TORONTO STAR
www.thestar.com

A week's worth of science news, Aug. 13

Aug. 13, 2006. 03:52 AM

PETER CALAMAI

The science of beach pebbles

You'd simply say pebble, but some scientists would call it "a rounded body with a near-Gaussian distribution of curvatures."

While we all know a beach pebble on sight, there has been no agreement on how to describe that shape mathematically. But now a team of French and American researchers has shown that all pebbles eventually wind up with the same set of curvatures no matter what their starting shape.

The key word is curvature. Think of drawing circles of different sizes whose outer arcs are overlapped to trace the outer contour of a pebble

Doug Durian of the University of Pennsylvania and colleagues from the Strasbourg labs of France's National Center for Scientific Research did just this for photographs of 60 pebbles. The stones had been gathered at Mont St-Michel on the Normandy coast, site of a famous abbey and also of vigorous tides that gradually erode hardened mud fragments from the bay bottom into rounded pebbles.

The researchers plotted the distribution of the curvatures from the 60 pebbles onto a graph. The older the pebbles, the more the graph resembled a special form of a bell curve called Gaussian. They then did the same thing for different shapes of clay pebbles made in the lab and flung about in a metal pan to erode them. Same result, according to findings to be published in *Physics Review Letters*.

Durian says a next step could be to find a way to decipher the message encoded in the pebble shape — such as how far it has travelled and whether wind, water or ice caused the erosion.

Better yet, how about whether it's a good skipping stone?

Winging toward Endless summer

The sooty shearwater puts Canada's snowbirds to shame. Also every other migratory animal. Weighing about the same as two bricks of butter, this small seabird wings as many as 73,000 kilometres every year, criss-crossing the Pacific Ocean in a figure-eight pattern to bask in an endless summer.

This remarkable odyssey has just been revealed by electronic tracking using miniature, made-in-Canada tags that recorded the movements of 19 shearwaters throughout their 200-day migration.

In addition to determining location by light levels, the six-gram tags from Lotek Wireless in Newfoundland also register temperature at the sea surface as the birds dive in pursuit of fish, squid and krill (normally 14 metres down, and as many as 67).

Researchers from the U.S. and New Zealand discovered that the seabirds made prolonged summer stopovers at one of three northern hemisphere locations — in Japan, Alaska or California — before heading back to their breeding grounds in New Zealand for the southern hemisphere's summer.

While on the wing, the 800-gram shearwaters (*Puffinus griseus*) covered up to 1,000 kilometres in a day. Their curious route took advantage of favourable winds (the Easterlies) and also the Coriolis Effect, where the Earth's rotation deflects winds.

In the current issue of the *Proceedings of the National Academy of Sciences*, the researchers suggest the extensive migration of the birds could provide early warning signals of the impacts of climate change or overfishing.

The sooty shearwater may already be sounding that alarm. While the global population is estimated at 20 million, numbers have plunged off the coast of California. Scientists fear warming oceans may have reduced the amount of shearwater food available.

Contagious canine cancer

At least two centuries ago, a contagious form of cancer broke free of its original host and infected a grey wolf or a closely related ancient dog breed.

Canine transmissible venereal tumour (CTVT) is still around today, successfully spreading, parasite-like, among dogs worldwide. That makes it the oldest cancer known to science and likely the longest continually propagated mammalian cell lineage, says a research team in the current issue of the journal *Cell*.

The finding has broad implications for the health of endangered species and for understanding how cancer progresses, including the possibility of sexually transmitted tumours in humans.

The idea that a cancer can be transmitted by the actual transfer of cells between animals recently gained prominence with an outbreak of facial tumours among the endangered Tasmanian Devil. The tumours were apparently passed along by the marsupial's bite.

CTVT spreads among dogs primarily through sexual contact but may also be transmitted by licking, biting and sniffing tumour-affected areas, says researcher Robin Weiss of University College in London, England.

Scientists previously thought that a cancer-causing virus might play a role in the spread of the tumour, also known as Sticker's sarcoma. To test this idea, Weiss and colleagues extracted DNA from blood and tumour samples collected from 16 unrelated dogs in Italy, India and Kenya.

The tumour DNA didn't match the blood DNA, meaning the tumour cells couldn't have originated with the dogs.

But the tumours from the far-flung dogs were closely related to one another genetically, suggesting a common cancer clone.

Based on genetic variation among the samples, the researchers estimate the disease has been transmitted among dogs for two centuries or more.

In most infected dogs, a tumour develops, regresses several months later, and eventually disappears.

Because the tumour is foreign, the dog's immune system triumphs.

CLICK HERE

http://www.esi-topics.com

What's hot in science this month? Using natural soil microbes as alternatives to pesticides, a better mathematical handle on planet formation, and a new approach to classifying physical symptoms that can't be medically explained.

Those are just three examples from scores of up-and-coming research fields highlighted this month by Thomson Scientific, a company that tracks the impact of scientific papers.

Thomson also asks researchers to explain the significance of their work "in layman's terms." Most haven't a clue how to do this.

Additional articles by Peter Calamai