

might occur) would provide generation-by-generation variability in phenotype. The resulting phenotypic variation would be similar to that caused by recombination among multiple loci with many alleles, but would have a more efficient molecular basis. One stable allele associated with a spontaneously variable regulator would enable offspring to display a range of phenotypic values around a parental mean.

Significantly, such a mechanism for spontaneous, site-specific mutagenesis of a regulatory sequence would enable even a small population to extend its range of phenotypic variation, for the affected trait, within a few generations. Natural selection could establish and maintain an optimal trait distribution in a shifting environment, with no delay for the mutation of Mendelian genes or for the elimination of less fit alleles. Yet maladaptive extremes of gene expression would be unlikely to arise except from parents who were themselves far from the population mean, so genetic load would be minimal (unless, of course, the mechanism slipped out of control or exceeded some threshold, as it may have in cases of human neurological disease).

From an evolutionary perspective, non-

standard mutational mechanisms that affect specific loci can offer substantial advantages (1). The triple repeats that are widespread among animal genomes might represent one such mechanism. Testing the hypothesis that variable repeat length may regulate quantitative gene expression will be challenging precisely because such sequences are not stable from one generation to the next. But understanding a mechanism that could generate copious but normally benign mutation might be worth the effort. After all, it's been more than a century since Darwin promised that "a grand and almost untrodden field of inquiry will be opened, on the causes and laws of variation" (2).

David G. King

Department of Anatomy,
School of Medicine, and
Department of Zoology,
Southern Illinois University,
Carbondale, IL 62901-6503

References

1. P. Rainey and R. Moxon, *Science* 260, 1958 (1993); R. E. Lenski and J. E. Mittler, *ibid.*, p. 1959.
2. C. Darwin, *On the Origin of Species* (Harvard Univ. Press, Cambridge, MA, 1964), p. 486.

Genetics and Violent Crime

Peter R. Breggin writes (Letters, 3 Dec., p. 1498) that there are no known biological or genetic factors that contribute to violent crime. Yet it is well known, even by most psychiatrists, that individuals with Y chromosomes commit the overwhelming preponderance of violent crimes.

I. Tinoco Jr.

Department of Chemistry,
University of California,
Berkeley, CA 94720-9989

Corrections and Clarifications

In the report "DNA sequence determination by hybridization: A strategy for efficient large-scale sequencing" by R. Drmanac *et al.* (11 June, p. 1649), the sequence of clone 8 in figure 2B (p. 1650) was inadvertently shortened by the deletion of "GA" at the seventh position from the right in the second line. In reference 20 of the same report, the probes ATATGGGG and ATGTCTG should not have been included.

MiniMACS - the BIG Attraction!

MiniMACS is a powerful tool for separating animal and plant cells, bacteria and cell organelles. **MACS** cell separation is known for its gentle staining with magnetic antibodies. With **MiniMACS** you can now sort rare cells with frequencies down to 10⁻⁶, isolate CD34⁺ hematopoietic progenitor cells or antigen-specific B cells, and even select for fusion events of plant protoplasts.

Simple and Gentle - just stain your sample with **MACS** Microbeads and separate using the **MiniMACS**. **MACS** Microbeads are 1 million times smaller than a eukaryotic cell and have virtually no effect on cell function and viability. They do not have to be detached.

Fast and Flexible - staining with **MACS** Microbeads takes just a few minutes. In 15 minutes one separation is complete. The separated cells can go straight to your experiment, culture or flow cytometer. A complete line of reagents against primary antibodies and specific cell types support a wide range of applications.

Superior Performance and Value - columns come sterile and separate up to 10⁷ bound cells. Up to four separations can run in parallel. Separations yield very high purities with excellent recovery.

MiniMACS - the superior magnetic separator.

Miltenyi Biotec

Distribution of MACS Products: GERMANY, Miltenyi Biotec GmbH, / +49 2204 8096, FAX: +49 2204 85197, USA / CANADA, Miltenyi Biotec Inc., / (800) 367 6227, FAX: (916) 888 8925, UNITED KINGDOM, Eurogenetics, / +44 81 977 3266, FAX: +44 81 977 0170, SWITZERLAND, Winiger AG, / +41 57 231123, FAX: +41 57 231125, AUSTRIA, Bender MedSystems, / +43 1 80105-0, FAX: +43 1 80105-488, FRANCE, TEBU, / +33 1 34 84 62 52, FAX: +33 1 34 84 93 57, ITALY, CELBIO, / +39 2 38103171, FAX: +39 2 38101465, SPAIN, Ingelheim Diagnostica, / +34 3 404 5220, FAX: +34 3 404 5485, BENELUX, Sanbio BV, Phone (NL), +31 413251115, Phone (B), +32 2 2192137, FAX (NL), +31 413266605, SWEDEN, GTF, / +46 31680490, FAX: +46 31680717, DENMARK, A H Diagnostics, / +45 86 101055, FAX: +45 86 161533, ISRAEL, Almag Diagnostica, / Medical Equipment Ltd., / +972 3 9673095-4, FAX: +972 3 9673091, NEW ZEALAND, Scitech, / +64 4 499 8868, FAX: +64 4 499 8869, AUSTRALIA, Becton Dickinson Pty Ltd., / +612 418-6166, FAX: +612 418-6881, JAPAN, Daiichi Pure Chemicals Co Ltd., / +81 3 5820-9408, FAX: +81 3 5820-9409, TAIWAN, Interlab Co., / +886 2 7367100, FAX: +886 2 7359807, KOREA, Medilab Korea Co., / +82 2 424 6367-9, FAX: +82 2 412 6535.



MACS
Magnetic Cell Sorting

Circle No. 9 on Readers' Service Card