

FOCUS

**HIS >>
MONTH**



Ever felt you're being watched?

Meet the scientist who thinks he can explain why p56

Google Earth

Zoom in on Beckham's house (left) with our unofficial user guide p65

Gene surgery

CRISPR: the biggest advance in medicine since antibiotics p48

Your town deathtrap?

The deadliest places to live in the UK p62

Attenborough on insects

He talks exclusively on the making of his new BBC One series p28

The GI diet

Kylie swears by it. Find out what nutritionists have to say p36

AMAZING NEW

WATER POWER

It's cheap, clean and limitless.
But can it really power the future?

On the cover

#157



Are you being stared at?

Scientists have a name for the feeling you're being watched: scopaeesthesia. But does it really exist?

» PAGE 56



Google Earth explained

See the pyramids or the Great Wall of China without getting out of your chair

» PAGE 65



Power drink

Could a new kind of hydrogen meet our energy needs?

» PAGE 22

Cover image

A scientist in New Jersey believes he's discovered a radical new form of cheap, clean energy – from water



The hamster bites back

Would Clarkson blow up a replica of parliament? Well, yes, but he hasn't. Richard Hammond has...

» PAGE 54



GI diets

Diet gurus with books to sell are pushing the latest craze. It's all about the glycemic index, apparently

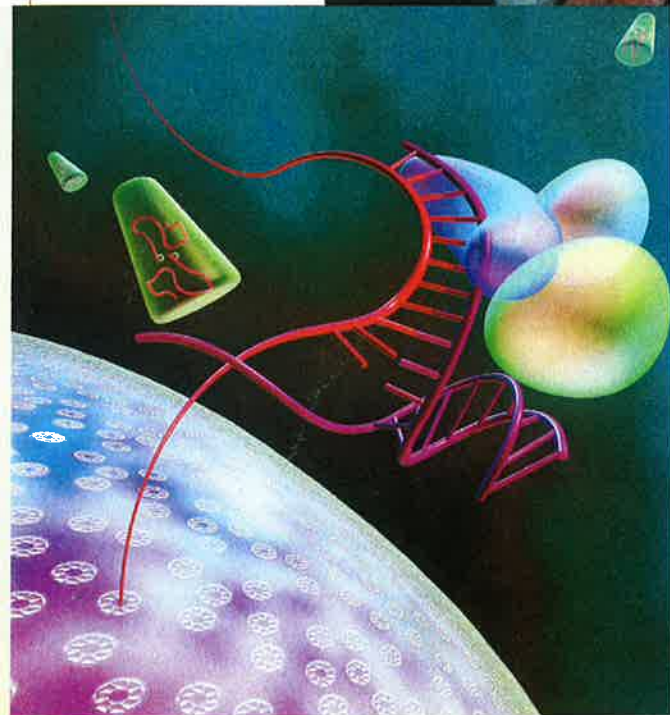
» PAGE 36



Elixir of the genes

A new technique known as RNAi – switching off troublesome genes – could offer cures for diseases ranging from AIDS to Huntington's

» PAGE 48



HYDRINO POWER

hype or hope?

Is there a new form of the hydrogen atom that can yield 1000 times more energy than conventional combustion? And if such 'hydrinos' exist, is it curtains for quantum theory? By **Robert Matthews**

AMONG SCIENTISTS, THE MERE MENTION of the name Dr Randell Mills can be enough to spark a row. Some claim he is a genius whose work in fundamental physics will lead to a radical new form of clean, cheap energy. His detractors, on the other hand, think he's a crackpot whose energy technology is as credible as cold fusion.

After years of such acclaim and opprobrium, Mills prefers to work with his colleagues at his company in New Jersey and focus on what everyone agrees will settle the argument: the construction of the first commercial product to exploit the power of 'hydrinos'.

According to Mills, hydrinos are a previously unrecognised form of the hydrogen atom which can be persuaded to release huge amounts of energy. The energy released depends on the catalyst used, but according to Mills in the case of hydrogen it could be as much as 1000 times greater than

that produced by conventional combustion. The reason they've gone unrecognised, he says, is because the textbook explanations of atoms are fundamentally mistaken.

It's a claim all but guaranteed to send scientists into paroxysms of rage. Even schoolchildren know that atoms are made up of negatively-charged electrons in orbit around positively-charged nuclei. The theory of atoms – quantum mechanics – has been developed by some of the most brilliant scientists of the last century, and its predictions have been confirmed with exquisite precision.

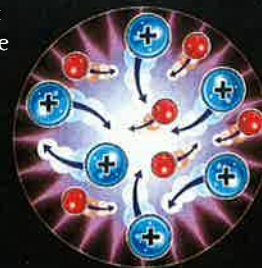
Even so, Mills says he can top it, with results that could change the world. We typically put very long odds on such grand claims proving true. But Mills

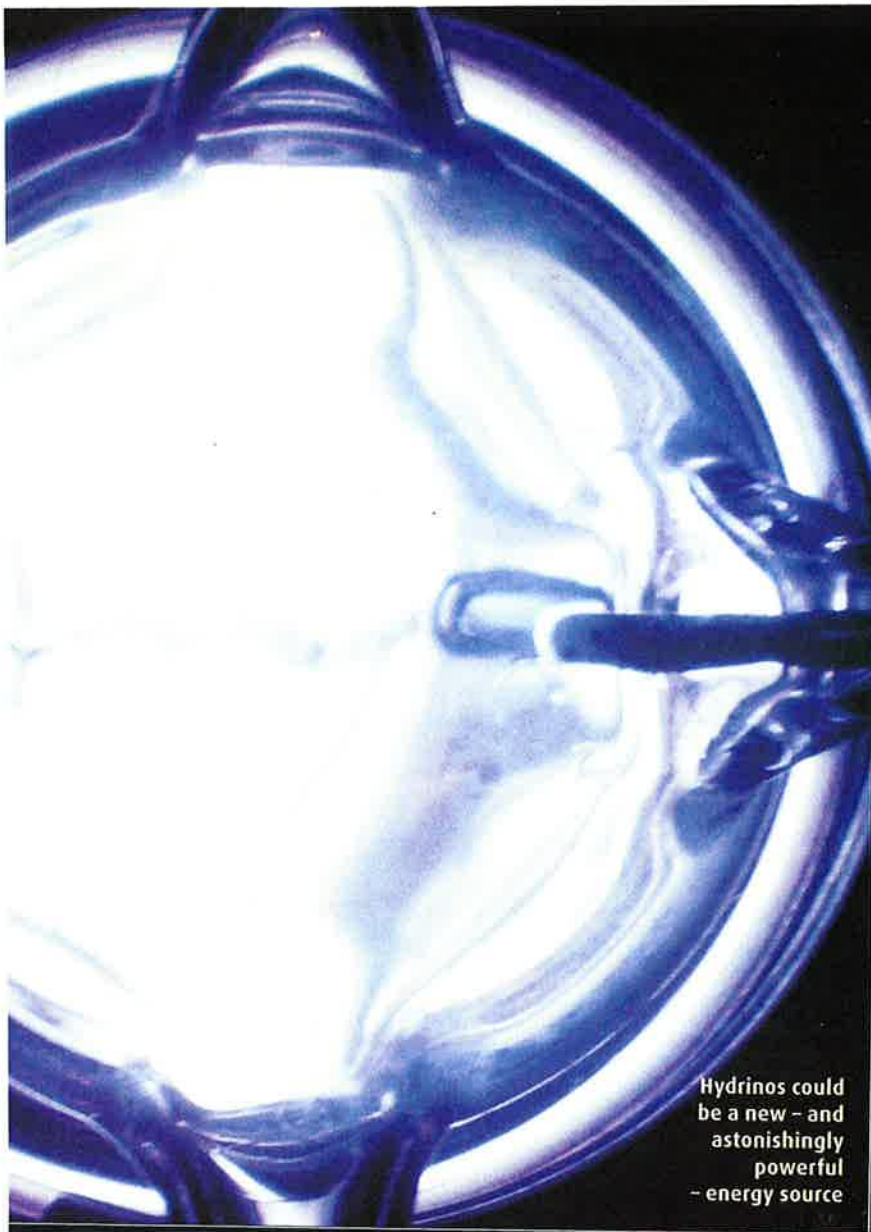
» JARGON BUSTER

Classical Quantum Mechanics (CQM)
A new form of quantum mechanics according to which classical laws of physics remain valid at the sub-atomic level

Catalysts
Substances that affect chemical processes, but without being consumed themselves

Plasma
A gas so hot that its electrons are stripped from their atoms (left)





Hydrinos could be a new – and astonishingly powerful – energy source

has published a host of papers detailing his theory of hydrinos in serious research journals. Meanwhile, independent investigators have carried out experiments to test his claims – and replicated them. Perhaps most impressive of all, the company formed by Mills to exploit the practical implications – Blacklight Power – is being backed with millions of dollars by investors that include US power companies.

Silent treatment

Despite all this, within the scientific community Mills and his claims still seem to attract the disdain reserved for inventors of perpetual motion machines. It's an attitude that puzzles chemistry professor Rick Maas of the University of North Carolina. After carrying out his own independent study of Mills's claims, Maas admits to being awestruck by the results. "There's no way – unless you didn't want to believe it – that you'd not say you were convinced," he says.

want to believe it – that you'd not say you were convinced," he says.

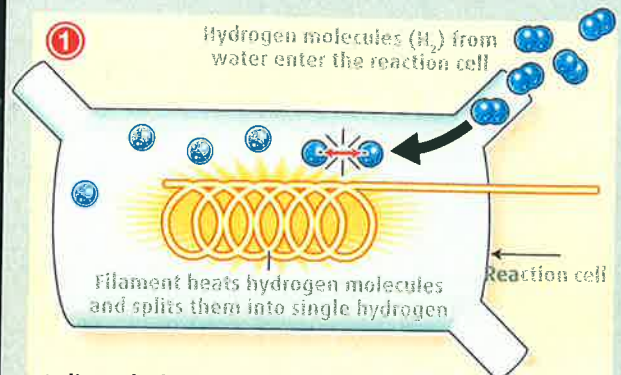
Part of the trouble surely lies with the debacle over cold fusion. In 1989, two electrochemists created a sensation by claiming to have triggered the power-source of the stars – nuclear fusion – in a jar of specially-prepared water. Attempts to replicate their experiment ran into a host of problems, and to this day the idea lacks any credible scientific theory. Yet this isn't the case with Mills and his work, says Maas. "This is so far from cold fusion that it's insulting to compare the two."

It's a view seconded by physicist Prof Jonathan Phillips of the University of New Mexico. He first heard of Mills and his ideas shortly after debunking cold fusion on theoretical grounds, and fully expected to be underwhelmed. That changed after reading Mills's theoretical papers. "I find his theory very compelling," says Phillips. ➔

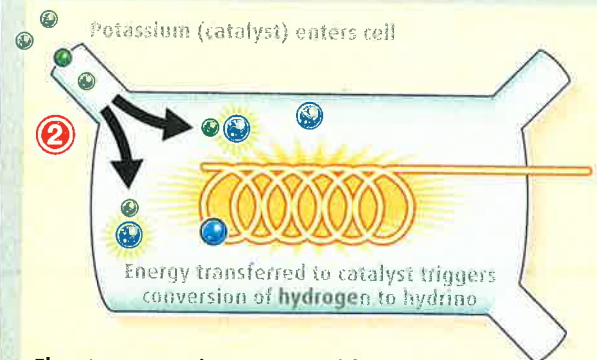
HOW TO GET ENERGY FROM HYDRINOS

Water makes hydrogen, makes hydrinos – makes power

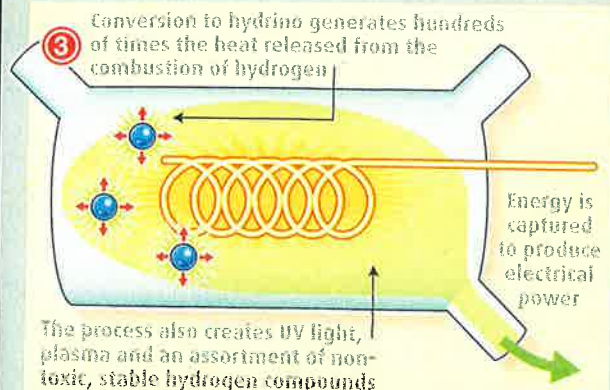
Dr Randell Mills claims hydrogen atoms, extracted from a plentiful source like water, can enter so-called 'hydrino states', releasing substantial amounts of energy



Ordinary hydrogen gas is injected into a reaction cell, where the molecules of hydrogen are heated by a filament until they split into individual atoms



The atoms come into contact with a catalyst such as potassium, which triggers the conversion of the hydrogen atoms into the hydrino state



The transformation leads to the release of substantial radiant energy. The resulting heat would then be turned into electrical power using standard technology

Future energy

UK GETS AHEAD OF THE GAME

Could Blacklight Power be pipped at the post?

NEWS

British scientists have created an energy cell that seems to create masses of 'free' heat – but they can't explain why



Take water and some potash, add a little electricity... and what do you get? A mystery

Scientists have created a small glass beaker containing water and potassium carbonate, the 'thermal energy cell' hardly looked like a challenge to known physics. Yet according to the company, independent tests indicated that the heat energy generated by the cell was over 20 times the amount supplied – in apparent contradiction to the law of energy conservation. Experts who witnessed the cell admitted to being totally baffled by its performance.

Blacklight Power is not the only company claiming to be able to tap into the mysterious energy source of sub-ground-state hydrogen. In 2003, Gardner Watts, a small Essex-based company, made headlines with a table-top device which appeared to generate far more energy than it took in.

Consisting of little more than a pair of electrodes dipped into a small glass beaker containing water and potassium carbonate, the 'thermal energy cell' hardly looked like a challenge to known physics. Yet according to the company, independent tests indicated that the heat energy generated by the cell was over 20 times the amount supplied – in apparent contradiction to the law of energy conservation. Experts who witnessed the cell admitted to being totally baffled by its performance.

The company has yet to go public with its device, however. A spokesman said: "We are active in work to upgrade the scale and controllability of the process."

→ who has since teamed up with Mills. But Phillips adds that the radical break from conventional thinking has helped fuel scepticism. "People don't want to listen because they're concerned about their careers."

There's no doubt that Mills's theory is extraordinary. But then, so is his background. After studying chemistry, he switched to medicine, graduating from Harvard Medical School in record time. Then he switched again, with graduate work in electrical engineering at the prestigious Massachusetts Institute of Technology. It was while at MIT that Mills began to develop his new theory of atoms. Like every science student, he had been taught quantum mechanics and how to apply it to the sub-atomic world. He also knew how physicists had been led to the quantum mechanics of atoms by a crisis that hit physics around a century ago.

The crisis was as simple as it was dramatic: the known laws of physics seemed to imply atoms could not exist. A charged particle like an electron should rapidly shed energy as it orbits the nucleus, with the atom collapsing in just a million-billionth of a second. To get around the problem, physicists turned to quantum mechanics, whose bizarre rules seemed to offer possibilities ruled out using the 'classical' laws of physics.

And this, says Mills, was their mistake. In a series of papers in leading physics journals, he argues that the classical laws work perfectly well at the level of atoms. The real source of the problem is in thinking of electrons as point-like particles. The classical laws work fine if the electron in a hydrogen atom is pictured as a spherical shell of electric charge that surrounds the central proton.

Opportunity knocks

This does more than solve the problem of the self-destructing atom – it leads to elegant formulas for a host of properties of hydrogen and other atoms widely held to be explicable only using quantum mechanics. "The formulas predict hundreds of results in precise agreement with observations," he says.

Most astonishing of all, the formulas predict the existence of entirely new energy states for hydrogen, which he terms hydrinos, and ways of persuading hydrogen atoms to move into them. The trick is to combine them with elements such as helium and potassium as catalysts. And the pay-off is a substantial release of energy – along with unexpected effects such as the release of high-frequency ultraviolet light (which gives Mills's company its name).

Despite being published in respected physics journals, the theory is still viewed with deep suspicion – though remarkably few critics have put their knock-out arguments in print. One who has is Andreas Rathke, until recently a theoretical physicist with the European Space Agency (ESA). Earlier this year he published a paper which concluded there were "severe inconsistencies" in Mills's theory, which was "incompatible" with quantum mechanics. But Rathke's critique has now been shown to be

Could a new state of hydrogen lead to an energy breakthrough?

FOR AND AGAINST

Are we on the brink of an energy revolution?

YES

Dr Randell Mills, President of Blacklight Power



What gives you confidence in your claims?

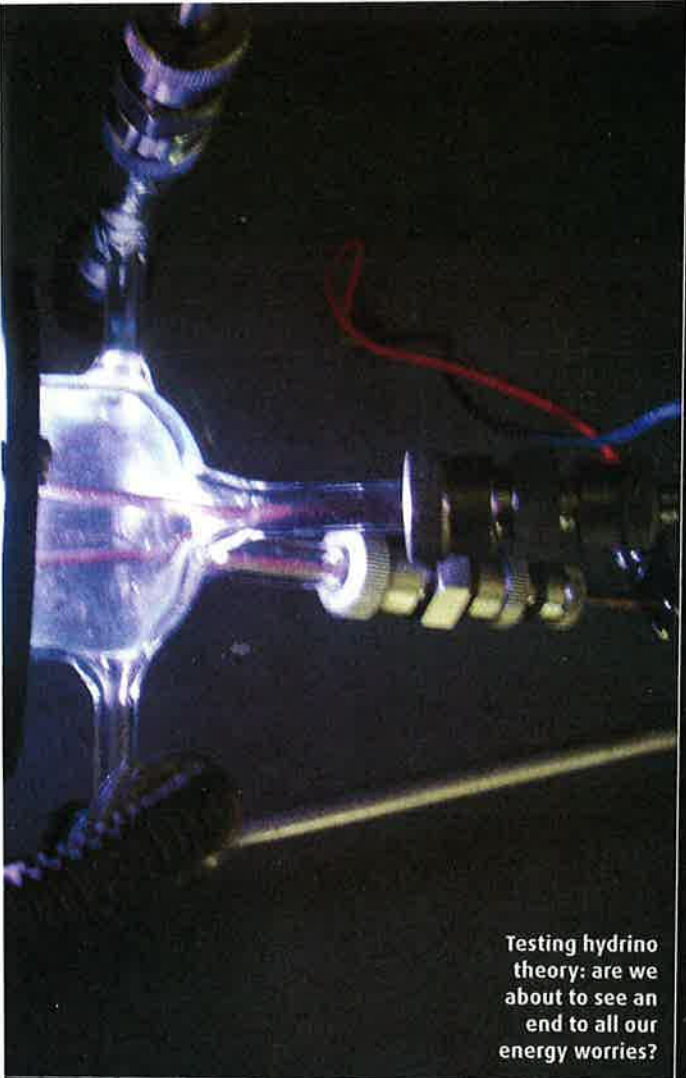
My theory gives equations that match observations correctly for hundreds of observable phenomena that cannot be explained by standard physics.

Why are so many scientists so sceptical?
Mostly it is hardcore quantum theoreticians that refuse to even look at our data.

What is needed to convince them?
I don't think the quantum physicists will ever be convinced. But we are now working with many classical physicists who are embracing the theory.

What applications of this energy source can we expect?

The first application is likely to be a 1 to 10MW electric power source.



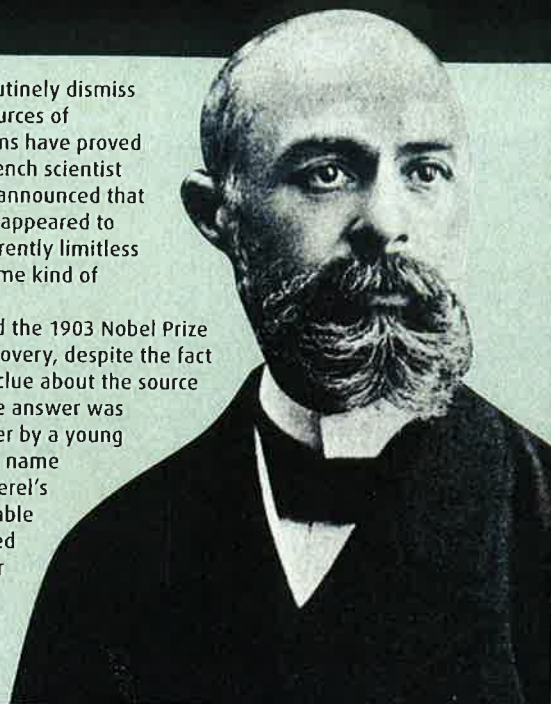
Testing hydrino theory: are we about to see an end to all our energy worries?

HENRI BECQUEREL AND THE ENERGY-EMITTING ROCKS

It's not the first time scientists have found energy in odd places

While most scientists routinely dismiss claims of radical new sources of energy, not all such claims have proved unfounded. In 1896 a French scientist named Henri Becquerel announced that certain types of mineral appeared to contain a source of apparently limitless energy in the form of some kind of radiation.

Becquerel was awarded the 1903 Nobel Prize for Chemistry for his discovery, despite the fact no-one had the faintest clue about the source of the energetic rays. The answer was discovered two years later by a young Swiss patent clerk by the name of Albert Einstein. Becquerel's minerals contained unstable atoms which disintegrated into fragments of smaller mass, the difference emerging as energy with Einstein's famous formula $E = mc^2$.



NO

Andreas Rathke, former research fellow, European Space Agency (ESA)



What do you make of the evidence so far?

I think there is indeed some interesting plasma physics. However, the explanation for the high plasma temperatures will most likely lie in conventional plasma dynamics.

What do you make of Dr Mills's theory?

The experimental data put forward cannot be interpreted in terms of his new theory because it is inconsistent and does not predict the results.

What does ESA plan to do?

I was asked to review the theory and the experimental evidence. ESA has decided not to support research on this subject.

What's your advice to anyone thinking of getting involved?

There's no such a thing as a free lunch.

flawed by Prof Jan Naudts, an expert on quantum mechanics at the University of Antwerp. "It was clearly incomplete, and even misleading," he says. According to Naudts, quantum mechanics does not rule out the existence of new energy states – though he stresses that is a long way from proving that they do exist. "We first need experimental proof."

Critical Maas

Which is precisely what Mills and his colleagues at Blacklight Power say they have got. In their laboratory, they claim to have triggered the creation of hydrino states by heating hydrogen until it turns into a plasma and adding catalysts, releasing energy much greater than predicted using standard theory. Once again, these claims have been published in serious academic journals, and have also been replicated by other researchers, including Maas. "We went in with a healthy amount of scepticism," Maas says. "We found very strong evidence for the existence of hydrinos, and significant net energy gains of two to 40 per cent." Maas

believes it's time for the sceptics to put up or shut up. "The experiments are so convincing, it's time to stop bickering about the theory." But he agrees with the sceptics that it's also time for Mills and his team to show they really can turn the theory into a commercial product.

We may not have to wait much longer: Mills and his colleagues are working on a commercial hydrino-powered generator. "Currently we operate bench scale systems giving 1 to 25 watts," says Mills. "We plan on working on scaled-up engineering with other companies that are validating our technology."

How close they are to success, Mills declines to say. Many scientists would still bet on him becoming just another of the many researchers who have seen their grand claims shot down by ugly facts. But as the evidence backing his claims mounts, only the most die-hard sceptic could deny that the odds on success seem to be improving. ☺

Robert Matthews is Visiting Reader in Science at Aston University

» FIND OUT MORE

The grand unified theory of classical quantum mechanics
Dr Randell Mills, International Journal of Hydrogen Energy volume 27, p565 2002

www.blacklightpower.com
Company website

www.hydrino.org/
Study group

www.csicop.org/sb/9712/rothman.html
Sceptical essay