

READING MAGAZINE

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A court case in ancient China

Chinese folk culture has many stories about a hero from ancient times called Yu. Early in his career Yu distinguished himself as a judge.

Two noblemen dressed in robes glittering with gold were kneeling before Judge Yu. Each waved a piece of paper, covered with small writing and with large red seals¹ impressed on it. Their prince had left each of them half of a large estate — land, houses and valuables — as specified on the papers they were presenting. Each claimed that the division was unjust, and that the other had received more than his proper share.

Judge Yu looked at the men, showing the whites of his eyes. He angrily shook his head, making the glittering ornaments on his cap dance in the light of the lamps. There was an atmosphere of tension.

Judge Yu rose. He grabbed the documents from the hands of the two plaintiffs, then handed to each the other's paper. He raised his hands signifying that the case had been decided. The two noblemen stared perplexedly² at the documents in their hands.

¹ stamps on a document showing it is genuine

² with confusion



Across the Pacific



The Pacific Ocean covers one-third of the Earth's surface. Small islands are sprinkled across the enormous blue expanse and often isolated from each other by great areas of sea. The islands that make up Polynesia (meaning 'many islands') were settled by seafarers from places that are now called Indonesia and Malaysia. These people spread gradually across the Pacific looking for new lands to settle. Between 2000^{BC*} and 1000^{AD**}, they navigated incredible distances in sturdy dugout canoes, 'reading' changes in the swell of the sea, the patterns of the stars and the easterly winds. They brought with them a patterned pottery called Lapita (above left), which has become an archaeological clue to their movements. The settlers adapted to the different environments they found, from the dry atolls to the lush and fertile volcanic islands. They reached Tonga and Samoa by at least 1000^{BC} and developed their own customs and a society that was ruled by chiefs. By about 1000^{AD}, Polynesians had reached Easter Island, New Zealand and the easterly islands of Hawaii.



Did You Know?

Gigantic stone statues line the coast of Easter Island. The people carved these guardians of the island from soft volcanic stone, then dragged them to platforms on the cliff edges.

READING THE SEA AND THE SKY



The Polynesians were expert navigators. They found islands to settle in the vast Pacific Ocean by reading the sea and watching for land-based birds such as frigates (above right). They travelled to and from these islands using maps they made from palm sticks and cowrie shells (left). The sticks represented the swells and currents of the sea, while cowrie shells marked islands.



* Also known as BCE

** Also known as CE

Blackberry picking

Once I slipped when we were running back along the cliff path. We'd been picking blackberries and I was watching the berries bounce in the bucket clasped in front of me, not the path. My foot caught on a stone, and I fell sideways, not safely on to the path, but sliding with horrible smoothness and speed to the lip of the cliff. I saw myself going and heard Isabel scream, and then I went over. But it was a rough slope, not the edge of the cliff itself, which was still fifteen feet away. I slid ten of them, bumping and banging, and then stopped. I began to scream, lying on my back, looking straight up at the sky. A second later a half-circle of terror broke the sky, upside down. It took me a moment to realise that this was Isabel's face. The next minute she was with me, dragging me back with both hands over the scattered blackberries. I got back to the path and sat down on it, shivering. My legs were smeared with blood and blackberry juice. There was a long burning graze up the inside of my arms.

'My bucket's gone,' I said.

'I'll have a look.' Isabel stood up and peered down. 'I can't see it. It must have gone over.'

I thought of my new bucket, silvery inside, bouncing and clanging down the rocks, and I began to cry. Then Isabel was crying too, worse than me, shaking and hiding her face with her hands. She hardly ever cried, and this was worse than losing the bucket. I patted her shoulders but she didn't seem to feel it. 'It's all right, Isabel. I didn't fall. I'm all right.' But she cried harder and I gave up and began to pick up the fallen blackberries and eat them. I wiped off the dust carefully and popped them into my mouth, one by one. They were delicious. And then there was Isabel, facing me on hands and knees, her face fierce. She was all smeary with crying, but back to herself again.

'And don't you dare tell them, Nina. Or I'll say I told you to stop and you ran on.'



Tourism in Antarctica?

YES

Dear Sir/Madam

I went to Antarctica for my last holidays, and it was one of the best things I've ever done. It was a thrilling experience, and worth every penny it cost me. It made me much more conscious of the impact we humans have on the environment, and made me realise how important it is to preserve the untouched places that we still have.

The penguins are unforgettable: not just the sight of them all huddled in close together, but also the sounds — and the smells. And the icebergs! No photograph or film footage comes close to preparing you for their truly awesome presence. They are spectacularly beautiful, full of light and shade, mysterious and marvellous.

The company that I travelled with is a member of IAATO (the International Association of Antarctic Tour Operators) and had very strong guidelines about what we were allowed to do and where we could go. Tourist operators in other parts of the world could certainly learn a lot from them. Our company had to fill in a log at the end of the cruise with details about where we had been, how many of us went ashore each day, and so on. The company also helps out some of the research scientists and other base personnel by transporting them or their equipment from one place to another.

Go to Antarctica if you possibly can. You will treasure the memories all your life. The cliché is true: it *will* change your life.

Yours

Voula Stavros

NO

Dear Sir/Madam

I am writing to express my disappointment about tourism in Antarctica. Why can't we leave the world's last wilderness alone? Let the penguins and the seals continue to live undisturbed by humans. Tourists mess about in rubber boats, take too many photographs and leave rubbish and oil spills behind them.

Every intrusion can harm the fragile landscape: moss banks take decades to recover from even a single footstep, and no one knows the amount of long-term damage done to penguin rookeries that are visited by humans over and over.

With increasing tourist numbers, there is a much greater risk of accidents, both in the icy waters off the coast of Antarctica, and at the various sites where tourists are shipped ashore. Who would clean up an oil spill? What would be the cost? Who pays for rescue attempts when grand adventure holidays go horribly wrong? How many diseases are being introduced to the Antarctic wildlife by people having a fun time at the locals' expense?

Tourists are in Antarctica by choice—let them choose somewhere else to spend their money and get their thrills.

Yours

Thomas Nguyen

Endemism

Endemism describes how species that are native to a particular geographical area or continent evolve. Examples of endemism in Australia are the koala and the red kangaroo — both of which are not naturally found anywhere else in the world.

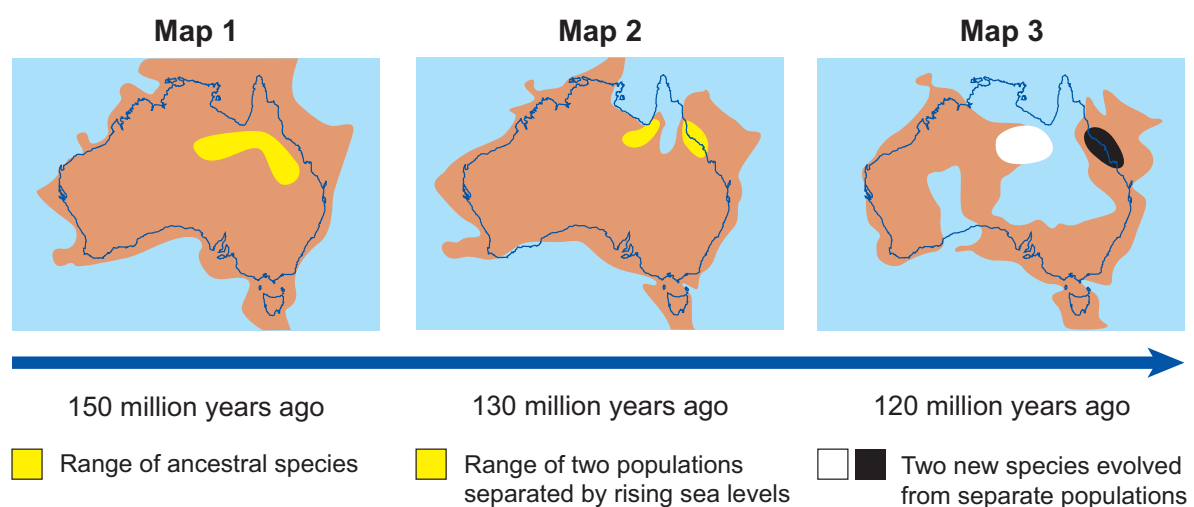
Endemism usually occurs in areas that are isolated in some way. Australia has been isolated from other continents for tens of millions of years, resulting in a high level of endemism. More than 80% of our plant and animal species are not found on any other continent.

Endemism occurs when populations of one species are separated so they cannot interbreed. Both populations continue to breed and evolve separately. In time, it is possible they will become two separate species.

The factor that causes populations to separate is called an isolating mechanism. Isolating mechanisms can be geographical (for example, changes in sea level or the formation of mountain ranges) or behavioural (for example, a population developing two different mating seasons or behaviours).

Endemism doesn't just occur between continents; it also occurs within them. For example, species can be restricted to large regions such as south-west Australia or tropical Queensland. Endemism can also occur over very small areas, such as on mountain tops or around springs. The isolating mechanism in both these cases would be the unsuitable nature of surrounding areas.

The diagrams below illustrate the evolution of one species of plant or animal into two isolated and distinct species. Brown areas show the changing land mass and blue areas show the changing sea levels. An outline of Australia's current coastline is also shown.

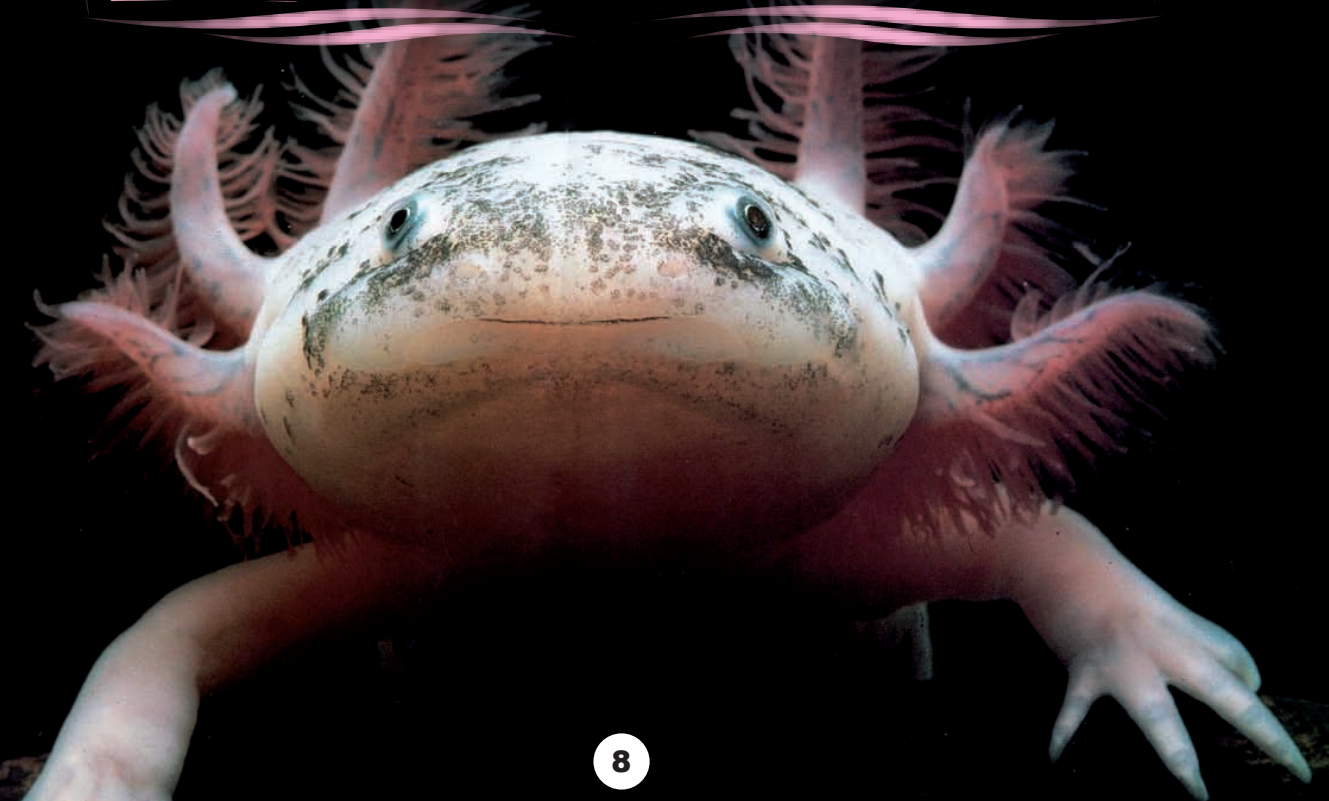


The double life of a slippery axolotl

In 1865 scientists were surprised when some of the Mexican axolotls at an exhibition in Paris turned into yellow-spotted, brown salamanders. Very surprised, in fact, because scientists had thought that the axolotl and salamander were different species, not different life stages of the same animal. What they had observed was an axolotl metamorphosing into a salamander. They had not seen this occur when the axolotl was in its natural habitat.

So why don't axolotls always metamorphose into salamanders? Well, the lakes in Mexico where axolotls are found are surrounded by barren, dry country which is an unsuitable environment for amphibians like salamanders to survive in. The lakes, however, are full of food and good water, the perfect place for an axolotl to survive. This environmental pressure has caused the axolotl to adapt and retain the aquatic, larval (immature) form of the salamander. At the same time it has developed the ability to increase in size and reach sexual maturity. This is called neoteny. The axolotl never has to change into the adult salamander form to grow and reproduce. But this does not mean it cannot do so.

If an axolotl is taken out of water it will most probably die. But if its lake or pond slowly dries up it may metamorphose into a salamander. Other changes in environmental conditions such as temperature and day length can have a similar effect. The change in environment affects a part of the brain called the hypothalamus which controls the release of a hormone called thyroxin. Thyroxin is essential for metamorphosis in amphibians. In its natural state the axolotl has adapted to switch off this biological signal so it can remain in its watery paradise.



Water warning in Angkor ruins



Dying city: Part of the spillway

Leigh Dayton

Science writer

TWO enormous masonry structures discovered near Cambodia's fabled Angkor Wat provide rock-hard evidence that the once-powerful Khmer kingdom vanished because of over-building, environmental damage and climate change.

One of the new-found structures was a 40 m by 80 m spillway. The other was a 100 m by 40 m outlet channel that, like the spillway, was part of the elaborate water system that served the sprawling ancient agricultural city of Angkor.

'These two structures demonstrate very high levels of hydraulic engineering,' said Sydney University archaeologist Roland Fletcher, director of the Greater Angkor Project (GAP), a five-year collaboration between the university, French researchers and the Cambodian agency managing the Angkor site.

'The Khmer engineers used their expertise in masonry construction to build these structures that managed water flows for the entire city. There are considerable implications for our understanding of our own water management systems.'

Angkor is the largest known city from the pre-industrial world. It existed from the 9th to the 15th centuries.

Using satellite images, aerial photographs and field surveys, the GAP team estimated that the low-density city covered about 1000 sq km, spreading outwards from the central complex of Angkor Wat.

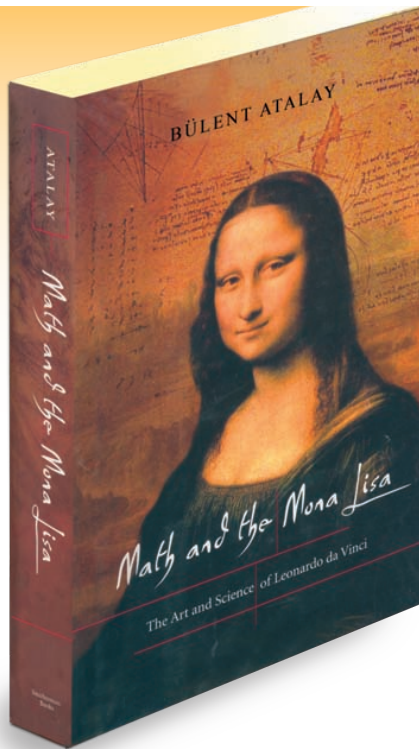
The intricate network of channels and reservoirs sustained a population of about 750,000.

Then, about 500 years ago, the Khmer capital was abandoned. This has baffled modern scholars. Theories ranged from invasions and decline of the controlling religion to major geological shifts.

But Professor Fletcher's group suspects the city died when it could no longer support the rice-growing economy that fed it.

That happened because of Angkor's success. As it grew, more land was cleared for rice paddies, increasing soil erosion into the irrigation canals. Silt built up, choking the water system and taking time and resources to keep it flowing.

The final kick came from an abrupt decrease in the monsoon rains that filled the great lake east of Angkor.



Math and the Mona Lisa:

The Art and Science of Leonardo da Vinci

by Bülent Atalay
ISBN 0-06-085119-8

Collins
336 pages
A\$24.99

Reviewed by Jeremy Chunn

Leonardo da Vinci will be long remembered after every copy of *The Da Vinci Code* has turned to dust, so it's a shame that Bülent Atalay's elegant book has a whiff of opportunism about it. Blame it on the cover art, because what lies within is a devoted work where the relationship between science and art is investigated, and it's not until halfway through that da Vinci becomes the primary focus.

Atalay, a professor of physics, starts with the golden ratio 'phi', an irrational number derived from the Fibonacci sequence. Suddenly we see it everywhere, in the pyramids, the Parthenon and in art from all ages. But is it used consciously or instinctively? Atalay can't answer that question; he just reveals patterns. When he points to the golden ratio's ubiquity in nature, however, it is the perfect time to introduce da Vinci, who instructed others — scientists and artists — to 'learn from nature, not from each other'.

It was the famous Italian's capacity to observe, conduct experiments and collect data that made him the first scientist, the author claims. It was also this curiosity and diligence that informed da Vinci's art: the curls in hair became a reference to the way water moves; a subject's gaze revealed his intimate knowledge of the human eye, having dissected so many of them.

Leonardo produced maybe 14 000 pages of notes, but we are left with less than a third of that amount. In his work he anticipated inventions that were realised hundreds of years later.

Atalay himself is a Renaissance man: appearing within the book are etchings by the author and he casts wide for references, including quotes from Milton on Galileo and Tom Wolfe on sculptor Frederick Hart.

The other cheek

Atalay veers off to findings of sophisticated modern research, including why we generally turn the left cheek when being photographed by a friend. It turns out the right side of the brain, associated with emotions and which controls the left eye and cheek, tells us to turn to the right, and show the left. Right?

ACKNOWLEDGEMENTS

Cover image: Thad Zajdowicz / stock.xchng

A court case in ancient China

van Guilik, Robert, adapted text and illustration from *The Chinese Gold Murders*, with a new introduction by Donald F. Lach, The University of Chicago Press, 1979. Reproduced by permission of Penguin Books Ltd.

Across the Pacific

Adapted text and illustrations from page 16 of *Discoveries: Explorers & Traders*, Weldon Owen, 1996. Consulting Editor: Dr Anne Millard. © 1996 by Weldon Owen Pty Ltd. Images: Auscape / Tui De Roy (bird); Auscape / J.P. Ferrero.

Blackberry picking

Dunmore, Helen, adapted text from *Talking to the Dead*, first published in 1996 by Viking and published in 1997 by Penguin Books. Reproduced by permission of Penguin Books Ltd.

Tourism in Antarctica?

Recht, Eve, adapted text from *Chatterbox Upper Primary A: White Elephants*, an anthology compiled by Eve Recht, Pearson Education Australia, 2006.

Endemism

Adapted text and illustrations from *Endemism Fact Sheet*, by Katy Crass / Australian Museum, www.amonline.net.au/factSheets/endemism.htm

The double life of a slippery axolotl

Adapted text from 'Of teeth and axolotls' which appeared in *The Helix*, No. 46 February / March 1996, published by CSIRO Education. Reproduced courtesy of *The Helix* / CSIRO Education.

Image: Stephen Dalton / Animals Animals – Earth Scenes

Water warning in Angkor ruins

Dayton, Leigh, adapted text from article 'Water warning in Angkor ruins', *The Australian*, Thursday 15 March 2007.
Image: Andrew Wilson / Newspix 2007

Math and the Mona Lisa

Chunn, Jeremy, adapted text from book review on *Math and the Mona Lisa: The Art and Science of Leonard da Vinci* by Bülent Atalay, in *Cosmos – The Science of Everything*, Issue 12, December / January 2007, published by Luna Media Pty Ltd.
Book cover; published by Smithsonian Books.



Barn Owls

Barn Owls are hunters.

They have large forward-facing eyes,
excellent night vision and exceptional hearing.

Barn Owls often sleep during the day
when their prey is also inactive.



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