

NYSSA SKILTON

BYTE SIZE



Australian physicists at Monash University in Melbourne have uncovered some unusual secrets which they will use to design the next generation of micro motors, which are thinner than a human hair. The team from its micro/nanophysics research laboratory videotaped a professional pizza tosser at work and then calculated how best to describe the way the dough travelled through the air using mathematical equations. The model may help them to design new standing wave ultrasonic motors, which operate on similar principles to pizza tossing. The tiny motors may one day be used in neuro-microsurgery.



An honours student in Western Australia has discovered a new asteroid orbiting in the outer reaches of our solar system. The 4km wide rock is between 125 and 400 million km from Earth and is about 250,000 times fainter than the faintest stars visible to the naked eye. Curtin University honours student Mick Todd spotted the asteroid while practising his search techniques for potentially hazardous rocks. He used the University of Western Australia's new Zadko telescope, a robotically controlled optical telescope, near Gingin, about 70km north of Perth. Unlike comets, asteroids are numbered, not named. This one will be known as asteroid 2009 FH19.



A conscientious partner may be good for your health. They are more likely to exercise and eat nutritious foods and are less likely to smoke, abuse drugs or take unwarranted risks. Researchers at the University of Illinois in Champaign report that the benefits may rub off on spouses. As described in the journal *Psychological Science*, they a significant, self-reported health benefit that accompanied marriage to a conscientious person, even among those who described themselves as highly conscientious. The researchers looked at the association of personality and self-reported health among more than 2000 couples taking part in the Health and Retirement Study, a representative study of the US population over 50.



Scientists have created an artificial ecosystem inside a test tube to examine Darwinian evolution at a molecular level. The work, which demonstrates some of the classical principles of evolution, by scientists at the US Scripps Research Institute is in the online edition of the journal *Proceedings of the National Academy of Sciences*. They write that, when given a variety of resources, different species will evolve to become increasingly specialised, each filling different niches in their common ecosystem. They say using molecules rather than living species offers a robust way to study evolution, because it allows the forces of evolution to work quickly, with a trillion molecules in a test tube replicating every few minutes.



Tiny mites living on the surface of cockroaches may help to reduce allergic responses in people handling the insects, a new study reveals. Scientists at the Ohio State University in Columbus examined different kinds of mould on the bodies of Madagascar hissing cockroaches with and without mites. The researchers had previously linked the mould with allergies and the ability for them to cause secondary infections if they entered the lungs or an open wound. Now they have found the mites can reduce the mould on the cockroaches by at least 50 per cent.



Spacecraft and robotic devices are preparing the way for humans to land on Mars.

Photos: NASA/JPL-Caltech

Big steps towards Mars

Hard scientific work is leading the way to the 'red planet', **Nyssa Skilton** writes

'**B**ecause it's there" is the response British climber George Mallory famously gave when asked why he wanted to climb Mt Everest. The world's highest mountain claimed his life just months after in 1924.

But humans continue to explore unfamiliar territories, driven by the lure of scientific discoveries, proving technological prowess or even just to see what's there. Now our sights are set outside the boundaries of our planet. Mars lies between about 60 and 400 million km from the Earth, depending on its position in orbit.

Humans have sent spacecraft to circle it and landed robotic devices on its surface in the quest for more information about the "red" planet. The next step is for humans to visit.

This month at the Australian Science Festival event – *Science In the Pub – Mars: Is it Worth The Trip?* – a panel of scientists will discuss the efforts to put humans on Mars. One of the speakers will be Mars Society Australia vice-president Jon Clarke, a geologist who studies exploration strategies for human missions to Mars.

Clarke says he thinks the human species needs a new frontier to test itself. "This is why in the 20th century, we went to the moon, we went to the poles, we climbed Everest," he says. "What are we going to do in the 21st century? Just sort of surf the internet at faster speeds, or watch drugged-up athletes cut thousandths of a second off records and then get stripped of their medals? Or are we going to do something that's bold and visionary, like explore Mars?"

He says Mars will reveal whether or not the human race

will spread through the universe, or if it will be confined to Earth. Mars can also teach us about our own planet – how our climate works, how our planet formed and how life may have appeared.

NASA sent two robotic "geologists", Spirit and Opportunity, to Mars in 2003 as the planet reached its closest point to Earth. The two 180kg robots, which landed on opposite sides of Mars, have trekked across the surface of the planet, collecting field data on the geology and atmosphere they observe. NASA is planning another rover mission dubbed the Mars Science Laboratory, which will collect Martian soil and rock samples and analyse them for signs they may have now or in the past supported life. The launch date is set for 2011.

Clarke says we know more about Mars now than we did about the moon in 1960, and "of course nine years later we were able to walk on the surface of the moon".

It typically takes six months to travel from Earth to Mars. The astronauts must stay there for another 18 months until our two planets are again aligned so they can take the six-month journey home to Earth. The round trip is similar in duration to what the early Antarctic explorers would have encountered some 100 years ago.

"In a sense we have to rediscover our past, and rediscover those lost skills of living in isolation and being self reliant and self sufficient. We're not used to sending people out on a bold endeavour for two-and-a-half years any more. But 100 years ago we did."

Australian National University PhD candidate Michael West agrees we are now capable, in terms of technology, of sending

people to Mars. He thinks it'll happen within the next 20 years. Interest in space exploration is growing and new powers are emerging: China, India and Japan. "It's really a question of political will and the money and the desire to do it," he says. "At a technological level there's nothing stopping us from doing it now, but there are technologies that are being developed now that in the future will make it easier."

West is working to develop one such technology, which may significantly decrease the cost of space missions. The work is on next generation plasma propulsion systems for spacecraft, which may one day propel humans to Mars. The work involves the "plasma thruster". The ANU announced last month it would be launched into space within the next four years, as part of a prototype satellite. It will be the first time in seven years that a piece of Australian hardware will be sent into space and the first time a satellite with a plasma engine will be tested.

Although these kinds of systems may mean it will take longer to reach a destination, they use less fuel. And this can make a big difference to the cost of a mission.

West says a way to make the best of the trade-off is to send the heavier cargo vessel, containing equipment, and living supplies, on the slow, but lower-cost trip and then the people on a stripped-down lighter, faster space craft.

"These are the grand endeavours of civilisation, to be exploring the world that we live in, whether it's exploring the southern oceans, exploring Antarctica or climbing Everest. Mars is there, the moon is there. We should go and explore them,

because it's part of humans' make-up to explore."

In Australia, researchers are studying the remote Arkaroola region in South Australia to test equipment and procedures that will help astronauts explore Mars more effectively. It has a diverse landscape with open plains, rocky gorges and sand dunes for testing space suits and vehicles, as well as features like volcanic processes and hot springs similar to what scientists hope to find on Mars.

Clarke says they are helping to do the groundwork that will support a mission to Mars. "The information we collect now, the things we do now, we'll be standing on the shoulders of giants," he says. "All the people who have gone to space before, all the scientist, all the engineers who have studied these things, the poets and the artists who have imagined what it might be like, whoever gets to go to Mars first will be standing on the work of all that's gone before."

One such scientist in the global effort is Pascal Lee, who is driving the Moon-1 Humvee Rover across the Northwest Passage to the NASA Houghton Mars Project's base on Devon Island in the Canadian Arctic.

The founder of the Mars Institute will fly in from the US to discuss his exploits at the *Science in the Pub* event this month. Centre for Astrobiology at the University of NSW director Professor Malcolm Walter will also be on the panel.

■ *Science in the Pub – Mars: Is It Worth The Trip?* is on Sunday, May 31, at 2pm at King O'Malley's Irish Pub. Cost is \$5.

For more information about the Australian Science Festival, visit sciencefestival.com.au.