TOUCHING**base**

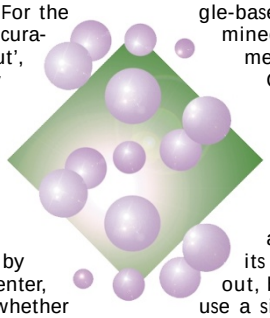
Heaven can't wait

Now that the first scrolls of genomic scripture have been revealed, the gates of interpretation are open wide. For the first time, Marvin Heiferman and Carole Kismaric, two curators from a New York-based company called 'Lookout', have convened a secular chapter of 39 artists, mostly from the United States, to provide their own exegesis. *Paradise Now: Picturing the Genetic Revolution* is showing at the 'Exit Art' gallery in Manhattan, from 9 September to 28 October 2000. A web version of the exhibition (http://www.geneart.org/) offers many links to clear explanations of genetics, in addition to 'webzine' updates on the hottest debates. These are punctuated by interviews of scientists such as David Baltimore, Craig Venter, Eric Lander and Harold Varmus. Each thorny question, whether related to human health, legal issues, agriculture or industry, is echoed in the art section. For example, Nancy Burson's interactive *Human Race Machine* allows visitors to scan their facial images into a computer and see them transformed into five ethnic versions. Bradley Rubenstein depicts children who stare at the viewer with the loyal, blank and, well, 'transplanted' eyes of Cocker Spaniels (see inset). *Photosynthesis*, by Heather Acroyd and Dan Harvey, is an oversized portrait of two girls sunbathing on a pebble beach, rendered through photo-conversion of a living canvas, 'grown' with genetically engineered grass. And in *Genesis*, Eduardo Kac transforms a bacterium with a passage from the Book of Genesis, 'translated' into DNA. Each time a browser visits his web site, the lighting of the bacterial culture grows more intense, thus establishing, according to the artist, "a relationship between artist, public and transgenic organism—which must be respected, loved and nurtured like any other organism". Paradise now? Hell on earth? Nobody knows—but it seems urgent; heaven can't wait. Progress in genetics is not only faster than ever, there is something irresistible about it. That sense of 'your-fate-in-your-face' is absent from the *Paradise Now*.

Web-popping

An impressive web site concerns the genesis and progression of a male pregnancy. In addition to allowing the browser to view a live ultrasound video of the developing fetus, one can continually monitor the diastolic and systolic blood pressure of the Dad-to-be (a Mr Lee), view his beating heart and hear his heartbeat. A sub-site entitled "How can this even happen?" includes a step-by-step outline of the procedure, from the dosing of Mr Lee with hormones to make him receptive to the pregnancy, to *in vitro* fertilization, to delivery by Caesarian section. (One assumes that the name of the website, *Pop!*, is in reference to fatherhood.) The pregnancy, it seems, has been made possible by Genochoice, Inc., which allows one to "create one's own genetically healthy child online!". Upon affixing a thumb to the monitor for a genetic screen, and supplying a name and password, one can obtain an instant readout of personal risk—and therefore, the risk of one's clone—for behavioural "defects" and disease. And should you draw a genetic 'short straw', salvation can be had, for a price. Anti-social behaviour, for example, can be "repaired" for about US $10,500, regrettably in excess of most corporate self-improvement programmes. But then post-conception repair is not on offer. Yet. Enhancements, such as increased compassion and sensitivity (US $3,000), may also be ordered. And if you place an order now, free surrogate mothers are available. The site is a hoax, created to explore a "very likely scenario that may one day result from new advances in biotechnology and infertility treatments". But its remarkable design and provocative content are worth a visit (http://www.malepregnancy.com/other.html).

Going for gold



With intense discussion of the usefulness of established single-base polymorphisms (SNPs) to map genetically determined traits, the impetus to develop high-throughput methods for their routine detection seems strong. Oligonucleotide arrays and mini-sequencing methods and variations thereof have dominated the playing field. A study by Elizabeth Boon, Jacqueline Barton and colleagues, published in October's issue of *Nature Biotechnology* (vol. **18**, 1096–1100; 2000), demonstrates a variation on the array method. Others have attempted to detect mismatched DNA by measuring its imperfect hybridization using an electrical read-out, but this approach seems prone to error. Boon *et al.* use a similar read-out, but the electronic signal depends not on the amount of duplexed DNA, but on the distortion of conductivity effected by a mismatch. First, they coat a gold electrode with the hybridized DNA. After ensuring that the duplexes are densely packed and in a vertical position (that is, they form a kind of film across the surface of the electrode), they add a mixture of methylene blue and ferrocynide ($Fe(CN)_6^{3-}$). Electrons flow up through the DNA film from the electrode—with greater or lesser ease, depending on the absence or presence of mismatches. At the surface, they reduce methylene blue to a product (leucomethylene blue) that in turn reduces $Fe(CN)_6^{3-}$ to $Fe(CN)_6^{4-}$. This product is then able to reduce leucomethylene blue back to methylene blue. The cyclical catalytic reaction procedes, allowing greater discrimination with every cycle. They demonstrate this in a chip format, and that where it is possible to detect 10^8 molecules on the electrode surface. The authors have demonstrated reliable detection of all single-base mismatches, including those that are comparatively stable (GT and GA); how it will stack up against other methods remains to be determined.

Name that tone

Absolute pitch (AP), commonly referred to as "perfect pitch," is the ability to identify a musical tone without having an external reference pitch. What distinguishes AP from other complex behaviours is that almost all individuals with AP have had musical training from an early age (before 6 years), implicating a strong environmental contribution to the trait. There is, however, growing evidence that this trait also has a genetic component. Siamak Baharloo, Jane Gitschier and colleagues (of the University of California, San Francisco) contribute significantly to this evidence by establishing that AP aggregates in families (*Am. J. Hum. Genet.* **67**, 755–758; 2000). They tested individuals both with and without early musical training and identified those with AP. On testing their siblings, they discovered that the percentage of those with AP is considerably higher than the percentage of people with AP who have simply been exposed to musical training at an early age—indicating that AP runs in families. The authors estimate the heritability of AP under various models of inheritance and find that the data are incompatible with a polygenic model; they therefore propose that the genetic components of AP include a major gene effect. Gitschier and colleagues have begun genotyping families with more than three members who possess AP. In attempt to augment their cohort, they have established a web site (http://www.perfectpitchstudy.org), replete with an acoustical test, that allows the user to determine whether s/he has perfect pitch. One wishes them luck: the identification of a gene(s) that predisposes to AP should come as music to the ears.