

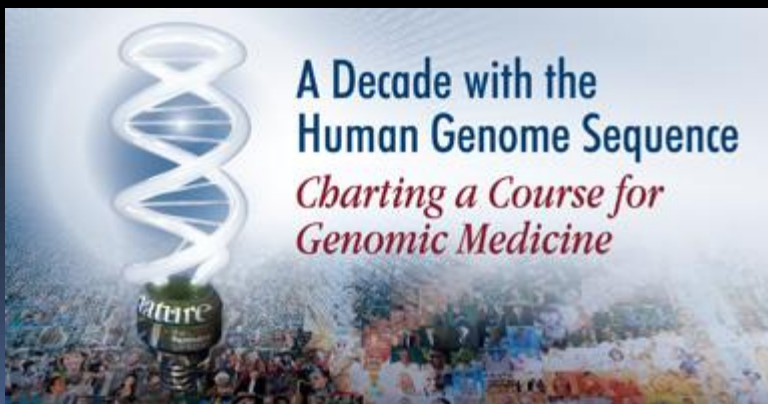
The Path Ahead

Maynard Olson

Departments of Medicine and Genome Sciences

University of Washington

February 11, 2011



<http://www.genome.gov/27542738>

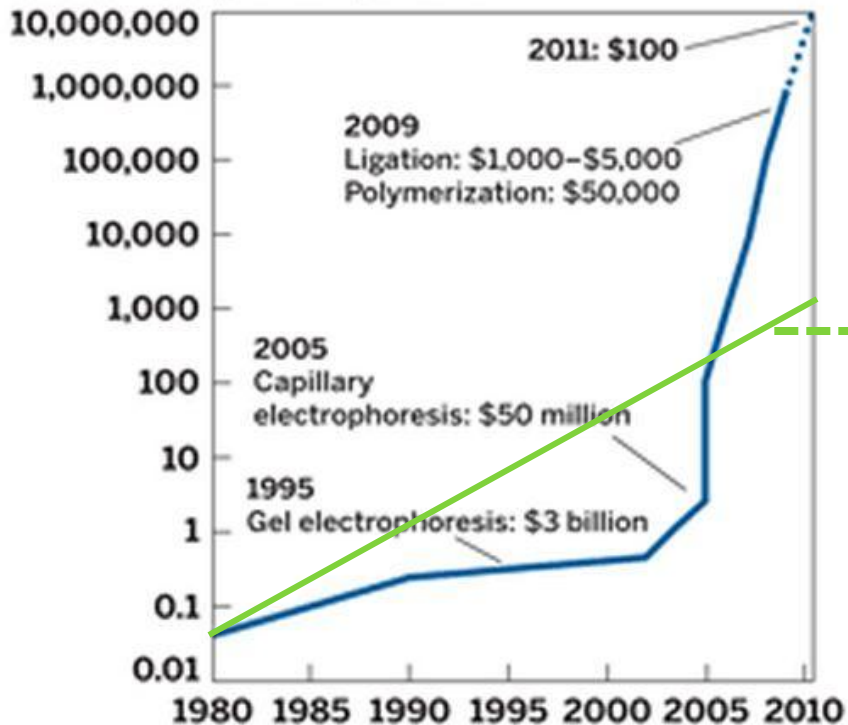


<http://staff.washington.edu/paymana/images/photos/uw/blossoms4.gif>

A NEW 'MOORE'S LAW'

Improvements in DNA sequencing are driving down the cost of whole genomes

Base pairs sequenced per dollar



NOTE: Dollar figures refer to reagent costs.

SOURCE: George Church, Harvard University

Moore's law

C.H. Arnaud (2009). DNA sequencing forges ahead. *Chemical and Engineering News* 87 (No. 50), 16-19.

“Thus, the hereditary properties of any given organism could be characterized by a long number written in a four-digital system.”

G. Gamow

Nature **173**, 318 (1954)

. . . **GGATCGTGAATCTGGAATCTGCTTAG** . . .
. . . **00123020112320011232032210** . . .

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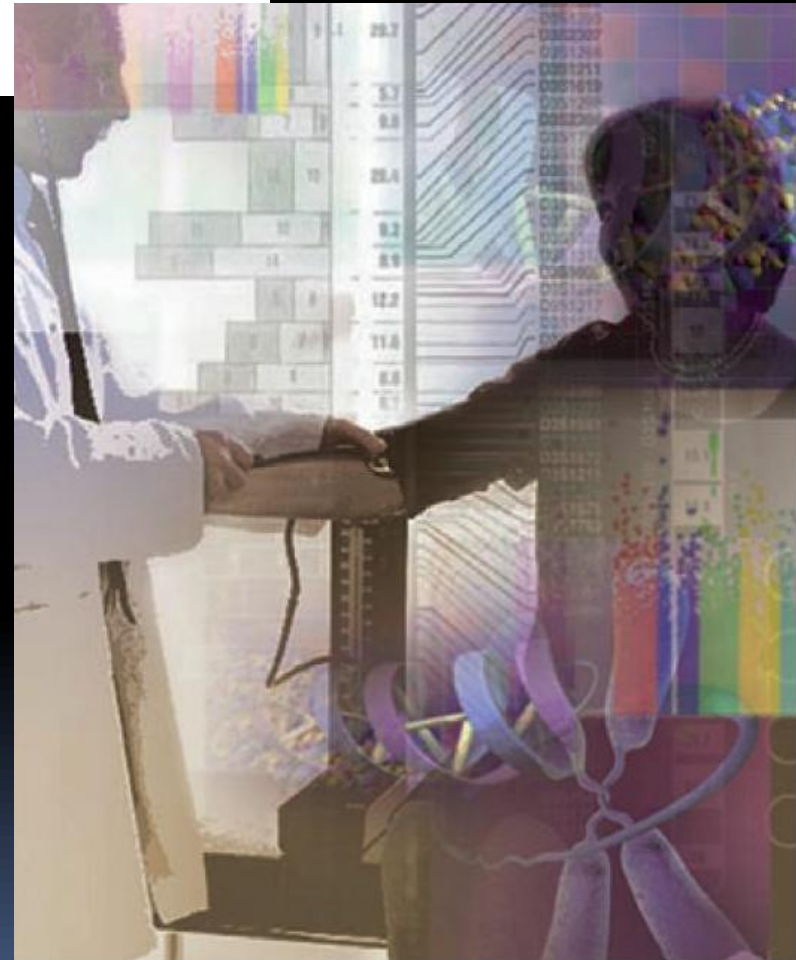
“Epigenetics may provide hope that we are more than just the sequence of our genes — and that our destiny and that of our children can be shaped, to some extent, by our lifestyle and environment.”

Nature Rev. Genet. (2010) **11**, p. 723. Ten years of genetics and genomics: what have we achieved and where are we heading?

Charting a course for genomic medicine from base pairs to bedside

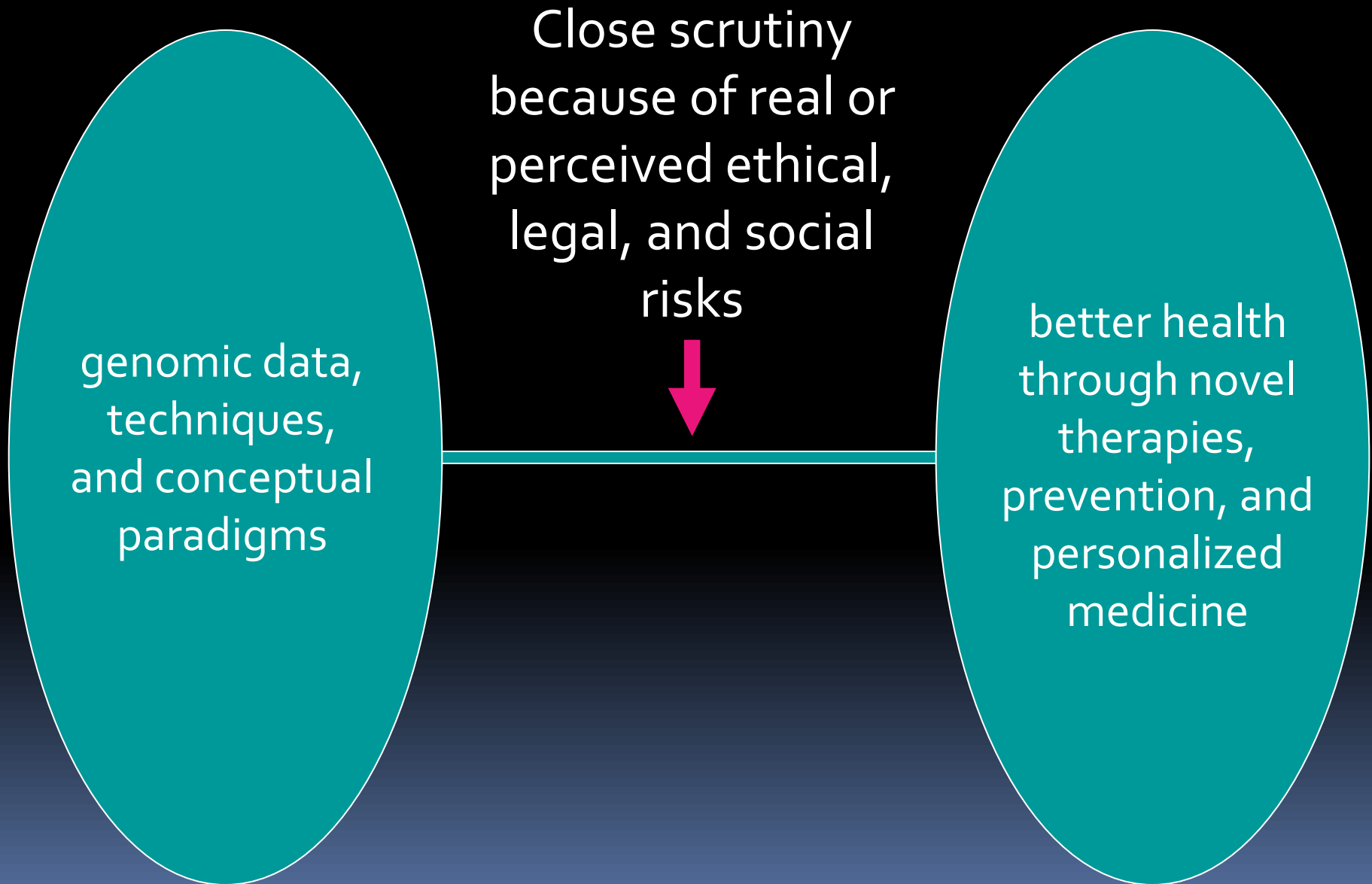
Eric D. Green¹, Mark S. Guyer¹ & National Human Genome Research Institute*

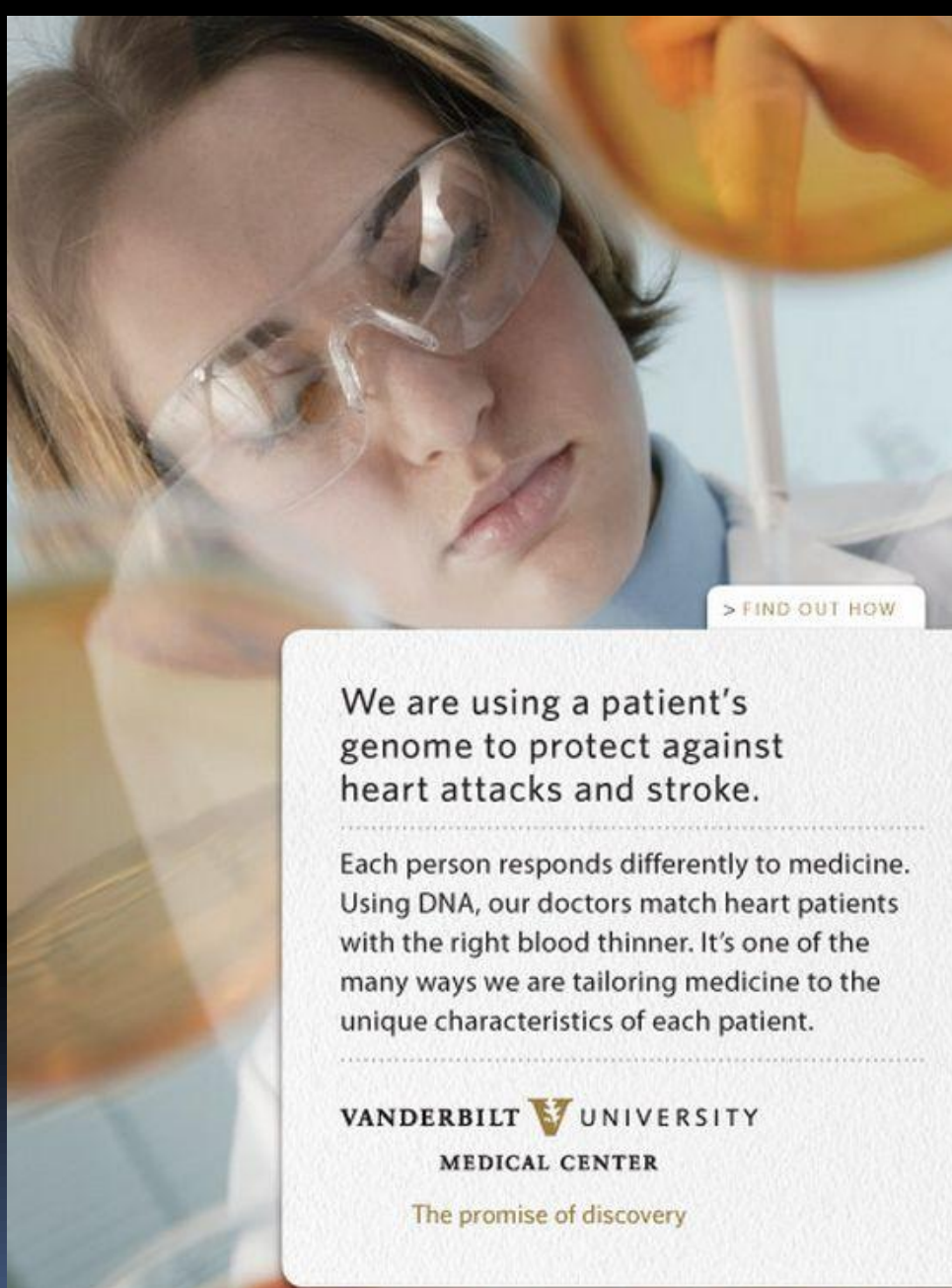
Genomics in the
real world...



D.J. Hunter *et al.* (2008). Letting the Genome out of the Bottle —Will We Get Our Wish? *New Engl. J. Med.* **358**, 105-107.

The Narrow, Squeezed Pipeline






> FIND OUT HOW

We are using a patient's genome to protect against heart attacks and stroke.

.....
Each person responds differently to medicine. Using DNA, our doctors match heart patients with the right blood thinner. It's one of the many ways we are tailoring medicine to the unique characteristics of each patient.
.....

VANDERBILT  UNIVERSITY
MEDICAL CENTER

The promise of discovery

<http://www.nytimes.com/2011/02/07/business/07views.html?ref=todayspaper> (accessed 2/7/11)

Chapter 3 Genetic Exceptionalism and “Future Diaries”: Is Genetic Information Different from Other Medical Information?

Thomas H. Murray

From M. A. Rothstein, ed. *Genetic Secrets: Protecting Privacy and Confidentiality in the Genetic Era*. New Haven: Yale University Press, 1997.

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The roots of genetic exceptionalism:

concern about genetic prophecy

concern for kin

concern about genetic discrimination

concern about enabling certain
identification of individuals

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From M. A. Rothstein, ed. *Genetic Secrets: Protecting Privacy and Confidentiality in the Genetic Era*. New Haven: Yale University Press, 1997.

Concern for the public good...

L.O. Gostin and J.G. Hodge (1999). Genetic privacy and the law: an end to genetics exceptionalism. *Jurimetrics* 1999 Fall, 21-58.

“To effectively assess the clinical validity of [direct-to-consumer] genetic tests the community needs more prospective studies with tens or hundreds of thousands of individuals that measure the predictive value of known markers.”

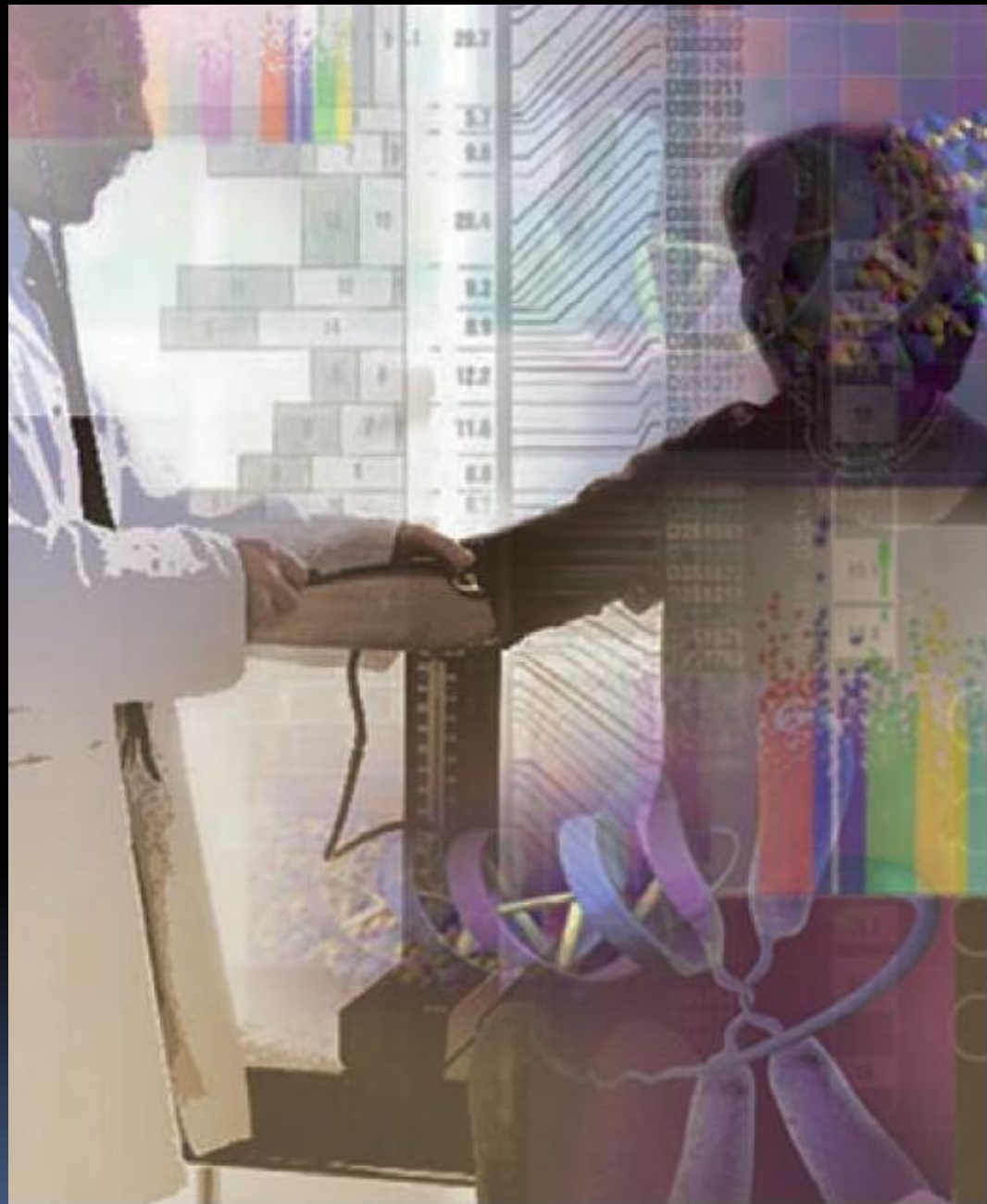
P.C. Ng *et al.* (2009). An agenda for personalized medicine. *Nature* **461**, 724-726.

“[C]orrelation of genomic information with high-quality phenotypic data... will benefit greatly from the linkage of genomic information to data gathered in the course of actual clinical care, such as in electronic medical/health records.”

E. D. Green *et al.* (2011). Charting a course for genomic medicine from base pairs to bedside *Nature* **470**, 204-213.



To capture this bright future we need a new message...



D.J. Hunter *et al.* (2008). Letting the Genome out of the Bottle — Will We Get Our Wish? *New Engl. J. Med.* 358, 105-107.

Now, a word about basic science...

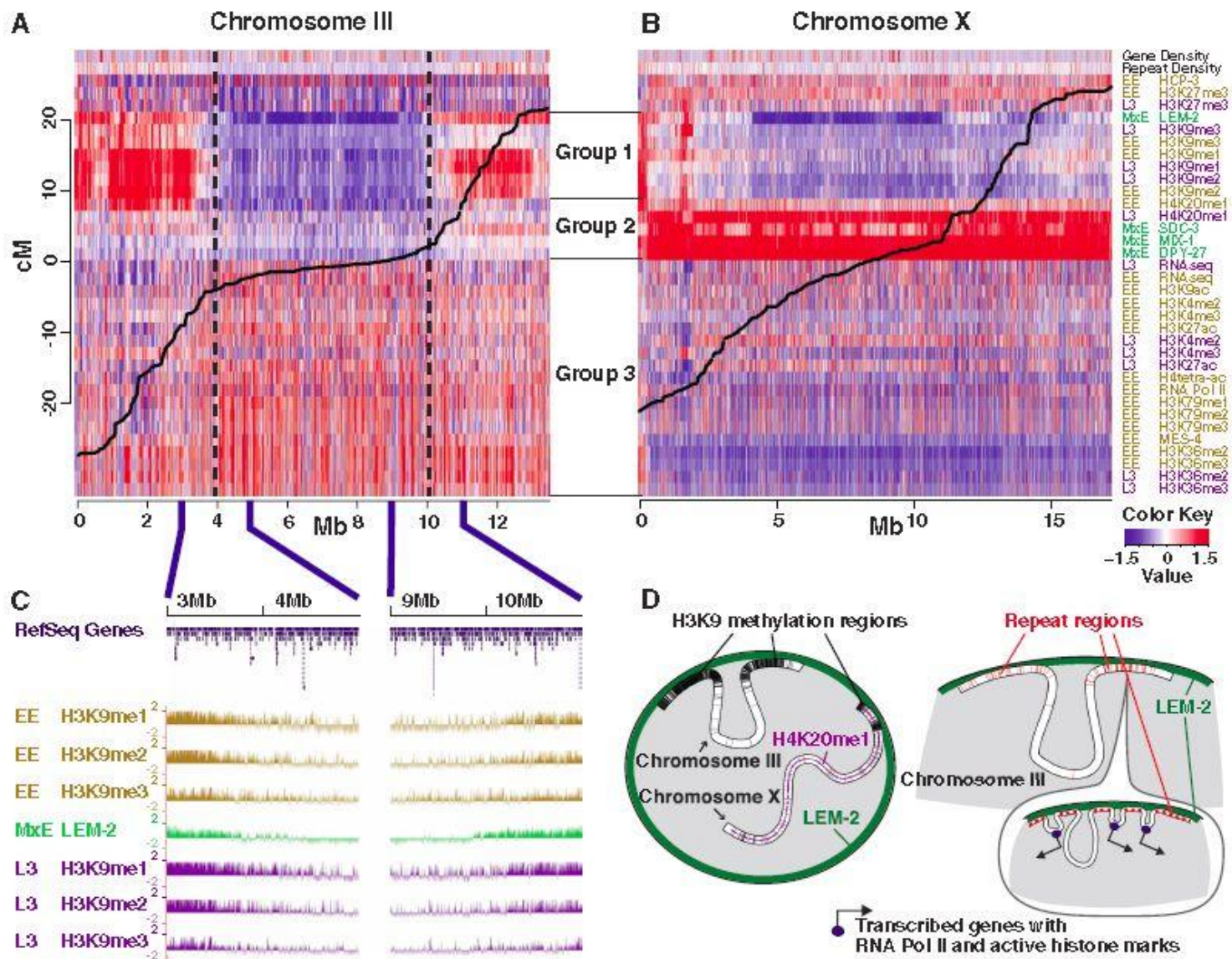


Fig. 5. Chromosome-scale domains of chromatin organization.

M.B. Gerstein *et al.* (2010). Integrative Analysis of the *Caenorhabditis elegans* Genome by the modENCODE Project. *Science* 330, 1775-1782.

nature

THE
FUTURE
IS BRIGHT

Reflections on the first ten
years of the human genome's age

NEWS
THE END OF
THE BEGINNING

How the genome is being used to
improve human health

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MORE BAMS
PER DOLLAR

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improve human health

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PROPER
TYPING

How the genome is being used to
improve human health

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