Gene jeanie

A new genetically engineered *Escherichia coli* bacterium can make the important dyestuff indigo in an environmentally friendly manner. Genencor International (Palo Alto, CA, USA) modified an existing *E. coli* strain that biosynthesizes indigo from tryptophan, but managed to eliminate a trace by-product that dyes clothes red. The Genencor scientists also increased the bacteria's indigo output by boosting tryptophan production, but it might be sometime before naturally dyed blue jeans are on sale – the process cannot yet compete commercially with synthetic indigo. *(J. Ind. Microbiol. Biotechnol.* 28, 127–133) *MJD*

Rice genome sequences

Draft genome sequences of two different varieties of rice have been published in the 5 April edition of *Science*. JunYu *et al.* report on the genome sequence of the indica variety, and Stephen Goff *et al.* on the japonica variety .The latter group is a private one, Syngenta [Torrey Mesa Research Institute (TMRI)] .The journal has taken the unusual step of not requiring Syngenta to place their data in the GenBank database. Instead, access is given through a private site (http://www.tmri.org/), subject to agreement with the private group's terms and conditions.The editorial by Donald Kennedy made special note of this arrangement, in particular the precedent set by last year's publication of the human genome sequence by Celera genomics. The rice genome is relatively small at 450 megabase pairs, and therefore 'gene-rich', making it an ideal candidate for shot-gun sequencing. Both private and public groups did exactly that and found around 50 000 genes, many of which had homologues in the plant whose genome was first sequenced *Arabidopsis thaliana*. (*Science* 296, 79–92 & 92–100) *DM*

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Letters

Isochores: dream or reality?

In their *Nature* paper [1], the International Human Genome Sequence Consortium (IHGSC) studied 'the draft genome sequence to see whether strict isochores could be identified' and failed to find any. They concluded that their results 'rule out a strict notion of isochores as compositionally homogeneous' and that 'isochores do not appear to deserve the prefix "iso".'

The terminology 'strict isochores' was used by the authors to denote sequences that cannot be distinguished from random (uncorrelated) sequences in which every nucleotide is free to change. Therefore, the authors' failure to identify random sequences masquerading as 'strict isochores' in the human genome could be predicted on three accounts. First, since the work of Rolfe and Meselson [2] over 40 years ago, random sequences are known to be much more homogeneous than the least heterogeneous genomic DNAs, namely bacterial DNAs (which are, in turn, much less heterogeneous than mammalian DNAs). Second, it has been known for some time that the standard deviations of CsCl profiles of major DNA components from mammalian genomes (namely the compositional families of 50–100-kb DNA molecules derived from isochore families) are comparable to those of bacterial DNAs of the same size and composition [3,4]. Third, 'strict isochores' cannot exist in any natural DNA because noncoding sequences are compositionally correlated with the coding sequences that they embed [5,6], and coding sequences are made up of codons, in which the compositions of the three positions are correlated with each other [7]. More detailed discussions of this problem are presented elsewhere [8–12].

The conclusion of the IHGSC authors that isochores are more heterogeneous than random sequences (or than 'strict isochores', to use the misleading terminology of the authors) is correct, but it is something we have known for at least two decades. The definition of isochores as 'fairly homogeneous sequences' [4] is still valid.

Unfortunately, denying the existence of isochores not only represents a mistake in itself, but it also means denying the existence of compositional discontinuities in the human genome and going back to a genome organization characterized by a continuous compositional variation, a view shown to be wrong in the early 1970s [3]. To deny the existence of isochores means to deny the existence of what has been recently summarized as 'a fundamental level of genome organization' [13].

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