

Memories and imagination

We all have memories of one sort or another. Many stay with us for ever but some fade away although they can often be recalled when one of our senses is stimulated. One can remember a long-forgotten occasion by the smell of a particular food, for example. Some are good memories: holidays, your first car, that first kiss and so on. Others are not so good. In any case we are not sure how we make them or where we store them.



The Journal of Neuroscience reported that a team led by Gary Lynch at the University of California, Irvine, looked at memory formed when three groups of rats learnt to navigate a maze. Using fluorescent antibodies which highlight nerve connections and a new technique called restorative deconvolution microscopy, they focused on one million synapses in a tiny part of the hippocampus which appears to be linked to memory and navigation. They found that 1 per cent (10,000) of the synapses in the "memory-learners" samples were enlarged and had formed stronger connections with their neighbours. These synapses appear to "write" the memory.

But what about the converse activity — imagining the future? The *New Scientist* recently described how researchers at New York University placed volunteers in a brain

scanner and asked them to reflect on various potential scenarios. They found that imagining a positive future event such as receiving a large sum of money activated the amygdala and the rostral anterior cingulate cortex (rACC) in the brain significantly more than when imagining a negative event. It seems these areas may be important in signalling cheerful thoughts. Earlier research also suggested they might be implicated in depression as postmortem examinations performed on severely depressed patients found fewer cells than normal in the rACC and amygdala. It is not yet known whether the lack of cheerful thoughts is a consequence of or cause of depression but if further investigation proves that abnormal signalling activity in these areas causes depression such brain scans may aid diagnosis and therapy.

Why stocking shelves is hard in the Pacific

Imagine for a moment living quietly on a semi-tropical island surrounded by an endless blue ocean, sipping the occasional pisco-sour in the shade of a palm tree while being 2,400 miles from the nearest pharmacy.

I am sure we have all had moments when that sounds mightily attractive. However it also means you have to buy any medicines needed from the stockroom in the small hospital and a plaster (sold individually) from a village shop if you cut yourself opening a coconut.

This was the situation on Easter Island until recently. Easter Island, with its 887 inscrutable statues, lies about 2,400 miles from the mainland of Chile and 2,500 miles from Tahiti. Its nearest inhabited neighbour is Pitcairn Island, last resort of the mutineers from *HMS Bounty*, 1,700 miles away and also without a pharmacy. There is a doctor and the hospital but, with almost 5,000 islanders and up to 49,000 visitors a year, a pharmacy was sorely needed.

Now, however, one of the 439 pharmacies of Chilean-based chain Farmacias CruzVerde has opened on the island. Stocking the shelves is not simple though because a small cargo vessel only calls once or twice a month, has to anchor offshore and transfer its cargo to land by a sort of tank-landing craft. Alternatively the one expensive flight from the mainland lands most days during the summer but only twice or three times weekly in the winter. Twice daily deliveries from your AAH, UniChem, Phoenix or whatever, even of direct-to-pharmacy supplies, are just unimaginable luxuries.

Humans virtually unwrapped

Techniques involving 3D imaging are set to replace X-rays as a basic diagnostic tool with many applications from facial reconstruction to aiding the detection of breast cancers. There are many other possible uses for the technology.

The MAAT3D or "Anatomical and anthropological tridimensional modelisation team" has developed the use of computer tomography scans, magnetic resonance imaging, microscopy techniques, laser scans and high powered computer systems to produce 3D images of ancient artefacts, fossils, artwork and anthropological specimens. They recently "virtually unwrapped" an Egyptian mummy from the Champollion Museum in France so displaying and examining its structure without actually cutting open the material.

The computer-minded might like to know (and I quote MAAT3D) that "a CT scan of the mummy was performed using a General Electric CT scanner to obtain 1510 2D slices (1 millimetre by slice, image resolution of 512x512 pixels). Using Volume Graphics GmbH softwares (VGL 1.2 and VGL 2.0 rendering engine) they made the volumetric reconstructions on a Powermac Dual G5 and Quad G5 running 8 Go of RAM. A DVD of this study was made for the museum and public presentation." Phew! The film has also been released as an iPod video for viewing inside the museum. The rest of us might just go to www.maat3d.com and follow the links to some amazing images.

Fairy physicians: fact or fiction

A post-Christmas walk on the Brecon Beacons in Wales to wash away the cobwebs resulting from the festive season brought to mind an ancient tale.

Near Llandovery on the Black Mountain is a tiny lake, Llyn y Fan Fach, which is said to be the haunt of fairies. One day in the 13th century a local young farmer fell in love with a beautiful girl he discovered sitting on the surface of the lake combing her hair. He coaxed her ashore and her father agreed to their marriage but said if he ever struck her three times she must return.

For some years they lived happily in the valley with a herd of magic cows and three sons.

Sadly he did slap her three times: once for making them late for a christening, again for weeping at a wedding and then for laughing at a funeral. She and the cattle returned to the water.

Her sons visited the lake often and one day she appeared and gave the eldest, Rhiwallon, a leather bag containing the secrets of the lake's medicinal plants and told him to go and heal the sick.

Now fiction blurs with fact, for historical records show that a man called Rhiwallon and later his sons, Cadwgan, Gruffydd and Einion were well known 13th century physicians and their descendants continued to practise in the area until the 18th century.

The lovely Pant y Meddygon or Physician's Valley is still rich in wild herbs, bog plants and lichens.