ground, to the decision makers here in the Okanogan Basin," said Samantha Bartling, North Central Washington RC&D coordinator. "We expect it'll help us more precisely predict water availability for a long time to come."

The four councils are working with North Olympic Peninsula Solutions Network leaders to determine how NASA technologies can best address their different challenges.

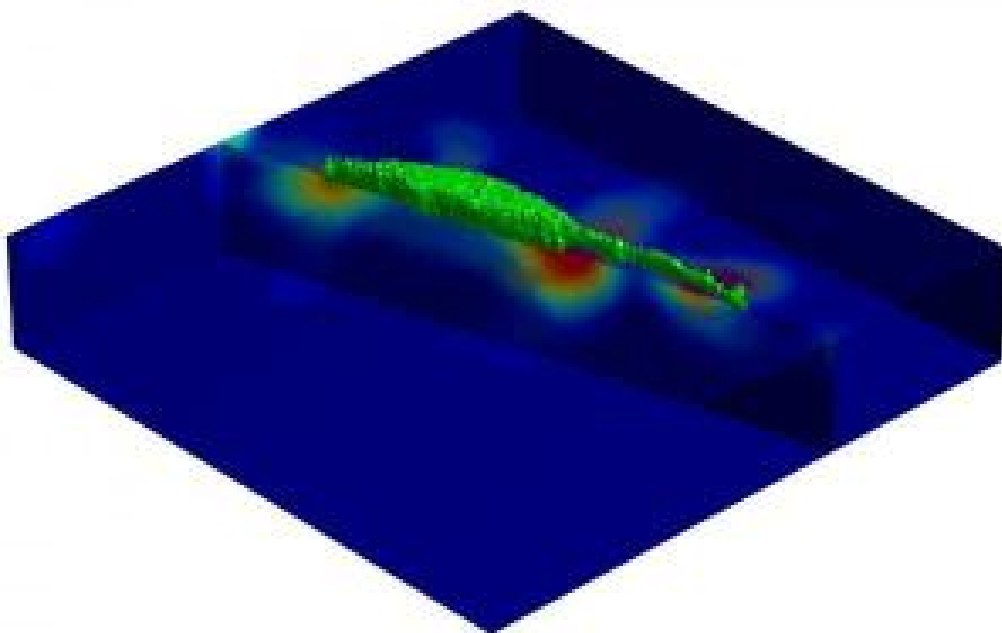
The project is funded by a \$1.6 million grant from NASA. More information can be found at the North Olympic Peninsula Solutions Network website, <http://pcnasa.ctc.edu/>. Other project partners include: the Department of Agriculture's Natural Resources Conservation Services; NRCS National Water and Climate Center; National Association of RC&D Councils; Idaho National Laboratory; Olympic National Park; Clallam County; The Dungeness River Management Team; The Elwha-Morse Management Team; Peninsula College and Pacific Northwest Regional Collaboratory.

Story Source:

Adapted from materials provided by [DOE/Pacific Northwest National Laboratory](#).

<http://www.sciencedaily.com/releases/2009/12/091215141520.htm>

Cells Move in Mysterious Ways, Experiments Reveal



Three-dimensional cell. Scientists at Brown University and the California Institute of Technology have for the first time tracked how cells move by measuring the force exerted by them on their surroundings. The method could lead to better understanding how healthy cells differ from malignant cells. (Credit: Christian Franck, Brown University)

ScienceDaily (Dec. 17, 2009) — Scientists at Brown University and the California Institute of Technology have for the first time tracked how cells move in three dimensions by measuring the force exerted by them on their surroundings. The scientists' experiments revealed that cells move in a push-pull fashion, such as probing at depth, redistributing weight at various points and coiling and elongating.

Our cells are more like us than we may think. They're sensitive to their environment, poking and prodding deliberately at their surroundings with hand-like feelers and chemical signals as they decide whether and where to move. Such caution serves us well but has vexed engineers who seek to create synthetic tissue, heart valves, implants and other devices that the human body will accept.

To overcome that obstacle, scientists have sought to learn more about how cells explore what's around them. While numerous studies have looked at cellular movement in two dimensions and a few recent experiments involved cellular motion in three dimensions, scientists remained unsure just how much cells interacted with their surroundings. Now, a study involving Brown University and the California Institute of Technology has recorded for the first time how cells move in three dimensions by measuring the force exerted by cells on their environs. The research gives scientists their most complete assessment to date about how cells move.

"We've learned that cells move in much more complex ways than previously believed," said Christian Franck, assistant professor in engineering at Brown and the co-lead author of the study published online in the *Proceedings of the National Academy of Sciences*. "Now, we can start to really put numbers on how much cells push and pull on their environment and how much cells stick to tissues as they move around and interact."

In the study, Franck and co-lead author Stacey Maskarinec, who both conducted the experiments while graduate students at the California Institute of Technology, placed cells on top of a 50-micron-thick water-based gel designed to mimic human tissue. They added into the gel spheres about a half-micron in diameter that lit up when jostled by the cells' actions. By combining two techniques -- laser scanning confocal microscopy and digital volume correlation -- the scientists tracked the cells' movement by quantifying exactly how the environment changed each time the cell moved. The team recorded results every 35 minutes over a 24-hour period.

What they found was cells move in intriguing ways. In one experiment, a cell is clearly shown operating in three dimensions by extending feelers into the gel, probing at depth, as if thrusting a leg downward in a pool. The Brown and Caltech scientists also found that as a cell moves, it engages in a host of push-pull actions: It redistributes its weight, it coils and elongates its body, and it varies the force with which it "grips," or adheres, to a surface. Combined, the actions help the cell generate momentum and create a "rolling motion," as Franck described it, that is more like walking than shuffling, as many scientists had previously characterized the movement.

"The motion itself is in three dimensions," Franck said.

Franck's lab plans to use the new force-measurement technique to examine how the movement of normal healthy cells differs from mutant or malignant ones. "That promises to give us greater insight in how cells' behavior changes when they become diseased," Franck said.

David Tirrell and Guruswami Ravichandran, scientists at Caltech, contributed to the research. The National Science Foundation funded the work.

Story Source:

Adapted from materials provided by [Brown University](#).

<http://www.sciencedaily.com/releases/2009/12/091216151151.htm>

Diet High in Methionine Could Increase Risk of Alzheimer's



A diet rich in methionine, an amino acid typically found in red meats, fish, beans, eggs, garlic, lentils, onions, yogurt and seeds, can possibly increase the risk of developing Alzheimer's disease, according to a study by Temple researchers. (Credit: iStockphoto)

ScienceDaily (Dec. 17, 2009) — A diet rich in methionine, an amino acid typically found in red meats, fish, beans, eggs, garlic, lentils, onions, yogurt and seeds, can possibly increase the risk of developing Alzheimer's disease, according to a study by Temple researchers.

"When methionine reaches too high a level, our body tries to protect itself by transforming it into a particular amino acid called homocysteine," said lead researcher Domenico Praticò, an associate professor of pharmacology in the School of Medicine. "The data from previous studies show -- even in humans -- when the level of homocysteine in the blood is high, there is a higher risk of developing dementia. We hypothesized that high levels of homocysteine in an animal model of Alzheimer's would accelerate the disease."

Using a seven-month old mouse model of the disease, they fed one group an eight-month diet of regular food and another group a diet high in methionine. The mice were then tested at 15 months of age -- the equivalent of a 70-year-old human.

"We found that the mice with the normal diet had normal homocysteine levels, but the mice with the high methionine diet had significantly increased levels of homocysteine, very similar to human subjects with hyperhomocysteinemia," said Praticò. "The group with the high methionine diet also had up to 40 percent more amyloid plaque in their brains, which is a measurement of how much Alzheimer's disease has developed."

The researchers also examined capacity to learn a new task and found it diminished in the group with the diet high in methionine.

Still, Praticò emphasized, methionine is an essential amino acid for the human body and "stopping one's intake of methionine won't prevent Alzheimer's. But people who have a diet high in red meat, for



instance, could be more at risk because they are more likely to develop this high level of circulating homocysteine," he said.

In addition to Praticò, other researchers working on the study included Jia-Min Zhuo and Hong Wang from Temple's Department of Pharmacology, Thomas J. Gould and George S. Portugal from Temple's Department of Psychology, and Warren D. Kruger from the Fox Chase Cancer Center.

The study was funded by grants from the National Institute of Health and the Alzheimer's Association, in addition to support from Pennsylvania Commonwealth through the Fox Chase Cancer Center.

Story Source:

Adapted from materials provided by [Temple University](#).

Journal Reference:

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<http://www.sciencedaily.com/releases/2009/12/091216121456.htm>



Mastery of Physical Goals Lessens Disease-Related Depression and Fatigue



Physically active individuals have an increased sense of accomplishment, or situation-specific self-confidence, which in turn results in reduced depression and reduced fatigue, said Edward McAuley, a professor of kinesiology and community health at Illinois and lead author on the study. (Credit: Photo by L. Brian Stauffer)

ScienceDaily (Dec. 17, 2009) — Physical activity is known to reduce depression and fatigue in people struggling with chronic illness. A new study indicates that this effect may stem from an individual's sense of mastery over -- or belief in his or her ability to achieve -- certain physical goals.

The study appears in the journal *Psychosomatic Medicine*.

"We base our arguments on fatigue being a symptom of depression," said Edward McAuley, a professor of kinesiology and community health at the University of Illinois and lead author of the study.

"Interventions to reduce depression have consistently resulted in reductions in fatigue. The opposite is not always the case."

Depression and fatigue also are highly susceptible to changes in a person's sense of his or her own ability to achieve a certain goal. This belief in one's own abilities is called self-efficacy, McAuley said. The conviction that you can jog down the block or climb several flights of stairs without stopping is an example of self-efficacy.

Previous studies have shown that increases in physical activity also increase self-efficacy. The effect is almost immediate, McAuley said.



"The evidence is monumental that physical activity has some effect on well-being," McAuley said. "The question is: Why?" He and his colleagues wanted to determine whether self-efficacy plays a role in the sequence that leads from physical activity to reduced depression and fatigue.

"Our argument was that physically active individuals would have higher self-efficacy, which in turn would result in reduced depression and reduced fatigue," McAuley said.

To test this hypothesis, the researchers reanalyzed data from two previously published studies, the first involving breast-cancer survivors and the second focusing on individuals diagnosed with multiple sclerosis. Both studies included self-report questionnaires, but the second used different measures of health status, physical activity, self-efficacy, depression and fatigue. It also required that participants record their physical activity with an accelerometer worn during waking hours for seven days, and it tested them again on all measures after six months.

A statistical analysis showed that in both groups, higher levels of physical activity corresponded to higher self-efficacy and lower levels of depression and fatigue. But when the researchers controlled for the influence of self-efficacy on depression and fatigue, they found that the effect of physical activity on both depression and fatigue was significantly reduced.

This suggests, McAuley said, that physical activity influences depression and fatigue by increasing self-efficacy.

"What we're showing is that the relationship between physical activity and reductions in fatigue in breast-cancer survivors and people with MS can be explained in part by the effect of physical activity on mastery experiences," he said. "That sense of accomplishment, or situation-specific self-confidence, serves to reduce depression, which in turn reduces fatigue." Increased self-efficacy also has a direct effect on reducing fatigue, he said.

Physical activity programs can be designed to effectively enhance self-efficacy and, in turn, well-being, McAuley said.

Also on the research team were Siobhan White and Robert Motl, of the University of Illinois; Laura Rogers, of Southern Illinois University School of Medicine; and Kerry Courneya, of the University of Alberta, Edmonton.

The research was supported in part by the Southern Illinois University School of Medicine; the American Cancer Society, Illinois Division; and the National Institute of Neurological Diseases and Stroke at the National Institutes of Health. McAuley is supported by a Shahid and Ann Carlson Khan professorship.

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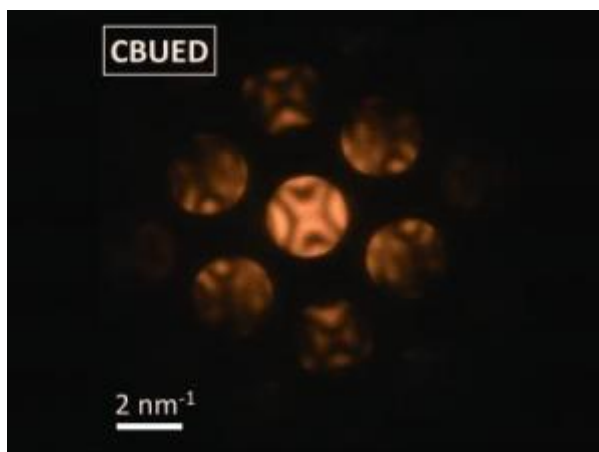
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<http://www.sciencedaily.com/releases/2009/12/091215131328.htm>



Scientists Film Photons With Electrons



This is the diffraction obtained for silicon with 4D electron microscopy. The nanoscale can be determined from the patterns the structure. (Credit: Zewail/Science/AAAS)

ScienceDaily (Dec. 17, 2009) — Techniques recently invented by researchers at the California Institute of Technology (Caltech) -- which allow the real-time, real-space visualization of fleeting changes in the structure of nanoscale matter -- have been used to image the evanescent electrical fields produced by the interaction of electrons and photons, and to track changes in atomic-scale structures.

Papers describing the novel technologies appear in the December 17 issue of *Nature* and the October 30 issue of *Science*.

Four-dimensional (4D) microscopy -- the methodology upon which the new techniques were based -- was developed at Caltech's Physical Biology Center for Ultrafast Science and Technology. The center is directed by Ahmed Zewail, the Linus Pauling Professor of Chemistry and professor of physics at Caltech, and winner of the 1999 Nobel Prize in Chemistry.

Zewail was awarded the Nobel Prize for pioneering the science of femtochemistry, the use of ultrashort laser flashes to observe fundamental chemical reactions occurring at the timescale of the femtosecond (one-millionth of a billionth of a second). The work "captured atoms and molecules in motion," Zewail says, but while snapshots of such molecules provide the "time dimension" of chemical reactions, they don't give the dimensions of space of those reactions -- that is, their structure or architecture.

Zewail and his colleagues were able to visualize the missing architecture through 4D microscopy, which employs single electrons to introduce the dimension of time into traditional high-resolution electron microscopy, thus providing a way to see the changing structure of complex systems at the atomic scale.

In the research detailed in the *Science* paper, Zewail and postdoctoral scholar Ayca Yurtsever were able to focus an electron beam onto a specific nanoscale-sized site in a specimen, making it possible to observe structures within that localized area at the atomic level.

In electron diffraction, an object is illuminated with a beam of electrons. The electrons bounce off the atoms in the object, then scatter and strike a detector. The patterns produced on the detector provide information about the arrangement of the atoms in the material. However, if the atoms are in motion, the patterns will be blurred, obscuring details about small-scale variations in the material.

The new technique devised by Zewail and Yurtsever addresses the blurring problem by using electron pulses instead of a steady electron beam. The sample under study -- in the case of the *Science* paper, a wafer of crystalline silicon -- is first heated by being struck with a short pulse of laser light. The sample is

then hit with a femtosecond pulse of electrons, which bounce off the atoms, producing a diffraction pattern on a detector. Since the electron pulses are so incredibly brief, the heated atoms don't have time to move much; this shorter "exposure time" produces a sharp image. By adjusting the delay between when the sample is heated and when the image is taken, the scientists can build up a library of still images that can be strung together into a movie. "Essentially all of the specimens we deal with are heterogeneous," Zewail explains, with varying compositions over very small areas. "This technique provides the means for examining local sites in materials and biological structures, with a spatial resolution of a nanometer or less, and time resolution of femtoseconds."

The new diffraction method allows the structures of materials to be mapped out at an atomic scale. With the second technique -- introduced in the *Nature* paper, which was coauthored by postdoctoral scholars Brett Barwick and David Flannigan -- the light produced by such nanostructures can be imaged and mapped. The concept behind this technique involves the interaction between electrons and photons. Photons generate an evanescent field in nanostructures, and electrons can gain energy from such fields, which makes them visible in the 4D microscope.

In what is known as the photon-induced near-field electron microscopy (PINEM) effect, certain materials -- after being hit with laser pulses -- continue to "glow" for a short but measurable amount of time (on the order of tens to hundreds of femtoseconds). In their experiment, the researchers illuminated carbon nanotubes and silver nanowires with short pulses of laser light as electrons were being shot past. The evanescent field persisted for femtoseconds, and the electrons picked up energy during this time in discrete amounts (or quanta) corresponding to the wavelength of the laser light. The energy of an electron at 200 kilo-electron volts (keV) increased by 2.4 electron volts (eV), or by 4.8 eV, or by 7.2 eV, etc.; alternatively, an electron might not change in energy at all. The number of electrons showing a change is more striking if the timing is just right, i.e., if the electrons are passing the material when the field is at its strongest.

The power of this technique is that it provides a way to visualize the evanescent field when the electrons that have gained energy are selectively identified, and to image the nanostructures themselves when electrons that have not gained energy are selected. "As noted by the reviewers of this paper, this technique of visualization opens new vistas of imaging with the potential to impact fields such as plasmonics, photonics, and related disciplines," Zewail says. "What is interesting from a fundamental physics point of view is that we are able to image photons using electrons. Traditionally, because of the mismatch between the energy and momentum of electrons and photons, we did not expect the strength of the PINEM effect, or the ability to visualize it in space and time." The work in the *Nature* paper and the *Science* paper was supported by the National Science Foundation, the Air Force Office of Scientific Research, and the Gordon and Betty Moore Foundation at the Center for Physical Biology at Caltech.

Story Source:

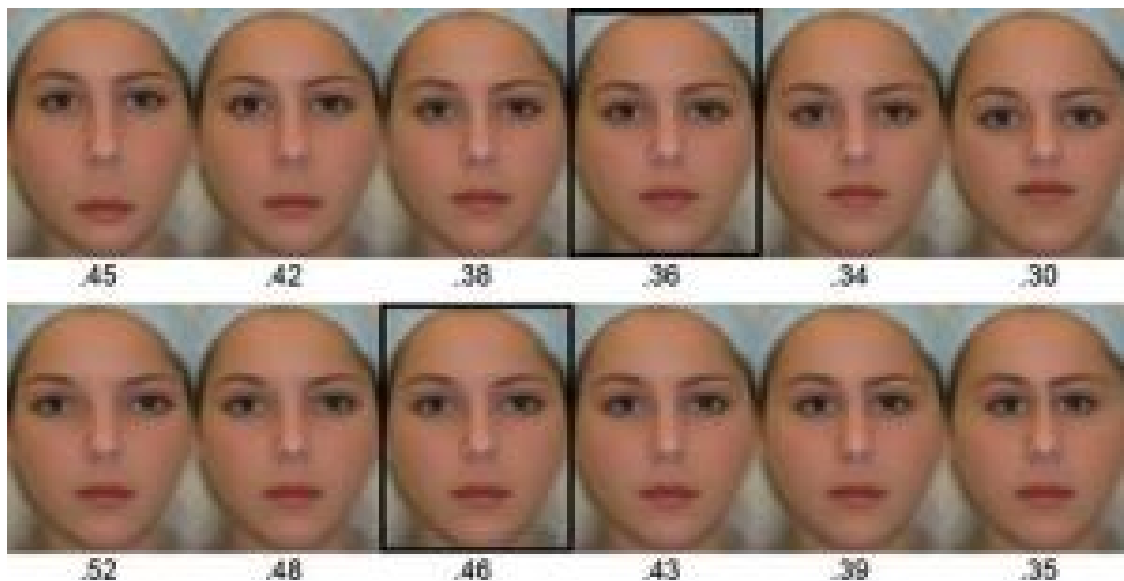
Adapted from materials provided by [California Institute of Technology](#), via [EurekAlert!](#), a service of AAAS.

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<http://www.sciencedaily.com/releases/2009/12/091216131749.htm>

New 'Golden Ratios' for Female Facial Beauty



Example of faces with different length and width ratios; faces with an average length or width ratio are framed in black. (Credit: Image courtesy of University of Toronto)

ScienceDaily (Dec. 17, 2009) — Beauty is not only in the eye of the beholder but also in the relationship of the eyes and mouth of the beholder. The distance between a woman's eyes and the distance between her eyes and her mouth are key factors in determining how attractive she is to others, according to new psychology research from the University of California, San Diego and the University of Toronto.

Pamela Pallett and Stephen Link of UC San Diego and Kang Lee of the University of Toronto tested the existence of an ideal facial feature arrangement. They successfully identified the optimal relation between the eyes, the mouth and the edge of the face for individual beauty.

In four separate experiments, the researchers asked university students to make paired comparisons of attractiveness between female faces with identical facial features but different eye-mouth distances and different distances between the eyes.

They discovered two "golden ratios," one for length and one for width. Female faces were judged more attractive when the vertical distance between their eyes and the mouth was approximately 36 percent of the face's length, and the horizontal distance between their eyes was approximately 46 percent of the face's width.

Interestingly, these proportions correspond with those of an average face.

"People have tried and failed to find these ratios since antiquity. The ancient Greeks found what they believed was a 'golden ratio' -- also known as 'phi' or the 'divine proportion' -- and used it in their architecture and art. Some even suggest that Leonardo Da Vinci used the golden ratio when painting his 'Mona Lisa.' But there was never any proof that the golden ratio was special. As it turns out, it isn't. Instead of phi, we showed that average distances between the eyes, mouth and face contour form the true golden ratios," said Pallett, a post-doctoral fellow in psychology at UC San Diego and also an alumna of the department.

"We already know that different facial features make a female face attractive -- large eyes, for example, or full lips," said Lee, a professor at University of Toronto and the director of the Institute of Child Study



at the Ontario Institute for Studies in Education. "Our study conclusively proves that the structure of faces -- the relation between our face contour and the eyes, mouth and nose -- also contributes to our perception of facial attractiveness. Our finding also explains why sometimes an attractive person looks unattractive or vice versa after a haircut, because hairdos change the ratios."

The researchers suggest that the perception of facial attractiveness is a result of a cognitive averaging process by which people take in all the faces they see and average them to get an ideal width ratio and an ideal length ratio. They also posit that "averageness" (like symmetry) is a proxy for health, and that we may be predisposed by biology and evolution to find average faces attractive.

The authors note that only Caucasian female faces were studied. Further studies are needed to know whether there is a different set of golden ratios for male faces and for faces from other races or for children's faces.

The research is published by the journal *Vision Research* and was supported by grants from the National Institutes of Health and the American Psychological Association.

Story Source:

Adapted from materials provided by [University of Toronto](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/12/091216144141.htm>



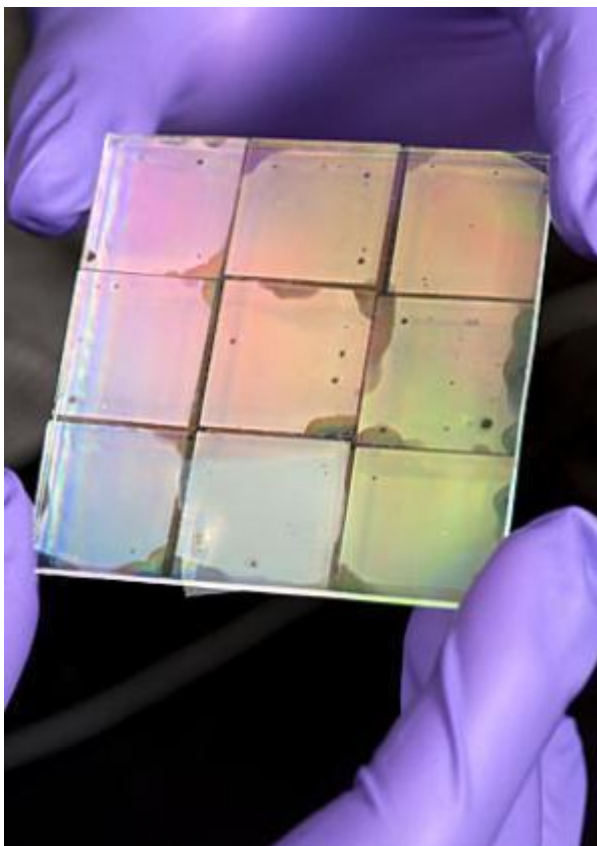
Heart Cells on Lab Chip Display 'Nanosense' That Guides Behavior

Johns Hopkins researchers developed this chip to culture heart cells that more closely resemble natural cardiac tissue. (Credit: Will Kirk/homewoodphoto.jhu.edu)

ScienceDaily (Dec. 17, 2009) — Johns Hopkins biomedical engineers, working with colleagues in Korea, have produced a laboratory chip with nanoscopic grooves and ridges capable of growing cardiac tissue that more closely resembles natural heart muscle. Surprisingly, heart cells cultured in this way used a "nanosense" to collect instructions for growth and function solely from the physical patterns on the nanotextured chip and did not require any special chemical cues to steer the tissue development in distinct ways.

The scientists say this tool could be used to design new therapies or diagnostic tests for cardiac disease.

The device and experiments using it were described online in the Early Edition of *Proceedings of the National Academy of Sciences*. The work, a collaboration with Seoul National University, represents an important advance for researchers who grow cells in the lab to learn more about cardiac disorders and possible remedies.



"Heart muscle cells grown on the smooth surface of a Petri dish, would possess some, but never all, of the same physiological characteristics of an actual heart in a living organism," said Andre Levchenko, a Johns Hopkins associate professor of biomedical engineering at the Whiting School of Engineering. "That's because heart muscle cells -- cardiomyocytes -- take cues from the highly structured extracellular matrix or ECM, which is a scaffold made of fibers that supports all tissue growth in mammals. These cues from the ECM influence tissue structure and function, but when you grow cells on a smooth surface in the lab, the physical signals can be missing. To address this, we developed a chip whose surface and softness mimic the ECM. The result was lab-grown heart tissue that more closely resembles the real thing."

Levchenko added that when he and his colleagues examined the natural heart tissue taken from a living animal, "we immediately noticed that the cell layer closest to the extracellular matrix grew in a highly elongated and linear fashion. The cells orient with the direction of the fibers in the matrix, which suggests that ECM fibers give structural or functional instructions to the myocardium, a general term for the heart muscle." These instructions, Levchenko said, are delivered on the nanoscale -- activity at the scale of one-billionth of a meter and a thousand times smaller than the width of a human hair.

Levchenko and his Korean colleagues, working with Deok-Ho Kim, a biomedical engineering doctoral student from Levchenko's lab and the lead author of the PNAS article, developed a two-dimensional hydrogel surface simulating the rigidity, size and shape of the fibers found throughout a natural ECM network. This bio-friendly surface made of nontoxic polyethylene glycol displays an array of long ridges resembling the folded pattern of corrugated cardboard. The ridged hydrogel sits upon a glass slide about the size of a U.S. dollar coin. The team made a variety of chips with ridge widths spanning from 150 to 800 nanometers, groove widths ranging from 50 to 800 nanometers, and ridge heights varying from 200

to 500 nanometers. This allowed researchers to control the surface texture over more than five orders of magnitude of length.

"We were pleased to find that within just two days, the cells became longer and grew along the ridges on the surface of the slide," said Kim. Furthermore, the researchers found improved coupling between adjacent cells, an arrangement that more closely resembled the architecture found in natural layers of heart muscle tissue. Cells grown on smooth, unpatterned hydrogels, however, remained smaller and less organized with poorer cell-to-cell coupling between layers. "It was very exciting to observe engineered heart cells behave on a tiny chip in two dimensions like they would in the native heart in three dimensions," Kim said.

Collaborating with Leslie Tung, a professor of biomedical engineering at the Johns Hopkins School of Medicine, the researchers found that, after a few more days of growth, cells on the nanopatterned surface began to conduct electric waves and contract strongly in a specific direction, as intact heart muscle would. "Perhaps most surprisingly, these tissue functions and the structure of the engineered heart tissue could be controlled by simply altering the nanoscale properties of the scaffold. That shows us that heart cells have an acute 'nanosense,'" Levchenko said.

"This nanoscale sensitivity was due to the ability of cells to deform in sticking to the crevices in the nanotextured surface and probably not because of the presence of any molecular cue," Levchenko said. "These results show that the ECM serves as a powerful cue for cell growth, as well as a supporting structure, and that it can control heart cell function on the nanoscale separately in different parts of this vital organ. By mimicking this ECM property, we could start designing better engineered heart tissue."

Looking ahead, Levchenko anticipates that engineering surfaces with similar nanoscale features in three dimensions, instead of just two, could provide an even more potent way to control the structure and function of cultured cardiac tissue.

In addition to Kim, Levchenko and Tung, other authors on this paper are postdoctoral fellow Elizabeth A. Lipke, doctoral student Raymond Cheong, and doctoral student Susan Edmonds Thompson, all from the Johns Hopkins School of Medicine Department of Biomedical Engineering; assistant director Michael Delannoy from the Johns Hopkins School of Medicine Microscope Facility Center; and Pilnam Kim and Kahp-Yang Suh from Seoul National University.

Both Tung and Levchenko are affiliated faculty members of Johns Hopkins Institute for NanoBioTechnology. Thompson is a member of INBT's Integrative Graduate Education and Research Traineeship in nanobiotechnology. Funding for this research was provided by the National Institutes of Health and the American Heart Association.

Story Source:

Adapted from materials provided by [Johns Hopkins University](#). Original article written by Mary Spiro.

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<http://www.sciencedaily.com/releases/2009/12/091215153632.htm>

Lung Cancer and Melanoma Laid Bare

The catalogue of somatic mutations in a small-cell lung cancer genome (top) and the COLO-829 (malignant melanoma) genome (bottom). From outside to inside: insertions or deletions (green); coding substitutions as numbers per 10 million (orange charts); coding substitutions (grey, purple, red and black marks); copy number (blue); deletions (red); rearrangements (green or purple) (Credit: Image courtesy of Wellcome Trust Sanger Institute)

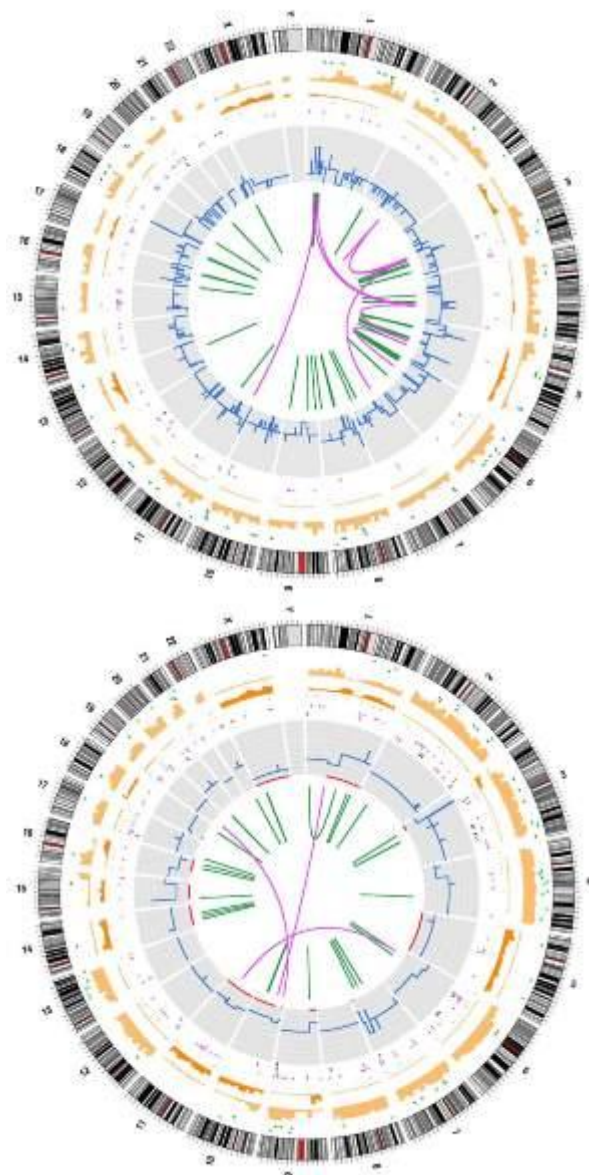
ScienceDaily (Dec. 17, 2009) — Research teams led by the Wellcome Trust Sanger Institute have generated the first comprehensive analysis of a malignant melanoma and a lung cancer genome. The results, which reveal essentially all the mutations in the genomes, will provide powerful insights into the biology of cancer and lay the foundation for understanding causation and improving prevention, detection and treatment. The ultimate aim will be to generate catalogs for thousands of individual cancer genomes, so that treatments can be directed in the most efficient and cost-effective way.

All cancers are caused by mutations in the DNA of cancer cells which are acquired during a person's lifetime. The studies, of a malignant melanoma and a lung cancer, reveal for the first time essentially all the mutations in the genomes of two cancers.

Lung cancer causes around one million deaths worldwide each year: almost all are associated with smoking. The number of mutations found suggest that a typical smoker would acquire one mutation for every 15 cigarettes smoked.

Although malignant melanoma comprises only 3% of skin cancer cases, it is the cause of three out of four skin cancer deaths. The melanoma genome contained more than 30,000 mutations that carried a record of how and when they occurred during the patient's life.

"These are the two main cancers in the developed world for which we know the primary exposure," explains Professor Mike Stratton, from the Cancer Genome Project at the Wellcome Trust Sanger Institute. "For lung cancer, it is cigarette smoke and for malignant melanoma it is exposure to sunlight. With these genome sequences, we have been able to explore deep into the past of each tumour, uncovering with remarkable clarity the imprints of these environmental mutagens on DNA, which occurred years before the tumour became apparent.



"We can also see the desperate attempts of our genome to defend itself against the damage wreaked by the chemicals in cigarette smoke or the damage from ultraviolet radiation. Our cells fight back furiously to repair the damage, but frequently lose that fight."

The studies used powerful new DNA sequencing technologies to decode completely the genome of both tumour tissue and normal tissue from a lung cancer and a malignant melanoma patient. By comparing the genome sequence from the cancer to the genome from healthy tissue they could pick up the changes specific to the cancer. The studies are the first to produce comprehensive genome-wide descriptions of all classes of mutation, producing rich accounts of the genetic changes in the development of the two cancers.

"In the melanoma sample, we can see sunlight's signature writ large in the genome," says Dr Andy Futreal, from the Wellcome Trust Sanger Institute. "However, with both samples, because we have produced essentially complete catalogues, we can see other, more mysterious processes acting on the DNA. Indeed, somewhere amongst the mutations we have found lurk those that drive the cells to become cancerous. Tracking them down will be our major challenge for the next few years."

The lung cancer genome contained more than 23,000 mutations, the melanoma more than 33,000. Identifying the causative mutations among the large number found poses a challenge, but the complete genome sequences mean, that for the first time, that challenge can be met.

"Nearly ten years on, we are still reaping the benefit from the first human genome sequence and we have much still to do to get to grips with these new disrupted landscapes of cancer genomes," explains Dr Peter Campbell from the Wellcome Trust Sanger Institute. "But the knowledge we extract over the next few years will have major implications for treatment. By identifying all the cancer genes we will be able to develop new drugs that target the specific mutated genes and work out which patients will benefit from these novel treatments."

A complete genome catalogue for each patient would be expected to help select between treatments and to direct treatment in the most efficient and cost-effective way. The Sanger Institute is already working with researchers at Massachusetts General Hospital on a large scale project to tie genetic changes in cancers to their responses to anticancer treatments.

"We want to drive healthcare through better understanding of the biology of disease," says Sir Mark Walport, Director of the Wellcome Trust. "Previous outcomes from our Cancer Genome Project are already being fed into clinical trials, and these remarkable new studies further emphasise the extraordinary scientific insights and benefits for patients that accrue from studying the genome of cancer cells."

"This is the first glimpse of the future of cancer medicine, not only in the laboratory, but eventually in the clinic. The findings from today will feed into knowledge, methods and practice in patient care."

The human genome is large. Moreover, there are more than one hundred different types of cancer and sequencing genomes is expensive. To ensure that thousands of cancers ultimately are sequenced in the same way as these two, the International Cancer Genome Consortium has been established, on the model of the Human Genome project itself to coordinate cancer genome sequencing across the globe.

These catalogues of mutations across the broad diversity of cancer types will provide powerful insights into the biology of cancer and will be the foundation for understanding cancer causation and improving prevention, detection and treatment.

One mutation a day: Ravages in a lung cancer genome

Research published in *Nature* shows that the genome of a lung cancer patient has more than 20,000 mutations: this total implies that a typical smoker would acquire one mutation for every 15 cigarettes smoked. The cancer genome is ravaged by mutations, many of which are repaired as the genome tries to defend itself.

In many cases, that battle is lost and some of the many thousands of mutations hit key genes and lead to cancer.

In the study, the researchers compared the genomes in normal blood cells and tumour cells from a patient with small cell lung cancer (SCLC). They sequenced the genome a total of 60 times over to develop a comprehensive catalogue of all known types of DNA mutation.

"For the first time, we have a comprehensive map of all mutations in a cancer cell," said Dr Peter Campbell, senior author on the work, from the Cancer Genome Project at the Wellcome Trust Sanger Institute. "The profile of mutations we observed is exactly that expected from tobacco, suggesting that the majority of the 23,000 we found are caused by the cocktail of chemicals found in cigarettes. On the basis of average estimates, we can say that one mutation is fixed in the genome for every 15 cigarettes smoked." "The mutations range from single-letter changes in the code to deletions or rearrangements of hundreds of thousand of letters. Most are 'passenger' mutations, previously defined by the team as mutations that do not influence the development of the cancer, but are a consequence of the highly mutagenic environment in many cancer cells.

"Cancers occur when control of cell behaviour is lost -- cells grow how, when and where they shouldn't," explains Dr Andy Futreal from the Wellcome Trust Sanger Institute. "Mutations in DNA caused by, for example, cigarette smoke are passed on to every subsequent generation of daughter cells, a permanent record of the damage done. Like an archaeologist, we can begin to reconstruct the history of the cancer clone -- revealing a record of past exposure and accumulated damage in the genome." "The study was so comprehensive that the team could see signatures of an undiscovered system of DNA repair, reducing the mutations in highly active genes, suggesting the genome seeks to preserve these regions above many others. However, as previous studies suggested, there was not one mutation that stood out as 'the lung cancer gene'. One gene -- CHD7 -- was found to be mutated in several SCLC samples. This gene is part of an emerging pattern that cancers often contain mutations in genes that are generalists in regulating genetic activity alongside more specific changes.

This work and the companion study on malignant melanoma using massively parallel sequencing portend an era in which the forces of mutagens shaping our genome can be described and the consequences of these processes can be decoded. It is clear that rates of lung cancer fall to around normal some 15 years after quitting smoking: the suspicion is that lung cells containing mutations are replaced by new cells derived from lung stem cells that are clear of mutation. "This is a difficult disease to diagnose and treat," continues Professor Stratton, "but fortunately we do know how people can minimize their risk of lung cancer. Even current smokers substantially reduce their risk by giving up now -- the more time passes off tobacco, the more the risk decreases."

Signatures of sunlight: Malignant melanoma genome contains 33,000 mutations

In a landmark study, researchers have described the first comprehensive catalogue of somatic mutations in a cancer genome. The breadth and clarity of the view of the genome from a patient with malignant melanoma is matched only by a companion study on lung cancer, published in the same issue of *Nature*.

The melanoma genome contains more than 33,000 mutations, many of which bear the imprint of the most common cause of melanoma -- exposure to ultraviolet (UV) light. But the comprehensive catalogue of mutation reveals other more unusual mutations and many not related to exposure to UV light.

Malignant melanoma is responsible for three out of four skin cancer deaths: most forms of skin cancer are relatively treatable, especially if detected early. "This is an unprecedented view of a cancer genome," says Professor Michael Stratton, from the Cancer Genome Project at the Wellcome Trust Sanger Institute. "Written within this code is the history of this cancer -- its mutations from UV light and the mutations it acquired when it spread within the patient. We have revealed the archaeology of exposure in this cancer genome, which becomes a palimpsest of successive mutations."

"It is amazing what you can see in these genomes," comments Dr Peter Campbell from the Wellcome Trust Sanger Institute. "UV-light-induced mutations leave a typical signature, forming the vast majority of the mutations." "Indeed because of the clarity of the genome data, we can distinguish some of the early, UV-induced mutations from the later mutations that do not have this signature, presumably occurring after the cancer cells spread from the skin to deeper tissues. The sequence also shows the genome's attempts to protect itself from damage, with DNA repair systems most active in gene regions, whereas the regions between genes are left less well guarded. Even with these actions, 182 changes in genes that would impair their function were charted.

"Within the lists of disrupted genes are all those that have driven the original cell to this malignant state," comments Dr Andy Futreal, from the Cancer Genome Project at the Wellcome Trust Sanger Institute. "We know that this cancer sample has a mutation in BRAF and other genes already implicated in melanoma. To discern all the important changes, we will need to analyse more samples."

The genomes -- cancer cell and normal cell -- were sequenced more than 70 times over to produce accurate data. The project was led by researchers from the Wellcome Trust Sanger Institute. In 2002, this group discovered that a mutation in one gene called BRAF was important in driving development of melanoma. That discovery has already driven the development of novel therapies that are in clinical trials.

Cancer is a leading cause of death worldwide. The disease accounted for 7.4 million deaths (or around 13% of all deaths worldwide) in 2004. The main types of cancer leading to overall cancer mortality each year are:

- lung (1.3 million deaths/year)
- stomach (803,000 deaths)
- colorectal (639,000 deaths)
- liver (610,000 deaths)
- breast (519,000 deaths).

This work was supported by the Wellcome Trust. Support for individual researchers was from the Kay Kendall Leukaemia Fund, Human Frontiers Science Program and the National Cancer Institute.

Story Source:

Adapted from materials provided by [Wellcome Trust Sanger Institute](#).

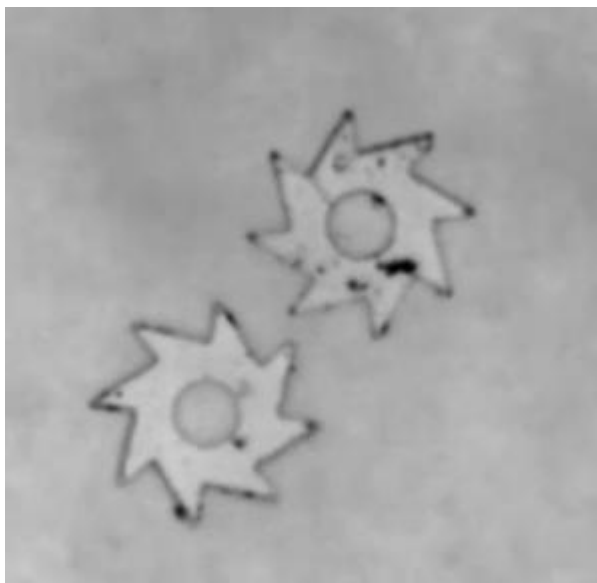
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Bacteria Used to Power Simple Machines: Organisms Turn Microgears in Suspended Solution by Swimming

Screenshot of video showing how the power of swimming bacteria can be harnessed to turn tiny gears, opening the possibility of building hybrid biological machines at the microscopic scale. (Credit: Courtesy of Igor Aronson)



ScienceDaily (Dec. 17, 2009) — Scientists at the U.S. Department of Energy's (DOE) Argonne National Laboratory and Northwestern University, Evanston, have discovered that common bacteria can turn microgears when suspended in a solution, providing insights for design of bio-inspired dynamically adaptive materials for energy.

"The gears are a million times more massive than the bacteria," said physicist and principal investigator Igor Aronson. "The ability to harness and control the power of bacterial motions is an important requirement for further development of hybrid biomechanical systems driven by microorganisms." The microgears with slanted spokes, produced in collaboration with Northwestern University, are placed in the solution along with common aerobic bacteria, *Bacillus subtilis*. Andrey Sokolov of Princeton University and Igor Aronson from Argonne, along with Bartosz A. Grzybowski and Mario M. Apodaca from Northwestern University, discovered that the bacteria appear to swim around the solution randomly, but occasionally the organisms will collide with the spokes of the gear and begin turning it in a definite direction.

A few hundred bacteria are working together in order to turn the gear. When multiple gears are placed in the solution with the spokes connected like in a clock, the bacteria will begin turning both gears in opposite directions and it will cause the gears to rotate in synchrony for a long time. "There exists a wide gap between man-made hard materials and living tissues; biological materials, unlike steel or plastics, are "alive." Biomaterials, such as live skin or tissue, consume energy of the nutrients to self-repair and adapt to their environment," Aronson said. "Our discovery demonstrates how microscopic swimming agents, such as bacteria or man-made nanorobots, in combination with hard materials can constitute a 'smart material' which can dynamically alter its microstructures, repair damage, or power microdevices."

The speed at which the gears turn can also be controlled through the manipulation of oxygen in the suspended liquid. The bacteria need oxygen in order to swim and by decreasing the amount of oxygen available, they will begin to slow down. If you eliminate the oxygen completely, the bacteria go into a type of "sleep" and stop completely.

Once the oxygen is reintroduced into the system, the bacteria "wake up" and begin swimming once again.

A paper on this subject is published in *Proceedings of the National Academy of Sciences*.

Story Source:

Adapted from materials provided by [DOE/Argonne National Laboratory](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/12/091216121500.htm>

Irrigation Decreases, Urbanization Increases Monsoon Rains

ScienceDaily (Dec. 17, 2009) — A Purdue University scientist has shown man-made changes to the landscape have affected Indian monsoon rains, suggesting that land-use decisions play an important role in climate change.

Monsoon rainfall has decreased over the last 50 years in rural areas where irrigation has been used to increase agriculture in northern India, said Dev Niyogi, an associate professor of agronomy and earth and atmospheric sciences. At the same time, heavily urban areas are seeing an increase in heavy rainfall.

"In the rural areas, we're seeing premonsoon greening occurring two weeks earlier than what it did 20 years back as the demand for agricultural intensification to feed India's people increases," Niyogi said. "The landscape has also moved in some places from what was once a traditionally rural setting to large urban sprawls. Both of these phenomena have affected monsoon rains."

Niyogi used more than 50 years of rainfall data -- spanning back to 1951 -- collected by 1,803 recording stations monitored by the India Meteorological Department to determine different regions' average yearly monsoon rain totals. While the mean monsoon rainfall for the entire country remained stable, Niyogi found that rainfall averages in India's northwest region decreased by 35 percent to 40 percent from the historical mean during the past 50 years.

Analysis of soil moisture showed that before monsoon rains came, the northwest region had become as much as 300 percent wetter in recent years relative to the past 30 years, which has been attributed to irrigation from groundwater to sustain intensified agricultural production. This wetter surface causes cooling that weakens the strength of low pressure necessary for monsoons to progress into northern India.

Satellite data showed that northern India is greening sooner than it had in the past. That greening is creating a barrier for monsoons, which provide much-needed rain to replenish groundwater reserves being used for irrigation.

"In this case, you need a warm, dry surface to advance the monsoon," said Niyogi, whose findings were published in the journal *Water Resources Research*. "Because of increased irrigation, you now have a wet, green area, which does not allow the monsoon to reach far enough north."

Since that rain isn't reaching the region, more irrigation is needed to sustain agriculture there.

"Unless this is checked and controlled, the problem is going to become more and more severe," Niyogi said. "With more irrigation, we will have less monsoon rain. With less monsoon rain, you will need more irrigation, and the cycle will continue."

Urban areas, on the other hand, are being pounded with rain when it comes. Niyogi said there have been storms in some urban areas that drop as much as 37 inches of rainfall in a single day.

Analysis of the areas that have received increases in heavy seasonal rainfall, based on Indian Meteorological Department and NASA satellite data, showed that those areas were experiencing fast urban growth. Areas where seasonal rainfall decreased were determined to have slow or no urban growth.

"You only see these types of heavy rainfall events in those areas with heavy urbanization," said Niyogi, whose research on the urban effect was published in the *International Journal of Climatology*. "The more urbanization spreads in those areas, the more of these heavy rain issues we'll see and the more flooding will become a problem."

Niyogi said there are two theories on why that's happening. The first says that urban landscapes create heat, which extends into the atmosphere and energizes storms. The second theory is that pollution created in urban settings interacts with passing clouds and increases rainfall.

Niyogi said the results of his study could have land-use implications elsewhere.

"If urbanization is affecting the Indian monsoon season, it has the ability to affect patterns here in the United States," he said. "This likely isn't localized in India."

He added that India is hotter than the United States, and that may be exacerbating the issues. As global temperatures rise, other parts of the world could see similar climate changes -- if they aren't already -- based on how land is used and developed.

Chandra Kishtawal, of the Space Applications Center of the Indian Space Research Organization and a co-author on the papers, said he hopes the findings trigger discussions on the role of large-scale land-use planning in regulating climate change in India.

"These kinds of things are not sustainable," Kishtawal said. "They cannot continue in the long run."

The next step in this research is to examine landscapes in the United States to see if development has affected weather patterns historically.

The National Science Foundation CAREER program and NASA's terrestrial hydrology program funded Niyogi's study.

Story Source:

Adapted from materials provided by [Purdue University](#).

Journal Reference:

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Can China Turn Cotton Green?

By: Chris Wood



That "all-natural" cotton T-shirt in your closet? The one with the eco-friendly message brightly printed on the front? Ounce for ounce, it could be the most environmentally toxic item of clothing you own. From the water and agrichemicals lavished on cotton grown in some of the world's driest regions (approximately one-third of the pesticide and fertilizer produced worldwide gets sprayed or dusted on cotton), through multihued rivers of waste streaming from textile mills to landfills bulging with castoff clothing, the life cycle of the humble cotton tee has left ecological wreckage in its wake.

As both the world's leading producer and biggest importer of raw cotton and its top exporter of cotton fabrics and apparel, China has experienced much of the damage. The expansion of industrial-scale cotton farming in the arid western Xinjiang province has been linked to the advance of the vast Taklamakan Desert, whose dunes have swallowed entire towns. In China's industrial heartland, untreated dye wastes stain drainage ditches in vibrant synthetic hues, contributing to pollution that renders most Chinese rivers undrinkable and a few even dangerously toxic to the touch. So when China's leaders sought advice from international researchers on how to reduce the ecological cost of their country's trade, it was natural for cotton to be put atop the list for scrutiny.

And perhaps it was no less inevitable that scrutiny would extend to America and other major cotton producers, shedding light on how divergent political and economic cultures can hinder the achievement of greener trade — even when the country at the center of that trade is focused sharply on sustainability.

China's environmental woes go far beyond its role in fashion, of course. One official conceded in 2006 that the cumulative cost of environmental damage and pollution-related health care was effectively offsetting all of the country's widely envied 10 percent annual economic growth. But few industries bind China's interests more closely to those of the United States than cotton textiles. In addition to all those Chinese-made T-shirts and other gear stocking the shelves in the local mall (more than \$30 billion worth a year), China is the No. 1 foreign customer for American-grown cotton, buying as much as 45 percent of its exported harvest in a typical year. Beyond China's two-way trade with the U.S., cotton is one of the world's major agricultural commodities, the economic support in whole or part of one-sixth of humanity,



when all stages of the cotton life cycle are included. It's also a central catalyst in a wide array of environmental issues, from falling aquifers in irrigated growing regions to nutrient overloads that nourish fish-killing algae blooms in lakes and oceans.

With the scale of pollution's drag on the Chinese economy becoming evident earlier in the decade, [China's State Council](#) (its rough equivalent of the federal cabinet) directed its research arm, the [Development Research Center](#), to seek advice on bringing the trade vital to China's prosperity into balance with its ecological resources. The DRC in turn commissioned a low-profile Canadian research center to oversee an international network of experts, funded in part by Switzerland, in a review of three trade streams with the worst environmental records. Sharing the short-and-dirty list with cotton were wood products and electronics.

"They asked us to help envision a sustainable trade strategy," explains [Mark Halle](#), the Swiss-raised American who directed the project from Geneva, with colleagues at the [International Institute for Sustainable Development](#) in Winnipeg, Canada. The scope of the study was to include the three industries' full-spectrum impact, from product cradle to grave. And the DRC made it clear that China's leaders were looking for pragmatic solutions, not idealized visions. In particular, whatever strategies emerged from the research had to be compatible with China's [World Trade Organization](#) and other trade commitments.

The unusual request represented "a unique opportunity" for the IISD team to inject research results directly into policymaking at the pinnacle of China's power structure, says [Jason Potts](#), a Montreal-based staff member who oversaw the nuts-and-bolts development of methodology. Under Potts' direction, the three research teams, involving academics and members of national academies of science from France, Britain, Germany, China, Canada and Switzerland, brought three general questions to each trade sector under study: What were its main environmental impacts? What was most influential in the industry's supply chain, market structure or participant population, in driving those impacts? What effective steps could China's national government take toward a lighter environmental impact?

The objective, as Potts saw it: "sensible policy recommendations that work with the market."

The team led by [Pan Jiahua](#), director of the Research Centre for Sustainable Development and Environment at the [Chinese Academy of Social Sciences](#) in Beijing, had no trouble identifying the environmental stains on cotton's production record. In several regions that China relies on to meet its enormous demand for raw cotton, irrigation diverts more water than is sustainably available, straining resources and damaging ecosystems from Central Asia to the American Southwest. By contrast, the researchers found that the use of agrichemicals differed widely among major supply regions, with China's own farmers dosing their fields with six times more fertilizer and pesticide than growers in sub-Saharan Africa. American farmers and others in Brazil fell somewhere in the middle.

Textile printing and dyeing did most of its damage on Chinese soil — more accurately, on Chinese watercourses. As China's textile industry blossomed in the wake of the country's entry into the WTO, doubling output in the decade after 1999, so has its production of hard-to-treat wastewater. Only about 10 percent of dye wastes are recycled, and about a third of the rest flows directly to the environment. In provinces like Xinjiang, this waste is a major contributor to industrial and municipal pollution so severe that nearly 1 in 4 of China's 1.3 billion people drink contaminated water every day.

In analyzing where along cotton's journey lay the power to influence change, Pan's team cited earlier research that identified the global cotton-textile value chain as "buyer-driven" — dominated by a relatively small number of increasingly global participants. In the key U.S. market, they noted, just two large discount chains — Wal-Mart and Kmart — account for one-quarter of all the clothing sold.

By contrast, the capacity of China's national government to influence the behavior of millions of mainly small cotton farmers and tens of thousands of textile enterprises in its own territory was limited. National



leaders have articulated numerous laudable environmental policies and guidelines, but the local agencies charged with implementing those policies are staffed and managed by local governments whose incentives are dominated by economic development. Dai Yichun, coordinator of the China Council for International Cooperation on Environment and Development, is an adviser to China's national leadership on the environment. Though not involved in the current project, she understands the localism problem, which she describes this way: "[Chinese Premier] Wen Jiabao is very aware of the importance of environmental protection, and he has his ideas. The trouble is, how far can the ideas carry? There is a disconnect between what the national government wants and what the local governments will do."

Even so, Pan's cotton research team identified several actions China's leaders could take to oblige an industry that has flourished by ignoring the environmental cost of its operations to account for those charges. "[I]f the true environmental costs can be included in the price of products and services," the researchers argued, "the pricing system can give market signals that ensure the efficient allocation of environmental resource use." It identified several tax and incentive measures that could help do the trick, including fees for wastewater discharge, a tax on cotton clothing to fund recycling and the redirection of existing tax incentives to motivate adoption of wastewater recycling.

With world demand for cotton goods rising and China's arable land under pressure from other demands, notably food production and urban expansion, the researchers concluded that the country should increasingly look abroad for sustainable sources of fiber. Countering the view that global trade is necessarily harsh on the environment, the researchers contended: "A market shift from irrigated, chemical input-intensive growing areas such as the U.S. and China toward rain-fed and less intensive areas in sub-Saharan Africa and parts of Brazil and India would bring significant net environmental gains."

With more than a third of the world's cotton crossing international borders at least once on its way to market, the researchers also concluded that China would benefit from invoking a "Green Trade Policy ... to encourage cotton production and sourcing from sustainable supply chains." In language echoing proposals heard recently on Capitol Hill for so-called "green" tariffs to be levied against carbon-intensive goods from other countries, Pan's team called for China to consider "a cotton textile environmental tariff."

Should America's cotton growers, who use two to four times as many agrichemicals on their irrigated cotton fields as African farmers do on rain-fed crops, worry about the possibility that China's trade policy will turn green? Not necessarily.

The international researchers concluded that a significant impediment to greater sustainability for China's cotton trade lies in a striking difference between cotton production in the nominally communist state and its production in supposedly capitalist America. While U.S. production is dominated by heavily mechanized, industrial-scale farms, and China's cotton is overwhelmingly grown on much smaller parcels tended by hand, it's the large American cotton farms that are arguably the more socialized. China's millions of small cotton farmers are highly exposed to the vagaries of the market; the United States subsidizes its growers by amounts that in some years exceed the harvested value of their crops. Such subsidies in the U.S. and countries in Europe and elsewhere (including China itself) depress the price of globally traded cotton, leaving small producers with little profit to invest in better growing techniques. In the long run, Pan's team argued that lower subsidies for cotton growers would contribute to "improved sustainability at the global level, mainly because the most trade-distortive countries are also countries where the pressure on the environment is the highest."

Still, the project's Western collaborators think America's cotton farmers have little to fear from any Chinese green trade policy — for a very bottom-line reason. As Potts observed: "In cases where one country is subsidizing massively, it usually means massive consumer welfare gains to the importing country" — in this instance, China. Put another way, American taxpayers' willingness to pick up much of the cost of its water- and chemical-intensive cotton crop makes the price of U.S. cotton all but irresistibly low to Chinese buyers, whatever the cost to America's ecosystems.

But if one market force (or distortion, depending on your point of view) may frustrate achieving a cleaner cotton, another holds promise. Given the rising power of branding in both domestic and foreign markets, Pan's team urged concerted policy efforts to stoke consumer demand for a "greener" white cotton tee. Before resorting to "green tariffs," it suggested that China throw its trade and diplomatic weight behind existing, multiparty, industry-backed ventures such as the Better Cotton Initiative (sponsored by jeans-maker Levi Strauss, among others), which is meant to raise the standard of environmental accountability from end to end of the cotton supply chain.

Teams working on the sustainability of China's lumber and electronics trades reached broadly similar conclusions, with some differences. Both also urged efforts to build market demand — and credible standards — for sustainably produced goods through China's participation in international, industry-backed initiatives. Achieving sustainability in lumber and wood products will require China to work closely with supplier nations to improve harvesting practices, that team found. Opportunity to clean up the life cycle of electronic goods lies closer to home, in formalizing environmental standards for the hitherto unregulated and often family-scale business of dismantling and recycling old computers and other electronics. (Find a summary of the three studies' recommendations [here](#)).

The researchers are currently completing similar studies of two additional trade sectors with troubled environmental records: fish products and copper. When those are done, DRC Deputy Director [Long Guoqiang](#) said, their "conclusions and policy recommendations will be reported to policymakers." Until then, he declined to evaluate the team's proposals. But Long, an occasional speech writer to Premier Wen, described sustainability as a rising priority for China's leaders. "Sustainable trade means economic, social and environmental sustainabilities," he told *Miller-McCune*. "In the past, China [judged] the former two more important than the latter one. In recent years the environmental target has become more and more important. We think the three targets are equally important to China at this stage."

China's growing population, as well as its taste for the same wardrobe gear the rest of the developed and developing world desires, will make sustainability an elusive target for cotton. What China may have going for it, suggests project leader Halle, who worked previously for the [World Wildlife Fund](#) and [International Union of Concerned Scientists](#), is its one-party government and authoritarian habits, which can support decisive action: "Once they figure out they have a problem, they move quickly and massively." If the policy response looks familiar, he says, "that's when you can say you've had an impact."

http://www.miller-mccune.com/science_environment/can-china-turn-cotton-green-1638?utm_source=Newsletter88&utm_medium=email&utm_content=1222&utm_campaign=newsletters

The Dirt on Climate Change

By: Peter Friederici



Conflicts tend to scatter people, and ideas, in unexpected ways. After the American Civil War, a flood of so-called Confederados fled the devastated South and set up farms in the Brazilian Amazon. They planted rice and sugar cane and tobacco, and they prospered. But the lands they settled — primarily high bluffs along rivers — weren't any more pristine than Alabama or the Carolinas had been. As they plowed, the settlers unearthed vast quantities of potsherds that showed the land had been inhabited before. And the ceramics weren't the only sign of previous human cultivation: The deep black earth itself, very different from the pale, nutrient-poor soils of much of the Amazon, quickly revealed that people had been indispensable in creating its fertility.

"The rich *terra preta*, 'black land,'" of one settlement was "the best on the Amazon. ... a fine, dark loam, a foot, and often two feet thick," wrote an American naturalist named Herbert Smith in 1879. "Strewn over it everywhere we find fragments of Indian pottery. ... The bluff-land owes its richness to the refuse of a thousand kitchens for maybe a thousand years."

Though they have always been prized by farmers, the dark soils of the Amazon were largely forgotten by science for a century after their discovery. They are now re-emerging as an important topic of study, not because they're an ethnographic or historical curiosity, but because they show an exceptional ability to store carbon, which in the form of carbon dioxide has rapidly turned into one of humanity's most pernicious waste products. As a result, they're joining the rapidly growing roster of tactics that might be used to combat climate change. Researchers around the world are considering whether people may, by engineering soils specifically to maximize carbon storage, be able to absorb substantial amounts of our emissions, increase the fertility of agricultural areas and dampen some of the effects of climate change.

Sound utopian? Maybe. But as the long aftermath of the Civil War shows, solutions to deeply ingrained social problems often do emerge — though not always quickly and certainly not without enormous and sustained effort.

"We could gear up for this with something like the Manhattan Project," says [William Woods](#), a University of Kansas geographer and expert on *terra preta*. "Imagine all the organic stuff that comes into a city — and then imagine putting all that carbon into the soil. It works, though we aren't there yet. So far no one seems to have the will to do it."

Carbon is the essential building block of all life, the bustling captain of industry, the stuff at the core of diamonds. Carbon has long starred quietly in virtually everything that goes on in human lives, but now its blandly essential air has been eclipsed by a new role: that of villain in the long-running drama of climate change. As the key component of carbon dioxide, element 12 has now firmly moved in the public mindset from good guy to a problem that threatens the future of the very lives it has made possible.

[Carbon dioxide](#) isn't the only greenhouse gas out there — [methane](#), the [nitrogen trifluoride](#) used in the manufacture of flat-panel televisions, and others contribute to global climate change, too — but it is the most widespread and the one most directly associated with the industrial revolution. Combustion begets CO₂, simply, and as that extra gas accumulates in the atmosphere, it causes the Earth to retain more heat. The litany of effects that result from that warming is becoming increasingly well known: rising oceans, more severe heat waves, irregular precipitation, greater threat of drought. So is the precise concentration of carbon dioxide in the atmosphere, which has been rising steadily since humans started burning a lot of coal in the 19th century — and which is currently rising at a rate faster than anticipated by most of the predictions made by the [Intergovernmental Panel on Climate Change](#).

Carbon helps form the organic molecules that comprise pansies and panthers, redwood trees and blue whales. When these organisms die, the carbon in them eventually returns to the environment, often by oxidation as carbon dioxide. How much carbon a given ecosystem stores, then, is a matter of dynamic flux that can be measured on a variety of different time scales. Some ecosystems can store carbon effectively enough that scientists refer to them as "carbon sinks" — that is, they hang onto carbon for decades or centuries, long enough that they contribute to lowering atmospheric concentrations of CO₂ and perhaps reduce the impacts of climate change. Grow a forest, and it accumulates carbon slowly, perhaps for centuries. Burn it down in a severe fire, and most of its carbon goes up in smoke. Cut it down for lumber and the carbon in that wood may lie undisturbed for centuries, while that in the leaves, unharvested branches and disturbed soil is quickly released into the atmosphere. Other ecosystems follow the same pattern but so much more quickly that no one refers to them as carbon sinks: In June, an Iowa cornfield rapidly sequesters carbon as the crop plants grow; in November, it releases the element as the chopped stalks degrade.

But it's not just plants and animals that hold carbon. Soils do, too, a lot of it — an estimated 2.5 trillion tons worldwide, or more than three times the amount floating around in the atmosphere and about four times as much as in all the world's living plants. About 60 percent of the soil's carbon is in the form of the organic molecules that compose living things, while the other 40 percent is in inorganic forms such as [calcium carbonate](#), the crusty salt common in desert soils. Unfortunately, people have not been very kind to the soil's pool of organic carbon, at least not since the dawn of agriculture. According to the IPCC, human beings were responsible for the emission of about 270 billion tons of carbon from the burning of fossil fuels between 1850 and 1998. During the same period, they caused the loss of about half that much carbon from terrestrial ecosystems through such activities as logging and plowing; all told, disturbances to soils during that century and a half caused the emission of about 78 billion tons of carbon. In other words, though the burning of fossil fuels is the main culprit in climate change, our land uses have played an important supporting role.

"If you convert from prairie or forest to agriculture, the soil's organic carbon decreases very rapidly," says [Rattan Lal](#), the director of the [Carbon Management and Sequestration Center](#) at Ohio State University. "It can decrease by as much as 30 to 50 percent in a relatively short time. Most soils in Ohio have lost between 10 and 40 tons per acre of carbon because of blowing, drainage, erosion, removal of crops for feeding cattle, removal for biofuels and other factors. The carbon storage capacity of these soils is like a cup that's now only half full."

To soil scientists such as Lal, humanity's recent history with dirt constitutes a triple whammy. All the carbon that's been removed from soils has helped to push up carbon concentrations elsewhere in the biosphere, whether in water, where it contributes to the acidification of the oceans, or in the air, where it contributes to the baleful effects of climate change. As soils have lost carbon, they also have lost a good deal of their productivity. They store less water, harbor fewer microorganisms, are less able to transfer nutrients to plant roots, require more fertilizer. In their impoverished form, they're also less able to store carbon than they once were. They've gone from sink, in many cases, to source.

That's a big problem, Lal says, but he is one to see soil's cup as half full, rather than as half empty: Saving the planet's soils, he says, may also mitigate at least some of the impacts of climate change. And it's vital, too, for the most visceral of reasons.

"We have 6.7 billion people now," he says. "We'll have 10 billion in a few more decades. How are we going to feed them if we don't take care of our soils?"

Plants have countless benefits, but to climatologists they're basically pumps that channel carbon from the atmosphere as they photosynthesize. They use much of it in constructing their own lasting tissues, but they also transmit a lot of it as they absorb nutrients from soil. According to David Manning, a soil scientist at the University of Newcastle, plants move about as much carbon underground as they do into wood and leaves.

"When we normally think about fixing carbon by plants, we think about forests," he says. "But when you see the carbon stored in a forest, you have to think that there's as much underground as there is aboveground. It comes out through the roots as a complex cocktail of compounds, such as citric acid, that break down the nutrients in the soil."

This function of plants happens to connect the organic and inorganic roles of carbon. Most of the carbon in soils is in organic material — it's the rich brown stuff that makes a vegetable garden thrive. But many soils also contain a lot of carbon in highly stable, inorganic forms such as calcium carbonate. That's well known to farmers and ranchers in the western United States and other arid regions, where a hard white crust known as caliche often forms on or within soil. These carbonates form readily where insufficient rain falls to wash them away, but Manning has found that they also form, often at greater depths, even in climates as wet as Britain's. All that's needed is a source of calcium, and the right plants to emit carbon through their roots.

As it happens, people have inadvertently been putting calcium into British soils for hundreds of years. When buildings are demolished and their bricks, mortar or concrete debris discarded, calcium is freed up. Manning's research team has found that urban sites in that country can sequester as much as 10 tons of carbon per acre each year, not by the creation of organic material but rather by the formation of long-lasting carbonates.

"It's fascinating," he says. "We bring up old house bricks, and they're covered with lumps of calcium carbonate. Typically we find that the urban soils we look at contain up to about 20 percent calcium carbonate."

Though this process takes place on its own, Manning thinks that careful planning could help speed it up. For example, choosing the right sorts of plants for urban landscaping could maximize the production of carbonates. He notes, though, that this sort of carbon sequestration in urban soils is a zero-sum game. The manufacture of cement produces huge amounts of carbon dioxide, and waste construction or demolition debris in soil can never bind to more carbon than has been produced in its manufacture.

"The scale of production of cement is so great that you could never do more than compensate for the production process," he says. "But this can help close the loop. It may help get rid of the word 'waste,'

which is a horrible word. And if carbon trading really takes off, then to be able to demonstrate that the carbon on your site has ended up as carbonate might have a value."

In theory, people may be able to remove large amounts of carbon from the atmosphere by taking advantage of the caliche formation that goes on naturally in the world's vast arid areas. Calcium is readily available in natural form in seawater, so why not simply put a lot of it on desert soils to form lots of carbonate and remove CO₂ from the atmosphere?

"We could probably sequester vast amounts of carbon by adding calcium to desert soils," notes Curtis Monger, a soil scientist at New Mexico State University who studies carbonate formation. "But at what point do we become concerned about turning our desert soils to stone? Whenever we talk about global-scale geoengineering, we don't mean to, but we tend to mess things up."

It's difficult to discuss the modification of desert soils as a carbon-sequestration strategy in much detail because these soils are little understood at this point. Several teams of desert researchers, including Monger's, have been surprised in recent years to find that tracts of arid land seem capable of absorbing far more carbon dioxide than can be explained according to standard models of how these ecosystems work. He remembers one experiment in which his team was measuring CO₂ being emitted from soil, only to find that the gas was suddenly sucked back down into the earth.

"We wondered whether our instruments were screwy," Monger says. He thinks that light precipitation may have caused a sudden surge in carbonate formation, removing the gas. But he notes that the study of desert soils, especially of their link to the global carbon cycle, is in its infancy.

"It's the quiet before the storm," he says. "The IPCC still hasn't recognized desert soils and calcium carbonate as a big player. But it will."

If the soils of desert areas are a wild card in the high-stakes game of climate change, biochar is increasingly coming to look like a royal flush — a reliable winner. The idea behind it is very simple: To get rid of unwanted carbon, put it directly into the soil. Farmers do this all the time, of course, when they till the harvested parts of crop plants back into a field — but under typical agricultural conditions some 90 percent of the carbon in these residues quickly winds up back in the atmosphere. The idea behind biochar, instead, is to convert that carbon before plowing it under by first turning it into durable charcoal.

That's exactly what the native peoples of the Amazon were doing for many centuries before Spanish and Portuguese explorers arrived. According to geographer Woods, the large-scale use of biochar in South America probably arose some two-and-a-half millennia ago, at about the time that corn was becoming a widespread food crop. This ready source of food led to increased human populations, centralized villages and pressure to increase yields. It could not have taken long before farmers observed where the lastingly fertile soils were: namely, in the places where charcoal and organic wastes were discarded.

"They're seeing that this stuff is fertile; they're putting their gardens there; and it's not a big step from there to creating it deliberately," Woods says. "The carbon in the form of charcoal is an integral part of these soils, and it happens to take a great deal of carbon out of the atmosphere."

Those farmers didn't need to worry about climate change, but they were taking advantage of a fundamental property of carbon in the form of charcoal: It has a complicated structure, and it lasts a long time. That's why charcoal does such a good job as a filter. Its complex structure provides many places where other molecules can linger, whether they're impurities in whiskey or nutrients that plants need. As a result, soil fertility can increase a great deal when charcoal is combined with organic materials that provide nutrients. Those terra preta soils in the Amazon don't just contain much more organic material than other soils; they also hold onto potassium, phosphorus and numerous trace minerals much more readily and provide much better microhabitats for such important organisms as bacteria and fungi. And

because charcoal takes so long to break down, *terra preta* soils retain their fertility much longer than those of other tropical areas.

Robert Brown began thinking about biochar as a side effect of working on gasification, which is a means of converting organic materials into energy with great efficiency by first turning them into a gas, then burning them. Brown, an engineer at Iowa State University, was struck by how difficult it is to burn the last small bits of charcoal even in the hottest and cleanest of fires. Fine, he thought — the charcoal, after all, is a carbon sink, and because it's itself a filter, it is not a pollutant.

"My notion was we had to put it in old coal mines to get rid of it," he says. "But in fact it's so recalcitrant that you can just bury it in soil to get rid of it."

Brown and colleagues are currently working on a small pilot plant that will convert unneeded organic material from Iowa cornfields into ethanol and charcoal. The idea is that farmers wouldn't harvest only ripe ears of corn come fall; they'd also harvest about half of the remaining plant fiber — which farmers call stover. Then they'd drive the stover to a nearby plant, where gasification and a reaction with a catalyst would turn the biomass into ethanol and some fine particles of leftover charcoal — about 300 pounds of it for every ton of stover. The latter could then be applied to fields, where it would both enhance soil fertility and act as a carbon sink. The corn stalk-based ethanol, meanwhile, wouldn't compete with food production in the way that ethanol produced from corn kernels does.

If charcoal would increase the health of Iowa's soils, Brown says, think of how much more it would help generally nutrient-poor tropical soils: "I think this could be a revolution for agriculture. It could dramatically increase the efficiency especially of tropical agriculture. If you were to establish a farm and sequester carbon there, you'd not only produce crops but improve the soil, too. So you wouldn't have to burn down another tract of forest a few years down the road."

Still, there a lot of kinks to be worked out before what manifestly works in the lab can be put into action in an Iowa cornfield, or in the Brazilian jungle. A number of researchers and entrepreneurs are trying to resolve some of those issues, by designing and testing the gasification burners that would be required, or calculating what other nutrients would need to be applied along with biochar to maximize soil productivity. But it's likely that some of the thorniest issues will play out on the ground. Some observers worry that biochar will become such a promising means of combating climate change that its production will trump other values; they envision nightmare scenarios in which huge tracts of forest are axed only for the value of the charcoal they can produce. As Monger points out, large-scale geoeengineering always seems to bring out a new set of problems.

"You have to think about it from a sustainability perspective," says Johannes Lehmann, a leading biochar expert at Cornell University. "It makes no sense to use pristine rainforest for biochar production, or to produce biochar in Iowa and ship it to West Africa. Biochar should not be seen as an alternative to best management practices, but in addition to them."

If biochar is beginning to seem like a sort of silver bullet that would allow us to shoot our way out of our climate quandary, then it's time to take a deep breath. It's not. Though many questions about it remain to be answered, its use may indeed prove a relatively inexpensive way to improve soil fertility, to find a productive use for many products — especially agricultural leftovers — that are currently considered waste and to sequester some carbon. But the harsh reality of the carbon cycle, and of climate change, is that there is no single solution that can get humanity out of its self-inflicted crisis.

A number of scientists have tried to estimate how much carbon people may be able to pump out of the atmosphere through the application of biochar. In a recent paper, James Hansen, the NASA scientist who has been a prominent voice on climate change for many years, and colleagues estimated that large-scale adoption of biochar sequestration could reduce atmospheric CO₂ by about 8 parts per million by 2050. Ohio State's Rattan Lal claims that widespread use of biochar, in conjunction with other wise agricultural

stewardship such as erosion control and no-till farming, could sequester some 1.25 trillion tons of carbon a year. By itself, that could cause atmospheric CO₂ levels to drop about 50 ppm over the next century.

That's a lot, but still far from enough, given that the current level of CO₂ is 387 ppm — up from about 315 in the late 1950s — and rising at the rate of about 2 ppm per year. Climatologists point out that the global carbon cycle appears to be experiencing some feedback loops through which warming begets more warming. As ice in the Arctic and on mountain glaciers melts, the newly exposed water or land surface is darker and absorbs more energy from the sun. As Arctic tundra warms, frozen peat decomposes, releasing both carbon and methane — itself a potent greenhouse gas. As once-lush forests dry out, they're more subject to large-scale fires that release enormous amounts of carbon dioxide. As the oceans warm, they become less able to absorb CO₂ from the atmosphere. And so on — the list is dispiriting.

Hansen and a number of his colleagues have called for a target CO₂ concentration of 350 ppm to avoid some of the worst effects of runaway climate change. As the human population and its energy demands both grow, there will be no way to get there without a widespread embrace of numerous conservation and sequestration tactics. It's politically tricky to both reduce emissions and increase carbon sequestration at the same time; embracing a solution with the potential to store lots of carbon may reduce the imperative to reduce carbon emissions in the first place. As Lehmann told the U.S. House Select Committee for Energy Independence and Global Warming in June, "Biochar must not be an alternative to making dramatic reductions in greenhouse gas emissions immediately, but it may be an important tool in our arsenal for combating dangerous climate change."

About a week after Lehmann testified, the House passed a climate bill that includes a cap-and-trade system giving polluters incentives to pay to offset their carbon emissions. Though many environmentalists criticized the bill as far too little, far too late, it at least opens the door to valuing projects that sequester carbon as an offset to emissions and dovetails nicely with the potential for finding money to pay for the widespread application of biochar.

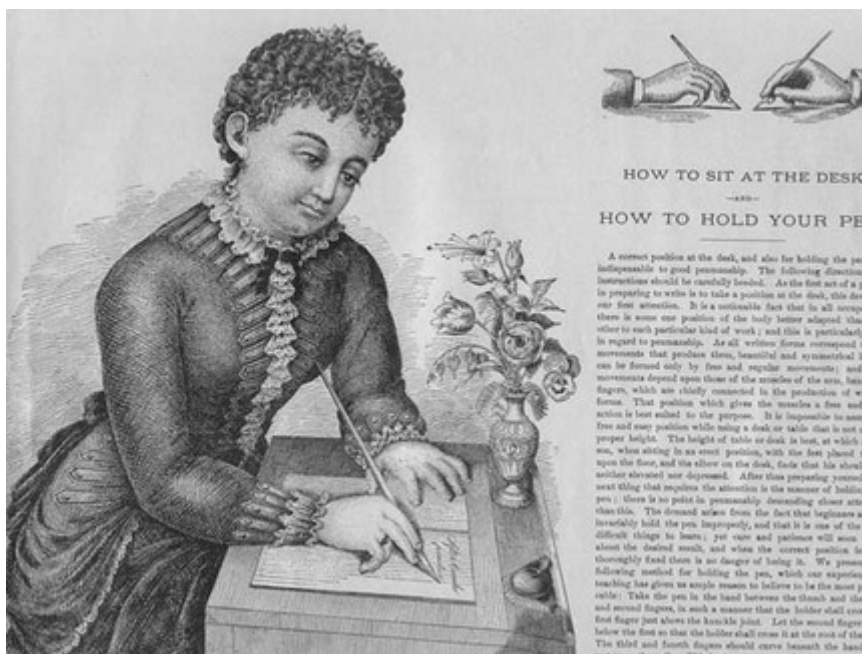
It may be, then, that future farmers — much like those of the ancient Amazon — will ultimately be judged not only on what they can extract from the soil but also on what they put in. To biochar advocates such as Rattan Lal, that's a step in the direction of good stewardship — and good economics.

"Let us pay farmers for ecosystem services," he says. "If they improve the quality of their soils, if it's good for erosion control, for biodiversity, for climate mitigation — let us pay them for those services."

http://www.miller-mccune.com/science_environment/the-dirt-on-climate-change-1651?utm_source=Newsletter88&utm_medium=email&utm_content=1222&utm_campaign=newsletters

Handwriting Is History

By: Anne Trubek



At 11 p.m. on Dec. 27, I checked my inbox out of habit. I had 581 new e-mails. All had been sent between 8 and 11 p.m. The days between Christmas and New Year's are not usually a busy time for e-mailing. What was going on?

It turns out that the home page for msn.com had linked to a short article I had published a year earlier. In the article, I argue that we should stop teaching cursive in primary schools and provide some background on the history of handwriting to back up my claims.

The comments on my piece were hostile, insulting and vehemently opposed to my argument. The onslaught continued for a few more days: Some 2,000 comments were submitted, and editors took down about 700 of the worst. If you check this article online today, you will find more than 1,300 comments. For some reason, people are very invested in handwriting.

If we define writing as a system of marks to record information (and discount petroglyphs, say), handwriting has been around for just 6,000 of humanity's some 200,000 years. Its effects have been enormous, of course: It alters the brain, changes with civilizations, cultures and factions, and plays a role in religious and political battles. Throughout the even smaller slice of time that is American history, handwriting has reflected national aspirations. The comments posted on my article about handwriting were teeming with moralism. ("I'm sorry, but when I see messy handwriting it tells me something about the person; maybe carelessness? Impatience? ... Penmanship is everything. ... Good penmanship shows the world we are civilized.") One might consider handwriting as a technology — a way to make letters — and conclude that the way of making them is of little moment. But handwriting is bound up with a host of associations and connotations that propel it beyond simply a fine-motor skill. We connect it to personal identity (handwriting signals something unique about each of us), intelligence (good handwriting reflects good thinking) and virtue (a civilized culture requires handwriting).

Most of us know, but often forget, that handwriting is not natural. We are not born to do it. There is no genetic basis for writing. Writing is not like seeing or talking, which are innate. Writing must be taught.

About 6,000 years ago, the Sumerians created the first schools, called tablet houses, to teach writing. They trained children in Sumerian cuneiform by having them copy the symbols on one half of a soft clay tablet onto the other half, using a stylus. When children did this — and when the Sumerians invented a system of representation, a way to make one thing symbolize another — their brains changed. In *Proust and the Squid: The Story and Science of the Reading Brain*, Maryanne Wolf explains the neurological developments writing wrought: "The brain became a beehive of activity. A network of processes went to work: The visual and visual association areas responded to visual patterns (or representations); frontal, temporal, and parietal areas provided information about the smallest sounds in words ...; and finally areas in the temporal and parietal lobes processed meaning, function and connections."

The Sumerians did not have an alphabet — nor did the Egyptians, who may have gotten to writing earlier. Which alphabet came first is debated; many consider it to be the Greek version, a system based upon Phoenician. Alphabets created even more neural pathways, allowing us to think in new ways (neither better nor worse than non-alphabetic systems, like Chinese, yet different nonetheless).

When we think of handwriting, we often assume a script, a regularized way to make letters, to which all writers adhere in order to aid communication. A famous early script is Roman square capital, which looks exactly as you imagine it: monumental u's in the shape of our modern v's and no spacing between words. It was written with a stylus and chiseled onto the sides of buildings.

Proclaiming the virtuousness of one way of forming a "j" over others is a trope that occurs throughout handwriting's history. For instance, early Christians jettisoned Roman scripts they deemed decadent and pagan. In their scriptoria, monks developed Uncial to replace Roman scripts. An internecine battle ensued when Irish monks developed a variation on Uncial that traditionalists deemed an upstart, quasi-heretical script.

Puritans in England and America also developed a script to distance themselves from the seeming Catholicism of the elaborate scripts popular in the 18th century. They adopted the plainer copperplate, or round hand. The Declaration of Independence is written in copperplate.

In the American colonies, a "good hand" became a sign of class and intelligence as well as moral righteousness. Benjamin Franklin was a proponent of proper handwriting, and when he founded the Academy of Philadelphia (which became the University of Pennsylvania), those seeking entrance were required to "write a legible hand." But very few Americans were eligible to enter Franklin's academy. First, to do so, you had to be male. Second, you had to have been taught to write; many women and non-wealthy men were taught to read, but not write. Only wealthy men and businessmen learned to write. Even when public schooling began, writing was not always included in the curriculum, so many colonists could read but not write. It was not until the beginning of the 19th century — a scant 200 years ago — that schooling became universal. Then, handwriting was finally taught to American schoolchildren.

For many, the prospect of handwriting dying out would signal the end of individualism and the entree to some robotic techno-future. (As one comment on my article put it, "What's next, putting programming chips in our brains?") But when we worry about losing our individuality, we are likely misremembering our schooling, which included rote, rigid lessons in handwriting. We have long been taught the "right" way to form letters. The history of American penmanship is dominated by two true believers, Platt Rogers Spencer and A.N. Palmer, whose fiercely moral and economic attachments to their scripts nicely sum up much of what we consider essential to American identity.

Spencer, "the father of American handwriting," was a fanatic who was obsessed with script even as a child. He made it big when he established a chain of business schools — the slogan was "Education For Real Life" — to teach his script, Spencerian, which he based on natural forms: leaves, trees, etc.

Spencerian was the standard script taught from the 1860s to the 1920s. This transcendentalist move toward a script that better followed the human body's movements is belied by his insistence on rigor and standardization. He advised his students to practice six to 12 hours a day. Mastering his script would, Spencer believed, make someone refined, genteel, upstanding.

Later in the 19th century, Palmer invented a script that would better suit the industrial age. The Palmer Method stresses a "plain and rapid style." He rejected the slightly fey Spencerian for a muscular, rugged script better suited to a commercial culture. By 1912, Palmer was a household word, and a million copies of his (printed) writing manuals had sold. Educators taught his method, and millions of Americans were "Palmerized."

The Palmer Method was gradually supplanted when educators decided to teach children manuscript (or printing) first, and cursive later, to get them started writing younger. Handwriting enthusiasts consider the end of the Palmer Method to be the end of good handwriting in America.

It took the printing press to create a notion of handwriting as a sign of self. For monks, whose illuminated manuscripts we now venerate as beautiful works of art (as they most certainly are), script was not self-expressive but formulaic, and rightly so. When the printing press was invented, the monks were worried about this new capricious technology, which was too liable to foibles and the idiosyncratic mark of the man helming the press. A hand-copied manuscript was for them then the authoritative, exact, regularized text. In his treatise, "In Praise of Copying," the 15th-century monk Trithemius argued that "printed books will never be the equivalent of handwritten codices, especially since printed books are often deficient in spelling and appearance."

Handwriting slowly became a form of self-expression when it ceased to be the primary mode of written communication. When a new writing technology develops, we tend to romanticize the older one. The supplanted technology is vaunted as more authentic because it is no longer ubiquitous or official. Thus for monks, print was capricious and script reliable. So too today: Conventional wisdom holds that computers are devoid of emotion and personality, and handwriting is the province of intimacy, originality and authenticity.

This transition, and the associations we make with old and new technologies, played out while millions of Americans were being Palmerized in school, and the Palmer Method is inextricably linked to a new writing technology that was starting to compete with handwriting: the typewriter.

In post-Civil War America, the Remington Arms Company needed a new product to boost sales (rifles were moving more slowly). The company unveiled the first typewriter in 1874. It was heavy and loud and looked like a big metal sewing machine, as it was set on a table with a treadle at the bottom. The machine was cumbersome, the noise it made cacophonous. Worse, you had to write blind: the keys hit the underside of the paper. It did not sell. Businesses wouldn't accept documents written on it because they were not penned. Remington sold only a few of that first model, but Mark Twain bought one. In his autobiography, he claimed to be the "first person in the world to apply the type-machine to literature" when he submitted a typed manuscript of The Adventures of Tom Sawyer to his publisher.

Twain hated blind typing, though, and he gave his Remington away to his friend William Dean Howells, the eminent Atlantic editor and novelist. Howells returned it, uninterested, six months later. But as with personal computers and cell phones, early adopters of a good technology will eventually persuade the rest of us we need it, too. In the 1890s, the typewriter gained a carriage return, and the new models allowed you to see the page while typing. By 1905, it was a curiosity *not* to own a typewriter.

That first Remington introduced the QWERTY keyboard, which separates common letter pairs to prevent bars from sticking when struck sequentially. Although others have developed more efficient, user-friendly and ergonomic keyboards, none has caught on. We seem stubbornly wed to QWERTY, as our thirst for the new new thing accompanies a stubborn grip on the familiar.

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When Kitty Burns Florey's *Script and Scribble: The Rise and Fall Of Handwriting*, a nostalgic look at handwriting's history and call to revive it in schools, came out early in 2009, the reviews tended to follow a pattern: The reviewer begins by admitting he or she never handwrites anymore, but thinks that is a shame. He or she goes on to laud Florey's book and ends by promising to do more handwriting in the future. Michael Dirda writes, "After reading *Script and Scribble*, I feel like digging out my beat-up calligraphy manuals. ... Of course, I also need to clean out the dried ink from my italic pen. But before you know it, even Ludovico Arrighi — the great Renaissance master of italic — will be envying my p's and q's." Florey wrote her own version of this genre in an article on the writing of her book. She tells how she always writes on the computer, never longhand: "My last eight books are children of Microsoft Word, and virtually everything I write, from a long book to a short e-mail, is done on the computer." While researching the book, she learned how to do italic script, and became enamored of it. She ends her piece by advising all of us to do more handwriting: "I suggest you set aside half an hour, grab a piece of paper and a pen, and, in your best script (be it Italic, Palmer, or a cleaned-up version of your usual scrawl), write a poem, start a diary, send a note to a friend, or ... compose a love letter."

I doubt whether the critics or Florey have followed up on their pledges to handwrite more. Nevertheless, people seem to think that school kids should be spending more time honing their mastery of the capital G. A 2007 U.S. Department of Education study found that 90 percent of teachers spend 10 minutes a day on handwriting. Zaner-Bloser, the most popular handwriting curriculum used today, deems that too little and is encouraging schools to up that amount to at least 15 minutes a day.

But typing in school has a democratizing effect, as did the typewriter. It levels the look of prose to allow expression of ideas, not the rendering of letters, to take center stage. Florey is aware of this but does not take the time to unpack the assumptions contained in her reason why we should continue to teach handwriting: "Children are judged by their handwriting; if they produce indecipherable chicken-scratching, a teacher will not be sympathetic." Florey mentions that when she was asked to judge handwritten applications for writing positions, she was "drawn to those with legible handwriting and prejudiced against the scrawlers."

Does having good handwriting signal intelligence? No, not any more than it reveals one's religiosity. But many teachers make this correlation: It is called the "handwriting effect." Steve Graham, a professor at Vanderbilt University who studies handwriting acquisition, says that "teachers form judgments, positive or negative, about the literary merit of text based on its overall legibility." Graham's studies show that "[w]hen teachers rate multiple versions of the same paper differing only in terms of legibility, they assign higher grades to neatly written versions of the paper than the same versions with poorer penmanship." This is particularly problematic for boys, whose fine-motor skills develop later than do girls. Yet all children are taught at the same time — usually printing in first grade and cursive in third. If you don't have cursive down by the end of third grade, you may never become proficient at it.

While we once judged handwriting as religiously tinted, now secular, we transpose our prejudices to intelligence. The new SAT Writing Exam, instituted in 2006, requires test takers to write their essays in No. 2 pencil. Not only will those with messy handwriting be graded lower than ones written more legibly, but those who write in cursive — 15 percent of test takers in 2006 — received higher scores than those who printed.

As of 2002, public schools had one computer for every four students, and since then, the number has risen. Despite talk of the digital divide, most high school students, even in low-income schools, are required to type and print out their essays, and they are able to find the means to do so. So assuming access, a standard font and printer paper, typing levels the playing field. Is this egalitarianism not a key value that, like the alphabet, goes all the way back to the Greeks?

When my son was in second grade, he had to stay in for recess almost every day because he could not properly form his letters. I was called in for "interventions," warned that he would fail the Ohio

Proficiency Tests if scanners could not read his test answers. (No Child Left Behind leaves teachers with less time to teach handwriting and fewer means to teach it, yet more tests students must take to prove they have mastered it.) For Simon, homework was always stressful. He would stare at a blank page for an hour. Then he would write one word and then stop; write a few letters and then stop. Soon, he began to fear taking up a pencil at all, and we had nightly battles over his language arts worksheets. Then he began to worry about not having anything to say, not knowing how to say it, or he would come up with ideas that he would not write down because they would take too long and thus write nothing. Perennially being told his handwriting was bad transmuted in his mind into proof that he was a bad writer — a poor student incapable of expressing ideas. He simply hated the physical process of writing. And since handwriting dominated his education in grades 1, 2 and 3, he hated school, too.

I transferred him to a private school where he was allowed to dictate his writing assignments. For his fourth-grade assignments, I sat at the computer, my laptop on the dining room table, as he paced the dining room, wildly gesticulating, sometimes stopping to put his hand on his chin in thought, but mainly speaking without stopping. I am a fast typist, but I could not keep up; I had to break his train of words. He spoke aloud in full clauses and paragraphs. What would have taken him about three or four hours (I am not exaggerating) by hand took him about four minutes by mouth.

The moral of this story is not that typing is superior to handwriting, that parents should have to transcribe the stories of their offspring or that private schools are superior to public ones. The moral of the story is that what we want from writing — what Simon wants and what the Sumerians wanted — is cognitive automaticity, the ability to think as fast as possible, freed as much as can be from the strictures of whichever technology we must use to record our thoughts. As Wolf writes: "A system that can become streamlined through specialization and automaticity has more time to think. This is the miraculous gift of the reading brain." This is what Palmer wanted for his students — speed. This is what the typewriter promised Twain. This is what typing does for millions. It allows us to go faster, not because we want everything faster in our hyped-up age, but for the opposite reason: We want more time to think.

This is how Simon describes why he hates to handwrite: "I have it all in my memory bank, and then I stop, and my memory bank gets wiped out."

Whatever we use to write, there will be a shortfall between conception and execution, between the ideas in our heads and the words we produce. We often insert nostalgia into this gap. Today, writing a novel with a BIC pen and a legal pad is considered as sweetly funny as William Dean Howells composing his first short story in a compositor's stick, upside down and backwards (his father was a printer) or Gay Talese's habit of writing on shirt boards (those cardboard panels they put in your shirts at the dry cleaners). Toni Morrison, Jim Harrison, John Updike and others write (or, unfortunately, have written) by hand.

We also make up stories to romanticize the mundane. The Sumerians used writing for accounting — they developed tokens to count sheep. But the Sumerians made up a better story for the invention of writing: "A messenger from the lord of Kulab arrived at a distant kingdom, too exhausted to deliver an important oral message. So as not to be frustrated by mortal failings, the lord of Kulab had also 'patted some clay and set down the words as on a tablet ... and verily it was so.'" (As Wolf points out, this tale "sidestep[s] the awkward matter of who was able to read the lord of Kulab's words.")

Handwriting does have a presence that can be absent in typed prose, I admit. I have a binder of notes my grandmother wrote shortly before she died. She scrawled her life story in thick black felt-tip on the backs of envelopes. I have been slowly typing up her notes to preserve them for the family, and as I squint to make out words, I sense the felt experience of her hand on paper. And I will admit that when I find a smooth expanse of sand or a bark-less tree trunk, I long to scratch my name in them.

I have no desire to lose the art of handwriting, to lose the knowledge retained in archives or to take pencils away from those who seek to wield them: Matthew McKinnon, a freelance writer, re-taught himself cursive at the age of 30 because he had forgotten it, found it useful for his work and wanted to



"shake the cobwebs" out of the area of his brain it activates. Kitty Burns Florey is starting a "slow writing" movement, mimicking the slow food movement, to revive the art of handwriting. Each year, the Spencer Society holds a weeklong "saga" where you can learn to master Spencerian script. Handwriting has always been both a way to express thoughts and an art, and preserving the artistic aspects, be it through calligraphy or mastering comic book lettering, is worthy. In schools, we might transition to teaching handwriting as we do other arts, specifically as a fine-motor skill and encourage calligraphers as we should letter press printers or stained glass window makers. These arts have a life beyond nostalgia.

When people hear I am writing about the possible end of handwriting, many come up with examples of things we will always need handwriting for: endorsing checks (no longer needed at an ATM), grocery lists (smartphones have note-taking functions), signatures (not even needed to file taxes anymore). These will not be what we would lose. We may, however, forsake some neurological memory. I imagine some pathways in our brains will atrophy. Then again, I imagine my brain is developing new cognitive pathways each time I hit control C or double click Firefox. That I can touch-type, my fingers magically dancing on my keyboard, free of any conscious effort (much as you are looking at letters and making meaning in your head right now as you read), amazes me. Touch-typing is a glorious example of cognitive automaticity, the speed of execution keeping pace with the speed of cognition.

Do not worry. It will take a long time for handwriting to die, for us to have the interview with the "last handwriter" as we do today with the last living speakers of some languages. By 1600 B.C., all Sumerian speakers had died, but the writing system that replaced Sumerian, Akkadian, kept aspects of Sumerian alive. It would take another 1,000 years — until 600 B.C. — for Sumerian writing to disappear completely. Even the revolutionary Greeks took a long time to change habits. After they created the Greek alphabet, they spent 400 years doing nothing with it, preferring their extant oral culture. Handwriting is not going anywhere soon. But it is going.

http://www.miller-mccune.com/culture_society/handwriting-is-history-1647?utm_source=Newsletter88&utm_medium=email&utm_content=1222&utm_campaign=newsletters



Fishing for Answers in Alaska

By: Bruce Porter



Photo by Clark James Miehler

Benjamin Mobeck Jr., with salmon.

Sand Point, Alaska

It was drizzling rain as we pulled out of the harbor a little after 9 a.m. in the middle of last August. A light wind was blowing from the northeast, and the usual fog obscured our view of the mountains that line the Alaskan Peninsula. Vaguely, in the distance, loomed the big boy of the region, a snow-covered volcano known as Mount Pavlov. Flying over Pavlov at night, it's said, you can make out a faint glow pulsating ominously from down inside the cone.

Our boat was the 37-foot gill netter *Melissa Marie*, captained by Benjamin Mobeck Jr., 41, and named for his daughter. Mobeck is a fourth-generation fisherman who has worked in the islands since he was a little boy, when his grandfather taught him how to hold a compass course on his wooden double-ender, steering a few points this way and a few that, until he'd go dizzy from the effort. Great-grandfathers on both sides had emigrated in the 1890s from Scandinavia. They rounded the Horn and sailed up from San Francisco as crewmen aboard codfish schooners, settling on the island of Sanak, about where the peninsula breaks up and becomes the Aleutian Islands, stretching out toward Russia, like the tail of a big dragon.

They married Aleut women and eventually moved to Sand Point on Popoff Island, 500 miles west of Anchorage. Sand Point is the biggest port in the region, with more than 110 fishing boats and 800 or so



year-round residents. The population increases in the summer when Filipinos arrive to work at the Trident cannery, which each year processes 5,500 tons of fish sent out to Japan and Europe and to supermarket chains in the United States.

Today, Mobeck was headed for Balboa Bay, 10 miles away on the mainland. At the eastern entrance sits a 1,053-foot promontory known as Swedania Point. It got its name from the Russian *do svidaniya*, meaning "goodbye," not inappropriate nomenclature for such a desolate piece of granite, whose jagged face plunges into the ocean like background scenery from *Lord of the Rings*. Inside, the bay is 5 miles wide and 12 miles deep, and owing to the rain we couldn't see up to the head. But I knew Balboa Bay pretty well. Fifty years ago, in the summer of 1959, when Alaska became the 49th state, I was stationed there as a stream guard for the U.S. Fish and Wildlife Service.

I was 20 years old, just graduated from college, and had come out from Connecticut. Fish and Wildlife transported a dozen of us from Anchorage to Sand Point in an amphibian, then dropped us off at our respective bays 50 to 100 miles apart via a converted 90-foot minesweeper named the *John R. Manning*. Our job was to guard the salmon streams at the head of each bay from being cleaned out by fishermen from the islands and the big purse seiners up from Washington state. I had a shack to keep out the rain and the wind that blew like crazy everywhere and all the time. It was plywood and measured 8-by-10 feet; to my dismay, it had blown down the previous winter and lay scattered all over the field. Before they pulled out, the crew of the *Manning* helped me nail together the walls and the tin roof and gave me some rope to tie it to the ground lest it blow away again, with me in it.

They left me with boxes of food and a skiff with a 10-horse Johnson outboard motor. Weather permitting, I was expected to patrol the bay to make sure no fishing boat had crept up inside the "Fishing Prohibited" markers that I would shortly set up 1,000 yards from mouth of the stream. Truth be known, there was little I could have done if they had. I had no radio to call in on. We'd been issued beat-up Krag-Jorgensen rifles used by the U.S. Army during the Spanish-American War. The guns weren't for pointing at fishermen; they were protection against the brown bears, which lumbered about the region like lords of the manor. My boss had assured me the bears would stay pretty much near the salmon stream, 3 miles up the bay. True enough, it turned out, but, judging from the large prints I discovered on my beach in the morning, they seemed to be in the habit of commuting to work.

As for violators, if I caught a fishing boat inside the markers, I was to motor over in my skiff and inform the captain that he was fishing illegally here, and I needed to come aboard and use his radio to call in the Fish and Wildlife plane to fly over and photograph him with his nets out; otherwise, the government couldn't prosecute. As a radio-less tenderfoot from Connecticut, summoning up such an air of authority seemed a bit daunting, especially after hearing tales told by a veteran stream guard about colleagues gone missing in prior years, presumably thrown off the sterns of fishing vessels they had tried to violate. These stories were undoubtedly apocryphal, I told myself. Weren't they? In any event, I never had the chance to find out, since in my three months of salmon guarding, I never caught anyone near the mouth of my stream.

At summer's end, when our tours were up and we all returned to Sand Point before starting for home, we shared in the exhilaration that, thanks to our stalwart efforts out there in the bays, the salmon industry of western Alaska and the Aleutian Islands had been saved for another year. We also felt sadly sure, since Alaska had become a state, that it would abandon the federal stream guard program as too expensive, that fishermen would henceforth swoop in and loot the streams for quick profits, and that the salmon fishery would collapse by reason of shortsighted greed.

As we now know, no conjecture could have been more wrong. Not only has the Alaskan salmon fishery thrived since statehood, but so have the fisheries for other species harvested up there — pollock, halibut, cod. Since 2000, all have won the stamp of approval as fully sustainable by the international Marine Stewardship Council based in London, and a recent report financed by the National Geographic Society rated Alaska as one of the best-managed fisheries in the world, alongside those of Iceland and New Zealand. What's more, in the fall of 2008, in a study of data compiled from 11,135 individual fisheries,



marine biologists at the University of California, Santa Barbara concluded that if fishermen universally adopted management practices like some of those used in Alaska, they might well reverse the grim conclusion reached two years earlier by the University of Dalhousie in Halifax, Nova Scotia, that under current practices, virtually 100 percent of the world's fisheries would collapse by the year 2048.

Despite the praise, however, there is evidence to suggest that Alaska's success in saving the fish might be accompanied by unintended costs. Indeed, there are few economic or cultural situations in the world that seem as complicated and contentious as the fishing business of Alaska. "Believe me, fishing politics up here are very intense," says [Gunnar Knapp](#), professor of economics at the University of Alaska Anchorage, who has made a specialty out of studying the salmon industry. "You can listen to one person who will say that what someone claims as the best possible solution is absolutely terrible, and walk across the street and find another person who feels the exact opposite."

Of the many issues complicating Alaska's fishing business, none seems as fateful as that of "limited entry." The policy resulted from a decision by the state back in 1973 to stem the tide of out-of-state boats coming up to fish Alaskan waters. If left unchecked, their fishing prowess seemed likely to reduce the salmon population to that of an endangered species, and in short order. By legislative fiat, entry into the salmon fishery was limited to those boats, locally owned or not, that were currently engaged in the fishing business. No more would be allowed.

Originally, the permits were issued for free; but, as the finality of the law dawned on people, the value of the permits skyrocketed: By 1991, at the height of prices fishermen were being paid for their salmon, the cost of buying a single permit had reached more than \$400,000. This was a tidy asset considering that, in the beginning, fishermen could have been issued up to three free permits for the different modes of fishing — stationary gill netting, drift gill netting and purse seining.

Not surprisingly, many fishermen gave in to temptation and sold out, until in some communities, especially small villages dotting the peninsula, the ownership of permits began to shift from the locals to outsiders, usually those with large pocketbooks. A study by anthropologists from Idaho State University of villages in Bristol Bay, which lies to the north of the peninsula and rates as the largest salmon fishery in the world, discovered that, of the 614 drift-net permits held by local fishermen in 1978, only 391 were still locally owned by 2008. Some places were hit even harder. In Nelson Lagoon, a tiny village on the other side of the peninsula from Sand Point, they found that locally owned permits had declined during roughly the same period by nearly half, from 51 to 27. And out in False Pass, across from the island of Unimak, at the start of the Aleutian Islands, they fell from 21 to 6. "Most of these permits were sold to nonlocal fishermen during hard times, and they will likely never return to local hands," wrote [Katherine Reedy-Maschner](#), an Idaho State anthropology professor. "If these trends continue, these two villages may cease to be fishing towns, or they may cease to exist altogether."

For his part, Knapp has concluded that the real effect of limited entry wasn't so much to save the salmon as it was to determine who gets to catch them. "Everyone throws into the conversation as to why they're putting forward some plan or other that it will 'Save the Fish'; but I'd be very skeptical of that," Knapp says. "What it's really about is what kind of people will get to catch what fish are going to be caught." As far as permits go, he says, "the concern is they go to wealthier fishermen who have more access to capital and more savvy about how the whole regulatory system works. Inevitably, it's led to an outflow of fishing opportunities from rural communities. Pretty soon the pattern of young people who would normally follow in their parents' and uncles' footsteps becomes disrupted, and gradually but steadily over time you begin to have a shift of who's doing the fishing. It's not like suddenly people are getting kicked off their boats and they're given to someone else. It's a long-term process that people look back on and say, 'My God, this thing has really changed.'"

Located at the western edge of Popoff, a mountainous, treeless island about 10 miles long by 7 miles wide, Sand Point is dominated, visually and economically, by the Trident Seafoods plant situated on the edge of the harbor. Along with its size, Trident declares its presence by the muted roar of its power generators and also the odor emanating from an adjunct factory that grinds fish waste into pellets the

company sells to fish farms; depending on which way the wind is blowing, the odor can be rank enough to cauterize an olfactory system. The island is an isolated place, sometimes dangerously so. Daily prop-jet service connects it to Anchorage — at \$810 a round trip, it's not a casual venture, but it's what islanders must use for school trips, baby deliveries, any medical emergency. Ten years ago, a young mother of two children who had suffered an aneurism died aboard an outbound MedEvac plane that had been prevented from landing in time to save her because of 100-mile-an-hour winds.

A dusty gravel road winds up and down through several clusters of modest houses, many of which possess what Lower 48ers would consider to-kill-for views of mountains and the sea. The road is marked with ominous signs setting out a "Tsunami Evacuation Route," in case an earthquake develops out of the Aleutian fault, which lies just to the south. The island has a hardware store, a food and clothing emporium run by the Alaska Commercial Co., which has sold stuff to Alaskans ever since the Russians left, two luncheonettes, and a Chinese restaurant that doses customers heavily with sweet-and-sour cuisine. There's a modern, one-building school catering to 100 or so students, K through 12, and a fully uniformed police force, whose chief and two officers festoon themselves with Glocks, bullet-proof vests and belt loads of other enforcement accouterments, as if they'd been assigned to subdue a drug ring in a Newark housing project. Social headquarters — at least for the island's population of drinkers and dope smokers — is the boisterous Sand Point Tavern, oft-commented-upon *bête noire* of polite Sand Point society, which blames the tavern for whatever decline can be detected in the island's moral standards.

Not far from the bar, on a hillside looking across Unga Strait toward the shrouded entrance to Balboa Bay, is the Sand Point cemetery. In August, it overflows with daisies and lupine and bushes bearing large orange salmon berries, which island women make into pies and jams. Ravens circling overhead fill the air with their strangled cries. Wooden crosses mark the graves, a few of them with the slanted bar memorializing former congregants of the old St. Nicholas Russian Orthodox Church that presides over the harbor. The people underground seem to have begun dying in the 1930s, but they all left progeny to carry on in the fishing industry: Halversons, Gronholdts, Gundersons, Ludvicks, Osterbecks, Andersons, Carlsons — a lot of them now related to each other through marriage.

Ben Mobeck Jr., whom I accompanied out to Balboa Bay, is also a Holmberg. His mother, Mary Ann, 62, who lives with Ben's father in a house near the graveyard, is one of 12 children produced by John Holmberg Sr. She spent her childhood on Sanak, which, with its handful of abandoned, crumbling houses, is now a ghost island out there in the North Pacific. While these days Sand Pointers provision themselves with food ordered from Costcos in Seattle and shipped up on a barge, the Holmberg children grew up living off the land and the sea. "The old saying was, "When the tide was out, our table was set,"" says Mary Ann, a jolly, bespectacled woman who organizes activities for island oldsters via a social service center run by the Eastern Aleutian Tribes, an organization that represents the interests of several thousand Native Alaskans. She and her siblings would root for clams, sea urchins, baby octopuses and bidarkies, black crustaceans that cling to rocks with a tongue-like muscle that makes for good eating. They gathered seagull eggs, which were jellied in large glass jars and would last through the winter. As for vegetables, nothing that requires much sun grows well in the islands, but rhubarb thrives, as do root crops such as rutabagas, turnips, potatoes, beets, carrots, salsify and parsnips.

I feel a connection to the Holmberg family. Fifty years ago, John Holmberg Jr., now 78, who's Mary Ann's brother and Ben's uncle, was the first fisherman to show up in my bay. He worked a gill net from a small, 42-foot boat named the *Milfred*. Sand Pointers get recalled to memory by their boats, and it's not uncommon for a man to go through a half dozen in his lifetime, able to reel off their names and characteristics like long-gone children. Many still exist, in what's known as the "Bone Yard" at the harbor. Ben's father's first boat, the *Sun Dial*, sits up on chocks, paint-chipped, its cedar frames sprung loose. Even his grandfather's decaying double-ender can be seen lying encrusted with seaweed below the water line near the fish food plant.

John Holmberg was 28 years old when I knew him in Balboa, and he arrived as a welcome visitor, indeed. Most of the time, I had only my own company to keep — reading through English Lit books ignored in college, fetching water from a trickling brook that was too small for the bears to check out,



futilely chasing leaks with a can of roofing tar. Invariably the tar would ooze through nail holes in the tin onto my blanket or, worse, end up in my hair. Regularly, I'd take out the skiff to scrounge driftwood from the beaches to feed the tin Yukon stove I kept glowing. One calamitous day, I endeavored to light some wet sticks using the Blazo fuel meant for the Coleman lantern and proceeded to catch the whole stove afire, along with a crate serving as a dining table, nearly burning myself out before dousing it all with a pail of drinking water.

Every couple of weeks or so, or whenever it might occur to my boss that I could be running low on food, the Fish and Wildlife plane would fly by. The drill was for the pilot to get my attention by buzzing the shack, then he'd fly over again and drop a crate out the airplane door. No parachute was attached, so often the load would burst apart on landing, whereupon the game became one of finding the fresh stuff in the tall grass and alder bushes before the foxes got it.

When Holmberg was in the bay, I'd help him pick fish out of his net, and we'd talk and drink coffee or beer in his wheelhouse. One day he mentioned casually that a stream guard could make some money for himself if he chose to sleep late some morning, catch up on a little shut-eye. Obtuse as I was about the ways of the world, even I could sniff out the offer of a bribe here, and I remember replying: "Look, John, I don't get many people to talk to out here, and I'd hate to lose our friendship if I woke up tomorrow morning and found you up there inside the markers." As far as I know, he never did go up, or, rather, I don't think he went up, because the next day I did in fact oversleep, in no way intentionally, and didn't roll out of bed until 10 a.m.

These days Holmberg spends most of the year in Edmunds, Wash., near Seattle, where a number of Sand Pointers retire after they're done with fishing. I called him last summer, the first time we'd talked since 1959. He said, yes, he did sort of remember that critical conversation, but he allowed as how I had taken him too seriously. "I was only fooling with you," he said.

Along with monitoring the yearly salmon catch, the state of Alaska tries to ensure sustainability by counting literally every salmon that makes its spawning run up one of thousands of natal streams throughout the state. From May into September, the fish crowd into the shallow bayhead lagoons, leaping in the air seemingly in ecstasy, waiting for the biological word that says it's time to go. Once up the stream, anywhere from a few miles to a thousand on the mighty Yukon, the female fans out a little gravel nest with her tail and lays 8,000 to 10,000 or so eggs; the male blankets them with his cloud of sperm, and the adults turn a different color — red, black or green, depending on the species — and they die. It will take anywhere from two to five years for those baby salmon to make their way downstream, grow to size far out in the ocean and return to that same stream to replenish their kind.

The state mostly counts fish going upstream rather than down — calculating what's known as the "escapement" rate, meaning the ones who've escaped getting caught in a fish net. But no one really knows how many of those baby salmon will actually make it back. Last year, biologists in California attributed the collapse of the king salmon run in the Sacramento River not to the diversion of river water to agricultural purposes, as was originally thought, but to something bad happening to their food supply out in the ocean that resulted in their starving to death.

Counting salmon can be a dizzying proposition, as Alex Bernard will testify. A 30-year-old biology graduate of the University of Northern Colorado, Bernard is now the assistant biologist at the Sand Point station of the Alaska Fish and Game Department. Each week during the season, he tries to monitor the run in each of the 232 salmon streams along an approximately 700-mile-long stretch of islands and coastline. He flies with a Fish and Game pilot from the Sand Point airport in a single-engine Cessna 185, equipped with extra-fat tires so it can land on a gravel beach in an emergency. Bernard uses five clickers to keep track of the different concentrations of fish as well as the different salmon species. He calculates, for example, that a tiny pod of fish about the size of an eraser head when seen from 300 to 500 feet in the air probably represents 50 salmon; a dense black line of them stretching half a football field length up a 50-foot-wide stream is about 100,000.



With his head stuck in a bubble-shaped window to give him a good view, with the plane banking sharply 30 degrees this way and that just above the terrain, so the stream and the alder bushes rush by in a blur, Bernard says he can't take more than an hour or two at a time, even with a load of Dramamine on. "The only way to describe it," he says, "is to imagine putting your head into a toilet and flushing it over and over and trying to follow the water as it goes down the drain."

How many salmon Bernard counts determines how many days the department allows Sand Pointers to go out and fish. A high count, depending on how it computes with those of previous years, could mean opening up the fishery for anywhere from 24 to 88 hours; after that, it would shut down again so biologists could see how the count fared the next week. Along with Bernard's count, the state has to navigate through the treacherous fish politics that rule in Alaska. Fishermen in villages along Bristol Bay, for example, are convinced that fishermen to the south — on the other side of the peninsula in Sand Point and in boats coming up from Washington — are catching fish that rightfully belong to them. They argue that salmon, making their way up from the south and southwestern part of the Pacific, really have it in mind to swim through gaps in the peninsula like the one in False Pass and return to streams that empty into Bristol Bay, except that they get caught. The same claim is put forth by fishermen around Chignik Bay, which is located on the peninsula about 100 miles east toward Anchorage. "It's a lot like fights over water rights in the Lower 48, where people fight tooth and nail with gunshots fired over who gets the water and who has rights to it," Bernard says.

The issue of whom these fish belong to is particularly fraught regarding Chignik because most of those thought to be headed for that bay happen to be sockeyes. Also known as red salmon, sockeyes, along with king salmon from the Yukon River, have more fat content than the other varieties and reign as royals in the salmon realm. More to the point, the salmon processors last summer were paying 85 cents a pound for sockeyes, nearly four times what they paid for any of the three other kinds — silvers, chums and humpbacks, or humpies, as they're called.

To avoid the issue turning violent, every three years the state's Board of Fisheries sets an allocation of fish that must be caught by Bristol Bay and Chignik before Sand Pointers can even put a net in the water. This number is negotiated each time, arrived at after much politicking by lobbyists and lawyers representing competing areas — and it rarely satisfies everyone, especially not Sand Pointers. By the time they're let out to fish, a lot of the sockeye run has already gone through to Chignik, and a lot of the fish Sand Pointers are left to catch are chums and humpies, which last August sold at the Trident cannery for only 24 and 22 cents a pound, respectively.

By the time Ben and I arrive at the eastern entrance to Balboa Bay in August, the rain has let up temporarily and two purse seiners are already circling the area. It's a popular spot. Ben inherited the permit from his father when he was only 13 years old. In an inventive deal worked out with another fisherman, Ben's father granted the man permission to use the permit if he agreed to take the boy on as a deck hand and teach him how to fish. It was one of three permits Ben Sr. was awarded when limited entry took effect in the 1970s. He retained one for himself and is reserving the third for his other son, Emil, 44, who currently works as a deckhand on his father's purse seiner. Passing permits along to children not only provides them entry into the fishing business; it's also a way for fathers to fatten up their Social Security checks when they retire. "If I can get a little percentage from them in the summer," says Ben Sr., now 65, "then I won't have to eat bidarkies off the beach all winter."

As a whole, Sand Point has done fairly well when it comes to keeping permits in the hands of locals. According to the Idaho State study, of the 111 permits held by resident boat owners in 1980, some 92 were still in Sand Pointers' hands as of 2008. But sad tales abound of families who have let permits escape from their grasp. Some fathers sold theirs after bitter squabbles with their sons, or their sons became alcoholics or drug addicts and were disinherited. Some fishermen borrowed heavily to outfit their boats with newfangled fishing gear or buy a bigger vessel with added fish capacity. When salmon prices took a catastrophic dive, as they did in the late 1990s and early 2000s, boats and permits were lost in bank foreclosures; others were seized by the IRS in lieu of unpaid taxes. A few fishermen, dazzled by the high permit prices being paid in the 1980s, put theirs on the market. "You could have made close to a million

dollars back then," Ben Sr. says, "so a lot of them sold their permits, but they never did anything with the money. They went off and got drunk or just spent it, and then there was no more. It was all gone."

Owning a permit or not usually spells the difference between making a decent livelihood and facing a bleak economic future. Those without them have little else to do on the island except work as deckhands for someone else, earning 10 to 15 percent of a boat's catch, as opposed to the 50 percent or more for the permit-owning captain. They could always, of course, take one of the 400 or so seasonal jobs sliming fish at the cannery, but this work is disdained by locals as fit only for the Filipinos and other foreigners imported for the season, some from as far away as the Czech Republic.

If you're smart about it, working at the cannery is not such a terrible deal. Outfitted in company uniforms consisting of electric-blue jump suits and hats, Trident employees resemble the minions working for some Dr. No character in a James Bond movie. They earn only minimum wage, around \$7.35 an hour, and they're expected to put in 12 to 16 hours a day, seven days a week. But this can add up to as much as \$2,500 or \$3,000 a month, all of which could go into a savings account, since Trident pays for their round-trip airfare, provides them free lodging in a dormitory and feeds them for free in a cafeteria, where the food is fresh and good enough to attract paying customers from among the islanders. If workers bring along a spouse or other family members, they can expect to return home with \$36,000 or more in the family coffers, a sum that goes a long way back in the islands, and this for only half a year's labor. Still, Trident's roster includes few Americans, either from Alaska or the Lower 48. "Let's face it," says the plant foreman, Elmer Mercado, who's been with Trident for 23 years, "if you're a guy born and raised in the USA, you'd never work for \$7.35 an hour, and if you had to work 12, 16, 18 hours a day, with no TV, no movies, no malls to go to, it would be, 'The hell with this, I'm going home.'"

Setting up his fishing gear in Balboa Bay, Ben puts the stern end of his boat in close to the beach, just inside Swedania Point, and starts pulling his gill net out of its bag. As we motor slowly toward the middle of the bay, he pays out the 600 feet of net off the back, over a big roller fastened above the transom. The net is nearly 30 feet deep and suspended by floats and weighed down by a lead line on the bottom. Normally he anchors one end to the beach and the other to a buoy out in the bay. His permit allows him another 600 feet, part of which he uses to make a 45-degree hook at the outer end, angled back toward the beach. As salmon swim along parallel to the shore, some become enmeshed in the first leg; if they don't like what they see — a lot of other fish thrashing about in the net, for instance — they make a right turn and head out toward the middle of the bay, and get snagged in the hook.

Theoretically, that is. Balboa Bay is more than 60 square miles of water, so catching fish is not best left to happenstance. Just because salmon are programmed to head up the stream doesn't mean they line up in orderly fashion, like people waiting for a movie in Manhattan. Salmon move with the wind and the tide; until they get the final go sign, they mill around, swimming in whatever direction the forces of nature send them. In Balboa, Ben relies on a falling tide to float the fish out of the bay toward the mouth. Ideally, then, a light westerly breeze would arise, or one coming in from the south, blowing the fish toward the eastern shore, where they'd fall victim to his nets. Dead calm is less good because there's no wind to help move the fish. A bright day isn't so great either; that makes the net flash in the sun, alerting salmon that something strange is up ahead they might not like.

"If I were just anybody coming into this bay I could have set up on the other side, and I wouldn't catch anything, because there're no fish over there," says Mobeck, who spends summers in a cabin next to his parents' house but the rest of the year in Everett, Wash., with his wife, Kelly, a paralegal in a law firm. "Knowing where to go is half the battle, or having a father who knows. You can also ask questions, but we're all fishermen out here, and we don't want people to invade where the fish are, so sometimes, depending who they are, they'll give you the wrong information."

Unlike purse seining, where a whole school is encircled by the net and scooped out of the water, in gill netting the salmon swims straight toward the net, thinking it can swim right through, but then gets caught by its dorsal fin. The more the fish struggles the tighter it gets caught. The mesh measures a little either side of 5 inches square; later in the season, the state mandates use of the larger opening so immature fish



can swim through unscathed. Once the net is full, some gill netters reel it in over the stern, but Ben would rather go out and patrol the net in a skiff, hauling up sections and picking out the fish himself. This way, the net stays out there fishing all the time, with no off-duty periods when it's being hauled in.

Ben's mother teases him about gill netting, saying it's "an old-man way of fishing," because it's more sedentary. It doesn't require the elaborate maneuvering of a purse seiner, which has to marshal two seine skiffs and a crew of four equipped with radios in a military-like operation. Seiners do catch more fish, 25- or 30,000 pounds in a single haul, whereas the fish hold in Ben's boat accommodates only 14,000. But with all the gear and a big crew, the cost of running a seine boat is much higher. Gill netting also results in less damage to the fish, so processors pay him more, he says. Crushed in the mass of writhing salmon, the fish caught by a seiner can often lose their protective scales, exposing their flesh to bruising or getting cut. Blood can get into the meat and make for darkened flesh, which a processor has to put in a can rather than sell to a restaurant or supermarket.

In the winter of 1997, when Ben supplemented salmon fishing by working on a crab boat in the Bering Sea, a heavy crab pot came loose from a stack and smashed his foot bones in three places. The captain dropped him off at a processing plant, but a week went by before he saw a doctor, and the foot still pains him when it's cold and damp. "So, that was my sign," he recalls. "I said, 'I gotta do something different.'" Back in Everett, he joined the seaman's union and eventually won an able seaman's job aboard an oil tanker heading for the Middle East. Year by year, he took more tests and rose in rank, taking a leave each summer to fish at Sand Point. Now he's studying for his mate's license, and dreams of becoming a tanker captain.

One of the differences between Mobeck and many others raised on the island is that, when it came time for high school, his mother took him out of the Sand Point school and moved with the boys to Lynnwood, Wash., near Seattle, so they could see another part of the world. As people working in the local school readily confirm, staying around Sand Point through teenage-hood can be a limiting experience. Other than rodding around on four-wheelers or hanging out at an Internet coffee shop called the Cut Her Loose Café, there's not much to do, except drugs. And there are plenty of controlled substances to abuse, enough so that the local community health center brought in a licensed clinical social worker from New Orleans last summer who plans to start a teenage branch of AA in the spring. The number who go on to college from Sand Point is pretty low, only one from the class of 2009; and the pregnancy rate leans heavily in the opposite direction, to the degree that the girls basketball team has earned the nickname "The Young Mothers."

"You grow up someplace else, you develop skills, you see things, you learn how to parallel park, take the public transit system. But these kids look at life through a straw," says Carl Dirkers, director of special education, who with his wife also runs the Marine View, a bed-and-breakfast overlooking the harbor. "The junior class has a program where they raise money to go to Washington, D.C., but it's too much for some kids. They get down there in the underground and some of them, they just close down."

When Ben went off-island to high school, the mainland education system at first proved overwhelming, so the family switched him to a small Christian-run school. On weekends, he and his brother would gas up the car and just drive. "I didn't know where the road was going, and we didn't have any maps; we'd come to a crossroads and turn left or right. We'd go through towns and see houses and tall buildings and colleges. The freeways were another thing, a road that had no stops, going from Canada to California. I just couldn't fathom it."

Ben's fishing permit limits him to set netting, and he had already put his regular gear away for the season, so today we let the net hang off the stern as we drift in the wind and current. This style is known as drift netting, and requires another kind of permit. But we were after what's known as "subsistence" fish. Anyone who gets a card from the U.S. Bureau of Indian Affairs saying he's some part Native Alaskan, or a "Nate" as they're colloquially called back in Anchorage, has the right to shoot bears and moose and caribou, as well as catch 500 pounds of salmon, without bothering with the usual permits or licenses, as long as it goes for the subsistence of his family. Thanks to all those Scandinavian men marrying Aleut



women in the early 1900s, just about every permanent resident of Sand Point is some part Aleut, in Ben's case one-quarter and his parents', one-half each.

As a result of the Alaska Native Claims Settlement Act of 1971, Alaskan Natives were also awarded ownership of 12 percent of the state's land. This is a lot of territory, much of it with spectacular views, but, unless oil or minerals lie underneath, the land has about zero economic use. Natives own much of the vacant land surrounding Sand Point, for instance; they own from the water's edge to the ridgeline of the mountains around Balboa Bay, and they own a large former Navy base where the government spent billions to build docks, housing, a jet port. Right now, the Aleut Corporation has the place up for sale or lease, but the bad news is it's located on the island of Adak, half way out the Aleutian chain, and has drawn precious little interest.

There are few, if any, actual, full-blooded Indians left around Sand Point. When the local school has its native culture fair in the spring, it brings in natives from the mainland to do the songs and dances. None of the Sand Point Aleuts have the look of movie Indians — reddish skin with a sculptured nose and long black hair — but they still at times have to confront the out-dated stereotype of their heritage. When Ben met the girl who's now his wife, he told her he was part native, but not the kind she had in mind. "My wife grew up in Anchorage, and, to her, being a native was like the ones down on Fourth Avenue where the people on the street were all drunk and panhandled people. I said, 'Well, yes, I'm a native, and there are people who do that, but I'm better than that.'"

In Balboa Bay, our net hadn't been out for more than a few minutes before we saw the corks near the shore getting tugged under water as fish began hitting mesh. The commotion gradually worked its way up the net's length toward the boat, and pretty soon the whole thing was fairly throbbing. After about 20 minutes, Ben tied the near end onto a big reel on deck and began slowly hauling in his catch. As fish came in over the transom, flapping and straining to get free, he worked them loose and put them in piles according to species. Balboa is mostly a humpie and chum bay, but reds travel in with them, even though it's not their stream. Realizing eventually it's the wrong place, they make their way out again and try another bay, like travelers looking up and down a street for the address of a friend.

Biologists can tell species apart in many ways, but Ben needs just to look at their tails — humpies with the spots, chums with stripes and reds a deep blue with no markings. On a normal fishing day, it would be the reds he'd want most, of course, but usually they account for only 10 percent of his catch, enough just to cover what he paid for diesel fuel and food. Pretty soon we had a couple dozen fish, averaging 8 to 12 pounds each. And since he was catching only subsistence fish, he threw the rest back, removing them carefully from the mesh so as not to cause any damage. He'll give some fish to friends and family, maybe smoke or freeze the rest. Humpies smoke the quickest and dry the best because they have very little fat. (The fat content of salmon depends on how far up a stream they go to spawn: Those with the longest journeys build up a lot of fat out in the ocean to sustain them during the time they spend in freshwater, when they don't eat anything. The leaner ones — humpies, chums and silvers — come from comparatively short streams. The fattest, with the longest run, are the kings of the Yukon.)

For general eating, it's the reds that everyone prefers. Like the French with their wine, Alaskans claim they can distinguish reds by the water they've swum in, those from Bristol Bay as opposed to Cook Inlet, say, and they can argue all night about which provides the best eating. Wherever they're from, reds are sweeter, more succulent. When it's properly broiled, not overdone, God forbid, sockeye flesh is purported to melt in your mouth, like a pat of butter. At the top of the sockeye heap are the Copper River reds from near Cordova, southeast of Anchorage. Alaskans claim they can divine the faint taste of copper in the flesh that adds to their distinction. Arriving in June, these are the first reds of the season, the ones that are cosseted with care by fishermen, pampered by the processors, given special branding treatment by the marketers and flown out by air to gourmet chefs in Seattle, San Francisco, Los Angeles, Chicago, New York City and many cities in Europe.

Not to be considered second-class citizens, the processors in the Aleutian area have tried branding the reds from their region; they call them "Aleutia" salmon. They're also handled with special care and rate a

higher price at the cannery, \$1.05 a pound instead of 85 cents. "If it's missing scales, they don't want it, or if there's marks or it's scuffed," says Ben, who loyally maintains he likes all salmon, regardless of species, origin or fat content. "They pay a better price, but I haven't signed up for that market. It's probably worth your time, but it's another added thing you've got to do in the whole scheme of things you've got to do." He knows all about the Copper River mystique. "I've been to Seattle and seen the label. I don't think they're any different from the reds we have here, but it's the first to the market, and now it's August and all the Copper River fishermen are sitting at home, relaxing."

While we were in Balboa, Ben's father was purse seining in Stepovak Bay, about 90 miles to the east. And in the 48-hour open period he was allowed to fish, he seemed to have made out pretty well. In four separate sets of his net, he pulled in a total of 107,000 pounds. Back in his kitchen, as his wife cooked up a lunch of king crab claws and deep-fried slices of halibut in beer-batter, Ben Sr. sat at the table with his two boys and toted up the figures. At an average price of 23 cents a pound, the trip had grossed him a little shy of \$25,000. Expenses were \$500 for fuel and \$130 for groceries. The three crewmen would share in a 48 percent split of the gross; the rest was his net. This meant he'd cleared between \$13,000 and \$14,000 for the two days of work. Was that a good trip? I asked. "Well, we caught a few fish," he said, speaking in typical understatement, fishermen not being ones to accentuate the positive.

"Yes," chimed in Ben Jr. "That was a good trip."

Over a fishing season, June into mid-August, Sand Pointers try to average between 500,000 and 1 million pounds, which nets them \$110,000 to \$120,000, after expenses. Out of this they must also pay for boat maintenance, dockage fees, taxes. They can experience expensive equipment breakdowns, prices may fall. In all, they've a lot to keep them worried. "I've never seen a fisherman say, 'Oh, I'm happy,'" says Elmer Mercado, the foreman at Trident, who deals with them daily as they come by for fuel and supplies. "They catch a lot, and the prices go down, and they complain. They don't catch much, and the prices go up, and they still complain."

For sure, one needn't search far in Sand Point to run into griping about the local cannery, one of 11 plants operated in Alaska and Washington by the Trident Seafoods Corp. of Seattle. The other processor in the area is also a seafood giant, Peter Pan, in King Cove. Fishermen sell to both of them and check their prices before calling for a tender, but only to discover they're usually pretty much the same.

The latest blowup between Sand Pointers and Trident came during the summer of 2008, when the company lowered the price for humpbacks to about 15 cents a pound, and Peter Pan wasn't doing much better. Enraged, some of the fishermen tried to organize a boycott of Trident, to withhold their fish in an economic war of nerves. Just about then, a floating processor called Snopac moved its barge into Sand Point on its way south and started buying fish for 40 cents a pound. This brought the Trident price back up more or less forthwith. The Snopac barge then continued on its way to southeast Alaska, but the experience left the idea percolating in Sand Pointers' minds that maybe they should put money into a processing co-op of their own.

So far, however, the idea hasn't progressed very far, and, considering the mentality of many fishermen, some people don't think it will go much further. "It's hard for them to take that step," says Carl Moses, owner of Carl's, the island's hardware store, and a retired state legislator. "Fishermen are independent and don't understand the benefit of being part of a co-op, or having an ownership through the whole chain of marketing the fish. They want to stay with what they know, with their guaranteed market."

Moses, now 80 years old, grew up on Sanak Island with the Mobecks and the Holmbergs. He used to own as many as six boats himself and knows the fishing business pretty well. He knows that, when it comes to things like withholding fish from the cannery, the cannery has a few cards to play if fishermen get too far out of line. "They'll pick one or two fishermen, and they'll use them as an example," he says. Aside from selling it their fish, Sand Pointers use Trident for a lot of services, such as storing nets and gear and buying fuel and supplies on credit, not paying until the end of the season. During the 2008 rebellion, Trident ordered one fisherman who'd begun selling to Snopac to get his gear off company property.



What's more, the cannery let it be known that it wouldn't be buying the Dungeness crab he'd planned to fish for that winter.

The fisherman in question has an uncle who owns four purse seiners and two crab boats. "I talked to him," Moses says of the uncle. "I said, 'They're using your nephew for a scapegoat. What if you worked with your nephew and tell the cannery if you do that to him, then we'll fish for someone else.'" The uncle didn't seem interested, Moses says. "The problem is they don't have an association, and they're not organized. They don't stick together."

In the opinion of economist Gunnar Knapp, grouching about the processors is wildly beside the point. The real problem salmon fishermen face is fallout from globalization — more specifically, competition from the international salmon farmers in western Canada, Chile, Norway, Scotland and other places, who raise fish in ocean pens, feed them on grain like cattle and send them on to the market in huge numbers. These farmers possess an economic advantage that, as far as Alaskans are concerned, seems insurmountable. Not only do they set up their enclosures close to truck routes, or build roads where there are none; they can also supply wholesalers with a steady, year-round product, one that's handled carefully to avoid damage and turned out in whatever species and size the stores want. That, as opposed to fish in Alaska that are caught thousands of miles from transport, spawn only seasonally so they all come on the market in a rush, and in whatever size and variety as happens to have been caught. It's thus no surprise that wild salmon, which during the season sells for \$12.95 a pound in East Coast supermarkets (compared to half that amount for the farmed variety), has reduced its appeal to a niche market of buyers, to those who buy wild salmon because it tastes better and is worth the price.

In 1980, barely 1 percent of the world's salmon came from farms; by 1992, that had risen to 32 percent. The landmark year was 1999, when salmon farmers produced so many fish they virtually crashed the market, flooding it with as many farmed salmon as there were caught in the wild, and their share has been going up ever since. As for Alaskan fishermen, what they've been receiving for their catch has gone in the other direction. The price for reds, for instance, which reached a statewide average of \$2.35 a pound at the cannery in 1988, had fallen to 58 cents by 2001. Prices have come back a little since then, but prospects don't seem bright for dramatic improvement. "It brought financial catastrophe to a lot of good people," Knapp says. "Here, you work just as hard as you always have, and you go to the processor, and he's paying you half or a third of what he gave you five or six years ago."

Nevertheless, the future isn't entirely grim. When it's in season, wild salmon — and Alaska is the major producer of wild salmon in the world — still dominates the select restaurant market. And in selling salmon at bargain prices, the farmers may have done Alaskans some small favor, by popularizing salmon in the public mind. Whereas it used to be strictly a low-end food item, eaten overwhelmingly out of a can, like tuna, salmon nowadays sits proudly alongside other fish filets and steaks at the fish counter; and overall salmon consumption has increased dramatically, from 8.5 million metric tons sold in 1985 to 16.9 million as of 2001. Thus, while Alaska's share of this dropped from 35 percent to 19, the total amount of salmon it sold on the world market actually increased by about a quarter of a million tons.

Then there's the health angle. Both wild and farmed salmon contain a lot of omega-3 fatty acids. This, as most people know by now, is the fat that reduces cholesterol and circulatory disease, lowers depression and maybe even assists in warding off Alzheimer's disease. Farmed salmon have been found to contain even more of this beneficial fat variety than wild. At the same time, however, farmed salmon, which are administered pesticides and antibiotics to ward off parasites and diseases caused by their being raised in close confinement, have a dramatically elevated chemical content that poses a serious threat to people's health; ones that have been shown to cause cancer, memory impairment and neurobiological changes in children. According to a study done in 2005 by Cornell University scientists, these chemicals — namely, chlorinated pesticides, dioxins and PCBs, among others — exist in salmon raised in western Canada and Chile at a percentage that's 10 times what is found in salmon caught in the wild; salmon raised in Scotland and Norway have even more.

The researchers, Barbara Knuth, a professor of natural resources, and Steven Schwager, an associate professor of biological statistics, noted that the chemicals in question take a while to build to a critical level; so for older people, especially those with heart problems, the benefits of staying on a diet high in farmed salmon, particularly from Chile because of its even higher good-fat content, might outweigh the threat posed by chemical intake. But, the researchers warned, "for people who are young — and they're at risk of lifetime accumulation of pollutants that are carcinogenic — or pregnant women — with the risks of birth defects and IQ diminution and other kinds of damage to the fetus — those risks are great enough that they outweigh the benefits." For young people, and especially expectant mothers, the researchers recommend they eat farmed salmon from Scotland, Norway and eastern Canada no more than three times a year, and those from Chile, Maine, western Canada and Washington state no more than six. Wild chum salmon from Alaska, on the other hand, can be safely eaten as often as once a week, and humpies, reds and silvers, some of which might have been caught around Sand Point, twice a month.

Whatever the future holds for wild Alaskan salmon economically, the state deserves considerable credit for setting one of the highest standards in the world when it comes to preserving a fishery for future generations. How many fishermen can survive the effort, however, remains an open question, as does whether the state's complicated rules and regulations can easily be transferred to other places. Aside from the effect limited entry has had of shifting permits once owned by small fishing operators to larger ones, it's done little to provide fishermen much advantage in competing with super-efficient salmon farmers. For one thing, the way the system now works — counting salmon going upstream and sending fishermen out for a limited number of days, depending on the tally — might succeed in maintaining a stable fish population, but it creates a periodic fishing frenzy that encourages boat captains to take chances with weather conditions that can endanger themselves and their crew. For another, in terms of man hours and diesel fuel, it's a terribly inefficient and expensive way to run an industry. In a study released in October of 2008 by the World Bank titled "[Sunken Billions](#)," researchers calculated that each ton of fish caught worldwide used up approximately a half-ton of fossil fuel. What's more, the buildup of fishing fleets and the introduction of sophisticated fishing technology has resulted in "massive overcapacity," whereby the catch-per-vessel rate has gone into steady decline. The bank estimated the cost of this redundancy, the "sunken billions," at about \$50 billion each year. The only reason many fishermen can stay in business, it said, is because of government subsidies generated in response to political pressure from fishing interests. If fish stocks were rebuilt to sustainable levels, the report concluded, "the current marine catch could be achieved with approximately half the current global fishing effort."

What conservationists such as the [Environmental Defense Fund](#) prefer to the limited-entry system — and what the Obama administration has thrown its weight behind — is a system called [Individual Transferable Quotas](#), or "catch shares." In this scheme, government biologists determine what amount of fish can be safely caught in order to sustain the fishery, and shares in the total catch are divided up and thrown onto the open market, where they can be bought and sold, like shares of stock in a company. By owning shares, the argument goes, fishermen have a stake in promoting conservation measures that preserve the fishery as a whole, and also the value of their shares; if fish stocks improve, their value would increase. Along with saving the fish, the catch-share system obviates the frenzy-mode of trying to catch as many fish as you can in a limited time. Guaranteed a share, fishermen could pursue their catch as they wish, going out on good days rather than bad, staying out longer to conserve both the fuel and manpower expended in the current herky-jerky fishing derbies. In Alaska, this system governs the halibut industry, where it's not only made for a flourishing fish population but, at the \$5-a-pound being paid last August by the canneries, has delivered a financial bonanza to halibut fishermen.

As with almost every fish-saving idea, the catch-share system produces winners and losers, and a large amount of controversy has followed in its track. Because the plan limits the number of shares to the total amount of fish that can be sustainably harvested, it inevitably results in a reduction in the number of fishing boats allowed on the water. Indeed, if this weren't the case, there would be no improvement over the old system, where too many boats went after too few fish, where no one made much money, and where the fish all but disappeared. Since catch shares went into effect in the mid-'90s in Alaska, for instance, the number of halibut boats has dropped from about 4,500 to 1,500, with the surviving few being generally well-financed operators who can afford to purchase a large number of fish shares.

The same sort of reduction looms ahead for communities on the East Coast, with a lot of unhappy fishermen as a result, especially those from families that have gone to sea for generations and now face being closed out of the business. Last fall in Gloucester, Mass., where the depletion of cod stocks in the waters off New England has reduced many in the local fishing community to a state close to impoverishment, some 300 angry fishermen from up and down the coast converged in protest on the regional office of the National Marine Fisheries Service, which enforces the catch-share system.

One idea for how to guarantee local fishermen a share of the catch is to expand the concept of catch shares to an entire community. Called a "community fishing quota," this plan would give a fishing village, such as Sand Point, the exclusive right to catch all the salmon within, say, 40 miles of its shores. Each resident fisherman would be allotted a portion of whatever number of fish biologists determined could be caught. His catch share could be sold back to the community or passed down to children, but it could not be transferred to the hands of outsiders. In this manner, the fish would be saved, the fishermen would be saved and the community would exist as a thriving economic enterprise. So far, the proposal has won few adherents, at least in Alaska, outside of some academics and special-interest advocates. "The politics would never play that way, because outside fishermen are just too strong," the economist Gunnar Knapp says. "You're talking about a couple of billion dollars annually in the fishing industry, and there's an enormous ongoing debate about who has access to that. Is it some politically astute guy who lives in Anchorage, where the decisions are made? Or is it some Aleut guy living 600 miles away?"

"So it's no wonder, when they talk about giving the fish to the people who live there, the reaction is: 'Ha Ha. Are you kidding?'" On one unusually nice day, with the sun actually peeking through the clouds, I returned to Balboa Bay to locate the site where my shack had been, to see if there remained any sign that I'd lived there. The boat captain taking me out was Geoff Flaherty, who in the fall works as a guide at a hunting camp on Bear Lake on the peninsula. He brought along his Remington .300 Magnum in case we surprised a bear in the alder bushes, an event he never considers beyond possibility when venturing onto the mainland.

We took the boat to the head of the bay, where four salmon streams flow down from the mountains and into a lagoon known as Albatross Anchorage. It's where the salmon gather in large numbers before the final rush. Today it seemed to be mostly silvers, leaping all over the place. We tried to catch some on a lure, but they weren't interested. Two brown bears appeared up at the head, about 500 yards away, swatting at fish in the stream, not paying us any attention. I found the field where my shack had been, a little spit of land jutting out to a point. It was still filled with tall grass and beach sunflowers blooming by the ocean. The shack was gone of course. I kicked around in the grass for remnants, but in 50 years just about everything decays into nothing. I recalled how the wind at night would make the building heave and sway, and I'd lie in my bed, giving thanks to the crew of the *Manning* for leaving me that piece of rope. I'd turn 21 at the end of the summer and knew I'd be going back east to face the expanse containing the rest of my life, whatever that would be — I wasn't one of those you'd call terribly career-directed. When the fishermen went in for the weekend, I'd sit against a drift log on the beach reading my favorite book of the summer, which was *Look Homeward, Angel* by Thomas Wolfe, searching for some clue in there about how to address what might be coming next. In the actual event, when I got back to Connecticut, I went to New York City and got a job in the advertising business, not from any clear-headed resolve but because I thought that's where you could at least meet girls. Through an ad in the *Times*, I became an advertising trainee for a firm on lower Madison Avenue, very much lower, it turned out, not the neighborhood of J. Walter Thompson and the other big agencies. Shortly I found myself traveling around the country, inspecting highway billboards for National Distillers brands. My task was to make sure advertisements for Old Crow bourbon or Gilbey's gin or a low-shelf blended whiskey called PM were not defiled by graffiti or relegated to low-traffic roads such as dead ends leading to the town dump. And as I'd retire for the day to my motel room in some town like Monroe, La., or Albert Lea, Minn., wondering how on earth I'd landed in such a place, I'd think back to my time in Balboa Bay and ask myself: Why did I leave? Why did I abandon what up to that point had been the best time of my life?

http://www.miller-mccune.com/business_economics/fishing-for-answers-in-alaska-1648?utm_source=Newsletter88&utm_medium=email&utm_content=1222&utm_campaign=newsletters

Time, the Infinite StorytellerBy ROBERTA SMITH

Time gets special consideration today. We sweep out the old and ring in the new, take stock, dust off some of those perennial resolutions and maybe even formulate one or two new ones. Depending on your age and the way things have been going lately, this annual rite is not necessarily easy.

So take refuge in art. There may be no better place — no place more stimulating or ultimately more comforting — to contemplate life's forward motion than a large museum, especially the great time machine that is the Metropolitan Museum of Art. The Met is closed today while most of us take a collective timeout for time, but — at least for now — there's always tomorrow.

In a way it seems a trifle odd that artworks are such superb instruments of time travel. Time is not visual, after all, unlike space. And most works in museums are static, unchanging objects. And yet art is loaded and layered with different forms of time and complexly linked to the past and the present and even the future. The longer they exist the more onionlike and synaptic they become.

For starters, each has withstood the test of time — a portentous phrase, but really no small thing: each object at the Met has been built to last by someone, for some reason. It may have fallen out of favor or fashion and lain undisturbed in the earth (or some attic) for centuries. But it remained intact long enough to be rediscovered, cherished once more, and studied, preserved and passed down through the generations for more of the same.

A special condition of art encourages such treatment. Each piece of it is a concentration or distillation of ideas, inspiration, sensibility and craftsmanship into a frozen, obdurately physical moment that focuses our attention and then unfolds in the mind. Sometimes what unfolds is a chronological narrative conveyed by a single representative image or a series of them; sometimes it is an intense experience that seems to take you out of time, yet persists and reverberates in the echo chamber of personal memory. Usually it is a combination of both.

At the Met time is everywhere, even in the labels, which not only tell us when a work was made but also when it entered the collection, joining the other moving parts of the glorious time machine.

But there are certain artworks that make us experience time with particular sharpness, deepening our emotional understanding of its nature. What follows is a tour of some of those pieces at the Met, arranged according to a few of the many ways time can inhabit art. These divisions are loose and permeable, as is inevitable with something as pervasive, powerful and unruly as time.

Time's Progress

One way or another, much art tells a story. That is, it depicts time on the move, at different rates, in slices of various thickness. Sometimes a narrative is so deeply embedded in cultural consciousness that a single moment from it, or maybe two — as in a before and after — can stand in for the epic whole.

The Robert Lehman Collection contains one of the Met's many highly efficient visual encapsulations of early history according to the Bible: Giovanni di Paolo's "Creation of the World and the Expulsion From Paradise," which presents two emblematic scenes. On one side, the blue-robed heavenly father brings the world into existence in the form of a globe complete with continents and rivers, and ringed by 11 bands of color — a pre-Galilean intimation of the solar system, albeit an Earth-centered one. On the other, we see Adam and Eve, naked and grieving, being ushered from a wooded grove by an angel.

Each image is legible on its own; together they give one rendition of the birth of mortal time: first came the world, and then, with the banishment from Eden, came death. (Before-and-afters are not always so consequential: upstairs from the Di Paolo in the 20th-century galleries, an early painting by [Andy Warhol](#) titled "Before and After I" spans the transformative time of a nose job.)

Sometimes the depiction of a single instant may suggest familiar events around it, but above all heighten our sense of the split-second before us, as in the Majolica plate, also in the Lehman Collection, that depicts Daphne turning into a tree to escape Apollo. His pursuit of her has rarely seemed quite so hot, given the wall of fire and ring of dark, sticky-bun-like spirals of smoke.

Life experiences also fill out the stories. In the European painting galleries we know that the beautiful soap bubble blown by Chardin's dreamy youth is just about to burst because we've all been there. Chardin's evocative freezing of the moment signals idle time and lost youth, but also the inexplicable pleasure and joy basic to both art and life. A similar instant is caught in a small relief in the Met's Egyptian wing, where the dominant time is mostly unchanging eternity. The relief, from the 18th Dynasty, shows the Pharaoh Akhenaten sacrificing a duck by giving its neck a sharp, visceral twist. Eternal or not, that is one freshly dead duck.

In art as in physics, time isn't necessarily linear. It can be compressed by memory, and some art reveals its simultaneity. Past and present are literally parallel on the Met's great Geometric period Greek krater, where bands of silhouettes show a dead hero on his bier, and, just below, recount some of his feats in battle. And in the newly reopened Japanese galleries, a hanging scroll by Kano Tsunenobu from the late 17th or early 18th century shows the painter's four favorite Chinese poets, who lived at different times, in the same landscape, admiring their favorite flowers (which symbolize the four seasons). Another layer of time: its style looks back, paying homage to Chinese painters of earlier centuries.

In the African art galleries on the first floor, what seems to be a single moment is experienced in two proximate but separate worlds — colonizer and colonized — in a wonderful carved-ivory altar and finial from 19th-century Congo. The upper band of figures show Europeans in suits talking, smoking, shaking hands, making deals. In the lower, loin-clothed natives are wrestled into captivity.

In the 20th-century art galleries Cubist paintings like Georges Braque's "Still Life With Banderillas" (1911), too, reminds us that any three-dimensional object — and thus any instant of time — is experienced from coexisting viewpoints.

Real Time

This would be time as we know it, and as known by regular people down through the ages, hinted at perhaps by Akhenaten's duck and Chardin's youth. But in truth, regular people and daily life are only intermittently present in art at the Met, where deities, saints, rulers and hybrids of them tend to dominate.

One of the greatest early depictions of real, nonroyal time at the Met is surely Pieter Bruegel's "Harvesters," in the European painting galleries on the second floor. This panoramic view shows men and women at work and at rest, sometime around noon on a 16th-century summer's day, in a wheat field somewhere in the European lowlands. Some eat, some loll, some keep scything; in the distance we see a wagon loaded with hay making its way toward an even more distant port. These are peasants, yet they seem to control their own time. Their freedom radiates around them and insulates them in that expanse of golden wheat.

Certain works of art make time real by incorporating it in the image. The clock and calendar on the wall in Otto Dix's 1922 portrait "The Businessman Max Roesberg, Dresden," in the 20th-century galleries specify that it is 1:32 in the afternoon on the 24th day of the month. Roesberg's sideways glance conveys quiet impatience amid this precision: What are you waiting for? he seems to ask. But Dix also took liberties with time, aging his subject — 32 when the portrait was painted — a good 20 years.

Few things make the historical past so immediately and efficiently available to the present as photography, and there is an extraordinary manifestation of that, too, at the Met — through this weekend at least — in the exhibition of Robert Frank's photographs of postwar Americans. Painting rarely measures up, although I would recommend Winslow Homer's photographlike "Veteran in a New Field," in the Met's "American Stories" exhibition. It depicts a Union soldier who has thrown his Army jacket on the ground and is cutting wheat as golden as Bruegel's.

But painting can be great for other aspects of real time — quality of light, for example, as is amply demonstrated in the Impressionist galleries of the Met's 19th-century European painting section. It is also good for exploring all-too-real forms of psychic time, as in Philip Guston's aptly titled "Stationary Figure" of 1973. It shows said figure in bed, prostrate — paralyzed really — with a bad case of night sweats or racing thoughts: wide awake, he smokes and stares, at the clock, the bare light bulb, the black sky visible through his window.

Mortal Time

Such anxiety tends to be tied directly or indirectly to the end of real time, aka mortality. It is hard to feel, in an art museum, alone in your fear of death, since it is one of the most common motivations for artists. To say that art has long tried to placate death, its gods or the dead themselves, or to achieve a comfortable afterlife, would be an understatement; think of the Met's Egyptian wing, filled mostly with items from royal tombs, or its galleries of European medieval art, where the lives of Jesus or the Christian saints are reiterated in work after work. And it could be argued that just about every object at the Met not intended to placate gods or commemorate the dead is an effort to live on beyond death in human memory. (Of course there's no penalty for trying to do both at once: the Raphael Madonna, to cite one of many examples.)

Mortality is made especially palpable by the deaths of our predecessors, starting with our parents, and paying respects has long been a way to ease our relationship with our own impending end. There is a comforting sense of filial bond in a Shang Dynasty tripod cauldron in the Chinese art galleries, which its label tells us is inscribed "made for deceased father Gui."

Finely detailed brass portraits of Benin kings in the African galleries were made by the succeeding sons — it was their first obligation. The cast heads were placed on altars in the palace in the hopes of exerting a positive influence on affairs of state, not unlike portraits of presidents in the White House.

Nearby, in a gallery devoted to Oceanic art, two fierce, elaborately carved Maori architectural ornaments invoke the protection of warrior ancestors. A more austere and realistic Sawos figure from Papua New Guinea in the 19th century or earlier is a primordial ancestor said to have been carried into battle for 10 generations.

When it comes to the death of an ordinary individual, precision about time can help dull the sting. A funerary altar from first-century Rome appears to be a very convincing account of the face of a noblewoman named Cominia Tyche, and notes her mortal span as “27 years, 11 months and 26 days.” A related precision can be found in a 19th-century theorem, or mourning picture, on view on the first floor of the American wing. In embroidery and watercolor on silk and paper, in a setting fringed by weeping willows, it portrays the survivors and grave monument of Daniel Goodman, the latter inscribed, as if incised, by an exact copy of his rather fulsome death announcement from Philadelphia newspapers.

The Gubbio Studiolo, arguably the Met’s greatest period room, is a walk-in attempt to transcend death. Commissioned in the late 15th century by Federico da Montefeltro for his palace in Gubbio, this small study is lined with elaborate wood inlay that depicts trompe l’oeil cabinetry and benches in honeyed tones. The contents of the cabinets include books, musical and scientific instruments, a pendant cross (and its shadow), weapons and an hourglass — all signaling the cultural pursuits, pastimes and manly responsibilities of a life well spent.

Somehow, an excellent chaser for this chamber is “Four Seasons,” a particularly wonderful Arcimboldo recently lent to the Met. It is the head of a man formed from wood stump, flowers and produce, a vanitas motif that also commemorates not only the erosions of time, but nature’s endurance.

Material Time

Some artworks make us especially conscious of the time they took to create. The Gubbio Studiolo speaks of awe-inspiring skill, patience and the desire for beauty. So does the tughra, or calligraphic signature, of Sulaiman the Magnificent, who ruled Ottoman Turkey in the 16th century, on view in the upper level of the Great Hall. Its sweeping strokes of blue, filled in with intricate blue and gold floral patterns, are the result of painstaking mastery and of a cultural sophistication refined over centuries. Appearing at the top of each of Sulaiman’s edicts, it lists all his titles and fittingly suggests a proud peacock.

Jackson Pollock’s dazzling drip painting “Autumn Rhythm” also awes, but with its sense of velocity. It conveys the painter’s movements and gestures, his “dance” around the canvas and his successive choices of color. As startling as the implied speed of its production is the way it so clearly expresses a new conception of painting.

Art also makes us aware of time by evoking other art, often leaping across chronological boundaries to connect styles, values or sensibilities. Sometimes this is done deliberately, as in a Gothic Revival prie-dieu from mid-19th-century Vienna or a noted late-17th-century pedestal clock in the Met’s Wrightsman galleries for French decorative arts, whose decorations represent a fairly mind-boggling synthesis of Egyptian sphinxes, Grecian urns and Renaissance grotesques.

Sometimes the connections are unintentional, more about the time machine of the human mind than the art. In the 19th-century European painting gallery lined with nothing but canvases by Cézanne, the veils of nervous, glancing brushstrokes can conjure Cubism and Pollock, as well as Guston, the worrier. But Pollock can also come to mind less logically in front of the wild staccato marks of “Riding a Donkey Through the Snow,” an ink painting by Huang Shen, an 18th-century Chinese artist, or Jean-Honoré



Fragonard's "Portrait of a Woman With a Dog," in which translucent slithers of maroon define her silk gown.

Time can be frozen midstream in unfinished works, making you feel "in the moment" with the artist, or slightly bereft. Manet's lush yet unsettled painting "The Funeral," possibly inspired by Baudelaire's sparsely attended burial in the summer of 1867, does both. The bare patches of canvas on a 16th-century court scene attributed to the German painter Jörg Breu the Younger further confuse time by making the painting seem almost modern.

And there's always vandalism, contributing its own epochal layers. Take the phrase "Leonardo 1820" jauntily carved by some 19th-century tourist into the gateway to the Temple of Dendur. Unfortunately it too qualifies as an attempt to live on through transformed materials.

Cosmic Time

All of these different kinds of time are encompassed by what even we of little faith call cosmic time. The Met contains more than a few visions of its power, among them Jan van Eyck's harrowing "Last Judgment" with its dark writhing mass of damned souls, as well as the implacable verticality and torn, smoldering colors of Clyfford Still's Abstract Expressionist paintings in the 20th-century art galleries.

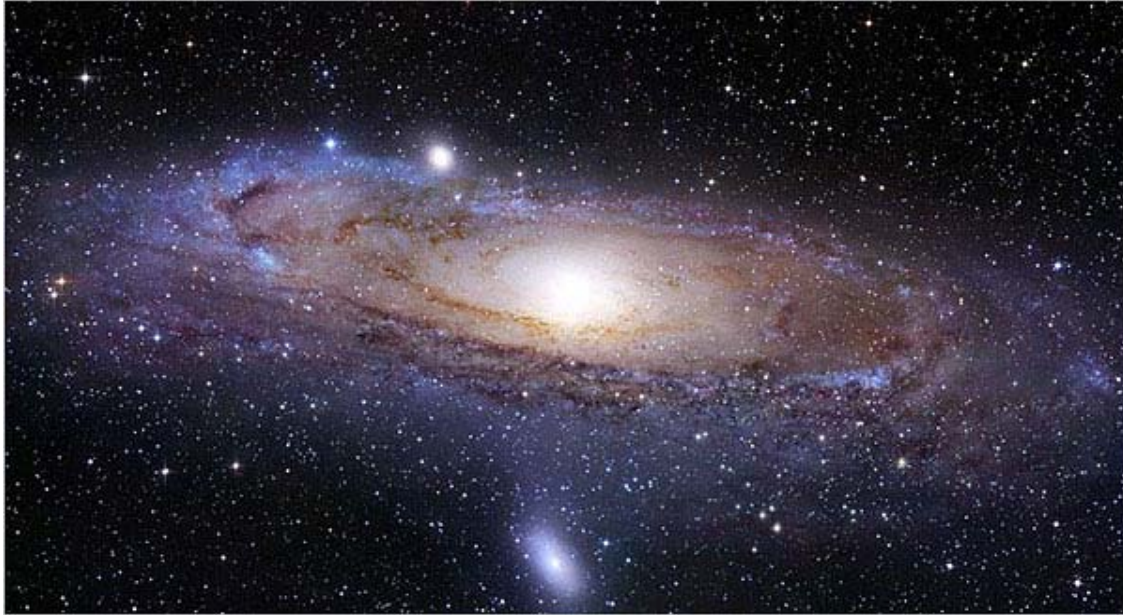
One of the museum's most dynamic and beneficent glimpses of the cosmos is a fabulous Chola bronze of Shiva from 11th-century India in the galleries for Asian art. The god is depicted in his incarnation as Nataraja, or Lord of the Dance, whirling at the center of the universe, encircled by a large nimbus that signifies its outer limits. His identity as Creator, Protector and Destroyer is indicated by various symbols and dance gestures (whose final tally skews positive, but who's counting?).

What rivets the eye even of non-Hindus is the sculpture's conflation of stillness and ecstatic, even violent, movement. Shiva is revolving with such force that his dreadlocks fan out, extending horizontally like lines of electricity on either side of his face. In another second they will wrap around his head, but in this one, and for all eternity, they connect him to the cosmos. That's one of the things art does for us.

<http://www.nytimes.com/2010/01/01/arts/design/01time.html?th&emc=th>

The Whole Earth Catalog: The Prequel

By KEN JOHNSON



Imagine the cosmos. What do you picture? A great void extending infinitely in all directions, sparsely dotted by stars, planets and other heavenly bodies, booby-trapped by black holes and traversed by light rays and magnetic fields? If you are a modern secularist that might be what you envision.

But what if you were a 16th-century Hindu? You might imagine a universe populated by gods, demons, monsters and other supernatural beings. You would behold great castles, paradisaical gardens and wilderness landscapes where stories of creation, love, sex, birth, initiation, war, death and resurrection are set.

This dichotomy is the subject of “Visions of the Cosmos: From the Milky Ocean to an Evolving Universe” at the Rubin Museum of Art. The show of 75 works is too modest to do justice to its enormous theme, but its juxtaposition of Western science and Eastern religion sets up a thought-provoking compare-contrast exercise.

One conclusion you might draw is that when it comes to inspiring visual art, Eastern cosmology has the advantage. This is misleading. While the Eastern side displays many captivating works of painting, sculpture and drawing representing Hindu, Buddhist and Jainist perspectives in sensuous detail, the European ideas are mostly in the form of printed illustrations in antique books, with astronomical photographs of the heavens taken by the Hubble space telescope and other high-tech machines representing current knowledge of the universe.

The selection serves mainly to show how Western cosmology evolved in response to increasingly accurate empirical observation. First we thought the Earth was still the center of the universe. Then we discovered that we were actually orbiting the Sun. Then we learned that our solar system was just a tiny blip on the universal radar screen. Meanwhile astrologists and alchemists theorized about magical correspondences between the stars and events on the ground, paving the way for the more credible sciences of astronomy and chemistry.

Finally we found ourselves adrift in the infinite, godless universe of modern science represented in the exhibition by a short, digital simulation produced by the American Museum of Natural History. It starts

with a satellite picture of the Himalayas and draws back for progressively more distant, expansive views: the whole Earth, the solar system, the Milky Way and so on.

There is no reason the West's picture of the universe cannot inspire great art, but it is not likely to precipitate the visual and metaphorical extravagance that the East's does. There is no comparison between a garishly colorful, digital abstraction representing the Big Bang theory and "Vishnu Sleeping on the Cosmic Ocean," an 11th-century sandstone sculpture representing the Creation. It shows Vishnu, the source of all existence, stirred from dormancy to a "pouring forth" of forms by a foot massage administered by his consort Lakshmi. Secularists might envy a worldview that conceives the origin of the universe in such sweetly erotic terms.

The Eastern side includes pseudoscientific diagrams similar to those in the old Western tomes. With their gridded number charts, astrological and magical notations and concentric circles symbolizing different dimensions of being, they give off a numinous vibe. But they do not represent an evolution of understanding that the West would recognize as scientific. It is more reasonable to think of Eastern cosmology as a projection of consciousness, the various elements of which are vigorously personified. That the male principal should be stimulated to productive action by the touch of the female principal, as in the sandstone Vishnu sculpture, says more about poetic imagination than about anything empirically verifiable.

Since Eastern cosmology is not constrained by science it is freer to give fantastic answers to big questions like how the world began and where it might be going. Its mythic scenarios come from publicly shared traditions, but they can have an almost surrealistic, dreamlike effect. Three small gouaches (two from the late 1600s and one from about 1785) representing a creation story called "The Churning of the Milky Ocean" are marvels of miniaturist craft and psychologically arresting image making. In each a team of demons and a team of gods play tug of war, pulling the ends of a giant snake whose middle wraps around a phallic-shaped mountain.

As the opponents exert themselves, the mountain, supported by an underwater tortoise, rotates and churns up treasures and magic elixirs from the oceanic depths. It surely is not much of a leap to see this as a metaphor about consciousness arising from tensions between psychologically opposed energies like those of the id and the superego.

What if anything the small, mid-18th-century painting of Krishna Vishvarupa, who has dozens of heads and scores of arms and legs, says about the nature of reality is hard to determine, but it is certainly a striking image of pluralistic consciousness and divine omniscience. And while the hierarchical architecture of a nearly 6-foot-tall, 11th-century copper stupa — a Buddhist reliquary — may offer a useful way to imagine a spiritual order, its value as a model of reality is doubtful.

Close study and creative interpretation may reveal surprising parallels between Eastern and Western cosmologies. Both have entertained theories of multiple realities, for example. But while Eastern cosmologists envision the enchanted inner world of mental experience, Westerners map the disenchanting outer realm of material reality. Only a wedding of the two perspectives — a marriage of the yin and the yang — is ever likely to yield a complete picture of the cosmos.

"Visions of the Cosmos: From the Milky Ocean to an Evolving Universe" is on view through May 10 at the Rubin Museum of Art, 150 West 17th Street, Chelsea; (212) 620-5000, rmany.org.

<http://www.nytimes.com/2010/01/01/arts/design/01cosmos.html?ref=design>

This Is English, Rules Are Optional

By NEIL GENZLINGER

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THE LEXICOGRAPHER'S DILEMMA

The Evolution of 'Proper' English, From Shakespeare to 'South Park'

By Jack Lynch

Illustrated. 326 pages, Walker & Company. \$26.



It's getting harder to make a living as an editor of the printed word, what with newspapers and other publications cutting staff. And it will be harder still now that Jack Lynch has published "The Lexicographer's Dilemma," an entertaining tour of the English language in which he shows that many of the rules that editors and other grammatical zealots wave about like cudgels are arbitrary and destined to be swept aside as words and usage evolve.

Also, despite what some fussbudget may have told you, civilization will not end when this happens.

Mr. Lynch, a professor of English at Rutgers University, subtitles his book "The Evolution of 'Proper' English, From Shakespeare to 'South Park,'" and those quotation marks around "proper" are telling. He takes us back to a time, half a millennium ago, when the very concept that there was a right and a wrong way to speak and spell things did not exist. Those edible things that come out of chickens were "egges" in the northern part of England and "eyren" in the southern. "Eggs" were still years in the future.

Not until the 17th century did people begin thinking that the language needed to be codified, and the details of who would do that and how have yet to be resolved. Should it be accomplished through a government-sponsored academy, an officially sanctioned dictionary, or what? These and other means were attempted, but meanwhile ordinary folks, dang them, kept right on talking and writing however they wanted, inventing words, using contractions and so on.

Odd quests against specific words and uses were cropping up even in the 1600s, and they reveal the modern-day grammar warriors who campaign against, say, “finalize” to be tomorrow’s ridiculous footnote. Jonathan Swift, for instance, had a thing about the word mob, a truncation of the Latin “mobile vulgus” (fickle crowd). Who knows how many other masterpieces he might have written had he not wasted all that energy fighting a battle that didn’t need fighting.

While some early writers were trying to pin English down, others were contributing to its disarray, as Mr. Lynch notes. “Another threat to good English,” he writes, “came from the poets, who, in order to get their lines to scan, had squeezed and mangled good English words until they were barely recognizable.”

And then there’s the matter of the split infinitive, which some today who fancy themselves grammatical purists cannot abide. Mr. Lynch points out that the split infinitive has actually gone in and out of fashion several times, for no apparent reason. Shakespeare, he says, “has only one split infinitive in his entire body of work,” but by the end of the 18th century infinitives were being split right and left, by the learned as well as the common folk. Then the tide shifted again and the poor split infinitive was an outcast again: “Whatever the reason, the prohibitions against it grew and grew until, by the early 20th century, it was among the most reprehensible of verbal crimes.”

Mr. Lynch, an expert on Samuel Johnson, spends a good deal of time on the evolution of dictionaries, doing a fine job of conveying the daunting task facing Johnson and all the dictionary makers since: How do you collect every known word, decide between competing spellings, reflect shades of meaning, separate faddish uses from the ones that will endure, and so on?

It is dictionary makers who have to confront most directly the dilemma of Mr. Lynch’s title. Is their job to tell people how the language should be used, or to reflect how it actually is used? Mr. Lynch, as might be expected, gives each view its due, but throughout this very readable book he makes clear that he thinks the grammar scolds need to shut up, or at least tone it down.

“Too often,” he writes, “the mavens and pundits are talking through their hats. They’re guilty of turning superstitions into rules, and often their proclamations are nothing more than prejudice representing itself as principle.”

And, as he notes in his final chapter, the grammatical doomsayers had better find themselves some chill pills fast, because the crimes-against-the-language rate is going to skyrocket here in the electronic age. There is already much whining about the goofy truncated vocabulary of e-mail and text messaging (a phenomenon Mr. Lynch sees as good news, not bad; to mangle the rules of grammar, you first have to know the rules). And the Internet means that English is increasingly a global language.

“All the signs point to a fundamentally reconfigured world,” he writes, “in which what we now think of as the English-speaking world will eventually lose its effective control of the English language.”

<http://www.nytimes.com/2010/01/01/books/01book.html?ref=books>

‘They Planted Hatred in Our Hearts’

By PATRICK COCKBURN

[Skip to next paragraph](#)**FOOTNOTES IN GAZA**

Written and illustrated by Joe Sacco

418 pp. Metropolitan Books/Henry Holt & Company. \$29.95



Joe Sacco’s gripping, important book about two long-forgotten mass killings of Palestinians in Gaza stands out as one of the few contemporary works on the Israeli-Palestinian struggle likely to outlive the era in which they were written.

Sacco will find readers for “Footnotes in Gaza” far into the future because of the unique format and style of his comic-book narrative. He stands alone as a reporter-cartoonist because his ability to tell a story through his art is combined with investigative reporting of the highest quality.

His subject in this case is two massacres that happened more than half a century ago, stirred up little international attention and were forgotten outside the immediate circle of the victims. The killings took place during the Suez crisis of 1956, when the Israeli Army swept into the Gaza Strip, the great majority of whose inhabitants were Palestinian refugees. According to figures from the United Nations, 275 Palestinians were killed in the town of Khan Younis at the southern end of the strip on Nov. 3, and 111 died in Rafah, a few miles away on the Egyptian border, during a Nov. 12 operation by Israeli troops. Israel insisted that the Palestinians were killed when Israeli forces were still facing armed resistance. The Palestinians said all resistance had ceased by then.

Sacco makes the excellent point that such episodes are among the true building blocks of history. In this case, accounts of what happened were slow to seep out and were overshadowed by fresh developments in the Suez crisis. Sacco, whose reputation as a reporter-cartoonist was established with “Palestine” and “Safe Area Gorazde,” has rescued them from obscurity because they are “like innumerable historical tragedies over the ages that barely rate footnote status in the broad sweep of history — even though . . . they often contain the seeds of the grief and anger that shape present-day events.”

Governments and the news media alike forget that atrocities live on in the memory of those most immediately affected. Sacco records Abed El-Aziz El-Rantisi — a leader of Hamas (later killed by an Israeli missile), who in 1956 was 9 and living in Khan Younis — describing how his uncle was killed: “It left a wound in my heart that can never heal,” he says. “I’m telling you a story and I am almost crying. . . . They planted hatred in our hearts.”

The vividness and pace of Sacco's drawings, combined with a highly informed and intelligent verbal narrative, work extremely well in telling the story. Indeed, it is difficult to imagine how any other form of journalism could make these events so interesting. Many newspaper or television reporters understand that the roots of today's crises lie in obscure, unpublicized events. But they also recognize that their news editors are most interested in what is new and are likely to dismiss diversions into history as journalistic self-indulgence liable to bore and confuse the audience.

In fact, "Footnotes in Gaza" springs from this editorial bias against history. In the spring of 2001, Sacco and Chris Hedges (formerly a foreign correspondent of *The New York Times*) were reporting for *Harper's Magazine* about Palestinians in Khan Younis during the early months of the second Palestinian intifada. They believed the 1956 killings helped explain the violence almost 50 years later. Perhaps predictably, however, the paragraphs about the old massacre were cut.

American editors weren't the only people who found their delving into history beside the point. When Sacco returned to Gaza to search for witnesses and survivors in 2002 and 2003, with Israeli forces still occupying the area, young Palestinians could not understand his interest in past events when there was so much contemporary violence.

Sacco's pursuit of Palestinian and Israeli eyewitnesses as well as Israeli and United Nations documentation is relentless and impressive. He details the lives of those who help him, notably his fixer Abed, and brings to life two eras of the Gaza Strip, its towns packed with refugees in the early 1950s as they are today.

It was an atmosphere filled with hate. Few Israeli leaders showed any empathy for the Palestinian tragedy. But early in 1956, the Israeli chief of staff Moshe Dayan made a famous speech at the funeral of an Israeli commander killed on the border with Gaza. What, Dayan wondered, explained the Palestinians' "terrible hatred of us"? Then he answered his own question: "For eight years now they have sat in the refugee camps of Gaza, and have watched how, before their very eyes, we have turned their lands and villages, where they and their forefathers previously dwelled, into our home." He added that Israelis needed to be "ready and armed, tough and harsh."

What this meant in practice became clear as Israeli troops took over Gaza six months later. The killings in Khan Younis were relatively straightforward, according to eyewitnesses and a few survivors. The men of the town were told to line up in the main square and were then systematically shot so their bodies lay in a long row. Some who stayed in their homes were killed there.

The episode in Rafah was more complicated and took place over the course of a day, when people were summoned to a school so the Israelis could determine if they were guerrillas or soldiers. Here there were many more survivors than in Khan Younis; they describe how some were shot on their way to the school and others beaten to death with batons as they entered the school courtyard. The Israeli Army did order two officers to conduct an inquiry into the "Rafah incident," as a top-secret communiqué called it. (The same communiqué said 40 to 60 people were killed and 20 injured.) Sacco's researcher found no report in military archives. Gaza has changed radically since Sacco did his research. In 2005, Israel unilaterally dismantled Jewish settlements and withdrew its military forces, although it remained in tight control of Gaza's borders. In 2007, Hamas seized control, and in 2008-9 the enclave came under devastating Israeli attack. In this bewildering torrent of events, Sacco's investigation into the 50-year-old killings is one of the surest guides to the hatred with which Palestinians and Israelis confront one another.

Patrick Cockburn is the author of "Muqtada: Muqtada Al-Sadr, the Shia Revival, and the Struggle for Iraq."

<http://www.nytimes.com/2009/12/27/books/review/Cockburn-t.html?ref=books>

New and Creative Leniency for Overdue Library Books

By SUSAN SAULNY and EMMA GRAVES FITZSIMMONS



CHICAGO — In the Illinois towns of Joliet and Palos Park, the economic downturn has pushed the public libraries into the grocery business, of sorts. Patrons with overdue books and hefty outstanding fines were recently given a way to clear their records: Donate canned goods or other groceries through the library to local shelters and food pantries.

Dozens of library patrons in both towns jumped at the opportunity.

In Colorado, despite a multimillion-dollar deficit, the Denver Public Library has practically done away with fixed-rate fines. Now librarians there are free to negotiate a fee structure that feels fair to them based on individual cases, or to charge nothing at all.

Since the beginning of the economic downturn, librarians across the country have speculated that fines for overdue items are keeping people from using the library — particularly large families whose children take out (and forget to return) many books at a time. Some libraries learned that the fines, which are often as low as 25 cents an item per day, quickly multiplied for many people and were becoming an added hardship.

“We can’t push the cost to consumers because they’re also struggling,” said Richard Sosa, the finance director of the Denver system, which has \$9 million worth of books in circulation through 23 libraries and two bookmobiles. “The library philosophy is: We do not want to restrict access to information. The use of fines or harsh collection tactics — and we could potentially do that — could essentially restrict people’s access to the library.”

And another thing: They need their books back.

As a result, libraries have been instituting amnesty days and weeks with increasing frequency this year, and offering programs such as “food for fines.” In Joliet, about 60 miles southwest of here, the program went well beyond groceries, and benefited a local social service agency that serves the needy.

“Toiletries, clothing — people could bring in just about anything,” said John Spears, the director of the Joliet library. “It went very well. I think these kinds of things are a win-win for everyone.”

The Conneaut Public Library in Conneaut, Ohio, has a list of more than 1,000 people who cannot use the system because of fines, and the staff has been contacting the long lost patrons to ask them to come back.

The food for fines program there, which started around Thanksgiving and runs through New Year's Day, offers this deal: Take the amount owed, divide it in half, and give that number of items to the Conneaut Food Pantry. For instance, if a family owes \$50, it can donate 25 canned goods to the pantry, and the fines will disappear.

"Behind my circulation desk, I have boxes and boxes of food that people are stumbling over," said Kathy Pape, the library's executive director. "The response has been overwhelming."

Other libraries are accepting any amount of food in exchange for returned materials. And the ones that are offering amnesty require nothing at all.

"We service an area that's extremely depressed, in the foothills of East Tennessee in the Smoky Mountains," said Aliceann McCabe, the director of the Audrey Pack Memorial Library in Spring City, Tenn., where an amnesty week ended Dec. 18. "Our computer use has tripled thanks to unemployment claims and things. This is our Christmas present to the people who use our library. We don't want to ding them with fines."

Ms. McCabe recounted the story of one woman who had \$196 in outstanding fines forgiven. The library, for its part, got her 10 books back in circulation. For a country library that only has 27,000 books in its collection, "that's a lot," Ms. McCabe said.

The Monterey County Free Library system in Monterey, Calif., has reclaimed more than 1,000 books since offering end-of-the-year amnesty to patrons in November and December.

"We thought, People are suffering, having a hard time, so let's give them a break and get our books back," said Jayanti Addleman, the county librarian.

But Ms. Addleman and others said they often faced a common-sense question from users and management: Why not raise fines to make money and serve more people?

The librarians say the new leniency makes sense. "What's going to keep my library doors open is the bigger picture," Ms. Pape said. "It isn't going to be a hundred-odd dollars here and there."

Mr. Sosa, in Denver, added: "A certain level of fines and fee structure is important to have people realize that these are important public materials, and that's how libraries work in a democracy. But at the same time, we're trying to figure out, when does a fee prohibit someone who's on the brink economically from using our service? We're cognizant of what we're doing."

In Pelham, N.H., the public library director, Robert Rice, offered a food-for-fines program during November.

"We will probably continue that policy once the new year starts," Mr. Rice said. "The loss in terms of money was maybe \$20 a day. We well made up for it with the amount of food that came in."

He continued: "We got our materials back and did something positive for the community. Use is up greatly, and budgets are being cut. But we're not going anywhere. We're keeping the doors open."

<http://www.nytimes.com/2009/12/29/us/29library.html?ref=books>

Dissertations on His DudenessBy DWIGHT GARNER

Joel and Ethan Coen's 1998 movie, "The Big Lebowski," which stars Jeff Bridges as a beatific, pot-smoking, bowling-obsessed slacker known as the Dude, snuck up on the English-speaking world during the '00s: it became, stealthily, the decade's most venerated cult film. It's got that elusive and addictive quality that a great midnight movie has to have: it blissfully widens and expands in your mind upon repeat viewings.

"The Big Lebowski" has spawned its own shaggy, fervid world: drinking games, Halloween costumes, bumper stickers ("This aggression will not stand, man") and a drunken annual festival that took root in Louisville, Ky., and has spread to other cities. The movie is also the subject of an expanding shelf of books, including "The Dude Abides: The Gospel According to the Coen Brothers" and the forthcoming "The Tao of the Dude."

Where cult films go, academics will follow. New in bookstores, and already in its second printing, is "The Year's Work in Lebowski Studies," an essay collection edited by Edward P. Comentale and Aaron Jaffe (Indiana University Press, \$24.95). The book is, like the Dude himself, a little rough around the edges. But it's worth an end-of-the-year holiday pop-in. Ideally you'd read it with a White Russian — the Dude's cocktail of choice — in hand. More than a few of this book's essay titles will make you groan and laugh out loud at the same time ("The Big Lebowski" and Paul de Man: Historicizing Irony and Ironizing Historicism"). But just as often, the writing here is a bit like the film: amiable, laid-back and possessed of a wobbly Zen-acuity.

In one essay Fred Ashe — he is an associate professor of English at Birmingham-Southern College — profitably compares the Dude to Rip van Winkle, for both his "friendly charisma" and what Washington Irving described as Rip's "insuperable aversion to all kinds of profitable labor." Both men, Mr. Ashe notes, expose "the sickness of a straight society premised on the Puritan work ethic." In another, "On the White Russian," Craig N. Owens — he teaches literature and writing at Drake University in Des Moines — divides the world into two factions: those who float the cream on their White Russians ("the floaters") and those who mix it in ("the homogenizers"). He praises the Dude's "middle way," avoiding the hassle of "shaking and straining."

At times Mr. Owens sounds as if he's been hitting the minibar himself. He writes about how Leon Trotsky is "doubly implicated" in the White Russian, first because he helped defeat the anti-Communist

White Russian army during the Russian civil war, and second because he later fled to Mexico, “Kahlúa’s country of origin.” Mr. Owens suggests that the Dude has a kind of “Trotskyan positionality.”

Most of the essays in “The Year’s Work in Lebowski Studies” began as papers presented at the 2006 Lebowski Fest in Louisville. Working at an unhurried, Dude-like crawl, it took the editors three years to wrap these papers up and usher them into print. “When we first put out a call for papers, we received about 200 proposals,” said Mr. Comentale, an associate professor of English at Indiana University, Bloomington, whose previous books include “Modernism, Cultural Production and the British Avant-Garde” and “T. E. Hulme and the Question of Modernism.”

When putting the book together, Mr. Comentale said, he and his co-editor “immediately cut out all the papers celebrating the Dude as a hippie hero in a postmodern landscape.” That’s a sober choice. Admirers of the Dude are already dangerously close to becoming Internet-age versions of Parrotheads, the weekend-warrior [Jimmy Buffett](#) fans who tip back margaritas — and embarrass their children — while wearing flip-flops, board shorts, Hawaiian shirts and coconut bras. “Trying to impress your academic colleagues and also make a dent in the popular market, that’s a fine line to walk,” Mr. Comentale added. “We wanted these essays to press the connection between the goofy and the profound.”

Reading “The Year’s Work in Lebowski Studies,” it’s hard not to recall some of the profound and not-so-goofy things the novelist Umberto Eco had to say about cult movies in his 1984 essay “‘Casablanca’: Cult Movies and Intertextual Collage.” “What are the requirements for transforming a book or movie into a cult object?” Mr. Eco asked. “The work must be loved, obviously, but this is not enough. It must provide a completely furnished world so that its fans can quote characters and episodes as if they were aspects of the fan’s private sectarian world, a world about which one can make up quizzes and play trivia games so that the adepts of the sect recognize through each other a shared expertise.”

(If the phrases “Nice marmot,” or “You’re entering a world of pain,” or “I can get you a toe” mean anything to you, then “Lebowski” has entered your private sectarian world.) Mr. Eco certainly seemed to presage the existence of “The Big Lebowski” when he wrote in his essay about “Casablanca” that a cult movie must be “ramshackle, rickety, unhinged in itself.” He explained: “Only an unhinged movie survives as a disconnected series of images, of peaks, of visual icebergs. It should display not one central idea but many. It should not reveal a coherent philosophy of composition. It must live on, and because of, its glorious ricketiness.”

The glue that holds “The Big Lebowski” together, as gloriously rickety as it is, is Mr. Bridges’ performance. [Pauline Kael](#) once observed that Mr. Bridges, who is gathering Oscar buzz this month for his performance as a down-on-his-luck country singer in “Crazy Heart,” “may be the most natural and least self-conscious screen actor that has ever lived.” In an essay in “The Year’s Work in Lebowski Studies,” Thomas B. Byers — he is a professor of English at the [University of Louisville](#) — points out that more mainstream actors like [Harrison Ford](#) or [Kevin Costner](#) or [Tom Hanks](#) could not have pulled off the role of the Dude. “What makes Bridges less of a star is precisely what makes him perfect for ‘Lebowski,’ whose particular niche of success depends on its outsider, cult status,” Mr. Byers writes.

As a new generation of “Lebowski” fans emerges, Dude Studies may linger for a while. In another of this book’s essays, “Professor Dude: An Inquiry Into the Appeal of His Dudeness for Contemporary College Students,” a bearded, longhaired and rather Dude-like associate professor of English at James Madison University in Harrisonburg, Va., named Richard Gaughran asks this question about his students: “What is it that they see in the Dude that they find so desirable?” One of Mr. Gaughran’s students came up with this summary, and it’s somehow appropriate for an end-of-the-year reckoning: “He doesn’t stand for what everybody thinks he should stand for, but he has his values. He just does it. He lives in a very disjointed society, but he’s gonna take things as they come, he’s gonna care about his friends, he’s gonna go to somebody’s recital, and that’s it. That’s how you respond.”

http://www.nytimes.com/2009/12/30/books/30lebowski.html?_r=1&ref=books

Ginkgo Biloba Does Not Appear to Slow Rate of Cognitive Decline

ScienceDaily (Dec. 30, 2009) — Older adults who used the herbal supplement Ginkgo biloba for several years did not have a slower rate of cognitive decline compared to adults who received placebo, according to a new study.

"Ginkgo biloba is marketed widely and used with the hope of improving, preventing, or delaying cognitive impairment associated with aging and neurodegenerative disorders such as Alzheimer disease," the authors write. "Indeed, in the United States and particularly in Europe, G biloba is perhaps the most widely used herbal treatment consumed specifically to prevent age-related cognitive decline." However, evidence from large clinical trials regarding its effect on long-term cognitive functioning is lacking.

Beth E. Snitz, Ph.D., of the University of Pittsburgh, and colleagues analyzed outcomes from the Ginkgo Evaluation of Memory (GEM) study to determine if G biloba slowed the rate of cognitive decline in older adults who had normal cognition or mild cognitive impairment (MCI) at the beginning of the study. The GEM study previously found that G biloba was not effective in reducing the incidence of Alzheimer dementia or dementia overall. The randomized, double-blind, placebo-controlled clinical trial included 3,069 community-dwelling participants, ages 72 to 96 years, who received a twice-daily dose of 120-mg extract of G biloba (n = 1,545) or identical-appearing placebo (n = 1,524). The study was conducted at six academic medical centers in the United States between 2000 and 2008, with a median (midpoint) follow-up of 6.1 years. Change in cognition was assessed by various tests and measures.

In this study, the largest randomized controlled trial of G biloba to report on outcomes to date, the researchers found no evidence for an effect of G biloba on global cognitive change and no evidence of effect on specific cognitive domains of memory, language, attention, visuospatial abilities and executive functions. They also found no evidence for differences in treatment effects by age, sex, race, education or baseline cognitive status (MCI vs. normal cognition).

"In sum, we find no evidence that G biloba slows the rate of cognitive decline in older adults. These findings are consistent with previous smaller studies examining prevention of decline and facilitation of cognitive performance and with the 2009 Cochrane review of G biloba for dementia and cognitive impairment."

Story Source:

Adapted from materials provided by [JAMA](#) and [Archives Journals](#).

Journal Reference:

1. Beth E. Snitz, PhD; Ellen S. O'2019Meara, PhD; Michelle C. Carlson, PhD; Alice M. Arnold, PhD; Diane G. Ives, MPH; Stephen R. Rapp, PhD; Judith Saxton, PhD; Oscar L. Lopez, MD; Leslie O. Dunn, MPH; Kaycee M. Sink, MD; Steven T. DeKosky, MD; for the Ginkgo Evaluation of Memory (GEM) Study Investigators Evaluation of Memory (gem) Study Investigators. **Ginkgo biloba for Preventing Cognitive Decline in Older Adults**. *JAMA*, 2009;302(24):2663-2670. [[link](#)]

<http://www.sciencedaily.com/releases/2009/12/091229164938.htm>

How Fine Particulates Are Formed in the Air



PSI scientists Urs Baltensperger and André Prévôt with the mass spectrometer that made new insights into the creation of particulates in the atmosphere possible. (Credit: Image courtesy of Paul Scherrer Institut (PSI))

ScienceDaily (Dec. 29, 2009) — A huge variety of chemical processes takes place on a continuous basis in the atmosphere; large molecules may be disintegrating to form smaller molecules, and small molecules may be coming together to form larger units, attaching themselves to small airborne particles. However, the important changes taking place within organic matter in the atmosphere can be understood without following every single one of the many thousands of substances present in the air.

Researchers were able to demonstrate that they only needed to investigate those few specific chemical properties that are particularly significant to the atmospheric behaviour of the substances. "For example, the ratio of oxygen to carbon in a substance affects its ability to absorb water -- and is therefore relevant to the ability of fine particulates to seed clouds," explains André Prévôt, who leads the project at the Paul Scherrer Institute.

Development of fine particulates reconstructed in lab

The constant chemical changes taking place in the atmosphere also mean that the composition of fine particulates is similar in almost every corner of the world -- regardless of the precise source materials. However, researchers demonstrated that the properties of particular source materials can be recreated from the fine particulates. To do this, they initially used the smog chamber at the Paul Scherrer Institute to simulate the changes within individual materials in the atmosphere.

"We were able to use these results in conjunction with a complex statistical process to determine the type of source materials from which the fine particulates had originated. Additional procedures, such as the C14 method, can then be used to establish the exact sources -- whether, for example, substances come from woodland or from exhaust gases," explains Urs Baltensperger, Head of the Atmospheric Chemistry Laboratory at the Paul Scherrer Institute.

Fine particulates at different locations: a hazard to health or seeding for cloud formation



The detailed investigations into the make-up of the fine particulates were made possible by a novel type of device -- a special mass spectrometer -- which can be used to analyse the composition of the air with a time resolution of one minute. The researchers took measurements at 26 different sites in the northern hemisphere. PSI was responsible for two very different locations in Switzerland: Zurich's inner city and the Jungfrauoch -- in the Swiss Alps at 3450 meters. The Zurich measurements were important primarily from the point of view of the effect of gaseous emissions on health, while the measurements on the Jungfrauoch concentrated on issues involving cloud formation.

The work of the PSI researchers was supported by the Swiss National Science Foundation (SNSF).

Story Source:

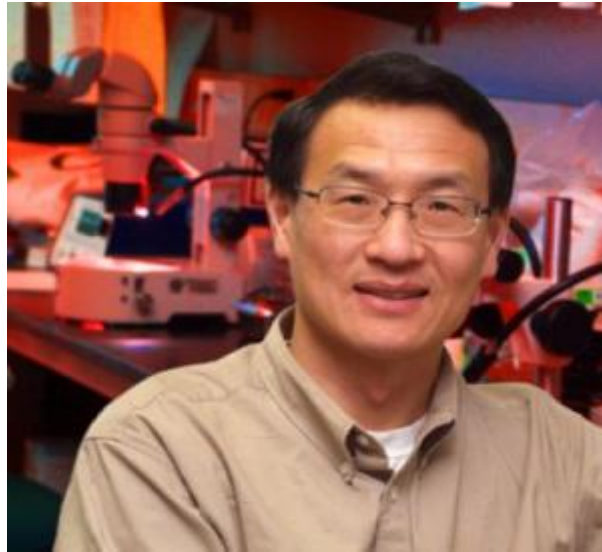
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Journal Reference:

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<http://www.sciencedaily.com/releases/2009/12/091215172327.htm>

Schizophrenia Mouse Model Should Improve Understanding and Treatment of the Disorder



Scientists at the Medical College of Georgia have created what appears to be a schizophrenic mouse by reducing the inhibition of brain cells involved in complex reasoning and decisions about appropriate social behavior. Pictured is Dr. Lin Mei, a developmental neurobiologist who directs MCG's Institute of Molecular Medicine and Genetics. (Credit: Medical College of Georgia)

ScienceDaily (Dec. 29, 2009) — Scientists have created what appears to be a schizophrenic mouse by reducing the inhibition of brain cells involved in complex reasoning and decisions about appropriate social behavior.

Findings by Medical College of Georgia scientists, published Dec. 28 in the *Proceedings of the National Academy of Sciences*, elucidate the critical balance between excitation and inhibition of these cells that appears to go awry in schizophrenia. They also provide the first animal model for studying the disabling psychiatric disorder that affects about 1 percent of the population.

"We believe the mouse, which exhibits some of the same aberrant behavior as patients with this disorder, will help identify better therapies," said Dr. Lin Mei, a developmental neurobiologist who directs MCG's Institute of Molecular Medicine and Genetics. "We are doing testing to see if antipsychotic drugs already on the market are effective in treating the mouse."

MCG scientists made the mouse by deleting a candidate gene for schizophrenia, ErbB4, from interneurons, which are brain cells that help shower larger decision-making neurons, called pyramidal cells, with inhibition.

In their earlier work, they identified how ErbB4 and another candidate gene, neuregulin-1, work together to balance the activity of these pyramidal cells. They reported in *Neuron* in May 2007 that the two help keep a healthy balance between excitation and inhibition by increasing release of GABA, a major inhibitory neurotransmitter in the inhibitory synapses of the brain's prefrontal cortex. Seven years earlier, they showed the two also put a damper on excitatory synapses, communication points between neurons where the neurotransmitter glutamate excites cells to action.

To further test these findings, this time they altered the natural check and balance in cells directly involved with supplying pyramidal neurons with the inhibitor GABA. They did this by knocking out the ErbB4 gene in nearby chandelier and basket interneurons that supply GABA to pyramidal cells. "If we take out ErbB4 in these two interneurons, the neuregulin should have no effect because it can't promote GABA," Dr. Mei, Georgia Research Alliance Eminent Scholar in Neuroscience, said.



His postulation played out in the behavior of the mouse, who exhibited schizophrenia-like behavior including increased movement and impaired short-term memory. The scientists are still gathering data on the manic aspect of schizophrenia in their mice.

For example, both the normal and knockout mice learned they would find a food pellet in each arm of an eight-armed chamber but that if they went to the same arm for seconds, there were none. But the knockouts took longer to learn and finish the task. Knockouts also spent a lot more time sniffing and snooping around and revisiting empty arms.

In another test, knockouts couldn't -- or wouldn't -- make the connection that a relatively low noise would be followed by a slightly louder one. When they treated the knockouts with diazepam, an anti-anxiety medication, they responded similarly to the normal mice: the first sound prepared them for the second.

Dr. Mei suspects that if he could look at the chandelier and basket interneurons in the prefrontal cortex of schizophrenics, he would also find something wrong with their usual role of sensing the need for the inhibitor GABA and supplying it to the pyramidal cells. "In schizophrenia, the baseline of the excitatory neurotransmitter is probably high," he said.

The research was funded by the National Institutes of Health and the National Alliance for Research on Schizophrenia and Depression, for which he is a distinguished investigator.

Co-authors include MCG scientists Drs. Wen-Cheng Xiong, Alvin Terry and Almira Vazdarjanova and postdoctoral fellows Drs. Lei Wen, Yi-Sheng Lu and Xin-Hong Zhu.

Story Source:

Adapted from materials provided by [Medical College of Georgia](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/12/091228163308.htm>



Climate Wizard Makes Large Databases of Climate Information Visual, Accessible



Climate Wizard, as shown in the above screenshot, is a new web tool aimed at making it easier to explore climate data interactively. (Credit: www.climatewizard.org)

ScienceDaily (Dec. 29, 2009) — A Web tool that generates color maps of projected temperature and precipitation changes using 16 of the world's most prominent climate-change models is being used to consider such things as habitat shifts that will affect endangered species, places around the world where crops could be at risk because of drought and temperatures that could cripple fruit and nut production in California's Great Central Valley.

Climate Wizard, a tool meant for scientists and non-scientists alike, is being demonstrated by The Nature Conservancy in Copenhagen, Denmark, in conjunction with the climate summit underway there. It also is the subject of a presentation Tuesday, Dec. 15, at the American Geophysical Union meeting in San Francisco and a paper just released online by the Public Library of Science's PLoS ONE with Evan Girvetz as lead presenter and lead author. Girvetz worked on Climate Wizard during postdoctoral work at the University of Washington's School of Forest Resources and just accepted a job with The Nature Conservancy.

"Climate Wizard is meant to make it easier to explore climate data in an interactive way," Girvetz says. "It makes the data accessible in ways that are more intuitive, even for people who are not climate scientists."

For example, data used by the U.N. Intergovernmental Panel on Climate Change, the science organization evaluating the risks of climate change, is made visual and more readily understandable through Climate Wizard. Politicians, resource managers and citizens are all potential users, Girvetz says. Find Climate Wizard at <http://www.climatewizard.org/>.

Climate Wizard, a joint effort among the UW, University of Southern Mississippi and The Nature Conservancy, lets users focus on states, countries or regions around the world and apply different scenarios to generate color-coded maps of changes in temperature and precipitation that can, in turn, be used to consider such things as moisture stress in vegetation and freshwater supplies.

Users can choose from a number of parameters. For example, one can look at the climate of the past 50 years or projections for mid-century, the 2050s, or toward the end of the century, the 2080s. Among other

variables, one can generate maps based on the Intergovernmental Panel on Climate Changes' estimates of greenhouse gas emissions being high, medium or low in the future.

One can consider the projections from each of 16 individual climate models. Girvetz recommends using one of the newest features added to the program, the ability to create an ensemble of some or all of the 16 models. Want to average the temperatures of, say, the 12 climate models that forecast the largest temperature increases? Climate Wizard can do so almost instantaneously.

"Ensembles can give a better range of future possible climate changes compared to using a single model," he says.

Girvetz was the project's analytical lead, taking the 16 climate models and organizing the data from them so they could be queried. Chris Zganjar of The Nature Conservancy brought expertise about user experiences and George Raber of the University of Southern Mississippi developed a Web site to connect to the data sets organized by Girvetz. Other authors on the PLoS ONE paper are Edwin Maurer, Santa Clara University; Peter Kareiva, The Nature Conservancy, Seattle; and Joshua Lawler, UW assistant professor of forest resources.

"Because of the size and format of the datasets, climate data are notoriously unwieldy," Lawler says. "Climate Wizard makes those data readily available to a much wider audience."

Climate Wizard was funded by and initially developed for The Nature Conservancy planners and scientists wanting climate change information when considering such things as priorities for habitat protection efforts.

Story Source:

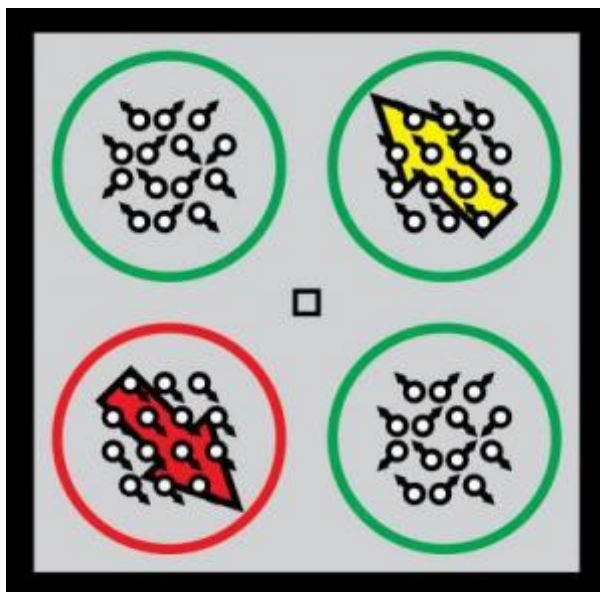
Adapted from materials provided by [University of Washington](#).

Journal Reference:

1. Evan H. Girvetz, Chris Zganjar, George T. Raber, Edwin P. Maurer, Peter Kareiva, Joshua J. Lawler. **Applied Climate-Change Analysis: The Climate Wizard Tool**. *PLoS ONE*, 2009; 4 (12): e8320 DOI: [10.1371/journal.pone.0008320](https://doi.org/10.1371/journal.pone.0008320)

<http://www.sciencedaily.com/releases/2009/12/091215145050.htm>

Seeing Without Looking: Brain Structure Crucial for Moving the Mind's Spotlight



During the motion discrimination task the test subjects had to fixate their gaze at the square in the middle while reporting the direction of movement in the red circle. (Credit: Image courtesy of Lee Lovejoy, Salk Institute for Biological Studies)

ScienceDaily (Dec. 29, 2009) — Like a spotlight that illuminates an otherwise dark scene, attention brings to mind specific details of our environment while shutting others out. A new study by researchers at the Salk Institute for Biological Studies shows that the superior colliculus, a brain structure that primarily had been known for its role in the control of eye and head movements, is crucial for moving the mind's spotlight.

Their findings, published in the Dec. 20, 2009, issue of the journal *Nature Neuroscience*, add new insight to our understanding of how attention is controlled by the brain. The results are closely related to a neurological disorder known as the neglect syndrome, and they may also shed light on the origins of other disorders associated with chronic attention problems, such as autism or attention deficit disorder.

"Our ability to survive in the world depends critically on our ability to respond to relevant pieces of information and ignore others," explains graduate student and first author Lee Lovejoy, who conducted the study together with Richard Krauzlis, Ph.D., an associate professor in the Salk's Systems Neurobiology Laboratory. "Our work shows that the superior colliculus is involved in the selection of things we will respond to, either by looking at them or by thinking about them."

As we focus on specific details in our environment, we usually shift our gaze along with our attention. "We often look directly at attended objects and the superior colliculus is a major component of the motor circuits that control how we orient our eyes and head toward something seen or heard," says Krauzlis.

But humans and other primates are particularly adept at looking at one thing while paying attention to another. As social beings, they very often have to process visual information without looking directly at each other, which could be interpreted as a threat. This requires the ability to attend covertly.

It had been known that the superior colliculus plays a role in deciding how to orient the eyes and head to interesting objects in the environment. But it was not clear whether it also had a say in covert attention.



In their current study, the Salk researchers specifically asked whether the superior colliculus is necessary for covert attention. To tease out the superior colliculus' role in covert attention, they designed a motion discrimination task that distinguished between control of gaze and control of attention.

The superior colliculus contains a topographic map of the visual space around us, just as conventional maps mirror geographical areas. Lovejoy and Krauzlis exploited this property to temporarily inactivate the part of the superior colliculus corresponding to the location of the cued stimulus on the computer screen. No longer aware of the relevant information right in front of them the subjects instead based all of their decision about the stimulus' movement on irrelevant information found elsewhere on the screen.

"The result is very similar to what happens in patients with neglect syndrome," explains Lovejoy, who is also a student in the Medical Scientist Training Program at UC San Diego. "Up to a half of acute right-hemisphere stroke patients demonstrate signs of spatial neglect, failing to be aware of objects or people to their left in extra-personal space."

"Our results show that deciding what to attend to and what to ignore is not just accomplished with the neocortex and thalamus, but also depends on phylogenetically older structures in the brainstem," says Krauzlis. "Understanding how these newer and older parts of the circuit interact may be crucial for understanding what goes wrong in disorders of attention."

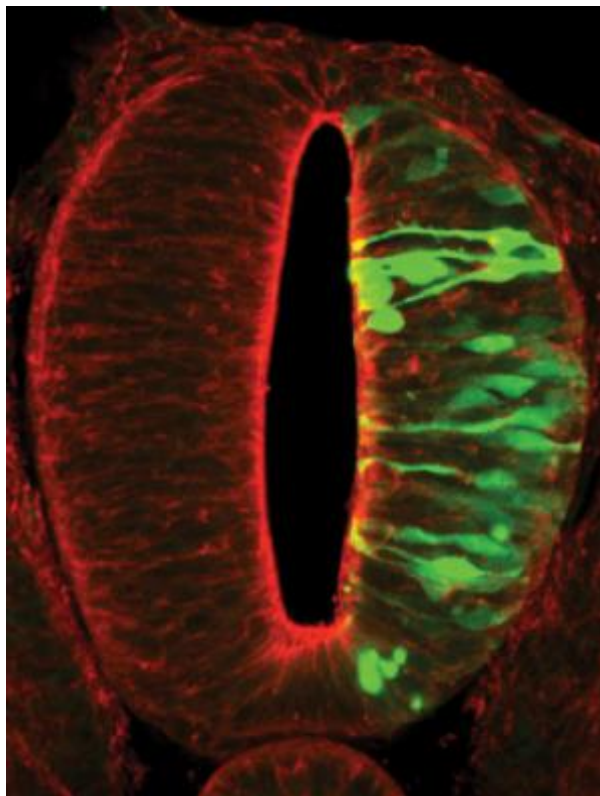
The work was funded in part by the Simons Foundation, the Institute for Neural Computation and an Aginsky Scholar Award.

Story Source:

Adapted from materials provided by [Salk Institute](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/12/091228090545.htm>

Researchers Design a Tool to Induce Controlled Suicide in Human Cells



The green fluorescent protein is produced by a system designed by researchers at IRB Barcelona and its expression demonstrates that the technique works correctly in human cells and other animal cells. (Credit: Roberto Álvarez-Medina (CSIC))

ScienceDaily (Dec. 29, 2009) — When cells accumulate excessive errors in the proteins they produce, apoptosis is activated, that is to say, a cell suicide programme; however, beforehand the cells attempt to rectify the problem through a number of rescue responses. Scientists know only the general outline of the mechanisms behind cellular "stress responses," the interactions between them and the molecular components involved. Researchers at the Institute for Research in Biomedicine (IRB Barcelona) have designed a new tool to study rescue signalling pathways and cell suicide in depth.

A description of this method has been published in the last issue of the specialized *Journal Nucleic Acids Research*, included in the group *Oxford Journals*.

"We have developed a strategy to induce controlled mutations in the cell, which allows us to gradually activate several repair systems that are triggered before the cell enters the cell death programme. Using previous methods, the effects on cells are less specific and may lead to parallel responses that hinder analysis of the results," explains the author of the article, Lluís Ribas de Pouplana, ICREA researcher and head of the Gene Translation Laboratory at IRB Barcelona.

Traditional techniques consist of exposing the cells to drug or compounds that affect protein production, thereby creating instability. Renaud Geslain, a researcher in Ribas' group and first author of the article, "had a brilliant idea to reproduce the same effect within the cell, without the help of compounds alien to the cell," recalls Ribas. Geslain manipulated a component of the cellular protein synthesis machinery that causes the production of defective proteins. "In response to the accumulation of misfolded proteins, the cellular alarm systems are switched on and stress responses are activated. Given that this approach affects

all the proteins, we obtain all the reactions possible, not only responses that could be exclusive to one or a few affected proteins."

How to interfere with protein production?

Cells are bags full of proteins and all proteins are formed by large chains of amino acids. Cells continually make these molecules through a highly complex system. One of the components involved in protein production, a process in which the Gene Translation Lab is specialized, is transfer RNA (tRNA). The function of tRNA is to transport the protein synthesis machinery and the precise amino acids required for each protein under construction. Geslain designed new tRNAs, very similar to natural ones, but that place erroneous amino acids into the protein sequences under construction. "When these tRNAs are introduced, the cells starts to make and accumulate defective proteins and it reacts in response. Given that the cell still conserves the healthy proteins present before the introduction of our tRNA, we can observe the extent to which the healthy part can correct the problem. We can also see when these defects are no longer correctible and how and when cells enter the suicide programme."

The lab has started to obtain results using this new tool. Analyses indicate that part of the cell response to the accumulation of misfolded proteins is the production of several micro-RNAs, small molecules that regulate gene expression. "We still don't know what they do or what genes they repress but we are discovering very surprising functional connections," notes the IRB Barcelona researcher.

Besides, Ribas continues, "the biological problem that we induce in the cell is directly linked to neurodegenerative diseases such as Alzheimer's, Parkinson's and Huntington's, which are caused by the aggregations of misfolded proteins that cause neuronal death." The tool developed at IRB Barcelona will allow the identification of new components of the response mechanisms to these mutations. In the future, these components may become targets for intervention in these and other diseases.

Story Source:

Adapted from materials provided by [Institute for Research in Biomedicine \(IRB Barcelona\)](#).

Journal Reference:

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<http://www.sciencedaily.com/releases/2009/12/091217094901.htm>

Scientists Isolate New Antifreeze Molecule in Alaska Beetle



Scientists have identified a novel antifreeze molecule in a freeze-tolerant Alaska beetle, *Upis ceramboides*, able to survive temperatures below minus 100 degrees Fahrenheit. Unlike all previously described biological antifreezes that contain protein, this new molecule, called xylomannan, has little or no protein. It is composed of a sugar and a fatty acid and may exist in new places within the cells of organisms. (Credit: Todd Sformo and Franziska Kohl)

ScienceDaily (Dec. 29, 2009) — Scientists have identified a novel antifreeze molecule in a freeze-tolerant Alaska beetle able to survive temperatures below minus 100 degrees Fahrenheit. Unlike all previously described biological antifreezes that contain protein, this new molecule, called xylomannan, has little or no protein. It is composed of a sugar and a fatty acid and may exist in new places within the cells of organisms.

"The most exciting part of this discovery is that this molecule is a whole new kind of antifreeze that may work in a different location of the cell and in a different way," said zoophysiological Brian Barnes, director of the University of Alaska Fairbanks Institute of Arctic Biology and one of five scientists who participated in the Alaska *Upis ceramboides* beetle project.

Just as ice crystals form over ice cream left too long in a freezer, ice crystals in an insect or other organism can draw so much water out of the organism's cells that those cells die. Antifreeze molecules function to keep small ice crystals small or to prevent ice crystals from forming at all. They may help freeze-tolerant organisms survive by preventing freezing from penetrating into cells, a lethal condition. Other insects use these molecules to resist freezing by supercooling when they lower their body temperature below the freezing point without becoming solid.



UAF graduate student and project collaborator Todd Sformo found that the Alaska Upis beetle, which has no common name, first freezes at about minus 18.5 degrees Fahrenheit in the lab and survives temperatures down to about 104 degrees below zero Fahrenheit.

"It seems paradoxical that we find an antifreeze molecule in an organism that wants to freeze and that's adapted to freezing," said Barnes, whose research group is involved in locating insects, determining their strategies of overwintering and identifying the mechanisms that help them get through the winter

A possible advantage of this novel molecule comes from it having the same fatty acid that cells membranes do. This similarity, says Barnes, may allow the molecule to become part of a cell wall and protect the cell from internal ice crystal formation. Antifreeze molecules made of proteins may not fit into cell membranes.

"There are many difficult studies ahead," said Barnes. "To find out how common this biologic antifreeze is and how it actually prevents freezing and where exactly it's located."

This project was led by Kent Walters at the University of Notre Dame with collaborators Anthony Serianni and John H. Duman of UND and Barnes and Sformo of UAF and was published in the Dec. 1 issue of the journal Proceedings of the National Academy of Sciences.

Story Source:

Adapted from materials provided by [University of Alaska Fairbanks](#).

<http://www.sciencedaily.com/releases/2009/12/091214131134.htm>



Deep Sea Anchors for Offshore Installations



The anchor is dropped in free fall until it reaches a speed of 100 kph. (Credit: Image courtesy of SINTEF)

ScienceDaily (Dec. 29, 2009) — It might look like a giant arrow or a rocket, but this 13 metre-long, 80-tonne anchor is currently being tested as a new mooring concept for offshore installations.

Entrepreneur Jon Tore Lieng is the man behind the new "Deep Penetrating Anchor." His story shows how an idea conceived at SINTEF, combined with drive and persistence, can bring good, cost-effective technology to the market.

In the 90s, when petroleum production began moving towards deeper waters, Lieng was a geotechnologist with SINTEF. He envisaged a better solution than the box-like suction anchors of the time that were placed on the seabed. These are open at the bottom and function by pumping out the water inside, thus creating a vacuum that pulls the anchor into the substrate so that it holds solid. However, the need to carefully orient such anchors, and their sensitivity to high seas and waves, makes for problems when they are being deployed, in many cases involving delays that can cost millions a day.

Jon Tore Lieng thought that the simplest concept would be to drop a sufficiently heavy anchor straight down into the sea. If it was heavy enough, and moving fast enough, such an anchor would force its way into the seabed and create an extra powerful hold.

Free-fall drop

Two of the new anchors have already been installed on StatoilHydro's Gjøa field near the Troll field. The anchors, which were manufactured in Lithuania and have been approved by Veritas, penetrate 31 and 42 metres respectively into the seabed.

The new anchors are not affected by waves, and the installation process is the same whether they are being deployed at depths of 500 or 3000 metres. Each anchor starts its descent under cable control, but for the final 75 m it drops in free fall until it reaches a speed of 100 kph.

A remotely operated vehicle (ROV) follows the manoeuvre and transmits the acoustic signal that releases the anchor for the final stage of the descent. Then ROV then goes down to check the situation on the seabed, and the chain is tightened up.

A typical mooring configuration for a platform will consist of 12 -- 16 anchors located in three or four groups. All the anchors can be carried by a single auxiliary vessel and deployed in the course of a single trip to the field.

Studies and tests

The path to today's full-scale trials has been long. At the same time as the offshore industry was beginning to move to deeper waters in the 80s, the Research Council of Norway launched its deepwater and offshore programmes, which were looking for proposals for new mooring technologies.

At that time, Lieng carried out a theoretical study, which he sent to all the oil companies that were based in Norway. His unusual concept was turned down, but at least the companies became aware that he was working in this area.

In 1997, Lieng took his idea with him when he left SINTEF and set up his own company GeoProbing Technology, with a licence for the patent. After a while, he made contact with people in Statoil who liked his ideas, and in 1998 and 1999 the company financed feasibility studies and model tests. The idea was to find out how large the anchor needed to be, and how much it would cost.

The scientists soon worked out that the new anchor concept would cost about 35 percent less than the technology then in use. Since we are talking here of hundreds of millions of kroner, this meant a significant saving.

In spring 2003, Lieng and the Statoil scientists moved into the Trondheimsfjord to test a 4-metre scaled-down version of the anchor. But the fibre cable attached to the anchor broke near the seabed when they were testing its holding power, and the anchor was lost.

"As well as the anchor itself, all the instrumentation was installed in its tail-end," says Lieng. "That was a bad day."

The anchor lay on the seabed for three years before it was found again and another company took on the job of bringing it to the surface. Meanwhile, the project was abandoned, and Jon Lieng worked as a consultant in offshore marine geotechnology.

Full-scale trials

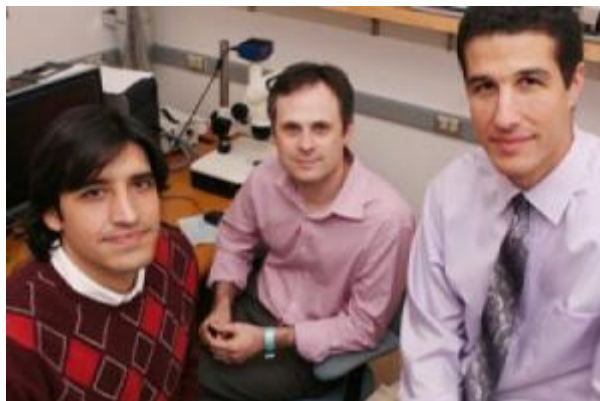
After that low point, however, things began to move again. StatoilHydro is currently evaluating a number of development projects off the coast of Norway that involve depths of around 1000 metres, as well as 30 or so deepwater fields in the Gulf of Mexico, all of them more than 2000 metres deep. These have brought the problem of cost-effective mooring back into the spotlight.

Story Source:

Adapted from materials provided by [SINTEF](#), via [AlphaGalileo](#).

<http://www.sciencedaily.com/releases/2009/12/091220174833.htm>

Why Some Continue to Eat When Full: Researchers Find Clues



Research by (from left) Drs. Mario Perello, Michael Lutter, Jeffery Zigman and their colleagues at UT Southwestern Medical Center in Dallas suggests that there are situations in which our brains drive us to seek out and eat very rewarding foods, even if we're full. (Credit: UT Southwestern)

ScienceDaily (Dec. 28, 2009) — The premise that hunger makes food look more appealing is a widely held belief -- just ask those who cruise grocery store aisles on an empty stomach, only to go home with a full basket and an empty wallet.

Prior research studies have suggested that the so-called hunger hormone ghrelin, which the body produces when it's hungry, might act on the brain to trigger this behavior. New research in mice by UT Southwestern Medical Center scientists suggest that ghrelin might also work in the brain to make some people keep eating "pleasurable" foods when they're already full.

"What we show is that there may be situations where we are driven to seek out and eat very rewarding foods, even if we're full, for no other reason than our brain tells us to," said Dr. Jeffrey Zigman, assistant professor of internal medicine and psychiatry at UT Southwestern and co-senior author of the study appearing online and in a future edition of *Biological Psychiatry*.

Scientists previously have linked increased levels of ghrelin to intensifying the rewarding or pleasurable feelings one gets from cocaine or alcohol. Dr. Zigman said his team speculated that ghrelin might also increase specific rewarding aspects of eating.

Rewards, he said, generally can be defined as things that make us feel better.

"They give us sensory pleasure, and they motivate us to work to obtain them," he said. "They also help us reorganize our memory so that we remember how to get them."

Dr. Mario Perello, postdoctoral researcher in internal medicine and lead author of the current study, said the idea was to determine "why someone who is stuffed from lunch still eats -- and wants to eat -- that high-calorie dessert."

For this study, the researchers conducted two standard behavioral tests. In the first, they evaluated whether mice that were fully sated preferred a room where they had previously found high-fat food over one that had only offered regular bland chow. They found that when mice in this situation were administered ghrelin, they strongly preferred the room that had been paired with the high-fat diet. Mice without ghrelin showed no preference.

"We think the ghrelin prompted the mice to pursue the high-fat chow because they remembered how much they enjoyed it," Dr. Perello said. "It didn't matter that the room was now empty; they still associated it with something pleasurable."

The researchers also found that blocking the action of ghrelin, which is normally secreted into the bloodstream upon fasting or caloric restriction, prevented the mice from spending as much time in the room they associated with the high-fat food.

For the second test, the team observed how long mice would continue to poke their noses into a hole in order to receive a pellet of high-fat food. "The animals that didn't receive ghrelin gave up much sooner than the ones that did receive ghrelin," Dr. Zigman said.

Humans and mice share the same type of brain-cell connections and hormones, as well as similar architectures in the so-called "pleasure centers" of the brain. In addition, the behavior of the mice in this study is consistent with pleasure- or reward-seeking behavior seen in other animal studies of addiction, Dr. Zigman said.

The next step, Dr. Perello said, is to determine which neural circuits in the brain regulate ghrelin's actions.

Other UT Southwestern researchers involved in the study were Dr. Ichiro Sakata, postdoctoral researcher in internal medicine; Dr. Shari Birnbaum, assistant professor of psychiatry; Dr. Jen-Chieh Chuang, postdoctoral researcher in internal medicine; Sherri Osborne-Lawrence, senior research scientist; Sherry Rovinsky, research assistant in internal medicine; Jakub Woloszyn, medical student; Dr. Masashi Yanagisawa, professor of molecular genetics and a Howard Hughes Medical Institute investigator; and Dr. Michael Lutter, co-senior author and assistant professor of psychiatry.

The work was supported by the National Institutes of Health, the Foundation for Prader-Willi Research, and the National Alliance for Research on Schizophrenia and Depression.

Story Source:

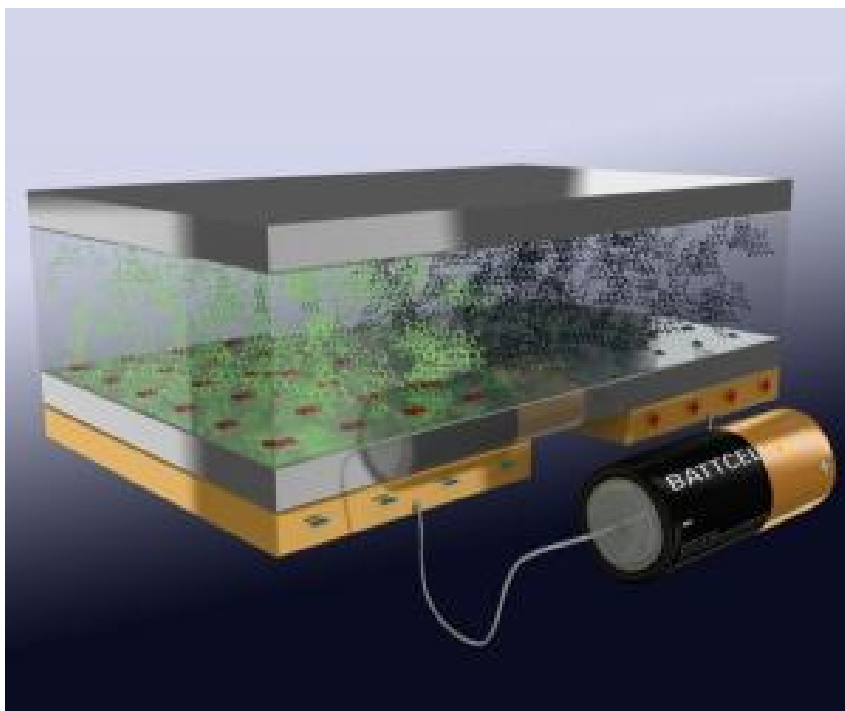
Adapted from materials provided by [UT Southwestern Medical Center](#), via [EurekAlert!](#), a service of AAAS.

Journal Reference:

1. Mario Perello, Ichiro Sakata, Shari Birnbaum, Jen-Chieh Chuang, Sherri Osborne-Lawrence, Sherry A. Rovinsky, Jakub Woloszyn, Masashi Yanagisawa, Michael Lutter, Jeffrey M. Zigman. **Ghrelin Increases the Rewarding Value of High-Fat Diet in an Orexin-Dependent Manner.** *Biological Psychiatry*, 2009; DOI: [10.1016/j.biopsych.2009.10.030](https://doi.org/10.1016/j.biopsych.2009.10.030)

<http://www.sciencedaily.com/releases/2009/12/091228090539.htm>

Adjusting Acidity With Impunity



The cover illustration of *Lab on a Chip* shows an impression of how gentle titration works: protons are attracted to, or released from the silicon-nitride surface. Variations in pH result in a different light intensity in the nanochannel. (Credit: Image courtesy of University of Twente)

ScienceDaily (Dec. 28, 2009) — How do individual cells or proteins react to changing pH levels? Researchers at the MESA+ Institute for Nanotechnology at the University of Twente have developed a technique for 'gently' adjusting pH: in other words, without damaging biomolecules. This should soon allow them to measure the activity of a single enzyme as a function of pH.

The researchers will publish their findings in the journal *Lab on a Chip*.

Current methods for adjusting pH often have unpredictable effects on the immediate environment of a cell or biomolecule. Electrochemical reactions may occur that affect measurements, or pH levels may not change rapidly enough. It is then difficult to determine exactly what happens when the pH changes, or the measurement itself may even produce unwanted side effects. Researcher Rogier Veenhuis and his colleagues have developed a technique which resembles traditional titration, but which is controlled electrically and takes place using extremely small volumes of solution. The greatest benefit of this technique is that there are no undesirable side effects: it is a 'gentle' approach.

Light intensity indicates pH

The researchers achieve this effect by using silicon nitride for the base of the micro and nano fluid channel, under which an electrode is attached. The electrode is given a negative charge which results in protons being attracted to the nitride surface. This causes the solution to become more basic and the pH rises. A positive charge results in the opposite effect: protons are released from the surface, the solution becomes more acidic and the pH decreases. There is no reaction on the electrode as there would be during electrolysis because the silicon nitride acts as an insulator: this arrangement creates a kind of capacitor. Acidity can be adjusted by 'fiddling with the knob' to change the electrical current. The changes can be made visible by introducing a fluorescent pH indicator to the solution: light intensity reflects changes in pH.



This new method of titration takes place in extremely small quantities of fluid; substances can be titrated in the attomol range (10^{-18} mol). This should soon allow the researchers to measure the activity of a single enzyme as a function of pH.

The research was conducted by the BIOS Lab-on-a-Chip research group of Prof. Albert van den Berg, who recently won one of the three 2009 Spinoza Prizes. The research group is part of the MESA+ Institute for Nanotechnology of the University of Twente.

Story Source:

Adapted from materials provided by [University of Twente](#), via [AlphaGalileo](#).

Journal Reference:

1. Veenhuis et al. **Field-effect based attomole titrations in nanoconfinement.** *Lab on a Chip*, 2009; 9 (24): 3472 DOI: [10.1039/b913384d](https://doi.org/10.1039/b913384d)

<http://www.sciencedaily.com/releases/2009/12/091223215155.htm>



Ladder-Walking Locusts Use Vision to Climb, Show Big Brains Aren't Always Best



Screen shot of high-speed video of a locust walking on a ladder. (Credit: Copyright 2009 Department of Zoology, University of Cambridge)

ScienceDaily (Dec. 28, 2009) — Scientists have shown for the first time that insects, like mammals, use vision rather than touch to find footholds. They made the discovery thanks to high-speed video cameras -- technology the BBC uses to capture its stunning wildlife footage -- that they used to film desert locusts stepping along the rungs of a miniature ladder.

The study sheds new light on insects' ability to perform complex tasks, such as visually-guided limb control, usually associated with mammals.

According to lead author Dr Jeremy Niven of the University of Cambridge: "This is another example of insects performing a behaviour we previously thought was restricted to relatively big-brained animals with sophisticated motor control such as humans, monkeys or octopuses."

Because insects such as bees and flies spend a lot of time flying, most research has concentrated on how insects use vision during flight. Many insects that spend a lot of time walking, such as stick insects, crickets and cockroaches have relatively small eyes and use long antennae to 'feel' their way through the environment.

Locusts spend time both walking and flying, and have short antennae and large eyes, which made Niven wonder whether they used vision to find footholds.

To answer this question, the team built a miniature locust-sized ladder and filmed the locusts walking along it. They counted the number of times the locusts missed steps, comparing the number of mistakes they made in different situations.

"By combining all these different experiments, we showed that locusts use vision to place their legs. We showed that when locusts can't see one front leg they stop using that leg to reach to the next ladder rung, favouring the leg they can see," Niven explains.

"Big-brained mammals have more neurons in their visual systems than a locust has in its entire nervous system, so our results show that small brains can perform complex tasks. Insects show us how different animals have evolved totally different strategies for doing similar tasks," he says.



As well as illustrating how insects can achieve similar results to mammals by using simpler mechanisms, the findings deepen our understanding of locusts' neural circuits.

This is important because locusts have been a model organism for studying limb control for the past 40 years. Insects such as the locust have been crucial to many breakthroughs in neuroscience, and insects are often the inspiration for limb control in robotics.

Story Source:

Adapted from materials provided by [University of Cambridge](#).

Journal Reference:

1. Jeremy E. Niven et al. **Visual targeting of forelimbs in ladder-walking locusts.** *Current Biology*, 24 December 2009

<http://www.sciencedaily.com/releases/2009/12/091227212400.htm>

Free yourself from oppression by technology

- 27 December 2009 by **Yair Amichai-Hamburger**
- Magazine issue 2739.

Technologically depressed (Image: Andrzej Krauze)

"THE age of melancholy" is how psychologist Daniel Goleman describes our era. People today experience more depression than previous generations, despite the technological wonders that help us every day. It might be because of them.

Our lifestyles are increasingly driven by technology. Phones, computers and the internet pervade our days. There is a constant, nagging need to check for texts and email, to update Facebook, MySpace and LinkedIn profiles, to acquire the latest notebook or 3G cellphone.

Are we being served by these technological wonders or have we become enslaved by them? I study the psychology of technology, and it seems to me that we are sleepwalking into a world where technology is severely affecting our well-being. Technology can be hugely useful in the fast lane of modern living, but we need to stop it from taking over.



For many of us it is becoming increasingly difficult to control the impulse to check our inbox yet again or see whether the headlines have changed since we last looked. Our children are in a similar position, scared to miss a vital Tweet or status update on Facebook. In many homes, the computer has become the centre of attention; it is the medium through which we work and play.

How did this arise, and what is it doing to us? In this era of mass consumption, we are surrounded by advertising that urges us to find fulfilment through the acquisition of material goods. As a result, adults and children increasingly believe that in order to belong and feel good about themselves, they must own the latest model or gadget.

Yet research by psychologist Tim Kasser of Knox College in Galesburg, Illinois, has shown that people who place a high value on material goals are unhappier than those who are less materialistic. Materialism is also associated with lower self-esteem, greater narcissism, greater tendency to compare oneself unfavourably with other people, less empathy and more conflict in relationships.

People who place a high value on material goals are unhappier than those who are less materialistic. Our culture also constantly reminds us that time is money. This implies a need for total efficiency, which is why we are allowing laptop computers and mobile phones to blur the separation between work and home. As one unhappy human-resource manager in a high-tech company put it: "They gave me a mobile phone so they can own me 24 hours a day, and a portable computer, so my office is now with me all the time - I cannot break out of this pressure." Sound familiar?

Psychologists generally believe that the lack of a clear separation between work and home significantly damages our relationships with loved ones. It also predisposes us to focus on the here and now at the expense of long-term goals.

By imposing these twin pressures, modern society is in danger of swapping standard of living for quality of life. We need ways to help recover those increasingly large parts of our lives that we have ceded to technology, to regain mastery over technology and learn to use it in a healthy and positive way.

My prescription is self-determination theory, developed by psychologists Edward Deci and Richard Ryan of the University of Rochester in New York state. It identifies three vital elements of healthy personal development and functioning which I think can be used to recalibrate our relationship with technology.

The first is autonomy - the feeling that our activities are self-chosen and self-endorsed. When we feel in control, we are able to organise our priorities and place effective boundaries around them. But when we feel we have insufficient control, it leaves us vulnerable to our impulses and causes us to abdicate decisions to other people. It is easy to see how technology undermines autonomy, but also how to regain it. This may be as simple as switching off mobile phones during meals and family time, setting aside specific times to answer emails, and being available only when we choose to be.

We also need a sense of competence, a belief that our actions are effective. In this respect our relationship with technology is complex, because many of us feel competent when we deal with an email, when we have the newest BlackBerry, or because 50 people enjoyed the holiday snaps we posted on Facebook. But being truly competent must be a continuation of our autonomy: knowing which activities are important to us and carrying them out in the most effectual way possible, making use of technology where applicable.

The other factor is relatedness: our need to feel close to other people. Technology is a threat to this. Devices like the iPod can be used to create a bubble that disconnects us from normal human interactions, and while some virtual relationships may be truly meaningful, in many cases they come at the expense of real-world connections. Psychologists have found that the pivotal difference between happy and unhappy people is the presence or absence of rich and satisfying social relationships. Spending meaningful time with friends, family and partners is necessary for happiness.

I would add a fourth factor, too: critical thinking. In today's world, where we are potentially available 24/7 to absorb messages from well-honed advertisements, it is vital that we know how to analyse and evaluate their validity - and to neutralise them where necessary.

I believe that autonomy, competence, relatedness and critical thinking are the best ways to establish a balanced approach to technology, and so enhance our well-being.

*Yair Amichai-Hamburger is director of the Research Center for Internet Psychology at the Sammy Ofer School of Communications, the Interdisciplinary Center in Herzliya, Israel. His book *Technology and Psychological Well-being* is published by Cambridge University Press*

<http://www.newscientist.com/article/mg20427390.100-free-yourself-from-oppression-by-technology.html?DCMP=OTC-rss&nsref=online-news>

Microbes survive 30,000 years inside a salt crystal

- 22 December 2009 by **Bob Holmes**
- Magazine issue 2739.

THRIFTY microbes entombed in a salt crystal have survived for 30,000 years by feeding off the remains of algae that were trapped along with them. This is the most convincing example to date of long-term survival.

Brian Schubert, a microbiologist at the University of Hawaii at Manoa, and colleagues studied salt crystals in a sediment core taken from Death Valley in California. The crystals contained tiny pockets of liquid, and the team found that they could grow live colonies of archaeans from samples of it. The team dated the liquid at between 22,000 and 34,000 years old (*Geology*, vol 37, p 1059).



Colonies of archaeans were grown from liquid within salt crystals that was up to 34,000 years old. This is not the first time microbes have been cultured from pockets of liquid trapped inside salt; one team has reported doing so with liquid they dated as being 250 million years old. Their results were questioned, however, as the salt crystals could have dissolved and recrystallised over time, trapping modern microbes.

In contrast, Schubert says that the structure of his crystals indicates that they formed in a hypersaline lake. As there hasn't been a permanent lake in Death Valley for at least 10,000 years, this suggests that recrystallisation hasn't taken place, supporting the idea that the crystals - and hence the microbes within them - are indeed as old as they appear, says Robert Hazen at the Carnegie Institution for Science in Washington DC, who is sceptical of previous claims.

Moreover, Schubert thinks he can explain how his microbes managed to stay alive so long. Every crystal that contained live archaeans also contained dead cells from a salt-lake alga known as *Dunaliella*, which contain high concentrations of glycerol. The team suggest that the glycerol had seeped out of the cells, and that the archaeans lived off this. *Dunaliella* cells are such good fodder that the microbes could live much longer than 30,000 years, says Schubert. He calculates that a single *Dunaliella* cell contains enough glycerol to meet an archaean's minimal needs for 12 million years. "We have inclusions with dozens of these algal cells inside and just a couple of archaeans, so they have basically a limitless supply," he says. If so, microbes could plausibly survive within salt crystals for hundreds of millions of years, as previous studies have claimed. Although, as Schubert warns, "it's a very large leap to go from 30,000 years to 250 million years".

<http://www.newscientist.com/article/mg20427393.700-microbes-survive-30000-years-inside-a-salt-crystal.html>

Sugar-free satisfaction: Finding the brain's sweet spot

- 27 December 2009 by **Douglas Fox**
- Magazine issue 2739.



The calorie-free version fails to activate a reward area of the brain (Image: Patrick Norman/Fancy/Plainpicture)

CONTAINS zero calories! Countless soft drinks are emblazoned with that slogan as a come-on for those of us locked in a never-ending battle to rein in a spreading waistline. Calorie-free sweeteners certainly have a lot to offer. Food and drink manufacturers have become so good at blending sugar substitutes into their products that it can be almost impossible to tell them apart from the real thing - sucrose - in taste tests.

But while artificial sweeteners may be able to confuse our taste buds, the suspicion is growing that our brain is not so easily fooled. Could it be that our cravings for sugary foods run deeper than a liking for sweetness? If so, a whole bunch of weight-loss strategies may need rethinking.

Non-sugar sweeteners have come a long way. One of the first, and perhaps the worst, was lead. Romans boiled grapes in lead pots, leaching the sweet-tasting metal into their food. The practice outlived the Roman empire by many centuries, and is thought to have led to the deaths of a number of notables, including Pope Clement II, who perished in 1047. Indigenous peoples in South America use a herb called stevia, which contains chemicals that taste sweet but aren't metabolised in the human gut. These early experimenters weren't worried about shedding the kilos - just searching for a way to sweeten food in a world where refined sugar was scarce.

Saccharin, the first of the industrially manufactured artificial sweeteners, was discovered late in the 19th century and soon became popular. Taxes and restrictive patents kept the cost high, and a black market sprang up throughout Europe: a report in 1911 claimed there were 129 saccharin smugglers in the Swiss city of Zurich alone. It does, however, have a potent aftertaste. Not for nothing has it earned itself a place in the English lexicon as the epitome of sickly sweetness. Since then, a parade of sweeteners has come on stream, including cyclamate, aspartame, the sucrose-like (and very sweet) sucralose, and several others, including one called Rebiana, derived from a South American herb.

Even as manufacturers get better at blending these agents to avoid peculiar tastes, their ability to help us cut down on calories and keep our weight in check is coming into question. A handful of studies, starting in the 1980s, suggested that regular use of artificial sweeteners might even make people eat

more, rather than less, by stimulating their appetites without satisfying them. Though the methodology of some of these studies was questionable, the doubts continued.

More recently, the hunt has been joined by Guido Frank, a psychiatrist at the University of Colorado in Denver who has a particular interest in eating disorders. To compare how the brain responds to sucralose and sucrose, he fed the sweetener and the sugar to 12 women, adjusting the concentrations so that the sweetness of the two matched. "They consciously could not distinguish them," Frank says. Yet when he looked at their brain responses with functional magnetic resonance imaging (fMRI), he saw clear differences.

Pleasure response

Sucrose produced stronger activation in the "reward" areas of the brain that light up in response to pleasurable activities such as eating and drinking. Sucralose didn't activate these areas as strongly, but it synchronised the activity in a whole constellation of taste-associated brain areas - and it did this more strongly than sucrose did (*NeuroImage*, vol 39, p 1559). Frank suggests that sucralose activates brain areas that register pleasant taste, but not strongly enough to cause satiation. "That might drive you to eat something sweet or something calorific later on," he says.

Similar results emerged from brain-scanning experiments by Paul Smeets, a neuroscientist at Utrecht University Medical Center in the Netherlands, in which he fed volunteers two versions of an orangeade drink. One was sweetened with sugar and one with a blend of the non-calorific sweeteners aspartame, saccharin, cyclamate and acesulfame potassium. Both drinks evoked similar patterns of brain activation, except that the calorie-free blend failed to light up a cherry-sized lump of tissue within a reward area called the caudate nucleus. Smeets presented his results at a meeting of the Organization for Human Brain Mapping in June 2009 in San Francisco.

A study that goes beyond brain mapping, published in July by Edward Chambers of the University of Birmingham, UK, adds weight to the idea that there's more to the appeal of sugary foods than sweetness. Chambers made eight cyclists perform 60-minute workouts on a stationary bike while measuring their work rate. During workouts on separate days he told them to rinse their mouth with a solution of either glucose or saccharin, without swallowing either one. The glucose mouth rinse improved the cyclists' performance by a small but consistent amount compared to saccharin. It was as if the taste suggesting that more calories are on the way was enough to inspire the tired athletes' brains to drive their legs harder.

There's more to the appeal of sugary foods than sweetness. The brain has a way of detecting calories. The really surprising result came later, however, when Chambers had the cyclists rinse their mouths with either saccharin alone or saccharin plus a calorific - but non-sweet - sugar called maltodextrin. The cyclists did slightly better when they rinsed their mouths with maltodextrin - even though both solutions carried identical saccharin tastes (*The Journal of Physiology*, vol 587, p 1779).

All these results suggest the brain has some way of detecting calories while food is still in the mouth. "It's an unconscious response," says Chambers - and it's independent of sweetness perception. When Chambers performed fMRI scans on his athletes, he got a glimpse of that unconscious response. The combination of saccharin and maltodextrin activated two reward-associated brain areas - the striatum and anterior cingulate - which saccharin alone failed to touch.

While this discovery might seem like bad news for zero-calorie drinks, it could be the beginning of real progress in finding ways to help people reduce their calorie intake. One approach focuses on information that has come in over the past decade describing the role of the receptor proteins on our taste buds. It is these receptors that detect the flavour molecules in our foods. While we seem to have

about 30 different receptors for bitter tastes, there seems to be just one receptor for sweetness, formed by a pair of proteins called T1R2 and T1R3. It sits on taste buds near the tip of the tongue and, not surprisingly, binds to both sugars and artificial sweeteners.

These receptors have become the focus of efforts to create better sugar stand-ins - and could solve the problem of aftertaste that has long plagued artificial sweeteners (see "[Lingering on](#)") - but they tell us little about the brain's apparent ability to discriminate between sugar and artificial sweeteners. Instead, it may be texture that is the key factor says Jayaram Chandrashekar, a neuroscientist at Howard Hughes Medical Institute in Janelia Farm, Virginia, who helped identify many taste receptors.

Because saccharin is several hundred times sweeter than sugar, Chambers used far less of it - with the result that the glucose and maltodextrin drinks were more viscous than the saccharin-only drink. The brain may take these subtle texture cues into account, Chandrashekar says.

"When you eat something sweet you may activate two pathways, one for sweetness and one for texture," Chandrashekar says. "Together they give you a better feeling than just the sweet pathway alone." A non-caloric bulking agent to thicken up the zero-calorie drink might solve the problem. Such bulkers are already used in a variety of products, from smoothies to enchiladas.

An alternative approach is under investigation at Senomyx in San Diego, California. The company has developed a tasteless molecule called S6973 that does not activate the sweet receptor directly, but changes it in a way that makes it bind more tightly to sucrose. "This will cause the sugar molecule to stay on the receptor maybe two times as long," says Grant DuBois, a flavour chemist at The Coca-Cola Company in Atlanta, Georgia, which has financed research at Senomyx. "You can take a beverage that may normally contain 10 per cent sugar and make it with 5 per cent sugar, and it tastes the same."

S6973 might still disappoint those of us who like to compensate for a million-calorie festive meal by drinking zero-calorie sodas - after all, drinks with sweetener enhancers will still contain as much as half the sugar of regular drinks. But that could actually be a plus if, unlike their zero-calorie cousins, these drinks manage to convince the brain that it is getting the calories it craves.

Never mind the taste test; they might even pass the brain-scan test.

Lingering on

Aftertaste has been the Godzilla of problems for zero-calorie sweeteners. "They all have this problem of slow sweetness onset and sweetness linger," says Grant DuBois, a chemist who develops sweeteners at The Coca-Cola Company in Atlanta, Georgia. In a study published earlier this year, he and Andrew James, a neuroscientist at Emory University, also in Atlanta, reported the first known neural signature for aftertaste (*NeuroReport*, vol 20, p 245).

DuBois and James ran fMRI brain scans on subjects as they sipped solutions of either sucrose or the artificial sweetener aspartame. When the researchers compared scans they discovered that a marble-sized nugget of tissue in an area called the insula, which is known for responding to sweet tastes, turned on for 15 seconds when people sipped sucrose, but for 30 seconds with aspartame. "Only in the insula did we see this prolonged response," says James. "We conclude that we were seeing a neural response which corresponds with aftertaste."



Such studies could provide the first objective tool for measuring aftertastes of up-and-coming sweeteners. But developing those aftertaste-free molecules will be tricky, says DuBois, who has studied artificial sweeteners on and off since the 1970s. "Over my career I have tasted in the ballpark of 1000 compounds," he says. "None of these compounds has sugar-like tastes. They all linger."

This may be down to a fundamental conflict that comes with using artificial sweeteners. They are expensive to produce, so they are only economic if they work in trace amounts. They must therefore be potent. Aspartame, for example, is 200 times sweeter than sucrose, and DuBois believes that this potency is what causes the problem. "You're just not going to find a high-potency [sweet] compound that has no aftertaste," he says.

No one knows for sure why there is this link between potency and aftertaste, but Michael Naim, a food chemist at the Hebrew University of Jerusalem, Israel, has an idea. When sweetness receptors bind to sugars, the cell sends sweetness signals to nearby nerves for a few seconds, until a protein switch inside the cell flips, turning off the signal. But zero-calorie sweeteners are soluble in both water and fat - a property which may contribute to their potency by making them bind strongly to the receptor - and so can do something that sugars can't, Naim reasons. They ooze across the cell's fatty membrane, and once inside they gum up the stop switch, so the sweetness lingers.

DuBois has designed around 100 chemicals which resemble sugars more closely - and so shouldn't cross the cell membrane - in the hope that they would be useful replacements for sucrose. Sure enough, they were sweet, but unfortunately none were sweeter than sucrose, making them non-starters as industrial sweeteners.

Douglas Fox is a writer based in San Francisco

<http://www.newscientist.com/article/mg20427391.900-sugarfree-satisfaction-finding-the-brains-sweet-spot.html>



Ancient clone saw out the last ice age

- 12:36 23 December 2009 by Jessica Hamzelou



Michael May, a member of the study team, next to the ancient bush (Image: Michael May)
Clones of an ancient bush have been discovered in California by botanists who reckon the original plant first grew at the height of the last ice age, 13,000 years ago.

Around 10 years ago, Mitch Provance of the University of California, Riverside, was carrying out a routine plant survey in the Jurupa mountains in southern California when he came across a patch of Palmer's oak bushes. The thicket interested Provance because not only was it miles away from its normal home – higher up in the mountains – but because each bush looked startlingly similar. Provance suspected the bushes might all be clones of each other.

Provance and his colleagues analysed proteins in the bushes' leaves and found that leaves from different bushes had all the same forms of proteins. "The chance that the bushes were so similar randomly, or even as siblings, is minuscule," says Jeffrey Ross-Ibarra, who led the study.

Evidence that the plants are clones of an ice-age original comes from the high rate of "acorn abortion". "The trees are aborting their acorns before they can mature – they're basically sterile," says Ross-Ibarra. He suggests that the bushes are being cloned from sprouts of other bushes.

Ring cycle

To put a date on the original bush, the team extrapolated the bushes' life cycle backwards in time. Every 40 or 50 years, wildfires burn the bushes down to the ground, and new shoots can only re-sprout from within the diameter of the previous bush. So, as the team knew how wide the bushes are,



how many growth rings they have, and the size of the entire thicket, they could estimate the age of the original bush. On that basis they suggest the clonal population is around 13,000 years old.

Marc Abrams, a forest ecologist at Pennsylvania State University in University Park is unconvinced. "The stems may very well be clones, but in my opinion the authors provide no credible evidence that the oak clone dates back 13,000 years," he says. "Their method for dating the clones based on the average growth rate of 11 stems is untenable."

Ross-Ibarra defends his estimate by explaining that his team couldn't age the bushes using radiocarbon dating, because they couldn't find any old pieces of wood. "It's likely that the termites got hold of it," he says.

Even if the original bush lived 13,000 years ago, and the present-day survivors are still carrying its ancient genetic information, the bushes themselves are unlikely to be anywhere near as old. The periodic wildfires mean the current oldest inhabitant of the thicket is probably around 130 years old.

Journal reference: *PLoS One*, DOI: [10.1371/journal.pone.0008346](https://doi.org/10.1371/journal.pone.0008346)

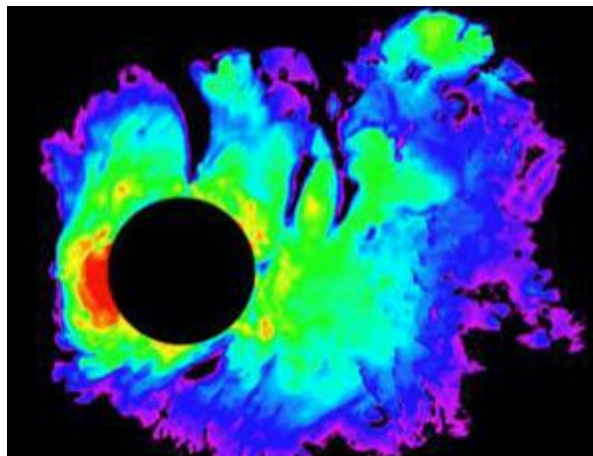
<http://www.newscientist.com/article/dn18324-ancient-clone-saw-out-the-last-ice-age.html>

Watery niche may foster life on Mars

- 07 December 2009 by **David Shiga**
- Magazine issue 2737.

This map shows the thickness of layered ice deposits at the south polar region on Mars. The material consists of nearly pure water ice with only a small component of dust (Image: NASA / ESA / ASI / Univ. of Rome)

Could snow on Mars harbour life? Perhaps, thanks to a form of greenhouse effect that creates liquid water beneath an icy crust.



As far as anyone can tell, liquid water is rare on Mars. At the equator, temperatures can rise above freezing, but any snow or ice that melts would quickly evaporate due to the low atmospheric pressure. Near the poles, water is abundant but permanently frozen.

New calculations by Diedrich Möhlmann of the German Aerospace Center in Berlin suggest that these frozen deposits could contain liquid water, at least during the day. According to Möhlmann, the heat from sunlight penetrating into ice or snow should get absorbed by any embedded dust grains, warming the dust and the surrounding ice. This heat mostly gets trapped because ice absorbs infrared radiation.

This effect melts the interior of ice and snow deposits in Antarctica, and so may do the same on Mars, an idea first proposed by Gary Clow of the US Geological Survey in 1987. But Clow assumed the liquid water would form within porous snow. On Mars, such water would still be subject to the low pressure of the atmosphere and so prone to evaporation.

Möhlmann's calculations assumed an impermeable upper crust of solid ice, which would form as water vapour diffused into pores and refroze. Such a seal would prevent evaporation and trap heat more effectively inside a snow bank, causing it to start melting in a zone that begins a few centimetres below the icy surface and extends a further 10 metres down, he says (*Icarus*, DOI: 10.1016/j.icarus.2009.11.013).

Martian snow might melt in a zone that begins a few centimetres below the icy surface Phil Christensen of Arizona State University in Tempe says the idea has merit. "If I was going to search for life on Mars I would certainly include landing and looking at some of these potential snow deposits," he says.

<http://www.newscientist.com/article/mg20427373.700-watery-niche-may-foster-life-on-mars.html>

Alice's adventures in algebra: Wonderland solved

- 16 December 2009 by **Melanie Bayley**
- Magazine issue 2739.



Critical of the new mathematics (Image: Andrew Hem)

[1 more image](#)

What would Lewis Carroll's *Alice's Adventures in Wonderland* be without the Cheshire Cat, the trial, the Duchess's baby or the Mad Hatter's tea party? Look at the original story that the author told Alice Liddell and her two sisters one day during a boat trip near Oxford, though, and you'll find that these famous characters and scenes are missing from the text.

As I embarked on my DPhil investigating Victorian literature, I wanted to know what inspired these later additions. The critical literature focused mainly on Freudian interpretations of the book as a wild descent into the dark world of the subconscious. There was no detailed analysis of the added scenes, but from the mass of literary papers, one stood out: in 1984 [Helena Pycior](#) of the University of Wisconsin-Milwaukee had linked the trial of the Knave of Hearts with a Victorian book on algebra. Given the author's day job, it was somewhat surprising to find few other reviews of his work from a mathematical perspective. Carroll was a pseudonym: his real name was Charles Dodgson, and he was a mathematician at Christ Church College, Oxford.

The 19th century was a turbulent time for mathematics, with many new and controversial concepts, like imaginary numbers, becoming widely accepted in the mathematical community. Putting *Alice's Adventures in Wonderland* in this context, it becomes clear that Dodgson, a stubbornly conservative mathematician, used some of the missing scenes to satirise these radical new ideas.

Even Dodgson's keenest admirers would admit he was a cautious mathematician who produced little original work. He was, however, a conscientious tutor, and, above everything, he valued the ancient Greek textbook Euclid's *Elements* as the epitome of mathematical thinking. Broadly speaking, it covered the geometry of circles, quadrilaterals, parallel lines and some basic trigonometry. But what's really striking about *Elements* is its rigorous reasoning: it starts with a few incontrovertible truths, or axioms, and builds up complex arguments through simple, logical steps. Each proposition is stated, proved and finally signed off with QED.

For centuries, this approach had been seen as the pinnacle of mathematical and logical reasoning. Yet to Dodgson's dismay, contemporary mathematicians weren't always as rigorous as Euclid. He

dismissed their writing as "semi-colloquial" and even "semi-logical". Worse still for Dodgson, this new mathematics departed from the physical reality that had grounded Euclid's works.

By now, scholars had started routinely using seemingly nonsensical concepts such as imaginary numbers - the square root of a negative number - which don't represent physical quantities in the same way that whole numbers or fractions do. No Victorian embraced these new concepts wholeheartedly, and all struggled to find a philosophical framework that would accommodate them. But they gave mathematicians a freedom to explore new ideas, and some were prepared to go along with these strange concepts as long as they were manipulated using a consistent framework of operations. To Dodgson, though, the new mathematics was absurd, and while he accepted it might be interesting to an advanced mathematician, he believed it would be impossible to teach to an undergraduate.

Outgunned in the specialist press, Dodgson took his mathematics to his fiction. Using a technique familiar from Euclid's proofs, *reductio ad absurdum*, he picked apart the "semi-logic" of the new abstract mathematics, mocking its weakness by taking these premises to their logical conclusions, with mad results. The outcome is *Alice's Adventures in Wonderland*.

Algebra and hookahs

Take the chapter "Advice from a caterpillar", for example. By this point, Alice has fallen down a rabbit hole and eaten a cake that has shrunk her to a height of just 3 inches. Enter the Caterpillar, smoking a hookah pipe, who shows Alice a mushroom that can restore her to her proper size. The snag, of course, is that one side of the mushroom stretches her neck, while another shrinks her torso. She must eat exactly the right balance to regain her proper size and proportions.

While some have argued that this scene, with its hookah and "magic mushroom", is about drugs, I believe it's actually about what Dodgson saw as the absurdity of symbolic algebra, which severed the link between algebra, arithmetic and his beloved geometry. Whereas the book's later chapters contain more specific mathematical analogies, this scene is subtle and playful, setting the tone for the madness that will follow.

The first clue may be in the pipe itself: the word "hookah" is, after all, of Arabic origin, like "algebra", and it is perhaps striking that [Augustus De Morgan](#), the first British mathematician to lay out a consistent set of rules for symbolic algebra, uses the original Arabic translation in *Trigonometry and Double Algebra*, which was published in 1849. He calls it "al jebr e al mokabala" or "restoration and reduction" - which almost exactly describes Alice's experience. Restoration was what brought Alice to the mushroom: she was looking for something to eat or drink to "grow to my right size again", and reduction was what actually happened when she ate some: she shrank so rapidly that her chin hit her foot.

De Morgan's work explained the departure from universal arithmetic - where algebraic symbols stand for specific numbers rooted in a physical quantity - to that of symbolic algebra, where any "absurd" operations involving negative and impossible solutions are allowed, provided they follow an internal logic. Symbolic algebra is essentially what we use today as a finely honed language for communicating the relations between mathematical objects, but Victorians viewed algebra very differently. Even the early attempts at symbolic algebra retained an indirect relation to physical quantities.

De Morgan wanted to lose even this loose association with measurement, and proposed instead that symbolic algebra should be considered as a system of grammar. "Reduce" algebra from a universal arithmetic to a series of logical but purely symbolic operations, he said, and you will eventually be

able to "restore" a more profound meaning to the system - though at this point he was unable to say exactly how.

When Alice loses her temper

The madness of Wonderland, I believe, reflects Dodgson's views on the dangers of this new symbolic algebra. Alice has moved from a rational world to a land where even numbers behave erratically. In the hallway, she tried to remember her multiplication tables, but they had slipped out of the base-10 number system we are used to. In the caterpillar scene, Dodgson's qualms are reflected in the way Alice's height fluctuates between 9 feet and 3 inches. Alice, bound by conventional arithmetic where a quantity such as size should be constant, finds this troubling: "Being so many different sizes in a day is very confusing," she complains. "It isn't," replies the Caterpillar, who lives in this absurd world.

Wonderland's madness reflects Carroll's views on the dangers of the new symbolic algebra. The Caterpillar's warning, at the end of this scene, is perhaps one of the most telling clues to Dodgson's conservative mathematics. "Keep your temper," he announces. Alice presumes he's telling her not to get angry, but although he has been abrupt he has not been particularly irritable at this point, so it's a somewhat puzzling thing to announce. To intellectuals at the time, though, the word "temper" also retained its original sense of "the proportion in which qualities are mingled", a meaning that lives on today in phrases such as "justice tempered with mercy". So the Caterpillar could well be telling Alice to keep her body in proportion - no matter what her size.

This may again reflect Dodgson's love of Euclidean geometry, where absolute magnitude doesn't matter: what's important is the ratio of one length to another when considering the properties of a triangle, for example. To survive in Wonderland, Alice must act like a Euclidean geometer, keeping her ratios constant, even if her size changes.

Of course, she doesn't. She swallows a piece of mushroom and her neck grows like a serpent with predictably chaotic results - until she balances her shape with a piece from the other side of the mushroom. It's an important precursor to the next chapter, "Pig and pepper", where Dodgson parodies another type of geometry.

By this point, Alice has returned to her proper size and shape, but she shrinks herself down to enter a small house. There she finds the Duchess in her kitchen nursing her baby, while her Cook adds too much pepper to the soup, making everyone sneeze except the Cheshire Cat. But when the Duchess gives the baby to Alice, it somehow turns into a pig.

The target of this scene is projective geometry, which examines the properties of figures that stay the same even when the figure is projected onto another surface - imagine shining an image onto a moving screen and then tilting the screen through different angles to give a family of shapes. The field involved various notions that Dodgson would have found ridiculous, not least of which is the "principle of continuity".

Jean-Victor Poncelet, the French mathematician who set out the principle, describes it as follows: "Let a figure be conceived to undergo a certain continuous variation, and let some general property concerning it be granted as true, so long as the variation is confined within certain limits; then the same property will belong to all the successive states of the figure."

The case of two intersecting circles is perhaps the simplest example to consider. Solve their equations, and you will find that they intersect at two distinct points. According to the principle of



continuity, any continuous transformation to these circles - moving their centres away from one another, for example - will preserve the basic property that they intersect at two points. It's just that when their centres are far enough apart the solution will involve an imaginary number that can't be understood physically (see diagram).

Of course, when Poncelet talks of "figures", he means geometric figures, but Dodgson playfully subjects Poncelet's "semi-colloquial" argument to strict logical analysis and takes it to its most extreme conclusion. What works for a triangle should also work for a baby; if not, something is wrong with the principle, QED. So Dodgson turns a baby into a pig through the principle of continuity. Importantly, the baby retains most of its original features, as any object going through a continuous transformation must. His limbs are still held out like a starfish, and he has a queer shape, turned-up nose and small eyes. Alice only realises he has changed when his sneezes turn to grunts.

The baby's discomfort with the whole process, and the Duchess's unconcealed violence, signpost Dodgson's virulent mistrust of "modern" projective geometry. Everyone in the pig and pepper scene is bad at doing their job. The Duchess is a bad aristocrat and an appallingly bad mother; the Cook is a bad cook who lets the kitchen fill with smoke, over-seasons the soup and eventually throws out her fire irons, pots and plates.

Alice, angry now at the strange turn of events, leaves the Duchess's house and wanders into the Mad Hatter's tea party, which explores the work of the Irish mathematician William Rowan Hamilton. Hamilton died in 1865, just after *Alice* was published, but by this time his discovery of quaternions in 1843 was being hailed as an important milestone in abstract algebra, since they allowed rotations to be calculated algebraically.

Just as complex numbers work with two terms, quaternions belong to a number system based on four terms (see "Imaginary mathematics"). Hamilton spent years working with three terms - one for each dimension of space - but could only make them rotate in a plane. When he added the fourth, he got the three-dimensional rotation he was looking for, but he had trouble conceptualising what this extra term meant. Like most Victorians, he assumed this term had to mean something, so in the preface to his *Lectures on Quaternions* of 1853 he added a footnote: "It seemed (and still seems) to me natural to connect this extra-spatial unit with the conception of time."

Where geometry allowed the exploration of space, Hamilton believed, algebra allowed the investigation of "pure time", a rather esoteric concept he had derived from Immanuel Kant that was meant to be a kind of Platonic ideal of time, distinct from the real time we humans experience. Other mathematicians were polite but cautious about this notion, believing pure time was a step too far.

The parallels between Hamilton's maths and the Hatter's tea party - or perhaps it should read "t-party" - are uncanny. Alice is now at a table with three strange characters: the Hatter, the March Hare and the Dormouse. The character Time, who has fallen out with the Hatter, is absent, and out of pique he won't let the Hatter move the clocks past six.

Reading this scene with Hamilton's maths in mind, the members of the Hatter's tea party represent three terms of a quaternion, in which the all-important fourth term, time, is missing. Without Time, we are told, the characters are stuck at the tea table, constantly moving round to find clean cups and saucers.

Their movement around the table is reminiscent of Hamilton's early attempts to calculate motion, which was limited to rotations in a plane before he added time to the mix. Even when Alice joins



the party, she can't stop the Hatter, the Hare and the Dormouse shuffling round the table, because she's not an extra-spatial unit like Time.

The Hatter's nonsensical riddle in this scene - "Why is a raven like a writing desk?" - may more specifically target the theory of pure time. In the realm of pure time, Hamilton claimed, cause and effect are no longer linked, and the madness of the Hatter's unanswerable question may reflect this.

Alice's ensuing attempt to solve the riddle pokes fun at another aspect of quaternions: their multiplication is non-commutative, meaning that $x \times y$ is not the same as $y \times x$. Alice's answers are equally non-commutative. When the Hare tells her to "say what she means", she replies that she does, "at least I mean what I say - that's the same thing". "Not the same thing a bit!" says the Hatter. "Why, you might just as well say that 'I see what I eat' is the same thing as 'I eat what I see!'"

It's an idea that must have grated on a conservative mathematician like Dodgson, since non-commutative algebras contradicted the basic laws of arithmetic and opened up a strange new world of mathematics, even more abstract than that of the symbolic algebraists.

When the scene ends, the Hatter and the Hare are trying to put the Dormouse into the teapot. This could be their route to freedom. If they could only lose him, they could exist independently, as a complex number with two terms. Still mad, according to Dodgson, but free from an endless rotation around the table.

And there Dodgson's satire of his contemporary mathematicians seems to end. What, then, would remain of *Alice's Adventures in Wonderland* without these analogies? Nothing but Dodgson's original nursery tale, *Alice's Adventures Under Ground*, charming but short on characteristic nonsense. Dodgson was most witty when he was poking fun at something, and only then when the subject matter got him truly riled. He wrote two uproariously funny pamphlets, fashioned in the style of mathematical proofs, which ridiculed changes at the University of Oxford. In comparison, other stories he wrote besides the *Alice* books were dull and moralistic. I would venture that without Dodgson's fierce satire aimed at his colleagues, *Alice's Adventures in Wonderland* would never have become famous, and Lewis Carroll would not be remembered as the unrivalled master of nonsense fiction.

Imaginary mathematics

The real numbers, which include fractions and irrational numbers like π that can nevertheless be represented as a point on a number line, are only one of many number systems.

Complex numbers, for example, consist of two terms - a real component and an "imaginary" component formed of some multiple of the square root of -1, now represented by the symbol i . They are written in the form $a + bi$. The Victorian mathematician William Rowan Hamilton took this one step further, adding two more terms to make quaternions, which take the form $a + bi + cj + dk$ and have their own strange rules of arithmetic.

Melanie Bayley is a DPhil candidate at the University of Oxford. Her work was supported by the UK's Arts and Humanities Research Council

<http://www.newscientist.com/article/mg20427391.600-alices-adventures-in-algebra-wonderland-solved.html>

Dams linked to more extreme weather

- 22 December 2009
- Magazine issue 2739.



Influencing the weather (Image: J.C Dahlig/Bureau of Reclamation)

DAM-BUILDERS: be careful when you create a reservoir because bigger storms and flooding could be on the way. That's the warning from an analysis of more than 600 dams, many of which have brought more extreme rainfall.

The idea that large bodies of water might influence rainfall is not new. But until now, no one had studied the effect of large dams and their reservoirs.

Faisal Hossain of Tennessee Technological University in Cookeville and colleagues looked at the magnitude of the biggest storms near 633 of the world's largest dams before and after construction. They found that in many places the level of precipitation in the most extreme rainfall events grew by an average of 4 per cent per year after a dam was built, with the relationship especially strong in semi-arid regions. There was also an increase in the frequency of rainy days (*Natural Hazards Review*, DOI: 10.1061/(asce)nh.1527-6996.0000013).

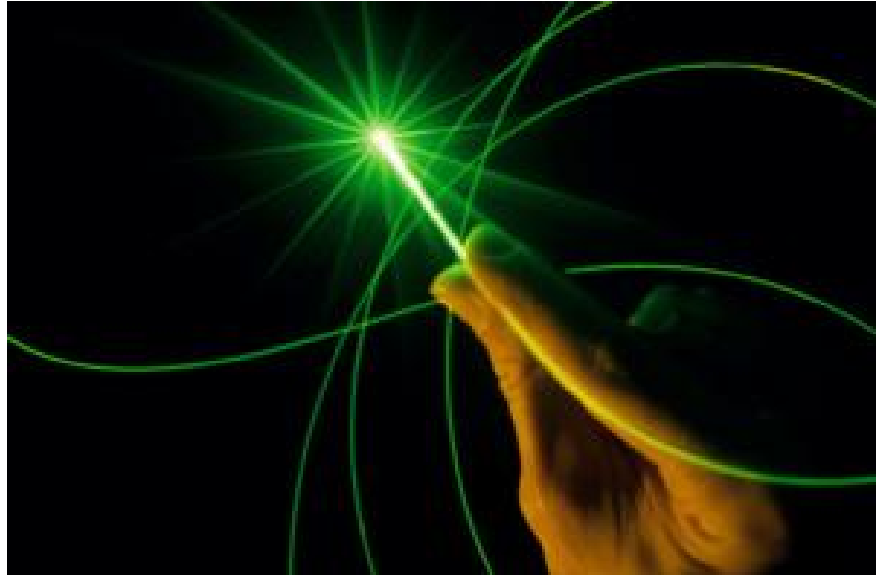
The paper is the first to show a clear relationship between dams and heavy rainfall, says Johannes Feddema at the University of Kansas in Lawrence. Though the results were not consistent all over the world, that is to be expected, he says, since regional weather patterns and numerous other factors come into play.

To explore these effects, Hossain plans to use computer models to simulate dams in different scenarios. "Hopefully it will make the picture less blurry," he says.

<http://www.newscientist.com/article/mg20427394.200-dams-linked-to-more-extreme-weather.html>

Single light wave flashes out from fibre laser

- 17:30 21 December 2009 by **Jeff Hecht**



Super-short light pulses marks a milestone in optical technology (Image: Kim Steele/Getty)

A long-elusive goal of physics has been reached – producing a pulse of light so short that it contains just a single oscillation of a light wave.

The flashes are almost as short as a light pulse can be, according to the laws of physics. The new super-short pulses could used as flashguns to sense very small, very fast events such as a single photon interacting with a single electron, says Alfred Leitenstorfer of the University of Konstanz in Germany. A single-cycle pulse packs in energy more densely than a pulse containing more wave peaks and troughs.

They could also show the way to boosting data transmission through fibre-optic cables, by shrinking the minimum amount of light needed to encode a single digital 1 or 0.

Leitenstorfer's group shunned the crystalline lasers typically used by physicists looking to make super-short light pulses and used optical-fibre lasers and wavelengths of light like those standard in telecommunications.

Technology milestone

"Single-cycle pulse generation with an essentially all-fibre system clearly marks a milestone in optical technology," says Martin Fermann of laser manufacturer Imra America, who was not involved with the work. He expects "the single-cycle regime will become a new standard" with applications in advanced imaging, sensing and signal processing.

The "uncertainty principle" formulated by 20th-century physicist Werner Heisenberg sets a limit on the shortest possible duration of a light pulse of any given wavelength in terms of time or number of

cycles. The research team knew that at the infrared frequencies they were using the uncertainty principle meant they had to get the pulse down to a handful of femtoseconds (millionths of a billionth of a second).

The Konstanz researchers started with pulses from a single fibre laser and split them between two sets of fibres that contained atoms of the rare earth metal erbium to amplify the light waves. Each fibre then had a second stage that altered the light's wavelength, one stretching it by about 40 per cent, the other shrinking it by a similar amount. The two fibres then converged again, causing the two light beams to interfere with one another in a way that cancelled out most of the waves to leave just a single wave cycle lasting just 4.3 femtoseconds.

Pulses that are even shorter, as short as 3.9 femtoseconds, had been made before using wavelengths nearly 50 per cent shorter. But the relationship between wavelength and frequency means they weren't such pure fractions of a light wave, containing between 2 and 1.3 wave cycles.

Fibre key

The key to success, says Leitenstorfer, was using a single source to generate the two light pulses that combined to produce the short pulse. "It's because it's all-fibre technology that we can recombine these two parts," he told *New Scientist*. "The biggest challenge in this entire paper was to measure the pulse." A series of the short pulses were compared with each other to verify that they were each only one cycle long.

Further refinements should be possible. "We did these experiments in three weeks," Leitenstorfer says. His group say they can remove background noise to make their single cycle stand out more clearly.

Journal reference: *Nature Photonics*, DOI: [10.1038/nphoton.2009.258](https://doi.org/10.1038/nphoton.2009.258)

<http://www.newscientist.com/article/dn18313-single-light-wave-flashes-out-from-fibre-laser.html>

The sinister powers of crowdsourcing

- 12:42 22 December 2009 by [MacGregor Campbell](#)
- For similar stories, visit the [Crime and Forensics](#) and [Innovation](#) Topic Guides



Spying on each other to spot crime (Image: Fran May/Getty)

[Innovation](#) is our regular column that highlights emerging technological ideas and where they may lead

When an ad hoc team of 5000 people who assembled in just two hours found [10 weather balloons hidden across the US by the Pentagon's research agency](#) earlier this month, it was just another demonstration of the power of [crowdsourcing](#) – solving a task by appealing to a large undefined group of web users to each do a small chunk of it.

So far crowdsourcing has been associated with well-meaning altruism, such as the creation and maintenance of Wikipedia or [searching for lost aviators](#). But crowdsourcing of a different flavour has started to emerge.

Law enforcement officials in Texas have installed a network of CCTV cameras to monitor key areas along that state's 1900-kilometre-long border with Mexico. To help screen the footage, a website lets anyone [log in to watch a live feed from a border camera](#) and report suspicious activity. A similar system called [Internet Eyes](#), which pays online viewers to spot shoplifters from in-store camera feeds, is set to launch in the UK in 2010. An Iranian website is [offering rewards](#) for identifying people in photos taken during protests [over June's elections](#).

Crowd chilling

Some people have declared those examples chilling. Now Jonathan Zittrain, a Harvard University law professor and co-founder of the Berkman Center for Internet and Society, says the next step may be for such efforts to get web users to help out covertly.

In a recent talk, "Minds for Sale", at the Computer History Museum in Mountain View, California, he pointed out that this could be done right away, using Amazon's Mechanical Turk, a service that provides a platform for anyone to farm out simple tasks.

In a speculative example, Zittrain has calculated that, assuming a population in Iran of around 72 million people, it would cost around \$17,000 for the government to use Mechanical Turk to identify any arbitrary person's picture, without the users that are doing it realising the cause they have enlisted in.

The scheme would show "Turkers" a photo of a protest, or just faces extracted from one, along with five randomly chosen photos from the country's ID card database, and asked to say whether or not there is any match.

Users would receive a few cents each time they contribute. Furthermore, Zittrain says that such a task might be made into an addictive game, similar to Google's image labeller.

"The people making the identifications in India or the US, idly doing this on their lunch hour instead of Minesweeper, would have no idea of the implications of what they are doing," Zittrain said in the talk. "I think people ought to know how their work is being used," he told *New Scientist*.

Crowdsourcing's power to compartmentalise and abstract away the true meaning of tasks turns human intelligence into a commodity. Zittrain's thought experiment shows how it could potentially entice people into participating in a project that they otherwise wouldn't support.

<http://www.newscientist.com/article/dn18315-innovation-the-sinister-powers-of-crowdsourcing.html>

School absence higher among poor

Persistent absence from school is five times higher in England's poorest areas than in the richest, government figures show.



Some 50,000 children in the poorest neighbourhoods are absent one day a week on average, according to an analysis by the Conservatives.

The government stresses the link between attendance and exam results.

It has spent more than £1.4bn on anti-truancy drives, and says overall absence has come down.

The figures show 6.1% of children in the most deprived 10% of areas were persistently absent, compared with 1.2% at the other end of the spectrum.

The government defines persistent absence as missing at least one fifth of the available school sessions for any reason including truancy.

'Vital'

The worst local authority was Manchester, with 6.7% persistent absentees. The best mainstream authority was Rutland, on 2.1%.

Shadow children's secretary Michael Gove said: "Attendance at school is absolutely vital if children are going to get the education they need to succeed later on.

"Children that are missing a fifth of school inevitably struggle to keep up, which leads to problems with low achievement and poor behaviour down the line."

He said the figures showed the problem was concentrated in the most deprived neighbourhoods.

"We need to focus on these areas, giving extra money to schools that take children from the most deprived backgrounds, so that we can give these children the opportunities which others take for granted.

"This is yet another block on social mobility from a government which has failed to help the poorest in society."

'Challenging'

Schools minister Vernon Coaker said overall levels of absence were at their lowest ever.

"If you look at some of the most challenging areas, the needs there are extremely complex.

"That's why schools are working with other children's services, working with families, in order to try to ensure that we get children where we want them, that is in school."

They were making school an exciting place to be and challenging children when they did not go, he said.

But he accused the Tories of misrepresenting the truth and undermining those efforts by suggesting all these children were missing school and nobody cared about it.

Other parts of the UK do not count absenteeism in quite the same way, but the pattern is similar.

In Scotland, latest figures show that on average in secondary schools each pupil was absent for just under three-and-a-half weeks, while in poorer areas absence amounted to an extra 14 days.

In Wales, the government says there is a continuing correlation between absenteeism and the proportion of pupils entitled to free school meals - a deprivation measure.

Latest figures show the rate of unauthorised absence was more than four times higher in areas where more than 30% qualified for free meals than in areas where under 10% did so.

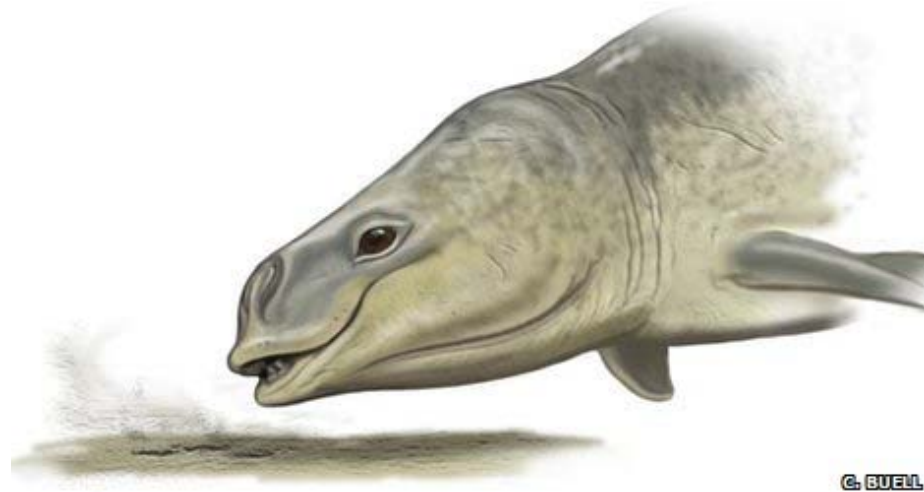
Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8430155.stm

Published: 2009/12/28 00:29:32 GMT

Ancient whale sucked mud for food

An ancient "dwarf" whale appears to have fed by sucking small animals out of the seafloor mud with its short snout and tongue, experts say.



Researchers say the 25 million-year-old fossil is related to today's blue whales - the largest animals on Earth.

The ancient animal's mud slurping may have been a precursor to the filter feeding seen in modern baleen whales.

These whales strain huge quantities of tiny marine animals through specialised "combs" which take the place of teeth.

The research is published in the Zoological Journal of the Linnean Society.

The fossilised remains of the primitive baleen whale *Mammalodon colliveri* were discovered near Torquay, in Victoria, Australia.

“ Clearly the seas off southern Australia were a cradle for the evolution of a variety of tiny, weird whales that seem to have lived nowhere else ”

Dr Erich Fitzgerald, Museum Victoria

This animal still had teeth; it had not yet evolved the baleen plates - used for filter-feeding - which characterise present-day baleen whales.

Although *Mammalodon* was discovered in 1932 and named in 1939, it has not been widely studied, according to Museum Victoria, which holds specimens of this group.

The study's author, Dr Erich Fitzgerald from Museum Victoria, said that his study of the fossil led him to the conclusion that *Mammalodon* was a bottom-feeding mud-sucker.

Splinter group

The idea would support Charles Darwin's observation about whale evolution in his seminal book *On the Origin of Species*.

In it, Darwin speculated that some of the earliest baleen whales may have been suction feeders - and that this served as a precursor to the filter feeding of today's giants of the deep.

Mammalodon had a total body length of about 3m. But it appears to have been a bizarre evolutionary "splinter group" from the evolutionary lineage which later led to the 30m-long blue whale.

It was effectively a dwarf whale; the research suggests that *Mammalodon* may have evolved into a relatively tiny form from larger ancestors.

Mammalodon belongs to the same family as *Janjucetus hunderi*, fossils of which were also found in 25 million-year-old Oligocene rocks near Torquay in Victoria. This family appears to be unique to south-east Australia.

"Clearly the seas off southern Australia were a cradle for the evolution of a variety of tiny, weird whales that seem to have lived nowhere else," said Dr Fitzgerald.

The baleen plates which allow today's baleen whales to filter their food from water, distinguish this group from the toothed whales - a group which includes beaked whales and dolphins.

Baleen whales are a taxonomical group which includes not only the majestic blue whale, but also the right whales, fin whales and humpbacks, to name but a few.

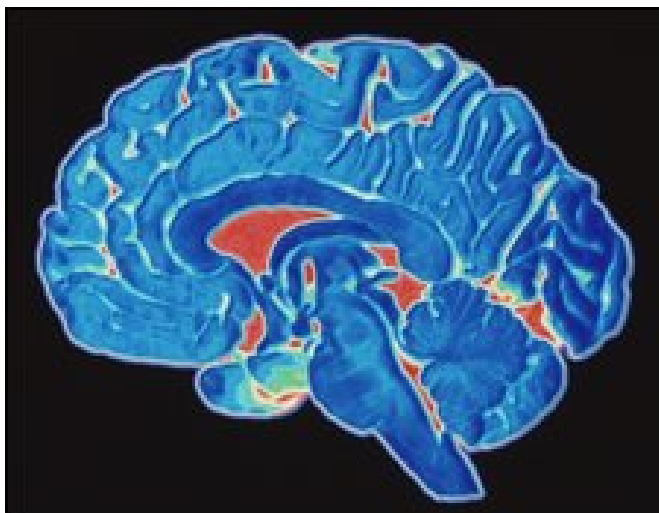
Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8430402.stm>

Published: 2009/12/26 03:24:16 GMT

Genes 'drive deadly brain cancer'

Scientists have discovered two genes that appear responsible for one of the most aggressive forms of brain cancer.



Glioblastoma multiforme rapidly invades the normal brain, producing inoperable tumours, but scientists have not understood why it is so aggressive.

The latest study, by a Columbia University team, published in Nature, pinpoints two genes.

The researchers say that the findings raise hopes of developing a treatment for the cancer.

“ It means we are no longer wasting time developing drugs against minor actors in brain cancer - we can now attack the major players ”

Dr Antonio Iavarone Columbia University

The genes - C/EPB and Stat3 - are active in about 60% of glioblastoma patients.

They appear to work in tandem to turn on many other genes that make brain cells cancerous.

Patients in the study whose tumours showed evidence of both genes being active died within 140 weeks of diagnosis.

In contrast, half of patients without activity from these genes were alive after that time.

Master controls

Lead researcher Dr Antonio Iavarone described the two genes as the disease's master control knobs.

He said: "When simultaneously activated, they work together to turn on hundreds of other genes that transform brain cells into highly aggressive, migratory cells.

"The finding means that suppressing both genes simultaneously, using a combination of drugs, may be a powerful therapeutic approach for these patients, for whom no satisfactory treatment exists."



When the researchers silenced both genes in human glioblastoma cells, it completely blocked their ability to form tumours when injected in a mouse.

The Columbia team is now attempting to develop drugs they hope will achieve the same effect.

Using state-of-the-art techniques, they effectively mapped out the comprehensive and highly complex network of molecular interactions driving the behaviour of glioblastoma cells.

Dr Iavarone said: "The identification of C/EPB and Stat3 came as a complete surprise to us, since these genes had never been implicated before in brain cancer

"From a therapeutic perspective, it means we are no longer wasting time developing drugs against minor actors in brain cancer - we can now attack the major players."

Nell Barrie, science information officer at Cancer Research UK, said: "This research is exciting, as it sheds light on the key changes that drive cells in the brain to become glioblastoma cells.

"By finding out exactly how healthy cells turn into cancer cells, scientists hope to find clues for preventing or reversing the process.

"The technique used in this study should help scientists to understand these changes in other types of cancer, leading to new and more personalised treatment approaches in the future."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8426015.stm>

Published: 2009/12/27 00:00:33 GMT



Disinfectants 'train' superbugs

Disinfectants could effectively train bacteria to become resistant to antibiotics, research suggests.



Scientists know bacteria can become inured to disinfectant, but research increasingly shows the same process may make them resistant to certain drugs.

This can occur even with an antibiotic the bacteria have not been exposed to.

Writing in *Microbiology*, the National University of Ireland team, who focused on a common hospital bacterium, urges a rethink of how infections are managed.

Scientists in Galway found that by adding increasing amounts of disinfectant to cultures of *Pseudomonas aeruginosa* in the lab, the bacteria learnt to resist not only the disinfectant but also ciprofloxacin - a commonly-prescribed antibiotic - even without being exposed to it.

The researchers report the bacteria had adapted to pump out anti-microbial agents - be they a disinfectant or an antibiotic - from their cells.

The adapted bacteria also had a mutation in their DNA that allowed them to resist ciprofloxacin-type antibiotics specifically.

“ Residue from incorrectly diluted disinfectants left on hospital surfaces could promote the growth of antibiotic-resistant bacteria ”

Dr Gerard Fleming

Pseudomonas aeruginosa is a bacterium most likely to infect those who are already seriously ill.

It can cause a wide range of infections, particularly among those with weak immune systems such as HIV or cancer patients, as well as people with severe burns, diabetes or cystic fibrosis.

Surface disinfectants are used to prevent its spread - but if the bacteria manage to survive and go on to infect patients, antibiotics are used to treat them.

Bacteria that could resist both these control points could be a serious threat to hospital patients, the study said.

At the high concentration levels generally employed this was unlikely to be a problem - but "in principle this means that residue from incorrectly diluted disinfectants left on hospital surfaces could promote the growth of antibiotic-resistant bacteria", said study author Dr Gerard Fleming.

"What is more worrying is that bacteria seem to be able to adapt to resist antibiotics without even being exposed to them."

“ Disinfectants may not just be the problem, they may also be the cure ”

Dr Gerry McDonnell

There is an increasing body of research that raises concerns about the effects on antibiotic resistance of disinfectants and antiseptics.

An EU report published earlier this year stressed the importance of the "appropriate and prudent" use of disinfectants to minimise the risk that bacteria become resistant to both forms of defence.

It also emerged this year that treatments in hospitals in Brazil had been compromised by a bacterium, mycobacterium massiliense, which had developed resistance to a common sterilisation fluid and a number of antibiotics used to treat the subsequent infections.

"This was very significant because it was really the first incident related to resistance to a biocide which led to clinical failure, which is new," said Dr Gerry McDonnell, a researcher in the field.

"This really needs to be an area of active investigation and debate. But it's worth bearing in mind that disinfectants may not just be the problem, they may also be the cure."

Research was published this year showing that the disinfecting wipes used to protect against MRSA could in fact spread the bug, as the solution contained was often not sufficient to kill all the bacteria picked up, and hospital staff often used the same wipe to clean more than one surface.

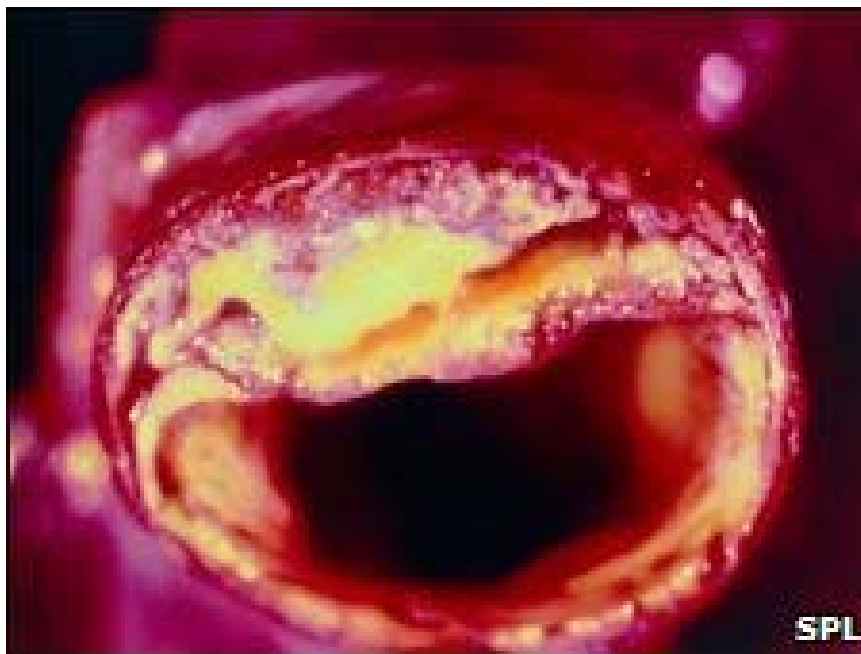
Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8427399.stm>

Published: 2009/12/28 00:42:58 GMT

Heart study targets immune cells

Scientists are to try to develop a treatment to target harmful immune cells in the arteries that are believed to trigger many heart attacks.



It is two decades since it was established a patient's immune system could produce the inflammation in the arteries that leads to an attack.

But treatments based on this knowledge have so far proved ineffective.

The Bristol Heart Institute says this could be because drugs kill off the helpful as well as the harmful cells.

With the backing of the British Heart Foundation, they want to look at developing a treatment that specifically targets the more harmful immune cells.

It is thought these are drawn to the arteries as a result of the plaques of fatty deposits that build up here.

This can lead to the artery becoming inflamed, and the wall damaged.

“ Such a discovery will help pave the way for new treatments to prevent heart attacks ”

Professor Andrew Newby

Plaques can then rupture, causing the formation of a blood clot, which can then lead to a heart attack.

"This research could point to new ways to protect fatty deposits from becoming unstable by selectively modifying the harmful immune cells while preserving their helpful activity," said Professor Andrew Newby, who will lead the £750,000 research.



"Such a discovery will help pave the way for new treatments to prevent heart attacks, which could save thousands of lives each year."

The Bristol researchers are to team up with experts from France, Sweden and the Netherlands to test the effectiveness of combining conventional drugs and new treatments to lower the immune response in the arteries of patients with heart disease, who are at risk of heart attacks.

The work could build on research being carried out at Imperial College London, where scientists recently identified one of the molecules that switches the immune cell into "attack mode" in the arteries.

More than 300 people die of a heart attack each day, and there appears to be a peak on Christmas Day and New Year's Day - perhaps, it is speculated, due to the rich food, alcohol and anxiety the festive season brings with it.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8429085.stm>

Published: 2009/12/28 00:42:07 GMT



Alzheimer's may 'ward off cancer'

Alzheimer's disease is associated with a reduced risk of cancer and vice versa, a study suggests.



US researchers followed 3,020 people aged 65 and above for the study, published in the journal *Neurology*.

Those who had Alzheimer's at the start of the study were 69% less likely to be admitted to hospital with cancer than those free of the disease at the start.

And those with cancer at the study's start were 43% less likely to develop Alzheimer's than the cancer free.

The researchers followed the subjects for an average of five years to see whether they developed Alzheimer's, and an average of eight years to see whether they developed cancer.

At the start of the study, 164 people (5.4%) already had Alzheimer's disease and 522 people (17.3%) already had a cancer diagnosis.

During the study, 478 people developed dementia and 376 people developed invasive cancer.

“ There are certain molecular pathways that may influence both Alzheimer's disease and cancer ”
Dr Catherine Roe Washington University School of Medicine

The researchers stressed that more work was needed before any firm conclusions could be drawn, and said the findings only seemed fully to apply to white people.

They found no association between cancer and another type of dementia, known as vascular dementia, which is thought to be caused by a lack of blood supply to the brain.

However, patients with this condition died earlier than people with Alzheimer's.

Lead researcher Dr Catherine Roe, of Washington University School of Medicine in St Louis, said this suggested the association between Alzheimer's and cancer was not simply due to people with those conditions dying before they could contract the other ailment.

"Discovering the links between these two conditions may help us better understand both diseases and open up avenues for possible treatments," she said.

"Alzheimer's disease and cancer are both characterised by abnormal, but opposing, cellular behaviour.

“ It is much too soon to say for certain whether the two diseases are connected ”

Rebecca Wood Alzheimer's Research Trust

"In Alzheimer's disease, excessive cell death occurs, whereas cancer is characterised by excessive cell growth.

"Other scientists have suggested that there are certain molecular pathways that may influence both Alzheimer's disease and cancer."

For instance, one specific enzyme has been shown to target a number of proteins, some of which are believed to stimulate cancer, some to suppress it, and others to be a hallmark of Alzheimer's.

Rebecca Wood, chief executive of the Alzheimer's Research Trust, agreed the study raised hopes of finding new ways to prevent or treat disease.

She said: "This study suggests that there might be a link between cancer and Alzheimer's, but it is much too soon to say for certain whether the two diseases are connected.

'Research needed'

"There could be molecular processes involved in both Alzheimer's and cancer, which, with more research, we could identify."

However, Professor Clive Ballard, of the Alzheimer's Society, said the existence of one of the diseases could mask the symptoms of the other and affect diagnosis.

"More research is needed to establish categorically if this link exists."

It is estimated 700,000 people in the UK have dementia, a number forecast to double in a generation.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8425824.stm>

Published: 2009/12/24 00:00:59 GMT

Another 'bad cholesterol' found

Scientists say they have found proof that another "bad" type of cholesterol contributes to heart disease.



Unlike the well-known LDL cholesterol, lipoprotein(a) or Lp(a) cannot be controlled by cutting down on dietary fats or taking a statin drug.

But researchers say high levels do not carry the same risk as LDL.

And other drugs might work to minimise its effects, they told the New England Journal of Medicine.

LDL is considered the aggressive tiger of the cholesterol world, furring the arteries and greatly increasing heart risk. Scientist believe Lp(a), which is inherited, is more of a pussycat, although it does appear to upset blood clotting.

Inherent risk

The researchers used gene-chip technology to scan DNA that they knew from previous studies were potential "hotspots" for heart disease risk. This analysis revealed the two genetic culprits.

Professor Martin Farrall, lead author of the study carried out at Oxford University, said one in six people carries one or more of the genes for Lp(a).

“ The hope now is that by targeting both we could get even better risk reduction ”

Lead researcher Professor Martin Farrall

He said: "The increase in risk to people from high Lp(a) levels is significantly less severe than the risk from high LDL cholesterol levels.



"So Lp(a) doesn't trump LDL, which has a larger impact and which we can already control pretty effectively.

"The hope now is that by targeting both we could get even better risk reduction."

Some existing drugs, such as Niacin, and others coming on to the market, such as CETP-inhibitors, lower Lp(a) as well as LDL cholesterol.

Professor Peter Weissberg of the British Heart Foundation, which funded the study, said the findings were useful but urged people not to be alarmed by them.

"They highlight the importance of trying to lower Lp(a), which will spark new efforts to design a medicine to achieve this effectively.

"And they reveal clues that open a new avenue for research to decipher how heart disease develops.

"But LDL is still the type of cholesterol to be more concerned about."

Fats from food are turned into cholesterol by the liver. There are different types but some, such as LDL, are known as "bad" cholesterol. They can lead to a build-up in the body's cells.

Prof Weissberg said everyone could reduce their risk of heart disease by eating a healthy balanced diet, being physically active and avoiding smoking.

Story from BBC NEWS:

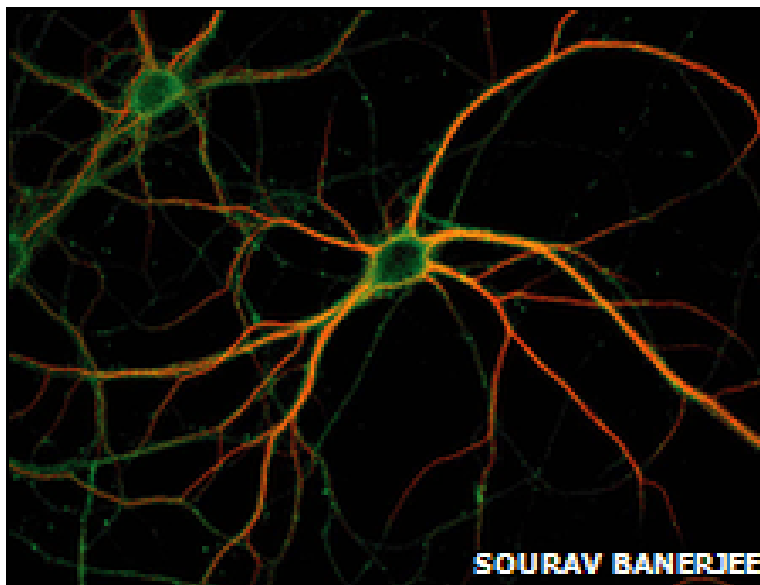
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8426591.stm>

Published: 2009/12/24 00:00:38 GMT



Scientists 'decode' memory making

US scientists believe they have uncovered one of the mechanisms that enables the brain to form memories.



Synapses - where brain cells connect with each other - have long been known to be the key site of information exchange and storage in the brain.

But researchers say they have now learnt how molecules at the site of the synapse behave to cement a memory.

It is hoped the research, published in *Neuron*, could aid the development of drugs for diseases like Alzheimer's.

The deteriorating health of the synapses is increasingly thought to be a feature of Alzheimer's, a disease in which short-term memory suffers before long-term recollections are affected.

“ Scientists have been perplexed for some time as to why, when synapses are strengthened, you have the degradation of proteins going on side by side with the synthesis of new proteins ”

Kenneth Kosik University of California Santa Barbara

A strong synapse is needed for cementing a memory, and this process involves making new proteins. But how exactly the body controls this process has not been clear.

Now scientists at the University of California Santa Barbara say their laboratory work on rats shows the production of proteins needed to cement memories can only happen when the RNA - the collection of molecules that take genetic messages from the nucleus to the rest of the cell - is switched on.

Until it is required, the RNA is paralysed by a "silencing" molecule - which itself contains proteins.

When an external signal comes in - for example when one sees something interesting or has an unusual experience - the silencing molecule fragments and the RNA is released.

“ This interesting development could give a greater understanding of the memory loss experienced by people with Alzheimer's and other forms of dementia and lead to new treatments ”

Rebecca Wood Alzheimer's Research Trust

Kenneth Kosik of the university's neuroscience research institute said: "One reason why this is interesting is that scientists have been perplexed for some time as to why, when synapses are strengthened, you have the degradation of proteins going on side by side with the synthesis of new proteins.

"So we have now resolved this paradox. We show that protein degradation and synthesis go hand in hand. The degradation permits the synthesis."

Identifying the proteins the brain needs in order to cement the memory could ultimately have benefits for those suffering from memory disorders.

Rebecca Wood, head of the Alzheimer's Research Trust, said: "Scientists say they have studied nerve cells in the laboratory and learnt more about how specific proteins may have a role in areas of the brain that transmit messages and help us store memories.

“ The health of synapses and their activity levels is becoming an important and interesting focus of research ”

Professor Julie Williams

"This interesting development could give a greater understanding of the memory loss experienced by people with Alzheimer's and other forms of dementia and lead to new treatments."

The most recent projections suggest 115 million people across the globe will suffer from dementia by 2050.

Julie Williams, professor of psychological medicine at Cardiff University, said: "Our increasing understanding of genetic risk factors in Alzheimer's is pointing to the synapses so any new study in this area is welcome.

"Alzheimer's is a complicated disease and it is early days, but the health of synapses and their activity levels is becoming an important and interesting focus of research."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8426959.stm>

Published: 2009/12/24 00:00:48 GMT

Old Ideas Spur New Approaches in Cancer Fight

By GINA KOLATA



Mina Bissell will never forget the reception she got from a prominent scientist visiting Lawrence Berkeley National Laboratory, where she worked. She gave him a paper she had just published on the genesis of cancer.

“He took the paper and held it over the wastebasket and said, ‘What do you want me to do with it?’ Then he dropped it in.”

That was 20 years ago, and ever since, Dr. Bissell and a few others have struggled for acceptance of what seemed a radical idea: Gene mutations are part of the process of cancer, but mutations alone are not enough. Cancer involves an interaction between rogue cells and surrounding tissue.

The idea seemed messy and unduly complicated. And cancer genes seemed comparatively clear-cut. So it was often ignored or dismissed as researchers focused on genes and on isolated cancer cells growing in Petri dishes in laboratories.

Now, though, more and more researchers are plunging into those murky depths, studying tumors in their cellular environments. And, once they do, they say, they can explain many anomalies of cancer. The new focus on a cancer’s surroundings, researchers say, is a major shift in thinking about why cancer occurs and how to stop it.

As yet, the research has not led to cures, and scientists expect the real fruits of their efforts — if they occur at all — will be years in the future.

But as the war on cancer drags on, nearly 40 years after it began, scientists say new directions are urgently needed. The death rate has barely budged for most cancers, and the gene mutation strategy has so far had a limited effect. That is probably because cancer cells have so many genetic abnormalities. If one mutated gene is attacked, others take over.

So some researchers are taking a fresh look at ideas that were dismissed as folklore — a blow to the breast might spur cancer, an infection might fuel cancer cells, a weak immune system might let cancer spread. They also say the new approach may help explain mysteries, like why the breast cancer rate plummeted when women stopped taking menopausal hormones. One answer may be that hormone

therapy changes normal cells of the breast and may allow some tiny tumors to escape from the milk ducts where breast cancer starts.

The basic idea — still in the experimental stages — is that cancer cells cannot turn into a lethal tumor without the cooperation of other cells nearby. That may be why autopsies repeatedly find that most people who die of causes other than cancer have at least some tiny tumors in their bodies that had gone unnoticed. According to current thinking, the tumors were kept in check, causing no harm.

It also may mean that cancers grow in part because normal cells surrounding them allowed them to escape. It also means that there might be a new way to think about treatment: cancer might be kept under control by preventing healthy cells around it from crumbling.

“Think of it as this kid in a bad neighborhood,” said Dr. Susan Love, a breast cancer surgeon and president of the Dr. Susan Love Research Foundation. “You can take the kid out of the neighborhood and put him in a different environment and he will behave totally differently.”

“It’s exciting,” Dr. Love added. “What it means, if all this environmental stuff is right, is that we should be able to reverse cancer without having to kill cells. This could open up a whole new way of thinking about cancer that would be much less assaultive.”

Some companies are taking note. Genentech, for example, is investigating the way some skin, ovarian, colon and brain cancers signal surrounding cells to promote cancer growth. The company has an experimental drug that it hopes might block this signaling.

Others are studying drugs like statins or anti-inflammatory drugs that may act by affecting signals between surrounding cells and cancers. But, says Dr. Robert Weinberg, a cancer researcher at M.I.T., “this is not a clearly articulated scientific agenda, in large part because we still know too little about these signals and how their release is controlled.”

The researchers are cautious. They, more than anyone else, know the blind alleys of cancer research over the past few decades. And no one is suggesting that controlling a tumor’s environment will, by itself, cure cancer.

And they are not discounting cancer-causing genes. But even some who have made their careers studying cancer genes say a tumor’s environment can no longer be ignored.

“I am an unabashed cancer geneticist,” said Dr. Bert Vogelstein, director of the Ludwig Center for Cancer Genetics and Therapeutics at Johns Hopkins. “The genetic alterations in the cancer cells are the proximate cause of the malignancy.”

But, Dr. Vogelstein said, “one cannot fully understand that disease unless one understands” the tumor’s environment.

It can be a reciprocal interaction, especially as cancers grow and become more advanced. The surrounding cells might let cancers start, but once they do, cancers appear to change the surrounding cells to help fuel the cancers’ growth.

“This notion is not a flash in the pan that will come and go,” said Dr. Weinberg, who, in 1981, discovered the first human oncogene, a naturally occurring gene that, when mutated, can cause cancer.

And Dr. Bissell is now hailed as a hero, with an award named after her.

“You have created a paradigm shift,” the Federation of American Societies for Experimental Biology wrote in a letter announcing that she had won its 2008 Excellence in Science award.

Struggle for Acceptance

Dr. Barnett Kramer, associate director for disease prevention at the National Institutes of Health, recently discovered a paper that startled him. It was published in the medical journal The Lancet in 1962, about a decade before the war on cancer was announced by President Richard M. Nixon. In it, Dr. D. W. Smithers, then at Royal Marsden Hospital in London, argued that cancer was not a disease caused by a rogue cell that divides and multiplies until it destroys its host. Instead, he said, cancer may be a disorder of cellular organization.

“Cancer is no more a disease of cells than a traffic jam is a disease of cars,” Dr. Smithers wrote. “A lifetime of study of the internal-combustion engine would not help anyone understand our traffic problems.”

Dr. Kramer said: “I only wish I had read this paper early in my career. Here we are, 46 years later, still struggling with issues this author predicted we’d be struggling with.”

Others say the time was just not right for such ideas. They know, they say, because they were excoriated when they advanced them.

Dr. Bissell said she had struggled for decades to find acceptance for her ideas.

She was not alone. In 1975, not long after Dr. Bissell started her work, another scientist published a hard-to-refute seminal experiment that seemed to indicate that cancer cells could become normal in the right environment.

The scientist, Beatrice Mintz of the Fox Chase Cancer Center in Philadelphia, inserted mouse cancer cells into early mouse embryos. The embryos grew into mice with cells from the cancer, a teratocarcinoma, and cells from the original embryo. The cancer cells had certainly been incorporated into the mouse embryo, but they were defanged, developing normally. Yet the same cancer cells will spread and kill an adult mouse if they are injected under the skin or into the abdomen.

“It was a sensational experiment,” Dr. Mintz said.

Dr. Bissell also thought the experiment was sensational. But she wanted to know why cells would become deadly tumors in one location and not another.

At the time, she was working with Rous sarcoma virus, or R.S.V., which causes fatal tumors in chickens when inserted into cells. Then, one of her postdoctoral fellows, Dr. David Dolberg, unearthed papers suggesting that the cancer virus would behave differently in chicken embryos.

They injected the virus into embryos. The old papers were correct.

“That meant that if you put the virus in cells in an embryo, you don’t get cancer,” Dr. Bissell said. “And if you put it in a chicken, you do.”

Dr. Bissell and Dr. Dolberg’s paper — the one the visiting scientist dropped into a wastebasket, thinking it ridiculous and clearly wrong — was published in the journal Nature in 1984. The scientist was not the only one who scoffed, Dr. Bissell said.

She interprets the response to the sociology of science.

“The people who are successful become vested in their ideas,” Dr. Bissell said. “It becomes extraordinarily difficult for new ideas to find their way.”

But, to her, the R.S.V. experiments were a clarion call.

Sleeping Cells Awakened

Next, Dr. Bissell did an experiment that gave some credence to an old idea oft dismissed.

Over and over, doctors and patients tell stories of injuries that seemed to spur a cancer. A blow to the breast, an operation, and suddenly cancer takes off. It may mean nothing, just an effort to explain the seemingly inexplicable.

Yet some stories end up in publications. For example, says Dr. Michael Baum, emeritus professor of surgery at University College London, there is [a report of eight men](#) with advanced [testicular cancer](#) who had surgery to remove the tumors, followed by “a sudden and dramatic exacerbation of the disease.” Animal studies find similar effects, Dr. Baum says.

And in breast cancer, he says, observations of women whose cancer accelerated after breast surgery as well as [mathematical modeling](#) indicates that surgery at the site of a dormant tumor can spur it to grow. In some unusual cases, chronic inflammation, as can happen with [hepatitis B](#) and C viruses, for example, is thought to lead to cancer. The current hypothesis is that chronic liver inflammation can disrupt the normal architecture of cells, allowing cancers that might have lain dormant to thrive.

Most likely, if wounding or inflammation has an effect, it happens only under unusual conditions and if tiny cancers are already present at the site of the wound.

That is what happened when Dr. Bissell did an experiment in chickens.

She knew that when she injected a chicken with R.S.V., the cancer-causing virus, the bird would develop a huge tumor at the site of the injection. But Dr. Bissell had injected the virus into the bird’s blood. Why weren’t there tumors everywhere?

She reasoned it through.

“What do we do when we inject?” Dr. Bissell asked. “Well, we make a wound. We injected the virus in one wing and got a huge tumor. What would happen if we injected the virus in one wing and wounded the other wing?”

She tried it. A huge tumor grew where she had injected the virus and another grew on the other wing where she had made the wound.

Researchers are not saying that infections or simple cuts or most cancer operations will cause cancer or make an existing cancer spread. Most likely, if there is an effect, it happens only if tiny cancers are already present at the site of the injury.

“Obviously it’s more than just surgery,” Dr. Love said. “The majority of people who have surgery don’t have a problem.”

But, she said, the findings tell her that if people have a choice of more or less invasive surgery — laparoscopy versus open surgery, for example — they might want to choose the less invasive.

“And I say this as a surgeon who likes to put her hands in and muck around,” Dr. Love added.

Dr. Kramer said that made sense, but added: “Would I avoid operations? No. I don’t think the evidence is good enough.”

A bigger risk than wounding, Dr. Bissell says, is simply aging, in which cell architecture crumbles, which is why people get wrinkles, for example. And it may be why most cancer occurs in older people.

“I think that this is unfortunately a fundamental problem in cancer,” Dr. Bissell said. “Unfortunately, we haven’t discovered what to do about aging.”

One of the great mysteries about breast cancer is what to make of tiny tumors known as ductal carcinoma in situ, or D.C.I.S. They are so small they cannot be felt and so common they account for about a quarter of tumors found with mammograms. But, studies show, most stay in the milk ducts, where they originate, never spreading to the rest of the breast where they can become lethal.

The problem is that doctors cannot tell the dangerous D.C.I.S. tumors from the harmless ones, so they treat all such tumors as if they were dangerous.

Dr. Kornelia Polyak of Harvard Medical School, like many others, thought she could solve the problem. From the start, she thought, dangerous D.C.I.S. might have genes different from those of D.C.I.S. that remains harmlessly enclosed in milk ducts. Dangerous D.C.I.S. would look like invasive breast cancer cells and harmless D.C.I.S. would not.

But, she found, D.C.I.S. cells looked just like cells from aggressive breast cancers — gene expression patterns, mutations and cell maturation patterns were all the same.

“It’s just that one tumor is inside the duct, and the other is outside the duct,” Dr. Polyak said.

“That was surprising,” she added. “Why is it D.C.I.S. if it looks like invasive cancer?”

She looked at cells surrounding D.C.I.S.

The first thing she noticed was that when D.C.I.S. broke free of a milk duct, the duct’s outer layer had broken down. It could be that the duct falls apart because the cancer is bursting out. Or it could be that the cancer is escaping the duct because the outer layer disintegrated — which is what her research showed. As long as the milk duct is intact, D.C.I.S. cells cannot escape.

She also found that when breast tissue is injured, wound healing can destroy the crucial outer layer of ducts, allowing D.C.I.S. to escape. That is what happens in animals, and it is her hypothesis that it happens in humans.

It made her ask about biopsies. They are unavoidable, as she knows, because she recently had one herself. And they cannot be a huge factor in causing cancer or millions of women would be getting breast cancer at the site of their biopsies — and they are not.

Still, she worries. “Frankly, this has not been studied extensively,” Dr. Polyak said. “People don’t like to bring it up.”

A Nudge Over Time

The dream of many cancer researchers is to find a way to prevent a cancer cell’s environment from allowing it to grow. They could then prevent cancer.

And in one situation, they might have accidentally stumbled upon a possible method.

The discovery began with a surprise in 2003, when breast cancer rates in women 50 and older suddenly fell 15 percent, after the rates for all women had steadily risen since 1945. The pattern held in 2004.

The drop was traced to the release of a large federal study in 2002 that reported that Prempro, a hormone therapy for menopause that was supposed to keep women healthy and protect them from heart disease, actually made heart disease more likely and slightly increased the risk of breast cancer.

Sales plunged after the report was released, as millions of women stopped taking the drug.

But cancer is supposed to take years, even decades, to develop. How, some asked, could cancer rates drop so quickly?

Could it be possible that the hormone treatment somehow changed the environment of naturally occurring cancer cells and let them progress?

Dr. Karla Kerlikowske, professor of medicine, epidemiology and biostatistics at the University of California, San Francisco, now believes that is a possibility. A combination of estrogen and progestin, like that in Prempro, may change the structure and activity of breast tissue, Dr. Kerlikowske finds, making breast tissue denser, a condition that has nothing to do with how breasts look or feel. Breast density is a cellular structure seen on mammograms and has long been associated with higher cancer risk.

Her hypothesis is that hormone therapy can give “that little bit of nudge over a long enough period to promote breast cancer,” Dr. Kerlikowske said.

For some cancers destined to be aggressive, she suggests, it probably makes no difference if a woman takes hormones because the cancer will spread anyway. But she thinks that “for the average person, it becomes very important.”

That, of course, makes it even harder to figure out cancer.

“If it was easy,” Dr. Polyak said, “we would have done it already.”

This article has been revised to reflect the following correction:

Correction: December 30, 2009

Because of an editing error, an article on Tuesday about new cancer treatments based on older ideas misspelled part of the name of the university that is home to the Ludwig Center for Cancer Genetics and Therapeutics. It is Johns Hopkins University, not John Hopkins.

http://www.nytimes.com/2009/12/29/health/research/29cancer.html?_r=1&nl=health&emc=healthupdate_email

Seeking a Cure for Optimism

By ABBY ELLIN



AMERICANS are an optimistic, can-do lot. We subscribe to the belief that we have a right to not just pursue happiness, but to be happy. No matter how grim the last year has been, no matter how rotten the economy or one's own setbacks, people believe it can all change with the flip of the calendar: all you need do is look on the bright side.

Happiness is not just our birthright, it is a growth industry. Beyond the perpetually positive [Oprah Winfrey](#), Tony Robbins and the thinking-makes-it-so gurus behind "The Secret," the Internet offers many new programs for self-improvement. [Happier.com](#) was created in the fall with promises of "scientific solutions for real improvement." LiveHappy, a \$9.99 a month "mobile happiness boosting program," is based on the book "The How of Happiness" by Sonja Lyubomirsky, a [psychology](#) professor at the [University of California, Riverside](#), who says that activities like "envisioning your best possible self" are "scientifically shown" to make people happier.

Is any of this true? Can an optimistic attitude and a will to happiness lead to a better you in the new year?

Recently, a number of writers and researchers have questioned the notion that looking on the bright side — often through conscious effort — makes much of a difference. One of the most prominent skeptics is [Barbara Ehrenreich](#), whose best-selling book "Bright-Sided: How the Relentless Promotion of Positive Thinking Has Undermined America," published in the fall, maintains that thinking positively does little good in the long run, and can, in fact, do harm.

"Happiness is great, joy is great, but positive thinking reduces the spontaneity of human interactions," Ms. Ehrenreich said. "If everyone has that fixed social smile all the time, how do you know when anyone really likes you?"

A study published in the November-December issue of [Australasian Science](#) found that people in a negative mood are more critical of, and pay more attention to, their surroundings than happier people, who are more likely to believe anything they are told.

“Whereas positive mood seems to promote creativity, flexibility, cooperation and reliance on mental shortcuts, negative moods trigger more attentive, careful thinking, paying greater attention to the external world,” Joseph P. Forgas, a professor of social psychology at the University of New South Wales in Australia, wrote in the study.

Psychologists and others who try to study happiness scientifically often focus on the connection between positive thinking and better health. In the September 2007 issue of the journal Cancer, Dr. David Spiegel at Stanford University School of Medicine reported his efforts to replicate the findings of a 1989 study in which he had found that women with metastatic breast cancer who were assigned to a support group lived an average 18 months longer than those who did not get such support. But in his updated research, Dr. Spiegel found that although group therapy may help women cope with their illness better, positive thinking did not significantly prolong their lives.

Ms. Ehrenreich, who was urged to think positively after receiving a diagnosis of breast cancer several years ago, was surprised by how many readers shared her visceral resistance to that mantra. She created a forum on her Web site for people to vent about positive thinking, and many have. “I get so many people saying ‘thank you,’ people who go back to work after their mother has died and are told, ‘What’s the matter?’ “ she said. Likewise, there are “corporate victims who have been critics or driven out of jobs for being ‘too negative.’ “

Such criticism has annoyed those in the burgeoning academic field of positive psychology, which traces to 1998 when the president of the American Psychological Association at the time, Martin Seligman, sought out good scientific research on positive emotion. He found hundreds of studies showing the health benefits of thinking positively. While it is impossible to change one’s inherent temperament, Dr. Seligman said, “it’s certain you can change pessimism into optimism in a lasting way.”

Dr. Seligman, who now runs the Positive Psychology Center at the University of Pennsylvania and makes a rather unflattering appearance in “Bright-Sided,” is not pleased with Ms. Ehrenreich’s book. In a posting on a positive psychology list serve, he accused “Barbara I Hate Hope Ehrenreich” of “cherry picking” studies to suit her purpose.

“Where Ehrenreich and I agree — we’re both trying to separate wheat from chaff,” he said in an interview. “We just differ on what we think is wheat and what we think is chaff.”

Many experts have come to question the connection between optimism and health. “Being optimistic is secondary to having health and resources,” said James C. Coyne, a professor of psychology and psychiatry at the University of Pennsylvania School of Medicine, who conducted a study on positive thinking and cancer and found no correlation between optimism and improved outcomes. “Ranges of cross-studies have found this,” he said.

“It’s easy to show an association between optimism and subsequent health,” he said, “but if you introduce appropriate statistical controls — if you take into account baseline health and material resources — then the effect largely goes away.”

Other experts are less definitive. Barbara L. Fredrickson, a psychology professor at the University of North Carolina at Chapel Hill, has been exploring the function of positive emotions since the early 1990s. Dr. Fredrickson, whose book “Positivity” was published this year, differentiates between positive thinking and positive emotion. “Positive thinking can sometimes lead to positive emotion, but it won’t always,” she said. “It’s like the difference between wearing a T-shirt that says ‘Life is Good’ and actually feeling deep in your bones grateful for your current circumstances.”

With that in mind, she cautions that the idea of “fake it till you make it” can actually be harmful to one’s health. “What my research shows is that those insincere positive emotions — telling yourself ‘I feel good’



when you don't — is toxic and actually more harmful than negative emotions. We need to become more sophisticated about what is real and what is fake within people's attempts to be positive."

Ruth Rossoff, 79, of Philadelphia, said that she has felt tyrannized by the agents of positivity. In September, she said, her husband, who had been ill for some time and had realized he would never again live the kind of life he had been used to, decided he was ready to die. "After seeing all the people who mattered to him and discussing his decision with me and our adult children, he made his wishes known to the people caring for him in the hospital," Ms. Rossoff said.

Then a doctor who was covering for her husband's physician stopped by. "This young man came in and proceeded to tell him about his own mother's miraculous recovery from some illness by sheer willpower and pushed him to try harder to get better," Ms. Rossoff said. Her husband, energized, lived a few weeks longer. "I was livid," Ms. Rossoff said. "My husband suffered a few extra weeks with the same end result by listening to the pep talk."

As for Ms. Ehrenreich, she believes that negative thinking is just as delusional as unquestioned positive thinking. She hopes to see a day when corporate employees "walk out when the motivational speakers start talking," she said. "It's all about control and money." Her goal? To encourage realism, "trying to see the world not colored by our wishes or fears, but by reality."

<http://www.nytimes.com/2009/12/31/fashion/31positive.html?ref=health>





Russia to Plan Deflection of Asteroid From Earth

By ELLEN BARRY

MOSCOW — Russia's top space researchers will hold a closed-door meeting to plan a mission to deflect 99942 Apophis, an asteroid that will fly close to Earth two decades from now, said Anatoly N. Perminov, the head of Russia's space agency, during an interview on Russian radio on Wednesday.

Mr. Perminov said Apophis, named for the Egyptian god of destruction, is about three times the size of the Tunguska meteorite, apparently the cause of a 1908 explosion in Siberia that knocked over an estimated 80 million trees. He said that according to his experts' calculation, there was still time to design a spacecraft that could alter Apophis's path before it made a dangerous swing toward Earth.

"I don't remember exactly, but it seems to me it could hit the Earth by 2032," he said, adding, "We're talking about people's lives here. It's better to spend several million dollars and create this system, which would not allow a collision to happen, than wait for it to happen and kill hundreds of thousands of people."

In fact, Apophis's chances of hitting Earth have been downgraded since it was discovered in 2004, NASA said this year. Scientists originally thought the orbit of the 1,000-foot-long asteroid gave it a 2.7 percent chance of hitting Earth on its first approach in 2029, but after studying its path they said it would remain 18,300 miles above the planet's surface.

On a second approach, in 2036, it was originally given a 1-in-45,000 chance of hitting Earth, but the odds were reduced to 1 in 250,000. The odds of impact on its third approach, in 2068, are 1 in 333,000, NASA scientists say.

Scientists have proposed various methods of averting an asteroid impact, among them a spacecraft that would land on the asteroid and, using electric motors, very gradually turn its trajectory. Another method would involve striking it with missiles or employing a satellite that used gravitational pull to change the orbit.

Mr. Perminov said the plan he envisioned would involve "no nuclear explosions; everything will be based on the laws of physics." Once a mission has been developed, Russia will invite NASA, the China Space Agency and the European Space Agency to participate, he said.

Russell L. Schweickart, a former Apollo astronaut who is chairman of the B612 Foundation, a California group that promotes efforts to deflect asteroids, hailed much of the proposal and said Mr. Perminov was the most influential official ever to articulate a coordinated deflection plan. But he objected to using Apophis to test new deflection methods, saying there was more risk if something went wrong.

"It takes a very small change in the Apophis orbit to cause it to impact the Earth instead of missing it," Mr. Schweickart said. "There are a million asteroids out there. Find another one."

<http://www.nytimes.com/2009/12/31/world/europe/31asteroid.html?ref=science>



The Joy of Physics Isn't in the Results, but in the Search Itself

By DENNIS OVERBYE

I was asked recently what the Large Hadron Collider, the giant particle accelerator outside Geneva, is good for. After \$10 billion and 15 years, the machine is ready to begin operations early next year, banging together protons in an effort to recreate the conditions of the Big Bang. Sure, there are new particles and abstract symmetries in the offing for those few who speak the language of quantum field theory. But what about the rest of us?

The classic answer was allegedly given long ago by Michael Faraday, who, when asked what good was electricity, told a government minister that he didn't know but that "one day you will tax it."

Not being fast enough on my feet, I rattled off the usual suspects. Among the spinoffs from particle physics, besides a robust academic research community, are the Web, which was invented as a tool for physicists to better communicate at CERN — the European Organization for Nuclear Research, builders of the new collider — and many modern medical imaging methods like M.R.I.'s and PET scans.

These tests sound innocuous and even miraculous: noninvasive and mostly painless explorations of personal inner space, but their use does involve an encounter with forces that sound like they came from the twilight zone. When my wife, Nancy, had a scan known as a Spect last fall, for what seems to have been a false alarm, she had to be injected with a radioactive tracer. That meant she had to sleep in another room for a couple of days and was forbidden to hug our daughter.

The "P" in PET scan, after all, stands for positron, as in the particles that are opposites to the friendly workhorse, the electron, which is to say antimatter, the weird stuff of science-fiction dreams.

I don't know if anyone ever asked Paul Dirac, the British physicist who predicted the existence of antimatter, whether it would ever be good for anything. Some people are now saying that the overuse of scanning devices has helped bankrupt the health care system. Indeed, when I saw the bill for Nancy's scan, I almost fainted, but when I saw how little of it we ourselves had to pay, I felt like ordering up Champagne.

But better medical devices are not why we build these machines that eat a small city's worth of electricity to bang together protons and recreate the fires of the Big Bang. Better diagnoses are not why young scientists spend the best years of their lives welding and soldering and pulling cable through underground caverns inside detectors the size of New York apartment buildings to capture and record those holy fires.

They want to know where we all came from, and so do I. In a drawer at home I have a family tree my brother made as a school project long ago tracing our ancestry back several hundred years in Norway, but it's not enough. Whatever happened in the Big Bang, whatever laws are briefly reincarnated in the unholy proton fires at CERN, not only made galaxies and planets possible, but it also made us possible. How atoms could achieve such a thing is a story mostly untold but worth revering. The Earth's biosphere is the most complicated manifestation of the laws of nature that we know of.

Like an only child dreaming of lost siblings, we dream of finding other Earths, other creatures and civilizations out in space, or even other universes. We all want to find out that we are cosmic Anastasias and that there is a secret that connects us, that lays bare the essential unity of physical phenomena.

And so we try, sometimes against great odds. The year that is now ending began with some areas of science in ruins. One section of the Large Hadron Collider looked like a train wreck with several-ton magnets lying about smashed after an electrical connection between them vaporized only nine days off a showy inauguration.

The Hubble Space Telescope was limping about in orbit with only one of its cameras working.

But here is the scorecard at the end of the year: in December, the newly refurbished collider produced a million proton collisions, including 50,000 at the record energy of 1.2 trillion electron volts per proton, before going silent for the holidays. CERN is on track to run it next year at three times that energy.

The Hubble telescope, after one last astronaut servicing visit, reached to within spitting distance of the Big Bang and recorded images of the most distant galaxies yet observed, which existed some 600 million or 700 million years after the putative beginning of time

Not to mention the rapidly expanding universe of extrasolar planets. In my view from the cosmic bleachers, the pot is bubbling for discovery. We all got a hint of just how crazy that might be in the new age of the Internet on Dec. 17, when physicists around the world found themselves glued to a Webcast of the results from an experiment called the Cryogenic Dark Matter Search. Rumors had swept the blogs and other outposts of scientific commentary that the experimenters were going to announce that they had finally detected the ethereal and mysterious dark matter particles, which, astronomers say, make up a quarter of the universe.

In the end, the result was frustratingly vague and inconclusive.

“We want it to be true — we so want to have a clue about dark matter,” Maria Spiropulu, a Caltech physicist working at CERN wrote to me the night of the Webcast.

“And it is not easy,” Dr. Spiropulu said. “The experiments are not easy and the analysis is not easy. This is a tough, tough ride over all.”

Although we might well solve part of the dark matter conundrum in the coming years, the larger mystery winds out in front of us like a train snaking into the fog.

We may never know where we came from. We will probably never find that cosmic connection to our lost royalty. Someday I will visit Norway and look up those ancestors. They died not knowing the fate of the universe, and so will I, but maybe that’s all right.

Steven Weinberg, a University of Texas physicist and Nobel Prize winner, once wrote in his 1977 book “The First Three Minutes”: “The more the universe seems comprehensible, the more it also seems pointless.” Dr. Weinberg has been explaining that statement ever since. He went on to say that it is by how we live and love and, yes, do science, that the universe warms up and acquires meaning.

As the dark matter fever was rising a few weeks ago, I called Vera Rubin, the astronomer at the department of terrestrial magnetism of the Carnegie Institution of Washington, who helped make dark matter a cosmic issue by showing that galaxies rotate too fast for the gravity of their luminous components to keep them together.

But Dr. Rubin, who likes to stick to the facts, refused to be excited. “I don’t know if we have dark matter or have to nudge Newton’s Laws or what.

“I’m sorry I know so little; I’m sorry we all know so little. But that’s kind of the fun, isn’t it?”

<http://www.nytimes.com/2009/12/29/science/29essa.html?ref=science>

In New Way to Edit DNA, Hope for Treating Disease

By NICHOLAS WADE

Only one man seems to have ever been cured of AIDS, a patient who also had leukemia. To treat the leukemia, he received a bone marrow transplant in Berlin from a donor who, as luck would have it, was naturally immune to the AIDS virus.

If that natural mutation could be mimicked in human blood cells, patients could be endowed with immunity to the deadly virus. But there is no effective way of making precise alterations in human DNA.

That may be about to change, if a powerful new technique for editing the genetic text proves to be safe and effective. At the University of Pennsylvania, Dr. Carl June and colleagues have used the technique to disrupt a gene in patients' T cells, the type attacked by the AIDS virus. They have then infused those cells back into the body. A clinical trial is now under way to see if the treated cells will reconstitute a patient's immune system and defeat the virus.

The technique, which depends on natural agents called zinc fingers, may revive the lagging fortunes of gene therapy because it overcomes the inability to insert new genes at a chosen site. Other researchers plan to use the zinc finger technique to provide genetic treatments for diseases like bubble-boy disease, hemophilia and sickle-cell anemia.

In principle, the zinc finger approach should work on almost any site on any chromosome of any plant or animal. If so, it would provide a general method for generating new crop plants, treating many human diseases, and even making inheritable changes in human sperm or eggs, should such interventions ever be regarded as ethically justifiable.

Zinc fingers are essential components of proteins used by living cells to turn genes on and off. Their name derives from the atom of zinc that holds two loops of protein together to form a "finger." Because the fingers recognize specific sequences of DNA, they guide the control proteins to the exact site where their target gene begins.

After many years of development, biologists have learned how to modify nature's DNA recognition system into a general system for manipulating genes. Each natural zinc finger recognizes a set of three letters, or bases, on the DNA molecule. By stringing three or four fingers together, researchers can generate artificial proteins that match a particular site.

The new system has been developed by a small biotech company, Sangamo BioSciences of Richmond, Calif., and, to some degree separately, by academic researchers who belong to the Zinc Finger Consortium.

Sangamo was founded in 1995 by Edward O. Lanphier II, a former executive with a gene therapy company. Reading an article by Aaron Klug, the British crystallographer who discovered the zinc finger design, he saw the technique's potential for genetic manipulation. He bought a company Dr. Klug had founded and worked with him and researchers like Carl O. Pabo to improve the technique and develop combinations of zinc fingers to match any sequence of DNA letters.

"We now have a full alphabet of zinc fingers," Mr. Lanphier said, "but when we started the company it was like typing a novel with two fingers."

Zinc finger proteins have many potential uses. One is to link them to agents that turn on or turn off the gene at the site recognized by the fingers.

More powerfully, the zinc fingers can be deployed as a word processing system for cutting and pasting genetic text. Two sets of zinc fingers are attached to a protein that cuts the DNA in between the two sites matched by the fingers. The cell quickly repairs the break but sometimes in a way that disrupts the gene. This is the approach used in destroying the gene for the receptor used by the AIDS virus to gain entry to white blood cells.

Or, if DNA for a new gene is inserted into a cell at the same time as the zinc fingers that scissor the DNA, the new gene will be incorporated by the cell's repair system into the DNA at the break site. Most gene therapy techniques use a virus to carry new genes into a cell but cannot direct the virus to insert genes at a specific site.

"I think it's a broadly applicable technology which has already allowed experiments that would not have been possible before," said J. Keith Joung, a biologist who designs zinc finger proteins at the Massachusetts General Hospital.

Daniel F. Voytas, a plant geneticist at the University of Minnesota, said the zinc finger technique would allow breeders to change the oil composition of any plant, the types of carbohydrates produced or the way carbon dioxide is captured. "We can go in and make any change we want to any plant species," Dr. Voytas said.

Zinc fingers can also be used for "trait stacking," the positioning of several beneficial genes at a single site. This avoids heavy regulatory costs because genetically altered plants must be tested for safety for each site that is modified.

The zinc finger technology has taken many years to prepare because of the difficulty of designing the fingers and also of preventing them from cutting the genome in the wrong places. Only a handful of laboratories are currently using the technique, but proponents expect to see rapid growth.

The Zinc Finger Consortium, founded by Dr. Joung and Dr. Voytas, makes the method available free, and researchers need only pay for materials. But there are some 200 steps in Dr. Joung's recipe for making zinc fingers, and it takes time and dedication to do them all correctly.

The alternative is to buy zinc fingers. Sangamo has a commanding patent position and has licensed Sigma-Aldrich, a large life science company in St. Louis, to make zinc finger proteins for researchers. Sigma-Aldrich's charge for a zinc finger protein that cuts the genome at the site of your choice is \$39,000, with a discount for academic researchers. Zinc fingers that cut well-known human genes cost \$12,000. Sigma-Aldrich has used the technology to generate rats with genetic defects that mimic human disease. A schizophrenic rat can be had for \$100.

David Smoller, president of Sigma-Aldrich's biotechnology unit, licensed the technology from Sangamo in 2006 when he felt the company had proved it worked. "This technology is just amazing," Dr. Smoller said. "It's a game changer."

Sangamo has licensed the use of zinc fingers to Dow Agrosciences for creating new crop plants, and has reserved medical uses for itself. It has four Phase 2 clinical trials in progress, including treatments for diabetic neuropathy and amyotrophic lateral sclerosis.

In an ambitious effort to cure AIDS, Sangamo and the University of Pennsylvania started a clinical trial in February.

The AIDS virus enters the T cells of the immune system by latching on to a receptor called CCR5, but about 10 percent of Europeans have a mutation that disables the CCR5 gene. People who inherit two disabled copies of the gene do not have CCR5 on the surface of their T cells, so the AIDS virus has nothing to grab. These people are highly resistant to H.I.V.

In the zinc finger approach, the patient's T cells are removed, and zinc finger scissors are used to disable the CCR5 gene. The treated cells are allowed to multiply, then re injected into the patient. In experiments with mice, the treated cells turned out to have a strong natural advantage over the untreated ones, since those are under constant attack by the AIDS virus.

Whether or not zinc fingers will make gene therapy practical remains to be seen. "It's a little too early to know since clinical trials are in their early stages," said Dr. Katherine A. High, a hemophilia expert at the University of Pennsylvania.

Dr. Matthew H. Porteus, a pediatric geneticist at the University of Texas, said, "I think it has the potential to solve a lot of the problems that have plagued the gene therapy field." But Dr. Porteus noted that even the most carefully designed zinc fingers seemed to do some snipping away from their target site, a potentially serious safety problem.

Zinc fingers could be the gift that stem cell researchers have been waiting for. Stem cells taken from a patient may need to be genetically corrected before use, but until now there had been no way of doing so.

Dr. Rudolf Jaenisch, a stem cell expert at the Whitehead Institute in Cambridge, Mass., reported in August that he had successfully singled out three genes in induced embryonic stem cells with the help of zinc finger scissors designed by Sangamo. "This is a really important tool for human embryonic stem cells," Dr. Jaenisch said. The technology has not yet reached perfection. Some of the zinc fingers Sangamo provided "worked beautifully," he said, but some did not.

Zinc fingers may also make technically possible a morally fraught procedure that has been merely a theoretical possibility — the alteration of the human germ line, meaning the egg or sperm cells. Genetic changes made in current gene therapy are to body cells, and they would die with the individual. But changes made to the germ line would be inherited. Many ethicists and others say this is a bridge that should not be crossed, since altering the germ line, even if justifiable for medical reasons, would lower the barrier to other kinds of change.

Several scientists were reluctant to discuss the issue, or dismissed it by saying that even zinc fingers did not meet the error-free standards that would be required for germ-line engineering. But zinc finger scissors are so efficient that only 5 to 10 embryos need be treated to get one with the desired result. This could make it practical to alter the germ line.

Since the germ lines of rats and zebra fish have already been altered with zinc finger scissors, "in principle there is no reason why a similar strategy could not be used to modify the human germ line," Dr. Porteus said. The kind of disease that might be better treated in the germ line, if ethically acceptable, is cystic fibrosis, which affects many different tissues.

The disease could be corrected in unfertilized eggs, using the zinc finger technique, Dr. Porteus said. But he added, "I don't think our society is ready for someone to propose this."

<http://www.nytimes.com/pages/science/index.html>

Frank A. Wilczek
Discovering the Mathematical Laws of Nature

By CLAUDIA DREIFUS



He is good-natured, funny and thought to be among the smartest men in physics: Frank A. Wilczek, 58, a professor at the Massachusetts Institute of Technology who was one of three winners of the 2004 Nobel Prize in Physics. The award came for work Dr. Wilczek had done in his 20s, with David Gross of Princeton, on quantum chromodynamics, a theoretical advance that is part of the foundation of modern physics. Here is an edited version of two conversations with Dr. Wilczek, in October and this month.

Q. IN THIS TIME WHEN EVERYONE THINKS THEIR CHILD IS A GENIUS, WERE YOU, WHEN YOU WERE GROWING UP, A REAL BABY EINSTEIN?

A. My parents didn't think in those terms. They're the children of immigrants from Poland and Italy and rather modest people. I grew up in Queens and went to public schools.

As a child, I liked puzzles, figuring out how abstract things might fit together. The big thing in my childhood was that every week my parents took me to a toy store, and I was allowed to pick something out. Did I want a model B-57 or a toy car? I had to make choices and really think about what my priorities were. It molded my brain to be what it is. I still think that way

Q. SO WHEN DID THE WILCZEKS REALIZE THEY HAD A PRODIGY IN THE HOUSE?

A. I took an I.Q. test in elementary school, and the teachers said, "Hmm, maybe you want to take him out of public school." That really changed my relationship with my parents. All of a sudden, instead of being a kid they would simply boss around, they had this ... phenomenon. So really, they offered advice, gingerly. It was, "You're the boss." But I went to regular schools, Martin Van Buren High. I was always a couple of years ahead. I was just a little over 15 when I went off to the University of Chicago.

Q. THE DISCOVERY THAT YOU WON THE NOBEL PRIZE FOR — YOU DID THAT AT THE AGE OF 21, RIGHT?

A. It was my doctoral thesis. In the early 1970s, I was doing graduate work in mathematics at Princeton, and I wasn't sure that I wanted to be a mathematician. Luckily, their math building is connected to the physics building. And I somehow drifted over there and met David Gross.

There were a lot of really interesting things happening in physics at that time. Once I started in that direction, there was no looking back. I discovered I was really good at theoretical physics and that there were all sorts of things I could do. One idea came after another.

Q. CAN YOU EXPLAIN THE THESIS TO A PHYSICS NOVICE?

A. One of the big questions at that time was — what is the strong force, one of the four basic forces, the most powerful force of nature, that among other things holds atomic nuclei together? There were lots of known facts about the strong force, but no real theory. Freeman Dyson had said that it would be 100 years before it was understood.

But David and I broke through to make a proposal for the fundamental equations that govern the strong force. We also proposed experiments to check the equations, which later proved out. The key was a property of quarks called “asymptotic freedom.” It's unique among the forces of nature in that it turns off as the particles get close to one another. Conversely, the strength of the force grows with distance. That was seen experimentally, but proved very difficult to reconcile with quantum mechanics and relativity.

Well, David and I discovered that it could be reconciled. But only in a unique and mathematically intricate, highly symmetric theory whose specific beautiful equations we could write down. That theory is now called quantum chromodynamics, or QCD. It would result in new knowledge about the particles that make up the universe, of how matter gets mass. It helped us understand more about the early universe, and it suggested new ideas about the unity of forces in nature.

Q. YOU DID ALL THIS IN LESS THAN A YEAR. WHAT DID YOU THINK ONCE YOU HAD FINISHED IT?

A. That it was beautiful. Philosophers from the time of Aristotle on had said that fundamental science was more like everyday experience, where you had rules of thumb, which couldn't be precise because you'd run into paradoxes and contradictions. So with QCD, it was, “Wow, nature obeys mathematical law.”

Q. THE WORK YOU DID ON QCD, THAT ENERGY IS THE SOURCE OF MASS, VERIFIED SOME OF EINSTEIN'S MOST BASIC IDEAS. DID THAT FEEL GOOD — TO VERIFY THE MASTER?

A. That was a very wonderful and unanticipated consequence of that work. He proposed this possibility of converting mass into energy and vice versa. That's what we did theoretically: we showed that most of the mass of ordinary matters comes from the energy of quarks and gluons moving around. So we confirmed, very much extended and fulfilled his ideas.

As you can imagine, Einstein was one of my big heroes when I was growing up. I think he'd like my work. I hope so.

Q. NOW THAT THE <http://lhc.web.cern.ch/lhc/LARGE HADRON COLLIDER> at CERN is cranking up for more tries, will you be working there?

A. No, I'd just get in the way. But I've proposed some fundamental equations, and I hope they will be tested and verified at the L.H.C. I haven't gotten involved in the details.

However, QCD will get an enormous workout at L.H.C. because most of what happens there is governed by QCD. It's the theory of the strong interaction, which happens often in the collisions they'll be producing.

Q. WHAT HAVE YOU BEEN WORKING ON SINCE YOUR NOBEL?

A. I've been thinking about these particles called axions and how they influence cosmology. I'm trying to be more serious about putting together what I've thought about earlier — the idea of supersymmetry and axions, what happens if you combine them.

I've also been working on some exotic electronics. I have taken ideas developed in high-energy physics, about unusual properties particles might have, and tried to find some examples that emerge in materials at low temperatures, where quantum mechanics really comes into its own. There are some ideas in this for possibly helping to make a future quantum computer.

Also, I'm writing a mystery novel I'm calling "The Attraction of Darkness." The central thread of it is that there are four physicists, two men and two women, who collaborate and discover what dark matter is. For this, they ought to get the Nobel Prize. But the rules are that at most three people can share it. One of the four dies, supposedly a suicide, but then, maybe not. I'm hanging a lot of sex and music and philosophy on it.

Q. WHERE DID THE STORY IDEA COME FROM?

A. There are situations like that. There are many cases where some notable discovery has contested origins. There might be five or six people who might be candidates for a given award. That situation has all kinds of possibilities for a mystery.

I started thinking about this when I was in Stockholm picking up the Nobel Prize. The whole sweep of it: you have this heightened consciousness. I just started thinking about the process and how all the things that were happening seemed so much larger than life. My New Year's resolution is to get the book done by my birthday in mid-May.

<http://www.nytimes.com/2009/12/29/science/29conv.html?ref=science>

Israelis' Cancer Is Linked to Holocaust

By RONI CARYN RABIN



An Israeli study, believed to be one of the first of its kind, has found significantly higher cancer rates among European Jews who immigrated to Israel after the Holocaust than among those who left Europe for what is now Israel either before or during World War II.

The rates of breast and colorectal cancer were particularly high among those who spent the war years in Nazi-occupied Europe, according to the paper, published Nov. 4 in The Journal of the National Cancer Institute.

The most striking disparity was among those who were youngest during the war. Of the 315,544 subjects in the study, men born from 1940 to 1945 who were in Europe through the war years developed cancer at three and a half times the rate of men the same age who immigrated to Israel during the war; women in Europe throughout the war years were at more than double the risk, the study found.

The question of whether living in camps or under other dire conditions contributed to cancer in later life has long vexed Israeli experts.

“It is a very delicate question,” said Dr. Micha Barchana, director of the Israel National Cancer Registry and the paper’s senior author. “Holocaust survivors are treated like a special population in Israel, and we wanted to be sensitive. They have already been traumatized, and we did not want to traumatize them again.”

Before embarking on the analysis, researchers broached the subject of the research with groups of survivors to assess their reactions, Dr. Barchana said.

Medical experts in Israel have long been intrigued by the discrepancy in cancer rates between Ashkenazi and Sephardic Jews. Even though several genetic mutations associated with increased cancer risk among Ashkenazi Jews have been identified, Dr. Barchana said, they do not entirely explain the cancer gap.

Experts in the United States whose research focuses on the link between life stressors and cancer said the paper was important and interesting, but they cautioned against drawing any conclusions about cancer causes because the war experience subjected Jews to so many different harsh experiences, including

severe, sustained malnourishment and exposure to cold and infections and extreme, prolonged psychological stress that continued after the war. Researchers were also not able to control for behaviors that increase cancer risk, like smoking.

In some ways, experts said, the research raises more questions than it answers. “What is it, or can you not even parse it out between the caloric restriction, the exposure to pathogens, the psychological stress or all of those combined,” said Lorenzo Cohen, director of the department of integrative medicine at the University of Texas M. D. Anderson Cancer Center, in Houston.

There was tremendous variation in the experiences of those who survived the war in Europe. The study included Israeli Jews born in Europe from 1920 to 1945 who were under Nazi occupation. Some had lived in ghettos, some had gone into hiding, and others had survived forced labor and concentration camps.

“There is a lot of heterogeneity in the sample,” said Bonnie A. McGregor, a clinical psychologist with the Fred Hutchinson Cancer Research Center, in Seattle, who studies the link between stress and immune function. “It’s very blurry.”

But, Dr. McGregor said, the association between the war experience and elevated cancer rates was very strong, adding, “I don’t think it’s spurious.”

Earlier studies of cancer rates in survivors of famine during World War II have shown mixed results, with Norwegians who lived through short periods of caloric restriction having lower colorectal cancer risk. Survivors of the Dutch famine of 1944 had a higher incidence of breast cancer.

In the new study on European Jews, the number of cancers in survivors of the war increased substantially the younger the survivors were.

Women born in the early 1940s, during the worst conditions, had breast cancer rates 2.4 times higher than women their age who immigrated to what is now Israel during the war. And men born in the late 1930s had colorectal cancer rates 1.75 times higher than their counterparts who migrated earlier.

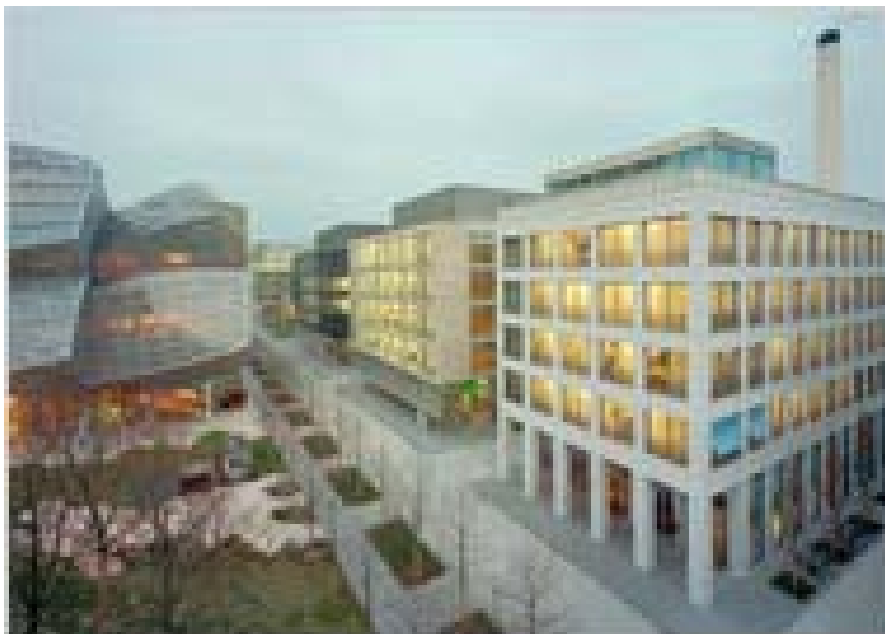
The results suggest that early life experiences and exposures, including prenatal conditions, may have a long-term impact on growth patterns and the endocrine system, as well as on behavioral responses that could increase susceptibility to some diseases, Dr. Barchana and his co-authors said.

“The people who were older at the time of exposure were less vulnerable later on,” Dr. McGregor said. By contrast, she said, those exposed to severe psychological and physical stressors in infancy and early childhood received less nurturing and were less equipped to deal with the stress, and would “be living with it and re-experiencing it for a greater percentage of their life.”

<http://www.nytimes.com/2009/12/29/health/29holocaust.html?ref=science>

Many Hands, One VisionBy NICOLAI OUROUSSOFF

BASEL, Switzerland



DANIEL L. VASELLA, the chief executive of the Swiss pharmaceutical company Novartis, was standing at the center of his imposing new corporate campus this fall, describing the lengths he went to in order to realize his architectural vision. “I made them move the border crossing,” he said pointing toward France. “It interfered with our plans. I put 100,000,000 Swiss francs on the table and said: ‘Move it over there. Tear down these silos and cranes.’ ”

Such grandiosity may bring to mind Louis XIV, whose own architectural creations, from Versailles to his summer residence at Marly, were expressions of seemingly unlimited personal power. But Mr. Vasella’s agenda could be considered even more sweeping. A fit, youthful-looking 56-year-old, he has made Novartis into one of the most innovative and ferociously aggressive drug makers in the world.

And the campus can be read as part of its carefully tailored image. In eight years Mr. Vasella is halfway through completing a plan to transform a dilapidated chemical complex into one of the most ambitious undertakings in a decade — one known for its architectural one-upmanship. He has built 10 research and office buildings and has plans to complete up to seven more. Mimicking a formula that has become the norm for big-money development in cities as disparate as Las Vegas and Abu Dhabi, he has hired an army of world-renowned architects — from Frank Gehry to Rafael Moneo to Alvaro Siza and the team of Kazuyo Sejima and Ryue Nishizawa — to design the individual buildings.

The procession of architectural treasures is laid out like jewels in a display case. And Mr. Vasella has effectively placed it behind a velvet rope by severely restricting access to the campus. The site is sealed off from the city, and he has refused to allow outsiders to photograph it until now. “We can’t say that people cannot write about it,” Mr. Vasella said, “but we didn’t make it easy. The problem is that if you talk too much before you are able to show something, you create more resistance to it.”

But despite the Who’s Who of architects that Mr. Vasella’s campus now boasts, he wants it to be about more than pretty spaces or corporate branding. From the very beginning he saw the design as a way to reorganize the entire social fabric of his company and foster better communication between those who

develop and market his drugs. Office floors would be laid out to prompt cross-disciplinary interaction; parks and courtyards, decorated with artworks, would be conceived as places of private contemplation. Every square inch, in essence, would be designed to encourage the flow of ideas.

More than any project of the new millennium, in short, Novartis crystallizes one of the central challenges in corporate architecture today: Is it possible to make a rigidly controlled, insulated environment that is also human?

Mr. Vasella was certainly not the first corporate titan to recognize architecture's use as a tool for social engineering. A century ago Henry Ford built factories in which lighting, ventilation and cleanliness were used to promote employees' health and speed production. At one point Ford even proposed the construction of an entire city modeled on the assembly line in the Muscle Shoals region of Alabama. (It was never built.)

In some sense the Novartis complex is a Muscle Shoals updated for the realities of a post-millennial economy.

When Mr. Vasella created the firm in 1996 from the merger of two smaller drug companies, it was a culture of white-collar scientists and businessmen. The headquarters for the new company were grim, a collection of aging office buildings and mostly boarded-up chemical factories.

"We were not up to the standards that the people we hire have come to expect," Mr. Vasella explained. "But I didn't want to build before we had a vision of where we wanted to end up in 20 years. By pure chance I sat at a dinner next to Vittorio Lampugnani and shared with him that we were planning to do this. He said: 'I am an urban planner. I know how to do this.'"

That dinner took place in 2001, and soon the two men were conspiring to wipe away every trace of the complex's industrial past. They decided to demolish all of the old buildings except one — the 1939 headquarters building that now houses Mr. Vasella's office. Not that there weren't challenges — the road that led to the border crossing with France cut diagonally across his site (and would be moved). Basel's main port would be relocated to make room for a three-and-a-half acre waterfront park.

The result is a master plan organized along what had been the old factory complex's main thoroughfare, Fabrikstrasse. The main entry is guarded by a crystalline glass pavilion, where uniformed guards check identification. From there visitors pass underneath a glass-covered walkway before arriving at a 2,000-foot-long white granite promenade, punctuated at its far end by a rust-colored sculpture by Richard Serra. The buildings are arranged along this axis with classical symmetry. A row of nearly identical office buildings, each by a different architect but all conforming to the same five-story height requirement, extends along the east side of the promenade. To the west is the unadorned masonry facade of the original 1939 office building and a small park dominated by a perfect grid of trees.

Over the next few years, as construction continues, the grid of new buildings will be extended toward the river, reinforcing the plan's relentless symmetry.

The starkness of the urban composition — with its deep shadowy arcades and repetitive street grid — is reminiscent of projects like EUR, Mussolini's urban fantasy on the outskirts of Rome. There, the rationalized plan and allusions to classical tradition contribute to the district's haunting emptiness. Novartis's buildings are more clinical. Both projects, however, reflect a desire for extreme order; anything that might detract from the overall purpose has been carefully filtered out.

And at Novartis that feeling is further reinforced by a degree of isolation that is unusual even for a corporate campus: there are no poor or homeless people walking the streets, no children, no parents with strollers — no outsiders of any kind.



“We have had many attacks, like many other companies, especially by animal-rights extremists,” Mr. Vasella explained. “They burned down a vacation lodge I own. They attacked the graves of my mother and of my sister. So inside we want to feel completely free of controls.”

The result is an exclusive and somewhat cool aesthetic oasis in which Mr. Vasella can observe how the social ambitions behind his design play out.

From the entrance, the building that first catches one’s eye is an elaborate composition of colorful glass panels designed by Diener & Diener with the artist Helmut Federle. The mismatched panels, suspended from steel rods and colored in different shades of blue, green and yellow, transform the entire building into an enormous cathedral window. At times, when the light is just right, the building seems to be dissolving into the heavens.

Inside the forms are solid and muscular. The big floor-to-ceiling windows are set in heavy chrome frames; a row of over-scaled white columns march down the lobby. Further inside, a gorgeous elliptical staircase, made of wood, spirals up through the building.

These architectural elements are a way of humanizing the conventional glass box. The columns help to break down the scale of the lobby; the staircase, which is extra wide, is conceived as a place to stop and mingle. Even the colorful glass panels outside are more than decorative, as they shield narrow balconies extending along the exterior of the building.

One of the most surprising effects of the design restrictions is that each architect’s vision is revealed through minute, precisely calculated decisions — the exact width of a corridor, the choice of material, the refinement of a detail — rather than through big gestures.

The building directly across the street, by Kazuyo Sejima and Ryue Nishizawa, looks comparatively simple at first. Its exactly thin concrete-and-steel frame is mostly hidden from view, so that all you see is vast expanses of clear glass. Once inside, only a few feet separate the entrance from a gravel courtyard that occupies most of the building’s core. The feeling of compression continues once you reach the office floors, where workers are suspended in a strange interstitial space between the tranquility of the courtyard below and the activity on the street outside. The only relief is a series of bridges that span the central courtyard and serve as a cafeteria and lounge areas.

It is a cheeky — almost perverse — play on Mr. Vasella’s idea of the campus as a place of social exchange, one that subtly wears down the formality of the conventional office space.

After we left the building, which was one of the first ones finished, Mr. Vasella said that many of the workers don’t like it. “They are too exposed. It makes them feel a bit agoraphobic,” he said.

He led me across the street to a more recently completed building, a visitor’s center by Peter Markli. The building’s front facade is decorated with an LED scroll by the artist Jenny Holzer. Inside, the furniture is a mix of styles: Chinese sofas, Navajo rugs and African sculptures that Mr. Vasella bought at auction. He seems particularly proud of the auditorium, whose cognac-colored leather seats look as though they were manufactured for a luxury sports car.

Mr. Vasella said he had been conscious throughout of considering the buildings’ effects on his staff. Full-scale reproductions of the offices were built so that employees could examine them before they were installed. A Harvard psychologist was hired to explain the effects of different colors and spatial configurations.

“We build for real people,” Mr. Vasella said. “We don’t build for machines. The idea is to create an ideal atmosphere, one where workers feel at ease and can communicate with each other easily. So the warmth is very important. When aesthetics intrude on other things, that is not the intention.”



Not all of the buildings, of course, are equally successful. Mr. Lampugnani's design verges on intimidating. Its exterior is stark and austere. And the imposing grand staircase, flanked by walnut paneling on three sides, that climbs straight up through its core feels like an overly corporate take on the Italian Rationalism of the 1930s.

It's only with Mr. Gehry's building that the straitjacket imposed by the master plan is finally removed. Over the years Mr. Gehry has often used conventional urban settings as a framework for his increasingly playful forms; the tension between the two is what brings his designs to life. Here he creates a composition of tumbling glass cubes that spill out along a grassy park, challenging the symmetry of the other buildings.

The exterior is conceived like a work of Baroque sculpture. From some angles its forms tilt up aggressively; from others it seems to have been abruptly sliced off, as if the street had literally been carved through the building. Inside, office floors are stacked up on top of one another like the decks of a ship. Supported on concrete columns, they are detached from the building's contorted glass shell, adding to the sense that you are floating amid clouds.

It is one of Mr. Gehry's most original designs in years. Yet it is also one of his most refined. The interiors have the carefully polished feel of offices everywhere: sleek floors, rich woods, fancy handrails. Every detail seems as though it was approved by a gauntlet of corporate executives.

And as I strolled around the building, I found myself reflecting on how much the profession has changed over the years. One of Mr. Gehry's early breakthroughs happened not far from here, at the Vitra furniture factory complex a half an hour drive across the German border.

Built in fits and starts over 20 years, the loose-knit complex includes a modest little fire station by Zaha Hadid and a factory by Alvaro Siza, as well as Mr. Gehry's first European project, a small furniture museum. In some ways it anticipated many of the themes that dominate contemporary architectural practice today: the treatment of buildings as precious aesthetic objects, the alliance of architecture and corporate marketing, the making of architects into international celebrities.

But the Vitra complex also embodied the spirit of risk. Few of the architects were well known when they built here; there was no formal plan. Instead the campus grew intuitively, building by building.

Gehry's building in particular reflects the work of someone struggling intensely with new ideas. Made of modest white plaster with a few punch windows and a swirling lead roof, it is a cheap — some would even say crude — little museum. Its contorted form gives the impression that the architect pulled back to observe his work while he was still groping with the composition.

It is the unruliness of the artist that on the Novartis campus has been stamped out in favor of a scientist's precision.

<http://www.nytimes.com/2009/12/27/arts/design/27novartis.html?ref=design>

Beauty, Utility, Eccentricity, Adultery

By JOHN SIMON

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THE BAUHAUS GROUP

Six Masters of Modernism

By Nicholas Fox Weber

Illustrated. 521 pp. Alfred A. Knopf. \$40



The artists' collective and school known as the Bauhaus was unique. It comprised architects, painters and master artisans in various crafts, and aimed at a fusion with industry to benefit all humanity.

As conceived by Walter Gropius, then a lieutenant in the World War I German Army, it was meant to reconcile beauty, simplicity, utility and mass production — a radical departure from the prevailing decorative elaborations. Though it lasted only from 1919 to 1933, and was forced to move from historic Weimar to industrial Dessau and then Berlin, always facing opposition, it produced worldwide changes in the arts and crafts it addressed.

As Nicholas Fox Weber puts it in his sometimes purplish prose, “In focusing on six of the people at the school who went far beyond the issues of one period or place, and were geniuses for all time, and in trying to sketch them as human beings, I have attempted to show how they created and lived out a dream that was never equaled before or since.”

The six are the architects Walter Gropius and Ludwig Mies van der Rohe; the painters Paul Klee, Wassily Kandinsky and Josef Albers; and the weaver and textile designer Anni Albers, Josef's wife. Weber, a specialist in artists' biographies, is the author or co-author of six previous volumes about the Alberses. As a Yale graduate student in fine arts, he was befriended by them in their Connecticut old age and ended up hero-worshipping them.

Worthy as “The Bauhaus Group: Six Masters of Modernism” is, it presents several problems. Since there are consecutive sections about parallel lives, some repetition is unavoidable. But are the Alberses quite

that important, save for Weber's involvement with them, or are others who figure only marginally — Marcel Breuer, Lyonel Feininger, Laszlo Moholy-Nagy and Oskar Schlemmer — just as noteworthy?

Although there are some good color reproductions, what use are the numerous black-and-white ones, - especially for abstract works where color is all-important? And how can architectural details be conveyed in words without becoming too technical? Other details, about the Alberses, are too personal. Do we care about what Josef saw from the car window when young Weber was chauffeuring them? Or about what Anni wore on varied occasions? Finally, there are contradictions. Was Gropius's hair fair or dark? Did Anni's trouble with her feet partly stem from unusually high arches or their absence?

In the Gropius section, we follow the peripeteias of the upper-class, dashing womanizer, creator and first director of the Bauhaus, cajoling the sponsoring Grand Duke and Grand Duchess of Saxe-Weimar, raising hard-to-find money, and battling for his aesthetic and humanistic ideals, often misunderstood and attacked. To earn a living, he took on private clients in Berlin; in Dessau, he also built the modern Bauhaus. Always concerned for the teachers and students, he emerges as a heroic figure.

All the more so, since much of the time he was devastatingly involved with, and for some time married to, one of the era's most alluring and exasperating women, Alma Mahler, widow of the composer, who was cheating on Gropius with the writer Franz Werfel and the painter Oskar Kokoschka. Switching perpetually between passionate devotion and frustrating coldness, she bedeviled all her men, Gropius — who as director had to hide his troubles with her — in particular.

Alma, who dominates the Gropius section and figures in some later ones too, almost eclipses her staunch husband. Eventually divorced, he also had problems with his second wife, Ise Frank, a haughty creature tortured by illnesses. Curiously, almost all the Bauhaus wives and mistresses were prey to serious neurosis, sickness and frequent hospitalization, complicating their men's lives.

Had Gropius not been equally apt as architect, administrator and educator, there would not have been a Bauhaus — meaning “house of building,” a term he derived from the medieval Bauhütten (lodges uniting assorted craftsmen). A hard institution to run, it was plagued by friction, with some factions blaming others for insufficient involvement or for assuming too much unearned power.

Although certain Bauhausers, like Moholy-Nagy, were left-leaning, this was no hotbed of radical agitation, of which hostile outsiders and persecuting authorities sometimes accused them. And then the wives: double-edged swords.

Though Alma Mahler's fame conferred prestige on the Bauhaus, she was, as mentioned, a constant strain. Ise Gropius, although an often useful proselytizer, was, through her affair with the fellow Bauhausler Herbert Bayer, partly the cause of her husband's resignation.

Gropius had to be the first in everything, so it was that he and Ise — along with the talented Marcel Breuer, who quit in a huff over the Bauhaus's bypassing of a fellow Hungarian — were among the first Bauhausers to emigrate to America, where Gropius designed, among other things, the questionable Pan Am Building, but also the effective Graduate Center at Harvard, where he taught.

Next, while helpfully discussing the work of Paul Klee, Weber also makes hay of the painter's eccentricity. Klee was more involved in communicating with birds and plants than with human beings. He never in his life thought of concealing what was either childlikeness or schizophrenia, and blithely expressed it in his art. His upscale marriage to Lily Stumpf, a doctor's daughter, provided him not only with an accompanist for his violin playing, but also with her income as a piano teacher when she was not being treated for “nervous disorders.” Paradoxically, this very modern painter seems to have played only Haydn, Mozart, Bach and Beethoven.



Although he was the chief nurturer of their only child, Felix, and passionately involved in cooking, Klee was almost as devoted to Fritz, his beloved cat, to whom “he always sent greetings” in his letters home. “Laundry is the household task I haven’t tried yet,” he once wrote. “If I could take it on, I’d be more universal than Goethe.” Whereas in his favored park walks he would stop to talk to a snake, his class lectures were often incoherent balderdash. But his epistolary accounts of what he cooked or ate were clear and explicit.

Weber dwells on Klee’s sexual ambivalence. His subjects included cross-dressing and hermaphroditism, dominatrixes and evil androgynes. As he wrote, “When girls wept I thought of pudenda weeping in unison.” In his lectures, he mostly discussed natural phenomena; his first lesson was: draw a tree.

To him, Ravel’s music was coarse, and his friend Hindemith’s “stark.” He ate “more cauliflower than anyone else in history,” considered Americans the only ones ignorant of how to live, frequently spoke a single word instead of a sentence and conducted to the gramophone records the Gropiuses played. Klee’s eyes, Weber writes, “usually were looking upward, as if connecting with the heavenly sphere.” And despite his “belonging to the obscure reaches of the cosmos, two of the essentials of his life — food and art — were of a piece.”

His only true Bauhaus friend was both similar and different. “Although Kandinsky spent most of his life in Germany and Paris,” Weber says, “he not only retained his fervent belief in Orthodox Christianity, remained immersed in Slavic literature and music,” and spoke Russian to his wife, “he also . . . relished a sense of inexplicable mysteries.”

Eventually, Kandinsky translated his mysticism into abstraction, painting in 1910 perhaps the first wholly abstract work ever. At the Bauhaus, he enjoyed eliciting fanciful responses — such as that the circle was blue, the triangle yellow, the square red. But he was also earthy, forsaking his intelligent, talented painter mistress, Gabriele Münter, and marrying in middle age his pretty but ignorant 19-year-old maid, Nina, who abjectly worshiped him.

Weber gushes about Kandinsky’s mystique: horizontal lines being cold, vertical ones hot and diagonal ones lukewarm. The painter’s spermatozoid squiggles, we read, “belong to a universe that did not exist until Kandinsky invented and painted it. . . . And the more we look, the more we feel the sheer life of the painting.”

There follows Josef Albers, “the Bauhaus’s first homegrown deity.” His story goes from humble working-class beginnings to exaggerated celebrity, climaxing in the “Homages to the Square.” This was a series “of nearly 3,000 paintings, each composed of only three or four squares in identical relationship but offering an infinite range of visual experiences.” Weber deplores “the clichéd thinking that has led viewers to miss the sensuality and fire that underlie all of Albers’s work.”

Albers and his wife were the gods of modernism for the Yale grad student who latched on to them as amanuensis and propagandist. Anni, whom photographs show as homely, had for Weber the “striking beauty . . . of an Egyptian deity,” though he doesn’t specify whether jackal-headed Anubis or ibis-headed Thoth. She did have a large nose that, like her Jewishness, she described as her lifelong torment.

Anni Albers was a fine weaver and textile designer, but one wonders whether that transcends craft into art. Her magnum opus, “Six Prayers,” is, according to Weber, “a memorial to the six million victims of the Nazi concentration camps. With interwoven threads, she succeeded in evoking swarms of humanity — a vast population of vibrant, connected lives — so that the mélange of black and white and gray fibers becomes audible.” That synesthetic “audible” is a favorite Weber device, with aspects of painting and architecture wearily morphing into the Mozartian or Beethovesque.

The aged, widowed Anni fell in mad love with the actor-director Maximilian Schell, who, we are told, amicably tried to lure valuable paintings out of her. Her true lover, however, was Weber: “Until we met,



she had not encountered anyone who . . . loved her the particular way I did.” Neither Klee nor Kokoschka had any use for her work, and her tastes made Coco Chanel the greatest artist of her century, “Merv Griffin” her favorite TV show and Mae West the person she most wanted to be.

Perhaps Weber’s best chapter is on Mies van der Rohe, the last director of the Bauhaus, who could not prevent its abolition by the Nazis. Excellent architect and fascinating character, he created the International style and made a successful doctrine of “less is more.” Born in poverty and named Maria Ludwig Michael Mies, self-supporting from the age of 16, he fabricated his Dutch-sounding name after working in the Netherlands. Rohe was his mother’s maiden name, but “van der” was sheer euphonious invention.

Mies’s works, marriage and amours (repeatedly with slightly older women) — like the buildings Weber aptly describes — cannot be easily summarized. A relentless rival of Gropius’s, Mies went his own way, but both ended up successfully in America. I prefer leaving these absorbing pages to careful readers.

A brief chapter rehashing the Bauhaus’s afterlife also glamorizes Weber himself; its woolgathering closes a useful, informative book. One should, however, skip the lengthy acknowledgments, oozing with sycophancy to many, not least Weber’s very pretty wife and gifted daughters.

John Simon is the theater critic for Bloomberg News.

<http://www.nytimes.com/2009/12/27/books/review/Simon-t.html?ref=design>

'Only in New York'

Back When 'Look' Meant a Magazine

By KAREN ROSENBERG

What will the magazine of the future look like? Revisiting an earlier period in print culture, when magazines evolved into sophisticated photo-delivery systems, is a good way to get in the mood to ponder touch screens and digital newsstands.

In the Museum of the City of New York's smartly packaged book and exhibition "Only in New York: Photographs From Look Magazine," you can see how one publication catered to voracious consumers of images. Look's founding editor and publisher, Gardner Cowles, created it in 1937, to meet what the magazine called "the tremendous unfilled demand for extraordinary news and feature pictures."

Look, in circulation until 1971, was modeled on European magazines like the French *Vu* and the German *Berliner Illustrirte Zeitung*. It was more mainstream than *Vogue* and *Harper's Bazaar*, more photo driven than *Life*, and more New York-centric than all of them. It had a little bit of everything: fashion, celebrity, crime, human interest. A contemporary equivalent might be *New York* magazine, in boosterish special-issue mode.



Magazines like *Look*, and its rival *Life*, thrived on an expanding economy and the attendant fantasy of upward mobility. Editors lured advertisers with the promise of "reader interest for yourself, for your wife, for your private secretary, for your office boy." It's hard to imagine a contemporary publication using the same sales pitch; general-interest magazines like Newsweek have refashioned themselves for niche markets, if they haven't disappeared entirely.

The book and show draw from the museum's trove of some 200,000 images from *Look*, donated by Cowles Magazines beginning in the 1950s. Many of these images are in the form of negatives, contact sheets and transparencies, which can be a challenge to exhibit.

The curators, Donald Albrecht and Thomas Mellins, have instead chosen to install large fabric screens with photographic reproductions — basically, a walk-in magazine.

Most of the screens hew closely to the layouts in the book, which in turn echo the combinations of large and small photographs that were characteristic of *Look*. The material, in any form, is fascinating (though it's disappointing that only three copies of the actual magazine are on view).

On the book's cover, for instance, is an arresting image taken at a performance staged for the magazine by Salvador Dalí. In it he uses a bent-over-backwards bikini-clad model as a desk, balancing a notebook and a telephone on sensitive parts of her anatomy.

Many other images in the show and book never made it into the pages of *Look*, which ran more like a photo agency than a magazine. Its photographers were given freedoms unfathomable to today's penny-pinching publishing executives. As the book notes, this strategy was designed to help the bi-weekly *Look* compete with the weekly *Life* by allowing the department to cherry-pick from a wide array of stories.

Among the talents *Look* attracted was a young Stanley Kubrick, who sold his first photograph to the magazine at the age of 16 and continued to work for it for five years. In his images of prizefighters and showgirls, New York is a noirish, not-quite-believable backdrop, as it was in Kubrick's much later film "Eyes Wide Shut."



Even his sunnier assignments have a suspenseful edge. He was one of three photographers assigned to cover the spectacle of a Midtown billboard painter working, high up on a scaffold, from a live model. The other shooters focused on the woman and the product, the Peter Pan bra company's "Merry-Go-Round" (slogan: "The secret's in the circle!"). Kubrick took close-ups of the gobsmacked people on the ground.

In between stunts like this one the magazine relied on famous faces. Portraits of models and entertainers, typified by a primping Lisa Fonssagrives and a leaping Ray Bolger, were Look's bread and butter.

On occasion movers and shakers in other industries received the celebrity treatment. In one photograph from 1957 the Museum of Modern Art director René D'Harnoncourt poses in a room full of objects from the design collection. Published in a special New York issue, it was accompanied by an article titled "The Taste-Shaper."

That issue, from Feb. 18, 1958, is on view at the museum — open to a color spread on Park Avenue construction, captured by the longtime Look contributor Arthur Rothstein. It's as if the buildings are going up faster than he can photograph them, an effect Rothstein exaggerated in other pictures taken with a fish-eye lens.

The magazine made tentative forays beyond Manhattan, in two markedly different stories on Brooklyn. The first one, "The Brooklyn Nobody Knows," challenged the borough's sleepy residential image with shots of cultural figures and institutions. The second, "Could This Happen to Your Boy?," focused on the neighbors of four murder suspects from Brooklyn and adopted a more sensationalist tone.

Such negative stories were rare. Look promoted the city as a place of luck, vigor and spontaneous affection, à la Cartier-Bresson's Paris. One starry-eyed series from 1947, "Love Is Everywhere," showed couples kissing in stairwells and on fire escapes and park benches.

By the 1970s the city's charm had faded. So had Look. The circumstances of its death sound eerily familiar: a new medium (television) siphoning advertising dollars, the rising costs of paper and printing, a hobbled economy.

A trip through the Look archives won't answer the trickier, economic questions now stumping publishers. In other ways, though, "Only in New York" is heartening. It reminds you that drastic changes in visual culture can spawn successful magazines — and hints that strong images, in some form or another, will always have a place.

"Only in New York: Photographs From Look Magazine" continues through April 10 at the Museum of the City of New York, 1220 Fifth Avenue, at 103rd Street; (212) 534-1672, mcny.org.

<http://www.nytimes.com/2009/12/25/arts/design/25look.html?ref=design>

The Lessons of Las Vegas Still Hold Surprises

By NICOLAI OUROUSSOFF



NEW HAVEN — When Robert Venturi and Denise Scott Brown boarded a plane bound for Las Vegas in 1968 with a dozen of their Yale architecture students in tow, there were no multimillion-dollar water shows or pirate ships waiting for them. There were no van Goghs in the hotel galleries. Nor could residents of the city live in tilting condo towers designed by Helmut Jahn and shop in a mall by Daniel Libeskind. Whatever glamour Las Vegas had was all veneer.

Mr. Venturi and Ms. Scott Brown, who had just married and would soon be business partners, were on a search for a way out of the dead end of postwar Modernism, whose early hopes had by then deteriorated into a dreary functionalism. The book they produced four years later, “Learning From Las Vegas,” was one of the last of the big architectural manifestos and a heartfelt embrace of American popular culture that would be hard to imagine anyone attempting today.

“What We Learned: The Yale Las Vegas Studio and the Work of Venturi, Scott Brown & Associates,” which is on view at the Yale School of Architecture Gallery through Feb. 5, looks at the extensive research the architects did in Las Vegas, though it doesn’t place the results in a context that would allow you to reevaluate the impact the project had on a profession starved for a new way forward. Nor do you get a feel for the place Las Vegas held in the popular imagination four years after Tom Wolfe celebrated the city’s “incredible electric sign gauntlet” in *Esquire* in 1964.

Still, it is a must-see for those who want to recapture momentarily the euphoric sense of discovery that came out of those early trips, as well as get a refresher course on their conclusions, which still have things to teach us.

The show includes roughly 100 photographs taken of Las Vegas, beginning with that first trip. A particularly sweet one shows Ms. Scott Brown with her feet firmly planted in the Nevada desert, her

hands fixed on her hips and a defiant smile. Just beyond her is the Strip: a string of flimsy signs, isolated hotels and half-empty parking lots.

The two seem light years away from the architectural establishment back East, which was composed of academic types who once worshiped at the feet of Walter Gropius at Harvard, Mies van der Rohe in Chicago and Philip Johnson at the Museum of Modern Art. And the Strip suggests an alternate future unburdened by the weight of history. It is also a rejection of the strain of rationalism that runs back through Modern architecture to Haussmann's Paris and the Renaissance.

Mr. Venturi and Ms. Scott Brown approached this world through the car windshield, like the British architectural critic and historian Reyner Banham — who wrote about Los Angeles around the same time — but their method was more analytical than historical. Los Angeles, they say in a short video made for the show, was not a “pure” enough distillation of what they were after: a philosophy of design that reflected the speed and messiness of life as it was coming to be lived. They wanted something “more concentrated and easier to study.”

A small drawing finds that kind of concentration, for example, in the organization of the typical casino sign, with the logo, surrounded by twinkling lights, located at the top so it can be seen from anywhere on the Strip. More detailed information is placed on a smaller sign lower down, so it can be read as the car approaches the parking lot entry.

Photographs of other signs speak to the impermanence of the life of the Strip: a campaign poster hanging off the side of a rusty pickup by the side of the road, the word “BIBLE” painted in capital letters on a horse trailer. The actual buildings, by comparison, look banal — like afterthoughts. The single white hotel tower of the Dunes casino, for example, seems a pathetic testament to a Modernism that has run its full course.

Such observations of real-world design are coupled with a detailed analysis of the urban fabric. A series of small photos, lined up to show the view from a car window along the entire length of the Strip, is inspired by a similar project about the Sunset Strip by the Los Angeles artist Ed Ruscha. In both, you get an overwhelming feeling of drift — a result of the horizontal rhythm of empty lots and cheap, low structures.

And the team also used more traditional analytical tools, like the 18th-century Nolli technique that maps out the elaborate pattern of solids and voids — the dense activity of the casinos and the emptiness of the parking lots, for example — that gave the Strip its unique character. Out of it, they hoped to create an architecture that reflected the conflicting needs and desires of normal people rather than one that conformed to rigid aesthetic rules.

Other parts of the show bounce around among the highlights of Mr. Venturi and Ms. Scott Brown's architectural careers, including work completed before their Las Vegas trips. There is a poignant model of the Vanna Venturi House, which Mr. Venturi designed for his mother in the early '60s and established him as both an architectural rebel and an original talent. A blend of Modernist and traditional vernacular references, it was a powerful reassertion of architecture's symbolic function.

There's also a personal favorite of mine: a wonderfully sinister design from 1988 for Euro Disney, never built, that shows cutout billboards of menacing-looking cartoon characters lined up on both sides of a seemingly endless roadway. It's an image that blends fantasies about the open road with nightmares about the infantilization of American culture.

An aura of nostalgia pervades the show. Ms. Scott Brown is in her 70s, and Mr. Venturi will be 85 in June, and you feel that they are approaching the end of a long and rich joint career. The world, too, has moved on. The group of architects that dominate the profession today — many of whom were inspired by Mr. Venturi and Ms. Scott Brown's work — are more interested in exploring architecture's potential as a



three-dimensional spatial experience than in its symbolic value. Some have even begun to mine late Modernism for new ideas about resisting the commercialization of public space.

What they have not found an answer for — and what Mr. Venturi and Ms. Scott Brown were remarkably attuned to — is the accelerating pace of contemporary society. When “Learning From Las Vegas” was published, we were all still getting used to a world of freeways and McDonald’s drive-throughs. Today commercial culture is more powerful and pervasive than ever. Las Vegas has become congested with high-end hospitality-and-retail malls, and urban fantasies just as outrageous, or more so, can be found all over the Middle East. China builds at a pace and on a scale that make postwar America seem quaint by comparison.

We may need these two architects as much now as ever.

“What We Learned” continues through Feb. 5 at the Yale University School of Architecture Gallery, corner of York and Chapel Streets, New Haven; www.architecture.yale.edu; holiday hours: (203) 432-2292.

<http://www.nytimes.com/2009/12/23/arts/design/23yale.html?ref=design>

The Man Behind Boy, Dog and Their Adventures

By CHARLES McGRATH

[Skip to next paragraph](#)

HERGÉ

The Man Who Created Tintin

By Pierre Assouline; translated by Charles Ruas

276 pages. Oxford University Press. \$24.95.



For some reason, the comic-book character Tintin, beloved just about everywhere else, has never quite caught on in America. This may change in 2011, when Steven Spielberg brings the first of three planned Tintin adventures to the movie screen, but for now he remains underappreciated — a little too odd and earnest, perhaps, in a landscape ruled by superheroes. Tintin, a virginal, 15-year-old journalist with a perpetually upswept quiff of reddish-blond hair and a wire-haired fox terrier named Snowy, is the hero of 23 book-length adventures — what we now call graphic novels — completed by the Belgian artist Hergé, who died in 1983 at the age of 75. Most of them are little masterpieces of the form, combining inventive and suspenseful comic storytelling with drawings that are clear, precise and as thrilling as movie stills. Andy Warhol was a big fan, and so was Roy Lichtenstein.

Regrettably, though Pierre Assouline summarizes the books in great detail, his biography of their creator, “Hergé: The Man Who Created Tintin,” is unillustrated, so if you don’t already know the work, this is not the place to start. And even if you do, the story is a little depressing. Hergé here is frequently reminiscent of the Charles Schulz depicted in David Michaelis’s recent biography: an artist far happier and more interesting in his work than he ever was in life. Mr. Assouline, a journalist and film producer who has also written a biography of Georges Simenon, manages to misspell Schulz’s name and also that of the great Winsor McCay, creator of Little Nemo, but is generally judicious and fair, determined to make his subject sympathetic. Ultimately, though, he reveals far more about Hergé’s publishing life and business affairs than about what made him tick.

Hergé was born Georges Remi in May 1907. (The pen name came from flipping his initials, as pronounced in French: RG.) He grew up in Brussels and led a life of almost comic Belgian blandness until as a teenager he came under the sway of Norbert Wallez, a right-wing Roman Catholic priest who idolized Mussolini. Wallez encouraged Hergé's drawing and got him a job with the children's section of *Le Vingtième Siècle*, a conservative Catholic paper that Wallez edited. He shaped Hergé's thinking, eventually chose a wife for him, and even suggested that for Tintin's first adventure — "Tintin in the Land of the Soviets" (1930) — Hergé dispatch his hero to Russia so he could expose the evils of Bolshevism.

Tintin's next mission was to the Congo, where he preached the virtues of King Leopold's colonialism. The drawings in this volume, "Tintin in the Congo," were so appallingly racist that Hergé later redid them, though not entirely removing a hint of condescension. He also redid a later book, "The Shooting Star," removing anti-Semitic details like a villain named Blumenstein and two panels in which characters named Isaac and Salomon look forward to the end of the world because it means they won't have to pay their bills.

Though Hergé later repented, and brought to his best work an almost reportorial accuracy, accusations of racism and anti-Semitism never entirely went away. Even more problematic was his conduct during World War II when, unlike many Belgians who refused to have anything to do with the Nazi occupiers, Hergé went to work for *Le Soir*, which had become pro-German. (This was the same paper for which the distinguished literary critic Paul de Man, then a young man, wrote anti-Semitic articles.) After the war Hergé, whose work flourished in *Le Soir*, was arrested four times on charges of collaboration and avoided prosecution only by entering into a convenient business alliance with some former members of the Resistance. Mr. Assouline suggests that Hergé was less a traitor than a self-involved obsessive for whom continuing Tintin was more important than anything else. Unlike P. G. Wodehouse, who was also accused of collaboration during the war, Hergé wasn't an innocent, exactly, but to the end of his life he never accepted that he had done anything wrong or understood why so many of his countrymen resented him. "I worked, period; that's all," he said, defending himself. "Just like a miner works, or a streetcar ticket taker, or a baker."

In the postwar years, when he published most of the best Tintin adventures, Hergé, depressed, overworked, drinking heavily and still smarting from criticism, had several breakdowns, disappearing for weeks at a time. He and his wife (who once admitted that Wallez was more her type) grew apart and in an effort to repair things adopted a child. After just two weeks, though, Hergé couldn't stand the disruption and had the boy sent back. He began to stray from rigid Catholicism, becoming interested in Eastern philosophy, and eventually fell in love with a woman almost 30 years his junior, with whom he lived for 17 years before finally getting a divorce and marrying her. In this, too — the depressions, the religious questioning, the relatively happy second marriage — he resembles Charles Schulz, and like Schulz he enjoyed a late mellowing. In the 1960s, with most of his best work behind him, he openly admired, among other cartoonists, Johnny Hart and even R. Crumb, whose sexual frankness didn't put him off at all. Now wealthy, he became an art collector, buying Rothko, Rauschenberg and Lichtenstein, and even took up painting himself, finishing, Mr. Assouline says, some 37 abstract canvases (here again, one wishes for photographs) before abruptly putting down his brush and returning to Tintin.

As Mr. Assouline readily admits, next to Tintin's life, Hergé's was a dim shadow, of interest mostly for the way it reminds us, yet again, that there is no accounting for genius. Hergé wrote to his first wife after one of his breakdowns, "Tintin has been for me the means to express myself, to project my desire for adventure and violence, the bravery and resourcefulness within me," and yet in the end the character seems less a projection of Hergé's inner self than the repression of it. What makes Tintin so appealing is that he never grows up and has no inner life at all.

<http://www.nytimes.com/2009/12/23/books/23book.html?ref=design>

Children's alcohol risks warning

Parents in England are being warned not to under-estimate the "dangerous consequences" of under-age drinking.



Children's Secretary Ed Balls says parents worried about their children's safety should recognise the connection between alcohol and "risky behaviour".

This follows a survey suggesting many parents do not rank drinking alcohol as a serious risk to their children.

Mr Balls says parents must make "the link between alcohol and the impact it can have on a young person's safety".

The children's secretary's advice comes ahead of a publicity campaign which will promote a "safe and sensible" approach to alcohol among young people.

New year parties

The survey, carried out by the Mumsnet website, found that under-age alcohol consumption was not a major concern for parents of children aged between nine and 16.

They were more worried about issues such as drug taking, traffic accidents and teenage pregnancy.

The survey also found that only about a quarter of parents talked to their children about the risks associated with alcohol.

And almost two-thirds of parents were not concerned that their children would drink alcohol by the age of 16.

With new year celebrations approaching, Mr Balls urged parents to advise their children that alcohol was often a factor in other concerns - such as accidents and teenage pregnancy.



"Research tells us that young people who regularly drink alcohol are more likely to fall behind in school, be involved in road traffic accidents or have unsafe sex," said Mr Balls.

"If parents discuss the link between alcohol and these other issues, they can make sure it's their child making the decisions, not the alcohol."

Earlier this month England's chief medical officer, Sir Liam Donaldson, criticised parents for an over-liberal approach in allowing their children to "get a taste" of alcohol at a young age.

He warned that 500,000 children between the ages of 11 to 15 years will have been drunk in the past four weeks.

Early exposure to alcohol could lead to binge drinking in later life, he said, advising that young people under the age of 15 should drink no alcohol.

Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8433792.stm

Published: 2009/12/30 00:59:12 GMT



Home drinkers 'over-pour spirits'

Most people who drink spirits at home pour well over what they would get in a pub when trying to give a single measure, figures suggest.



The government's Know Your Limits Campaign found that among 600 people tested, the average amount poured was 38ml, compared with a standard 25ml.

Those aged 31 to 50 - the most generous pourers - gave an average of 57ml.

For a person thinking they were drinking 7.5 units a week, the larger measures would equate to 17 units.

It could also mean that people wrongly think they are drinking within the NHS recommended limits of two to three units a day for women and three to four units a day for men.

The alcohol industry has been offering free measuring cups with certain mixer drinks this Christmas.

“ It is important that people understand how much they are drinking and the easiest way is to ensure that you have a wine and spirit measure at home ”

Jeremy Beadles, Wine and Spirit Trade Association

Public health minister Gillian Merron said: "Many of us enjoy a drink, especially at new year.

"But it's easy to get carried away and it's worrying to see just how much more people might be unwittingly pouring for themselves and their friends at home on a regular basis.

"If you want to minimise your risk of diseases like cancer, heart disease and stroke, it's worth paying attention to the size of your measures."

Tests with vodka, gin and whiskey were carried out on 600 people in London, Liverpool and North Shields at the beginning of December.

Adults between 18 and 65, who were regular home drinkers, were asked to pour what spirit measures they would normally pour at home, with or without ice cubes.

Men pour more

When asked to pour how much they thought a single 25ml shot would be, the average amount poured was 38ml, with the highest amount measuring 182ml.

Men poured considerably more than women, 43ml compared with 32ml.

The experiments also suggest that the size of your wine glass really does matter.

When asked to pour the equivalent of one unit into a large (250ml) wine glass, the average amount poured was 157ml - almost exactly twice the correct amount of 76.25ml.

In a smaller wine glass (175ml), it was 131ml, which is still 55ml more than the correct standard measure.

The drinks company Diageo gave away more than 60,000 free metal unit measures in supermarkets earlier this year to help consumers get their measures right.

And have given a further 300,000 measures out in Scotland over the last two years.

Some Schweppes mixer drinks have also had bottle caps adapted to be measures this Christmas.

Professor Ian Gilmore, President of the Royal College of Physicians and Chair of the Alcohol Health Alliance, said: "It is worrying that people have little appreciation of how much they are drinking when serving themselves, especially given the rise in home drinking fuelled by cheap alcohol from supermarkets.

"Part of this lack of awareness comes from ever larger glass sizes and drinks such as wine and beer increasing in strength."

Jeremy Beadles, chief executive of the Wine and Spirit Trade Association, said: "It is important that people understand how much they are drinking and the easiest way is to ensure that you have a wine and spirit measure at home.

"These are readily available and indeed during the last year both producers and retailers have run promotions to offer them free to shoppers."

Professor Ian Gilmore, president of the Royal College of Physicians and Chair of the Alcohol Health Alliance, said: "It is worrying that people have little appreciation of how much they are drinking when serving themselves, especially given the rise in home drinking fuelled by cheap alcohol from supermarkets.

"Part of this lack of awareness comes from ever larger glass sizes and drinks such as wine and beer increasing in strength.

"This advice comes at a welcome time as recent data shows that three quarters of people intend to see in the New Year at home. It is also timely as people think about how they can improve their health in 2010."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8434905.stm>

Published: 2009/12/31 03:33:24 GMT

'Back to nature' cuts flood risks

By Mark Kinver
Science and environment reporter, BBC News

Reconnecting flood-plains to rivers will help reduce the risk of future flooding, suggest US scientists.



A study by US researchers said allowing these areas to be submerged during storms would reduce the risk of flood damage in nearby urban areas.

Pressure to build new homes has led to many flood-prone areas being developed.

Writing in *Science*, they said the risks of flooding were likely to increase in the future as a result of climate change and shifts in land use.

"We are advocating very large-scale shifts in land use," said co-author Jeffrey Opperman, a member of The Nature Conservancy's Global Freshwater Team.

"There is simply no way economically or politically that this could be accomplished by turning large areas of flood-plains into parks," he told the *Science* podcast.

"What we are proposing in this paper is a way that this strategy can be compatible, and even supportive, with vibrant agricultural economies and private land ownership."

“ Control infrastructure prevents high flows from entering floodplains, thus diminishing both natural flood storage capacity and the processes that sustain healthy riverside forests ”

Jeffrey Opperman, The Nature Conservancy

For example, the authors explained, the flood season and growing season in California did not occur at the same time.

This meant that allowing the land to be submerged by floodwater would not result in a permanent loss of farmland or crops being destroyed.

In their paper, they said that man-made flood management systems, such as levees, also had an ecological impact.

"Control infrastructure prevents high flows from entering flood-plains, thus diminishing both natural flood storage capacity and the processes that sustain healthy riverside forests and wetlands," they observed.

"As a result, flood-plains are among the planet's most threatened ecosystems."

'Ecosystem services'

The reconnection programmes would deliver three benefits, they added:

- Reduce the risk of flooding
- Increase in flood-plain goods and services
- Greater resilience to potential climate change impacts

In other parts of the world, Dr Opperman said that there was a range of agricultural strategies for private landowners that would be compatible with allowing areas to be flooded.

"There are emerging markets for ecosystem services, such as carbon sequestration and nutrient sequestration," he explained.

"These are services that flood-plains do provide, so with various climate policies there will be a price for carbon."

The researchers cited the Yolo By-pass, in California, US, in their paper as a successful demonstration of the idea they were advocating.

The scheme absorbed 80% of floodwater during heavy storms, they said, protecting the nearby city of Sacramento.

"During a March 1986 flood, the by-pass conveyed [about] 12.5bn cubic metres of water, more than three times the total flood-control storage volume in all Sacramento basin reservoirs. "Without the by-pass flood-plain, California would need to build massive additional flood-control infrastructure," they observed. The Yolo by-pass was created back in the 1930s, when a 24,000 hectare flood-plain was reconnected to the Sacramento River.

The scheme was introduced when it became apparent that a "levees only" approach would not offer the required flood protection. "It's connected in an engineered way, which mean that when the river reaches a certain volume it flows over a weir and enters the flood-plain," Dr Opperman explained.

He added that the scheme also had numerous additional ecological benefits: "In recent decades, people began to notice that this area was a phenomenal habitat for birds. "In the past 10 years, people recognised that native fish were moving from the river on to the flood-plain, and deriving all of the benefits that fish get from natural flood-plains.

"It was an excellent place for fish to spawn, and for juvenile fish to be reared." Story from BBC NEWS: <http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8406351.stm>

Published: 2009/12/28 16:41:45 GMT

Rise in diabetes limb amputations

By Emma Wilkinson
BBC News health reporter

The number of people in England having a limb amputated because of type-two diabetes has risen dramatically, a study has shown.

Between 1996 and 2005, below-ankle amputations doubled to more than 2,000, and major amputations increased by 43%.

However the number of amputations in people with type-one diabetes dropped, an Imperial College London team found.

A charity said more early diagnosis was needed, as diabetes can go undetected for more than 10 years.

The number of people diagnosed with type-two diabetes had increased greatly in the past decade, which could partly explain the findings, the researchers said.

In the UK, 2.35 million people have type-two diabetes, which is caused by the body not properly responding to the insulin it produces, and is often a result of lifestyle factors such as obesity.

DIABETES AND AMPUTATION

- Type-one diabetes is caused by the body failing to produce insulin
- Type-two diabetes accounts for 90% of cases and is caused by the body not responding properly to insulin or not producing enough
- Both types can impair blood flow to the feet
- People with diabetes can also suffer nerve damage and might not immediately notice a problem
- If left unattended a small injury could develop into a hard-to-treat ulcer that could become infected, leading to the need for amputation

Along with complications such as heart attacks and strokes, people with diabetes are far more likely to develop foot problems, including ulcers, which can become infected and lead to gangrene.

Writing in the journal *Diabetes Research and Clinical Practice*, the researchers said the number of the most major amputations, above the ankle joint, had risen by 43%.

And the average age of those having above-ankle amputations fell from 71 to 69 years, which followed the pattern of people being diagnosed younger, they said.

More men underwent amputations than women, a gap that widened during the 10-year period.

Study leader Dr Eszter Vamos said they had expected to see long-term complications of diabetes rising to some extent because the number of people diagnosed with the condition had increased.

"But at the same time there is very strong evidence that with a multidisciplinary team approach you can prevent up to 80% of the amputations.

“ The findings of this study are especially interesting because they indicate a particular rise in the number of type-two diabetes related amputations ”

Sara Spiers Diabetes UK



"It highlights the importance of frequent foot checks and that it is very important to get glycaemic control and blood pressure and cholesterol control."

Diabetes UK care manager Sara Spiers said there were about 100 diabetes-related amputations each week in the UK.

"The findings of this study are especially interesting because they indicate a particular rise in the number of type-two diabetes related amputations," she said.

"This rise could be for a number of reasons, including type-two diabetes not being diagnosed early enough, people not getting the education they need to manage their condition effectively, and swifter treatment of foot problems, meaning people are more likely to have an amputation than die because of foot ulcers."

She added more early diagnosis was needed, as the condition could go undetected for more than 10 years and most people already had complications when they were diagnosed.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/ft/-/2/hi/health/8427937.stm>

Published: 2009/12/29 00:01:02 GMT



Music therapy for tinnitus hope

Individually designed music therapy may help reduce the noise levels experienced by people who suffer from tinnitus, say German researchers.



They altered participants' favourite music to remove notes which matched the frequency of the ringing in their ears.

After a year of listening to the modified music, individuals reported a drop in the loudness of their tinnitus.

The researchers said the "inexpensive" treatment could be used alongside other techniques to relieve the condition.

“ It could significantly complement widely-used and rather indirect psychological treatment strategies ”

Dr Christo Pantev Westphalian Wilhelms University

It is thought that around 1-3% of the population have chronic ringing in their ears which is significant enough to reduce their overall quality of life.

Writing in the Proceedings of the National Academy of Sciences, the researchers said although the cause of tinnitus remains unknown, it has been shown that the part of the brain that processes sounds is frequently disrupted in people with the condition.

The theory behind the new technique is that removing the spectrum of noise associated with tinnitus from the music reduces activity in the brain relating to that frequency, alleviating the condition.

Therapy

The 39 patients who took part in the study all had chronic tinnitus for an average of five years but had no other hearing problems.

They were split into three groups and were offered either the modified music therapy, a dummy version of music therapy or usual treatment.

Participants listened to the music for an average of 12 hours a week and by the end of the study, those who had been given the tailored music reported a significant drop in the level of the ringing they heard compared with those listening to the dummy version.



Study leader Dr Christo Pantev, from Westphalian Wilhelms University in Munster, said the approach specifically targeted the part of the brain responsible for tinnitus.

"The notched music approach can be considered as enjoyable, low cost, and presumably causal treatment that is capable of specifically reducing tinnitus loudness.

"It could significantly complement widely-used and rather indirect psychological treatment strategies."

Dr Ralph Holmes, director of biomedical research at deaf and hard of hearing charity, RNID, said he would look in detail at the findings.

"While we find it encouraging there is new investment in treatment for tinnitus, we know there is no proven 'cure'.

"This seems to be similar to tinnitus retraining therapy which is one of the most common ways of managing the condition."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8429715.stm>

Published: 2009/12/29 00:01:15 GMT



Mushroom drug cancer secret probe

Scientists have discovered how a promising cancer drug, first discovered in a wild mushroom, works.



The University of Nottingham team believe their work could help make the drug more effective, and useful for treating a wider range of cancers.

Cordycepin, commonly used in Chinese medicine, was originally extracted from a rare kind of parasitic mushroom that grows on caterpillars.

The study will appear in the Journal of Biological Chemistry.

The cordyceps mushroom has been studied by medical researchers for some time - the first scientific publication on cordycepin was in 1950.

However, although the drug showed great promise, it was quickly degraded in the body.

It can be given with another drug to combat this - but the second drug can produce side effects that limit its potential use.

As a result, researchers turned their interest to other potential candidate drugs, and exactly how cordycepin worked on the body's cells remained unclear.

“ It could lay the groundwork for the design of new cancer drugs that work on the same principle ”
Dr Cornelia de Moor University of Nottingham

Researcher Dr Cornelia de Moor said: "Our discovery will open up the possibility of investigating the range of different cancers that could be treated with cordycepin.

"It will be possible to predict what types of cancers might be sensitive and what other cancer drugs it may effectively combine with.

"It could also lay the groundwork for the design of new cancer drugs that work on the same principle."

The researchers have also developed a method to test how effective the drug is in new preparations, and combinations with other drugs, which might solve the problem of degradation more satisfactorily.

Dr De Moor said: "This is a great advantage as it will allow us to rule out any non-runners before anyone considers testing them in animals."

The Nottingham team observed two effects on the cells - at a low dose cordycepin inhibits the uncontrolled growth and division of the cells, and at high doses it stops cells from sticking together, which also inhibits growth.

“ The knowledge generated by this research demonstrates the mechanisms of drug action and could have an impact on one of the most important challenges to health ”

Professor Janet Allen Biotechnology and Biological Sciences Research Council

Both of these effects probably have the same underlying mechanism - that cordycepin interferes with how cells make proteins.

At low doses cordycepin interferes with the production of mRNA, the molecule that gives instructions on how to assemble a protein.

And at higher doses it has a direct impact on the making of proteins.

Professor Janet Allen is director of research at the Biotechnology and Biological Sciences Research Council, which funded the study.

She said: "This project shows that we can always return to asking questions about the fundamental biology of something in order to refine the solution or resolve unanswered questions.

"The knowledge generated by this research demonstrates the mechanisms of drug action and could have an impact on one of the most important challenges to health."

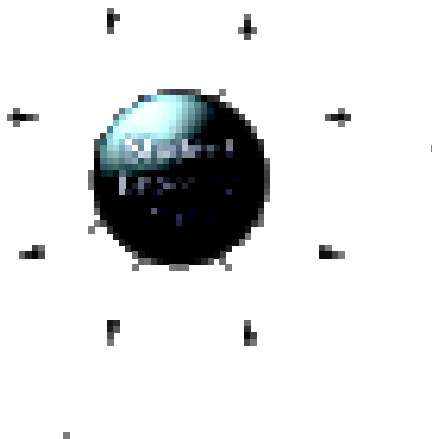
Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8428340.stm>

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Hybrid Education 2.0

December 28, 2009



What if you could teach a college course without a classroom or a professor, and lose nothing?

According to researchers at Carnegie Mellon University, there's no "what if" about it. Earlier in the decade, Carnegie Mellon set out to design software for independent learners taking courses through the university's Open Learning Initiative, an effort to make courses freely available to non-enrolled learners. But rather than merely making course materials available to non-students, like MIT's famous OpenCourseware project, Carnegie Mellon wanted to design courses that would respond to the individual needs of each student. It currently has courses in 12 different subjects available on its Web site, mostly in math and science.

In the process of testing the software on Carnegie Mellon students to make sure it would "do no harm" if used, the researchers found that, over a two-semester trial period, students in a traditional classroom introductory statistics course scored no better than similar students who used the open-learning program and skipped the three weekly lectures and lab period.

Carnegie Mellon is not about to replace all its professors with computer programs. But with \$4 million in private grants and perhaps more to come from the federal government, the university is currently exploring how the open-learning software could be used *in conjunction* with classroom education to speed up the teaching and learning process -- a prospect that some involved think could help solve overcrowding in America's community colleges and realize the Obama administration's goal of boosting graduation rates.

As intriguing it was to find that a computer program could prepare students to pass tests just as well as a professor, the researchers seem more excited by a hybrid application of the open-learning program that, instead of replacing professors, tries to use them more effectively. By combining the open-learning software with two weekly 50-minute class sessions in an intro-level statistics course, they found that they could get students to learn the same amount of material in half the time.

"If they're all getting that baseline information, [faculty] can spend that class time going deeper and doing something much more interesting, so they can really leverage that you're an expert," says Candace Thille, director of the Open Learning Initiative, "because right now, oftentimes the faculty expertise is wasted."

The project's 2008 report on the tests takes care to state that the goal of the testing was not to prove that professors are superfluous to introductory-level courses, but rather to make sure students who don't have access to a classroom course can take an "equivalently effective alternative." That those courses might produce indistinguishable outcomes from professor-taught classes attended by tuition-paying students is nonetheless provocative.

"At the most selective tier of colleges and universities, they have some significant interest in the existing model of residential education," says Roger C. Schonfeld, manager of research at Ithaka S+R, the strategy arm of Ithaka, a non-profit higher-ed technology group. "And I think there's a lot more at risk in terms of the reputation they have built up over the course of decades or centuries, that even for the many advantages that might come from new models, there may be obvious or unforeseen disadvantages they need to guard against."

Gary Rhoades, general secretary of the American Association of University Professors, says that the intangible benefits of "contact with human beings" are still crucial to learning, and that plenty of research has said so. "So many of the effects that we seek from education... go well beyond the limited 'learning outcomes' that are defined for a specific subject matter in a specific class," Rhoades says. "Those outcomes generally are connected to a narrow set of competencies focused on the specific subject matter."

Still, the apparent quality of Carnegie Mellon's online learning program does touch on the prickly subject of what should qualify students to receive credit for material they demonstrate having learned. "If we can demonstrate that these courses are effective at supporting these students to achieve these outcomes even without being in a formal class, why isn't someone saying OK, work through the [online] course, and if you work through it successfully we'll say, 'Great, you've passed statistics, here's credit!'" says Thille. "And that's actually a really big question in the open educational resources movement right now."

Thille says the current model relies on a credentialed instructor to confirm what written assessments suggest: that a student has either earned institutional credit or not. And while she does not dismiss this model, and makes clear that her institution has no plans to "do away with" professors, she does note that a logic course, currently taught to residential students for credit through the hybrid model, only involves a cursory level of instructor contact. "It's completely taught self-paced and online, and they put a [teaching assistant] who is, in theory, responsible for being in the course," Thille says. "Basically what they do is just monitor the grade books... The students are pretty much working through it on their own, and at some point they're done, and then they get credit for taking logic."

The university also plans to move a non-credit digital literacy course from its current incarnation as a class taught in clusters by teaching assistants to one taught completely online by the software's digital tutors.

But what the Carnegie Mellon researchers are selling -- and what the U.S. government might be looking to buy -- is greater efficiency, which is the promise of the hybrid version. The university last week announced it has received \$4 million from the Hewlett, Gates, and Lumina foundations to help build a version of the Open Learning Initiative specifically for community colleges, citing the White House's proposed "American Graduation Initiative," an effort currently under review in Congress that would invest up to \$500 million in online learning projects, possibly based on the Carnegie Mellon model.

'Reinventing Higher Education'

So what exactly is the pedagogical model Carnegie Mellon has discovered, that has inspired such faith? Essentially, it's an online program that teaches students itself, rather than just being the medium a professor uses to teach. Furthermore, it leverages the opportunity to interact directly with a unique student -- an opportunity a professor addressing dozens of students in a lecture hall does not have.

“Studies have shown that immediate and targeted feedback leads to significant reductions in the time it takes students to achieve a desired level of performance,” the researchers wrote in a paper on the project published last year. “Distributed throughout OLI-Statistics, there are many ‘mini-tutors,’ interactive activities that give students hints and feedback as they practice individual skills,” they continue. “Each of these was carefully constructed to respond to particular mistakes and misconceptions students would likely show.”

In other words, the software acts like a private tutor, quizzing students constantly as they work through linear lessons and adjusting in accordance with how quickly they show they are grasping different concepts. Testing companies have used a similar concept to make standardized evaluations such as the GRE and the GMAT adapt to the abilities demonstrated by the test-taker, but using adaptive technology as a teaching tool is relatively novel.

The virtual tutor takes care of the basic concepts that typically dominate lectures, leaving professors open to plan the face-to-face component of the course according to what parts of the curriculum the software tells him students are picking up more slowly, and what concepts could bear reinforcement. For example, if a statistics professor notices in the data he receives from activity in the open-learning program that a great number of students struggled with the assessments the program gave while teaching conditional probability, the professor could use the class periods to hold a discussion with his students about that concept until he is confident they get it -- a preferable alternative, Thille says, to rolling through concepts didactically and hoping they stick.

“I would call that reinventing higher education,” says Thille, noting her hope that this new paradigm of course design could render lecture courses -- and lecture halls -- obsolete. “It sounds Pinky and the Brain-like, but that’s actually what I’m trying to do.”

Lectures and the classroom spaces built to accommodate them, she explains, represent academe’s first attempt to do higher education at scale after new waves of students started flooding into America’s universities following World War II. With technology having evolved to its current state, such a method is primitive, she says. “You have this poor faculty member,” Thille says, “who’s sitting there as an expert in their area trying to figure out how to transfer their expertise to this large number of students, who are all variable. And it’s a horrible task. The affordances of the technology and also the learning sciences... for the first time enable us to really think about how to scale in a much more effective way, so we truly can serve many many many more students.”

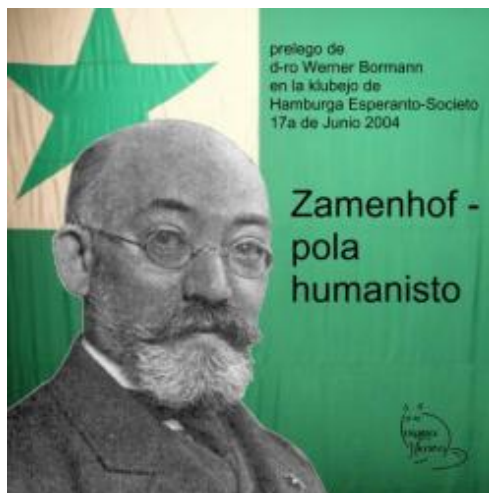
— Steve Kolowich

<http://www.insidehighered.com/news/2009/12/28/carnegie>

L.L. Zamenhof and the Shadow People

The amazing story of how Esperanto came to be.

- Esther Schor
- December 30, 2009



Starting at midnight on December 15, 2009, the Google logo was draped in a green flag. Perhaps you thought it was the Palestinian or the Saudi flag; perhaps this unsettled you enough to mouse it. If you did, you'd have learned that the flag celebrated the one hundred and fiftieth birthday of Ludwik Lazarus Zamenhof, the founder of Esperanto. And if you clicked on it, you'd have helped make "L.L. Zamenhof" the third most often-searched term on Google that day.

None of this was happenstance. It was the work of an Israeli Esperantist named Yosi Shemer, who sends two hundred twenty-five people a weekly Jewish-joke-in-Esperanto (with all Hebrew or Yiddish terms glossed in Esperanto). Though he modestly credits the idea to "some European Esperantist," it was Yosi who began the campaign last September, entreating Esperantists worldwide to lobby Google—in English—for a doodle. And enough of them did to conjure a bright green flag on Google's homepage in 33 different languages, including Chinese, Japanese, and Korean. Google calls this a "global" doodle, and of the last 59 to appear on its various home pages, only Zamenhof, the invention of the bar code, and water on the moon received this honor. News travels fast in Esperanto-land and soon Esperantists who were already lifting glasses to honor Zamenhof, lifted them a bit higher.

To Esperantists, the man who created the language-movement is a household god, a patron saint. As for non-Esperantists who are aware of Zamenhof, he's too unthreatening nowadays to be derided as a quixotic dreamer. Most regard him with mild condescension as a MittelEuropean, Jewish Geppetto, hammering together his little toy language in the hope that it might someday become real.

But inside this Geppetto was not only the dream of a new language, but also of something far stranger and unimagined: a new people altogether, and neither the Jews nor the Esperantists were the people he envisioned. Project by project, credo by credo, member by member, he tried to build a new people, a Geppetto with the audacity of Frankenstein.

He was born in Bialystok, Poland (then, Greater Lithuania) in 1859, the son of the czar's Jewish censor for Hebrew and Yiddish books. A slight, bespectacled man, Zamenhof had piercing, faintly Asiatic eyes that seemed out of place in his implausibly bulbous head. Nearing 30, his boxy beard still black, he could have passed for a younger, less self-important, brother of Sigmund Freud. He was an oculist by profession but, at one time or another, he'd been many other things: an early Zionist, a journalist, a modernizer of

Yiddish, a general practitioner, a lecturer, a poet, a translator, a religious reformer, and an amateur language-engineer, with a knack for getting the bugs out. “I was taught,” he wrote, “that all men were brothers, and, meanwhile, in the street, in the square, everything at every step made me feel that men did not exist, only Russians, Poles, Germans, Jews and so on.” He was determined to bring “men” into being with his 1887 *Lingvo Internacia*, published under the pseudonym “Doctor Esperanto” (the hopeful one).

At the back of the 44-page Russian-language pamphlet were coupons; the signatory was to promise to learn the international language provided ten million other people promised likewise. Two years later, Zamenhof had received only 1,000 promises. But by then the language, already going by his pseudonym, Esperanto, had been adopted by the “World Language Club” of Nuremberg, an Esperanto-language journal had been launched, and the introductory pamphlet—the *Unua Libro* (First Book)—had been translated into a dozen different languages. The rest, as they say, is history. From a mere 16 grammatical rules and 900-odd roots, Esperanto has endured, grown, and flourished into a living, world language with a sophisticated original literature. People make love and have toothaches in it; children are born into it. And it is alive and well on the Internet, where it is used to teach, inform, debate, entertain, gossip, persuade, and argue with other Esperantists about everything from advocacy to ... well, Zamenhof.

He seemed to be the right man at the right time. Between 1866, when the transatlantic cable was finally up and running, and 1896, when Marconi patented the radio, the future promised new networks of communication about education, culture, science, and technology. Glimpsed just over the hills, the century that would beget the atom bomb appeared to have a distinctly human face, and it was speaking incessantly. With new conversations forging new bonds, relations among diverse peoples and nations were sure to benefit.

Zamenhof intended Esperanto to jump-start such conversations. It was easy and cheap to learn—“the labor of a few hours,” as he put it—and equally accessible to workers and intellectuals. But though quick to be learned, it was slow to gain momentum and impotent to make money. The late 1890s found Zamenhof trying to start a medical career, raise a family, and secure his beloved language; he was itinerant and impoverished, at times despairing. By 1901, having staked his wife’s dowry, his family’s well-being, and his meager earnings on Esperanto, he became convinced that to survive, Esperanto would have to become the hereditary language of a people.

Which people? The answer, to this modern, Russian-speaking Jew, was obvious; he would offer it to the Eastern European Jewish intelligentsia, exhorting them to give up their tribal identity and become an enlightened, ethical community. He put their situation starkly: “The Jewish people, for a long time now haven’t existed. ... The expression ‘the Jewish people,’ which according to traditional custom is used by us and our persecutors, is only a consequence of an illusion ... a deep-rooted metaphor, similar to the way in which we say about a portrait of a person, customarily, ‘there is that person,’ nevertheless this person is already long dead and in the portrait remains only its shadow.” Tethered to dead ancestors yet religiously unmoored, these Russified Jews had become a “shadow people.”

There was an alternative: a plan for a reformed Judaism that Zamenhof called *Hilelismo* (Hillelism). In a lengthy, Russian-language tract, he presented Hillelism as a new, purified, theosophical Judaism with an emphasis on ethics. At times, he sounds like the Apostle Paul entreating the Corinthians to abandon the literal observance of the laws of Moses and interpret according to the spirit. But into the legal vacuum created when the laws of torah were abandoned, Zamenhof beckoned a rule drawn from within the Judaic religion. His point in naming the “purified” Judaism after a pivotal first century BCE rabbi was to overgo, in one bold gesture, both Moses and Jesus, who had based his golden rule on Hillel’s famous admonition, “Do not do unto others what is hateful to you.”

While Zamenhof disparaged the separatism of what he called Jewish “self-exile,” he wanted to do more than transform Jews into individuals of conscience; he wanted to rebuild the Jews as a people. In fact, there is a deeply conservative strain to Zamenhof’s Hillelism, in which cultural traditions serve as moral cement. The Hillelists, he imagined, would retain what Edmund Burke called a “moral wardrobe” of their cultural inheritance. All traditions that could possibly be purged of tribalism and chauvinism were to be

conserved: the Bible, the sabbath, the festivals, etc. Thus, with Hillelism recognizably and culturally Jewish, it would in time attract unworldly, traditionally educated, Jews into the fold and eventually, others who sought a “pure theosophical” faith.”

Though the Hillelists of the future would be multicultural and multireligious, Zamenhof nonetheless imagined those Hillelists as a people. Thus he arrived at a conundrum. How could a group of human beings with varied national origins possibly attain—and sustain—the bonds of peoplehood? This is not a question that federated states—or multinationals such as the United Nations or the European Union—need to ponder. But those of us who are citizens of multicultural nations such as the United States, know that our “peoplehood” has a checkered history. Our knee-jerk, civics-class habit of equating American peoplehood with diversity is a recent development. In fact, attempts to define Americans as a “people” coincide with our most egregious episodes of racism, nativism, exclusionism, and anti-immigration legislation.

For Zamenhof, the answer to this conundrum lay squarely in the arena of language. Wearing the mantle of Johann Gottfried Herder, who argued that language is the essence of the *volk*, Zamenhof identified language as the *sine qua non* of peoplehood. The fragility of Jewish identity, he argued, lay chiefly in the fact that the Jews lacked their own language. He noted that he’d at one time backed the Hebrew revival piloted by his contemporary, Eliezer Ben Yehuda (though I haven’t found evidence for this); he had also spent three years developing a modern, rationalized Yiddish using Latin characters. But by 1901, he had changed his mind on both counts. Hebrew, he felt, was “cadaverous,” and Yiddish, a “jargon.” Only with a neutral, artificial language—an Esperanto that Hillelist Jews would remake, eventually, in their own image—could the Jewish people justify their peoplehood to themselves and the modern world.

But the Jews of the Russian empire spurned both of his gifts—Hillelism and Esperanto. As the *Jewish Chronicle* of London put it in 1907, “The sect which Dr. Zamenhof sought to establish has never been represented by more than one person—himself.” By the time *Hilelismo* appeared in 1901, the First Zionist Congress of 1897 had already convinced many Jews of Eastern Europe that a political solution to the Jewish question was close at hand. It is not that Zamenhof was out of step with developments; on the contrary, *Hilelismo* was a rebuke to political Zionism, and he was not the only Jew to write one. So did Ahad Haam, the religious conscience of the early Zionists, who derided Herzl for his “idolatrous” failure to root nationalism in Jewish ethics. As for the Jews and Esperanto, some were drawn to it from the start. In the earliest Esperanto *adresar* (directory), there are nearly 200 Jewish names among the 900-odd Esperantists living under the Czar. But most Russian Jews, as Jeffrey Veidlinger has recently shown, were consumed with endless debates on the relative merits of Yiddish and Hebrew, and would continue to be for decades.

While Zamenhof smarted from the failure of Hillelism, the neutral, artificial language he had offered the Jews had taken on a life of its own. As Esperanto, his “beloved child,” became a cranky adolescent, journeying from provincial Eastern Europe to worldly Paris, the Jewish father with his prophetic talk of justice and brotherhood became an embarrassment. Zamenhof’s hope for the first World Congress of Esperantists in 1905, to take place in Boulogne-Sur-Mer, was that the Congress would be “a heart-warming religious center.” He addressed these words in a letter to the organizer, the eminent French attorney Henri Michaux, who alerted the other French members of the committee to his concerns about Zamenhof’s “mysticism.” When the poem Zamenhof intended to read at the opening ceremony (his own composition, called “Prayer under the Green Standard”) was read aloud to the Committee, the result was explosive. In Michaux’s words, “one could hardly grasp the wonderment and scandal of these French intellectuals, with their Cartesian ... spirit, these representatives of lay universities and supporters of secular government, accustomed to and identified with freethinking and atheism, when they heard this flaming prayer to ‘the high moral Power.’ ... ‘But he’s a Jewish prophet,’ cried [Carlo] Bourlet, and [Theophile] Cart for his part: ‘That Slav! Michaux will never be able to control this crazy man!’ And [General Hippolyte] Sebert lamented: ‘We’ll be ruined and a laughingstock.’” In the end, Zamenhof recited his prayer, minus the final stanza, which began: “Together brothers, join hands, /Forward with peaceful armour! / Christians, Jews or Mahometans, /We are all children of God.” After reading it, Zamenhof received an ovation so long and ardent that it startled him. Still, the French organizers of the

1905 Congress went to great lengths to obscure Zamenhof's Jewishness, and the result was noted—with evident pride—by Zamenhof's close Jewish associate, the oculist Emile Javal: "Of 700 articles in the press, only one mentioned Zamenhof's Jewishness."

But the bloody events of the revolutionary year 1905 renewed Zamenhof's determination to inculcate Esperantists with the values of Hillelism. In January 1906, a fictitious "Circle of Hillelists" issued "The Dogmas of Hillelism," a twelve-point credo treating religion, language, morals, and customs. It was clear that he was no longer addressing it to Jews; all Hillelists were entitled to their chosen or inherited religions—entitled also to their various "family languages" at home—but each would vow to reject those elements that failed to meet the severe ethical standards of Hillelism: nationalistic ideals; national, racial and religious chauvinism; and doctrines offensive to reason. In short, it was to be a sort of ethical quality-control on religion, transacted in Esperanto, with a few key social institutions attached. (Think, your neighborhood JCC: Hillelists would someday convene in Hillelist temples with Hillelist religious schools and Hillelist programs for the elderly.) The goal, to form a new people, had not changed, but the strategy had. It was to be a quiet, gradual transformation, conscience by conscience, "unremarked and without any disruption."

Before the year was out, Zamenhof lightly revised the declaration, changing the name from Hillelismo to Homaranismo (Humanitarianism). He was de-Judaizing a movement grounded in Jewish ethics, presenting it anew to the Esperantists as a "philosophically pure monotheism." But his intention to present Homaranismo at the Second World Congress in 1906 evidently met with a fierce backdraft from the movement's leaders. In the months leading up to the Geneva congress, as Christer Kiselman has shown, Zamenhof began backpedaling on Homaranismo. It would have trouble gaining adherents, he wrote, if it required the adoption of a new language; if it were perceived as a religious dogma rather than a "neutral bridge" among religions; if it sounded too utopian. A mere three weeks before the opening of the Congress, his confidence low, he wrote to Javal, "According to your advice, I threw out of my congress speech the last part touching on Homaranismo—and speak only of the *interna ideo*—the internal idea—of Esperantism. I am leaving each person to clarify for himself the essence of the idea, as he wishes." There is pathos in his concealment of Homaranismo at the behest of the movement's most prestigious, mainly French, leaders; in this encoding of his most dearly held belief as the *interna ideo*. Pathos, but heroism too, since Zamenhof was in fact trusting the Esperantists themselves to understand the *interna ideo* as the mandate for a modern, ethical community.

Zamenhof, though he many times renounced his authority over Esperanto, in fact wielded his authority shrewdly to guide the movement through three controversies, each of which eventually led to a schism—schisms, I would add, that the movement somehow survived. The first was the question of language reform. Since 1894, when the earliest agitation for language reform forced Zamenhof to hold a plebiscite, he realized that not only had the language failed to create a harmonious people; it was dividing its users. As Alexander Korjhenkov, Zamenhof's most recent (and most scrupulous) biographer notes, the reforms Zamenhof proposed in 1894 reforms remain a puzzle. For one thing, they are far more extreme than his conservative fundamental rules would suggest; for another, he was at work translating *Hamlet* in the very language that he was now proposing to revise drastically. The reforms were defeated, but the problems remained, and Zamenhof turned his attention to setting up an elected, authorized Language Committee that would decide linguistic matters.

In 1907 the issue of language reform, in Zamenhof's words a "sword of Damocles," nearly hacked the movement apart. When the prestigious *pour l'adoption d'une langue auxiliaire internationale* met in Paris to select an authorized international language, Zamenhof's hand-picked delegate sabotaged his, Zamenhof's, sacred cause. Louis de Beaufront, the sham marquis anointed by Zamenhof, put forward an anonymously authored language called "Ido" (Esperanto for offspring), passing it off as a "revised" Esperanto. The "Ido schism" put paid to Zamenhof's long-held expectation—both a dream and a fear—that an independent academy or international governmental authority would endorse Esperanto. Zamenhof stood up to the Delegation's attempt to compel the Esperantists to accept "Ido" as their own;

holding his ground, he declared the movement's autonomy and the Language Committee's authority over linguistic reform. To this day, Esperantists maintain that the Ido schism was the crucial coming-of-age for the movement, when it reckoned with—and proudly assumed—the burden of having an idealistic, ethical *interna ideo*.

The other two controversies, incipient in the early years of the movement, were kept in check during Zamenhof's lifetime. First, was the question of ideological "neutrality," insisted upon by the French Esperantists and made sacrosanct in 1905 by the Declaration of Boulogne. In 1921 it was not Hillelists but socialists who shredded the frayed ethos of neutrality. Taking as their slogan "*For la neutralismon*"—"Away with neutrality"—they broke off and formed the "Sennacieca Asocio Tutmonda," or "SAT"—in English, the "World Anational Association." (SAT, in time, would fissure into pro-Stalinist and anti-Stalinist factions, but that is a story for another day.)

As the word "Anational" in the name of the socialist movement suggests, the controversial role played by national Esperanto groups also prompted a schism. A 1922 a compromise plan called the "Contract of Helsinki" set up an International Central Committee to balance the interests of national groups with those of the rank and file members of the Universal Esperanto Association. In the 1930s, national groups desiring greater control over the UEA broke away to form the Internacia Esperanto Ligo (International Esperanto League or IEL); in 1936, they abandoned the Geneva headquarters of the UEA and set up an Avignon papacy in London. Only after World War II, in 1947, were the two factions reunited.

This story of quarrels and schisms is one way among others of telling the story of Zamenhof's language-movement. My point in telling it this way—and in extending it 30 years after his death—is to marvel that Zamenhof kept faith, until almost the end of his life, with the Esperantists. For him, they remained the last, best chance of realizing his dream of creating an ethical, modern people. He knew that, in the mouths of free human beings, the language Esperanto could be used either for promoting harmony or for backbiting, cheating, and lying; he knew, in other words, that the language would never by itself confer on humanity the affective bonds of peoplehood. Only an Esperanto people who shared a language and an ethos could do that, and Zamenhof made it his life's work to bring that people into being.

In the end, it was not the Esperantists who caused him to lose his faith in this pursuit; it was a world at war. In 1917, a few months before his death, he sent yet another version *Homaranismo* to newspapers all over the world, asking this time that it be published in diverse national tongues. He knew that the people he'd tried to create, who would cherish their neutral, modern, classless language, pass it to their children, and share it universally, remained a dream.

What Zamenhof could not know was that Esperanto would survive the brutal twentieth century because he inspired women and men in each generation to choose it freely—sometimes, during the century's most brutal decades, at risk of their lives. It was the Esperantists after all, flawed, bickering, merely human, who would shadow forth the people of a more just, harmonious world.

Esther Schor, a poet and professor of English at Princeton University, is the author of Emma Lazarus (Schocken, 2006) and is writing a book about Esperanto. Her essays and reviews have appeared in The Times Literary Supplement, The New York Times Book Review, and The Forward.

<http://www.tnr.com/article/books-and-arts/11-zamenhof-and-the-shadow-people>