Technology in Indonesia first described the frog 30 years ago. Now he, David Bickford of the National University of Singapore and Anggraini Barlian, also at the Bandung Institute, have determined by dissection that it is entirely without lungs. Instead, it breathes through its skin.

Lunglessness among the four-limbed vertebrates is rare; only two families of salamander and one species of caecilian — a limbless amphibian — are known to have evolved this trait. Unfortunately, the frog is endangered by habitat loss and gold mining, which warms, pollutes and muddies its formerly cool and clear home streams.

B. VAN BOCXLAER

PALAEONTOLOGY

Unpunctuated

Evolution **62–63,** 511–520 (2008)

Palaeontologists have re-evaluated one of the first pieces of evidence to support 'punctuated equilibrium' — the theory that evolution can proceed in fits and starts — and found it lacking.

In the late 1970s and early 1980s, fossil molluscs (pictured above) from the Turkana Basin, Kenya, were interpreted as showing three bursts of rapid evolutionary change during a 3.3-million-year period. Now, Bert Van Bocxlaer of Ghent University in Belgium and his colleagues say that changes in the mollusc species can be explained more prosaically: environmental change in wet periods caused new species from outside the basin to colonize the area.

CLIMATOLOGY

Low cloud cover

Science **320,** 195 (2008)

The presence of fewer clouds could help to explain how global temperatures rose so markedly in 'supergreenhouse' events of the past.

The key, say Lee Kump and David Pollard of Pennsylvania State University, is the number of tiny particles in the atmosphere that serve as nuclei for clouds to condense around. In the unpolluted atmosphere, these are mostly aerosols produced by organisms such as ocean algae. The researchers used a global climate model to simulate the climate 100 million years ago. They found that if rising temperatures cause algae to be less productive, and thus provide fewer aerosol seeds for clouds to form around, clouds would be thinner and less reflective.

This would have cut the amount of solar energy reflected back into space, leading to even more drastic warming.

QUANTUM PHYSICS

Missing holes add up

Phys. Rev. Lett. **100,** 136804 (2008)

Quantum computing might be done on a gossamer-thin sheet of carbon, suggest Thomas Pedersen of Aalborg University in Denmark and his co-workers. Their calculations show that a single sheet of graphene — a graphite-like material comprising a monolayer of hexagonal carbon rings joined edge to edge — could supply an array of 'quantum bits' (qubits) when perforated with a regularly spaced lattice of nanometre-scale holes.

Omitting holes in the lattice creates localized defects in the sea of electrons spread across the sheet, which act like particles with quantum-mechanical spin. Different spin states can be used to encode bits of binary information, and adjacent spins can interact with each other for data processing. In addition, the lattice produces a controllable energy gap that could pave the way for graphene-based semiconductor devices.

BIOMEDICINE

Resisting radiation

Science **320,** 226–230 (2008)

High doses of ionizing radiation, such as those used in radiotherapy for cancer, can cause many of the body's normal cells to self-destruct. But a tool pinched from cancer's own arsenal might keep those cells alive.

Elena Feinstein of Cleveland BioLabs in Buffalo, New York, and Andrei Gudkov of the Roswell Park Cancer Institute, also in Buffalo, developed a drug from a bacterial protein, flagellin, that activates a cell-survival pathway, known as the NF-κB pathway, that is constantly active in the majority of tumours.

Mice given 0.2 milligrams per kilogram of body weight of this protein — flagellin — survived usually lethal doses of radiation, up to 13 joules per kilogram of tissue.

JOURNAL CLUB

Bob O'Hara
University of Helsinki, Finland

A statistician wonders about the influence of additive variance.

Where complex problems are concerned, it makes things simpler if some factors can be safely ignored. In quantitative genetics, one such assumption is that the bulk of genetic variation is additive. That is, the effect of an allele — a particular version of a gene — can be adequately described by its average effect in a population. But we know that genes often do not act additively; alleles interact, both with others of the same gene (a phenomenon known as dominance) and those of different genes (epistasis). All this contributes to the total genetic variation. But does this matter?

This question is tackled by Hill *et al.* (*PLoS Genet.* **4,** e1000008; 2008). Reviewing the literature, they show that additive genetic variance is often close to total genetic variance. The authors then look at some mathematical models with strong non-additive genetic effects, and average over reasonable distributions of allele frequencies to show that the genetic variance is mainly additive. So non-additive genetic variation is usually of minor significance and we can continue to concentrate on additive genetic variance.

This is probably true on average, but may not always be so. Any trait is affected by only a finite, and in some cases small, number of genes. So averaging over all possible allele frequencies may say little about a particular case. There is also a much subtler problem. The authors conclude that additive genetic variance swamps other types of variation largely because most alleles common to a population occur with close to 100% frequency. But these extreme frequencies also reduce the total genetic variance. So, in practice, a lot of traits with strong additive effects might be classified as having no detectable genetic variation, and overall the importance of additive genetic effects would be diminished. Is this a genuine problem? Ah, more research is obviously needed.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**