

# Visualisation of genomic data with the Hilbert curve

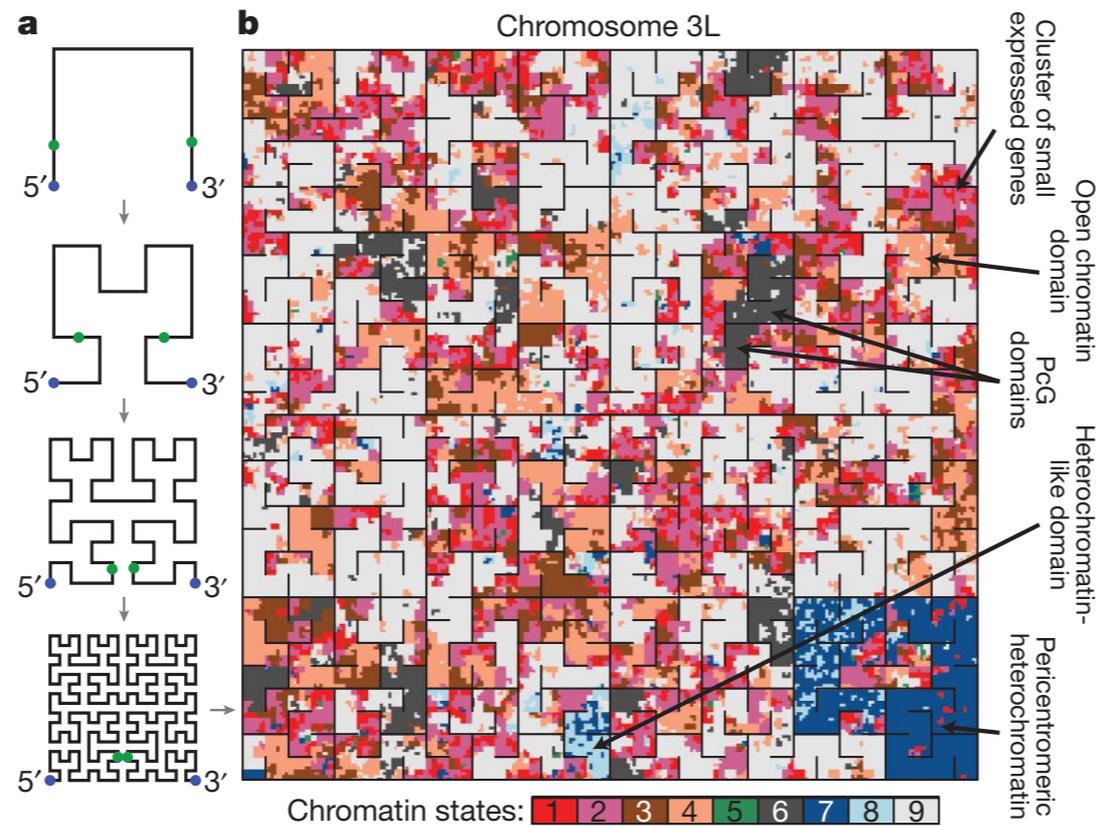


Figure 2 | Visualization of spatial scales and organization using compact folding. a, The chromosome is folded using a geometric pattern (Hilbert space-

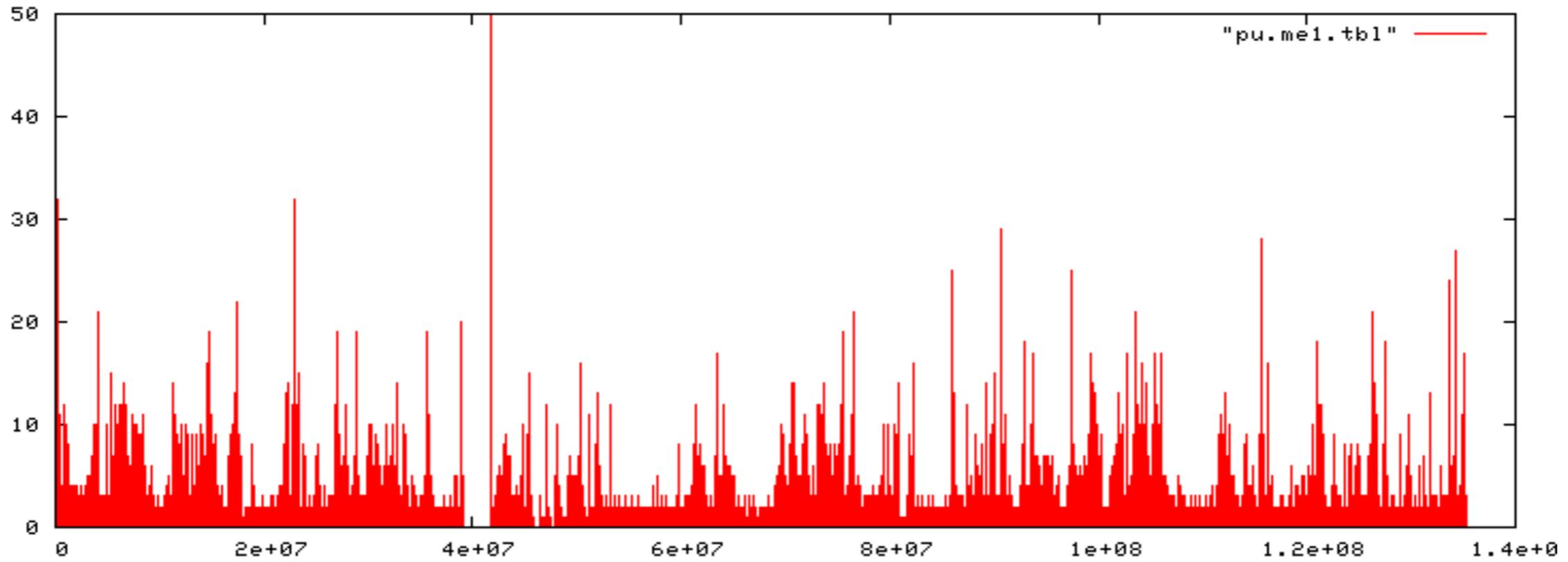
Wolfgang Huber

Brixen 2011

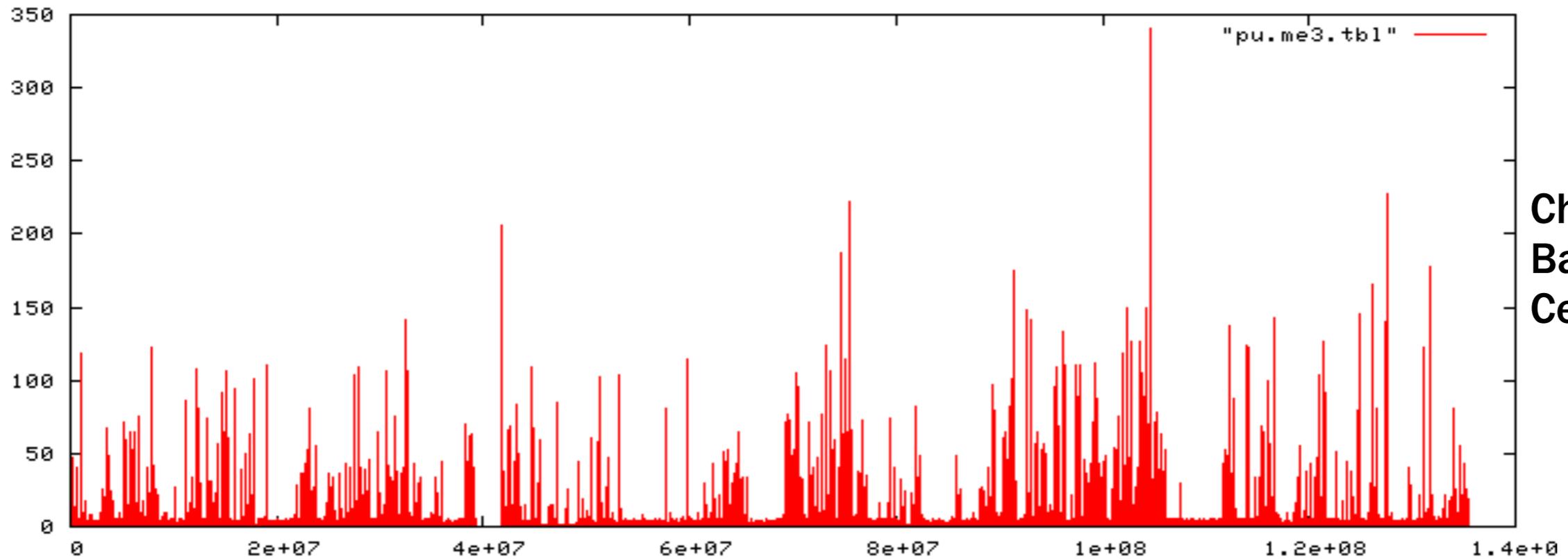
with slides from Simon Anders

# Pile-up plot for chromosome 10

H3K4me1



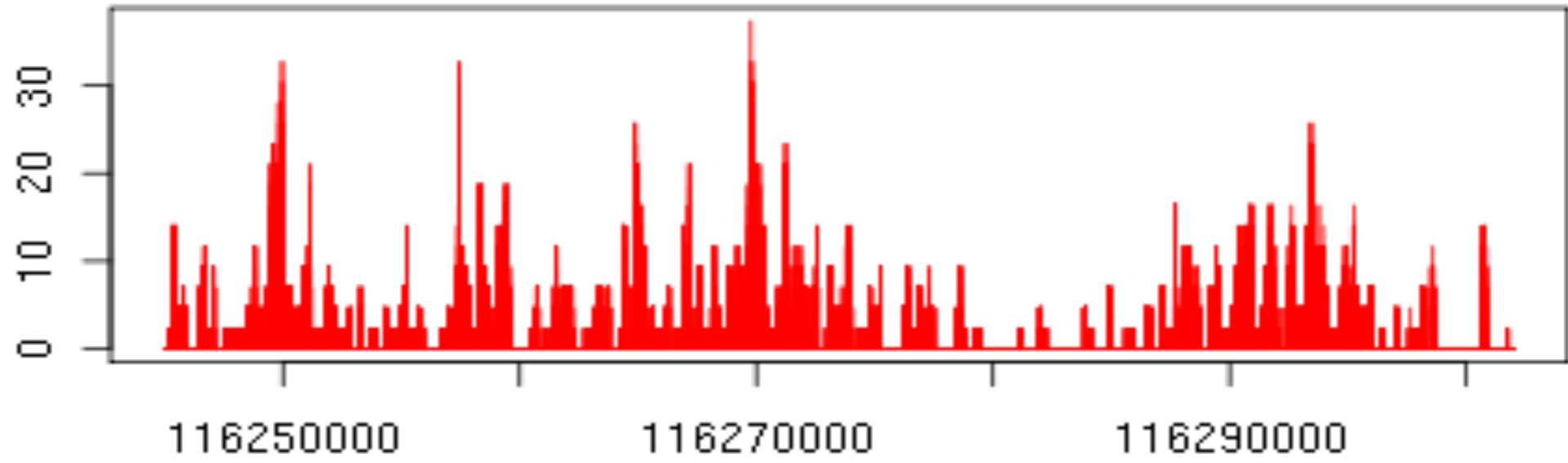
H3K4me3



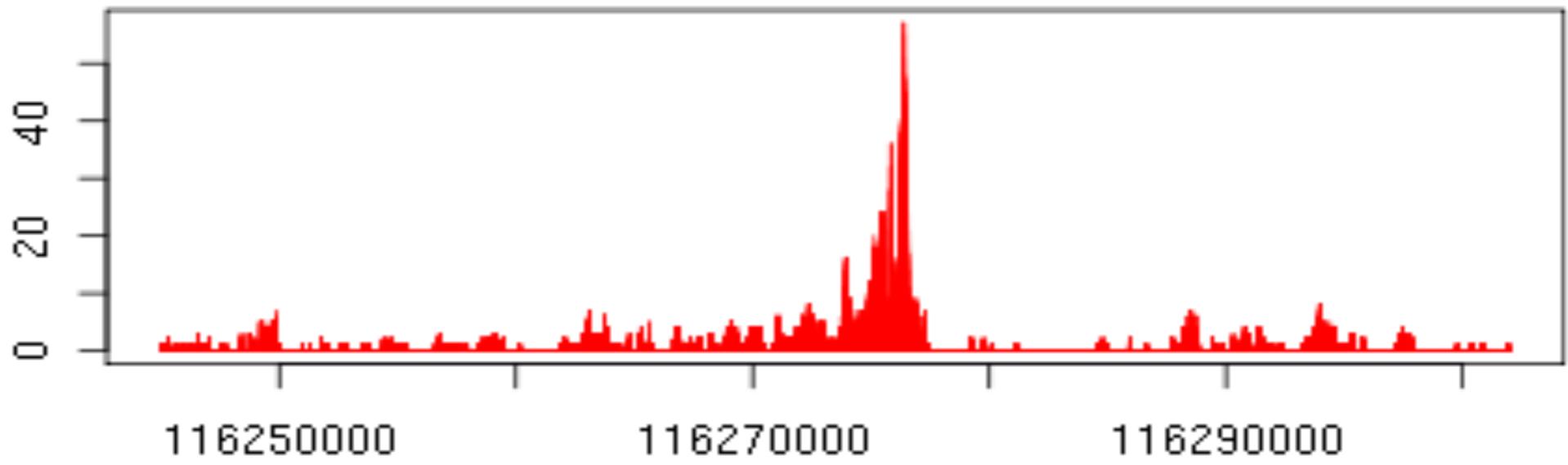
ChIP-Seq  
Barski et al.  
Cell 2007

# Zoom-in

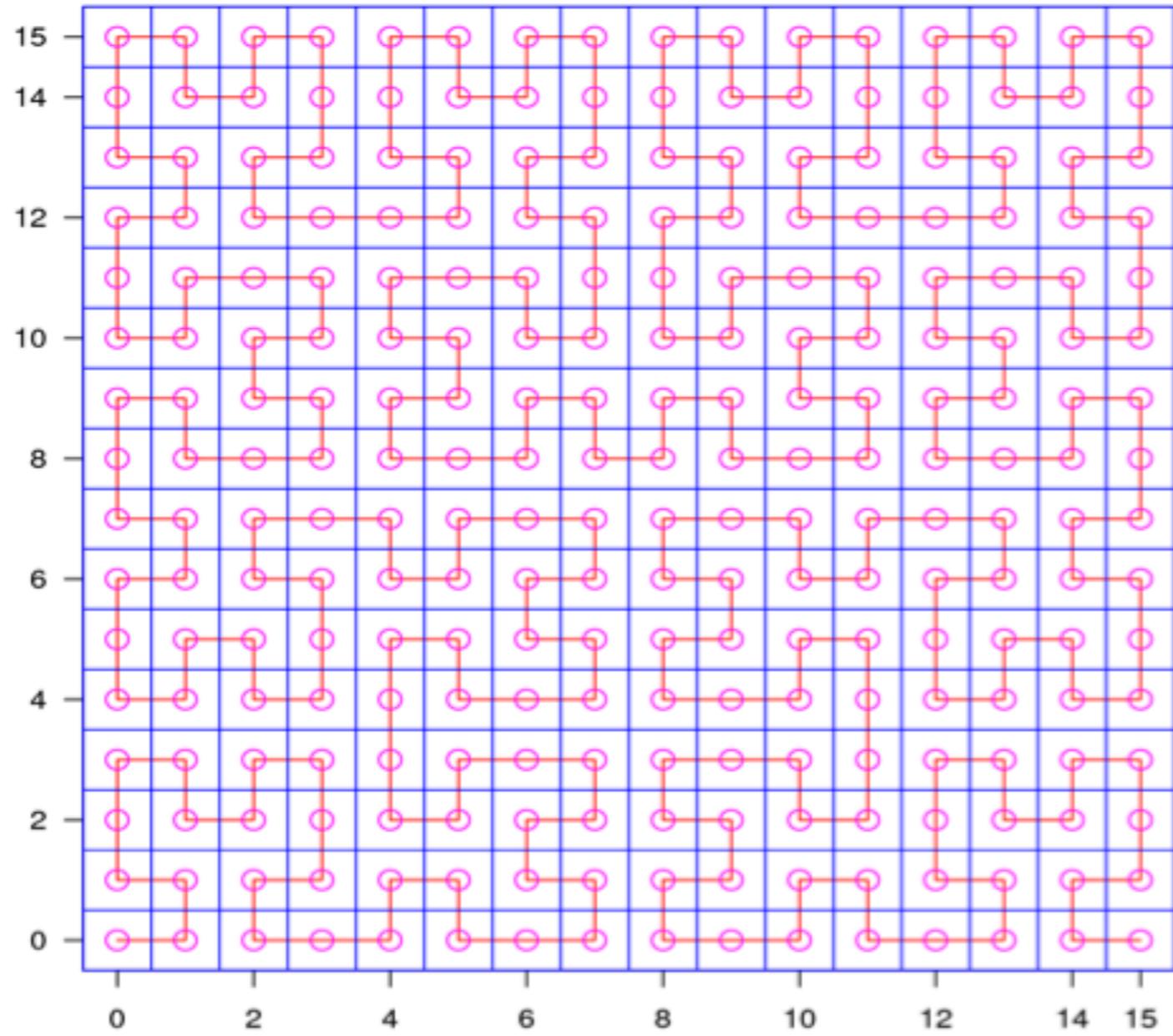
H3K4me1



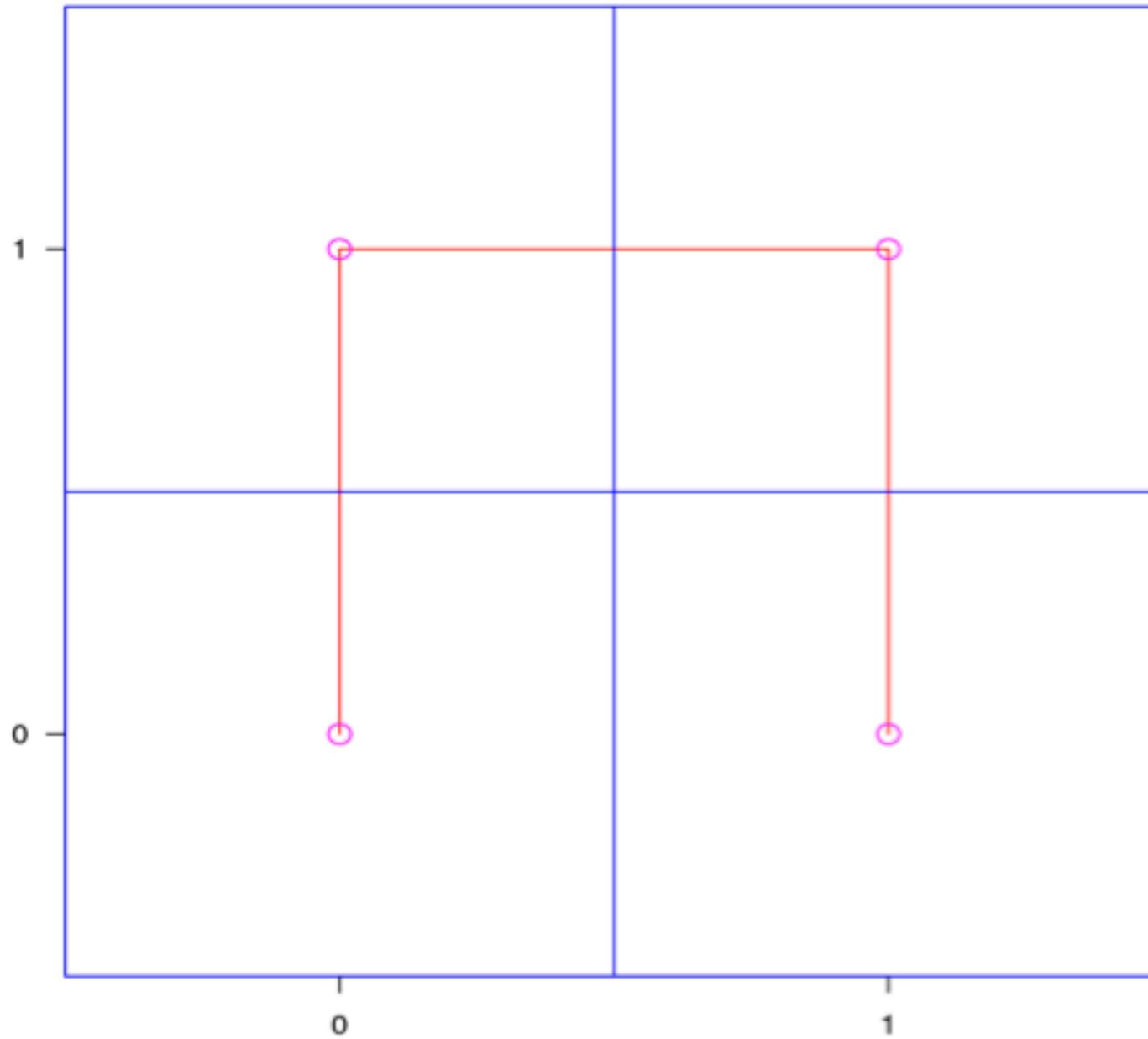
H3K4me3



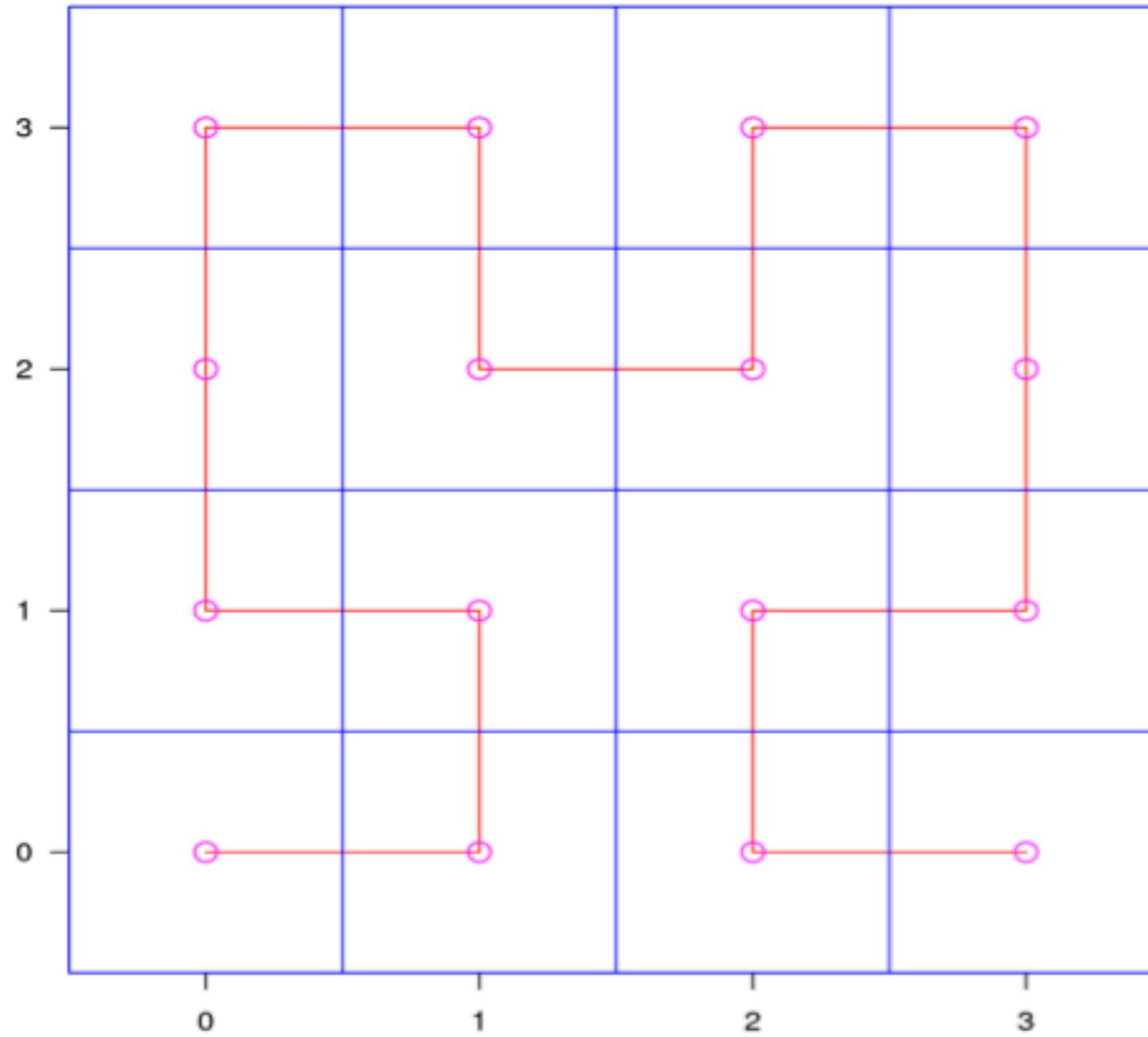
# Hilbert curve



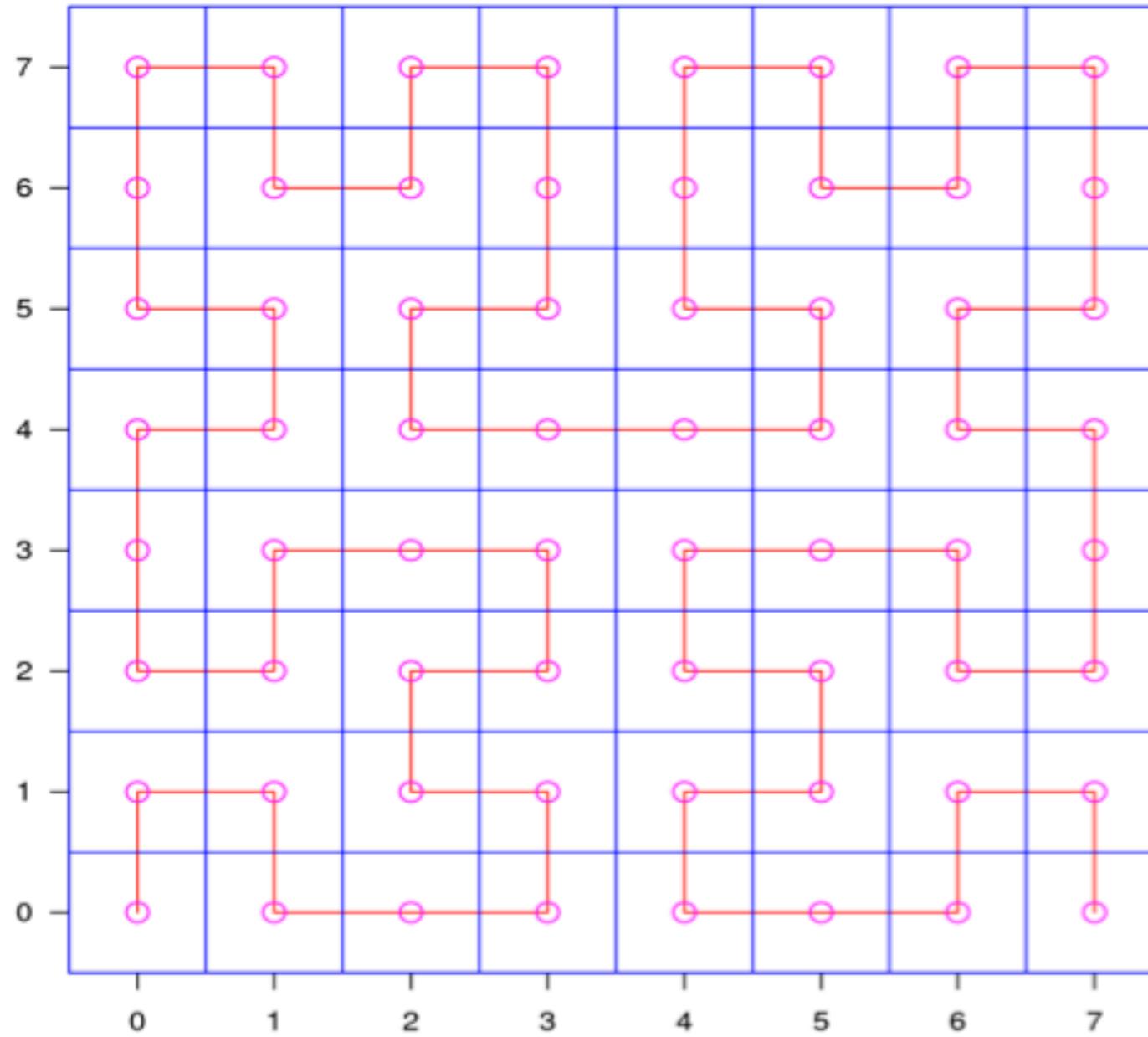
# Hilbert curve, iteration 1



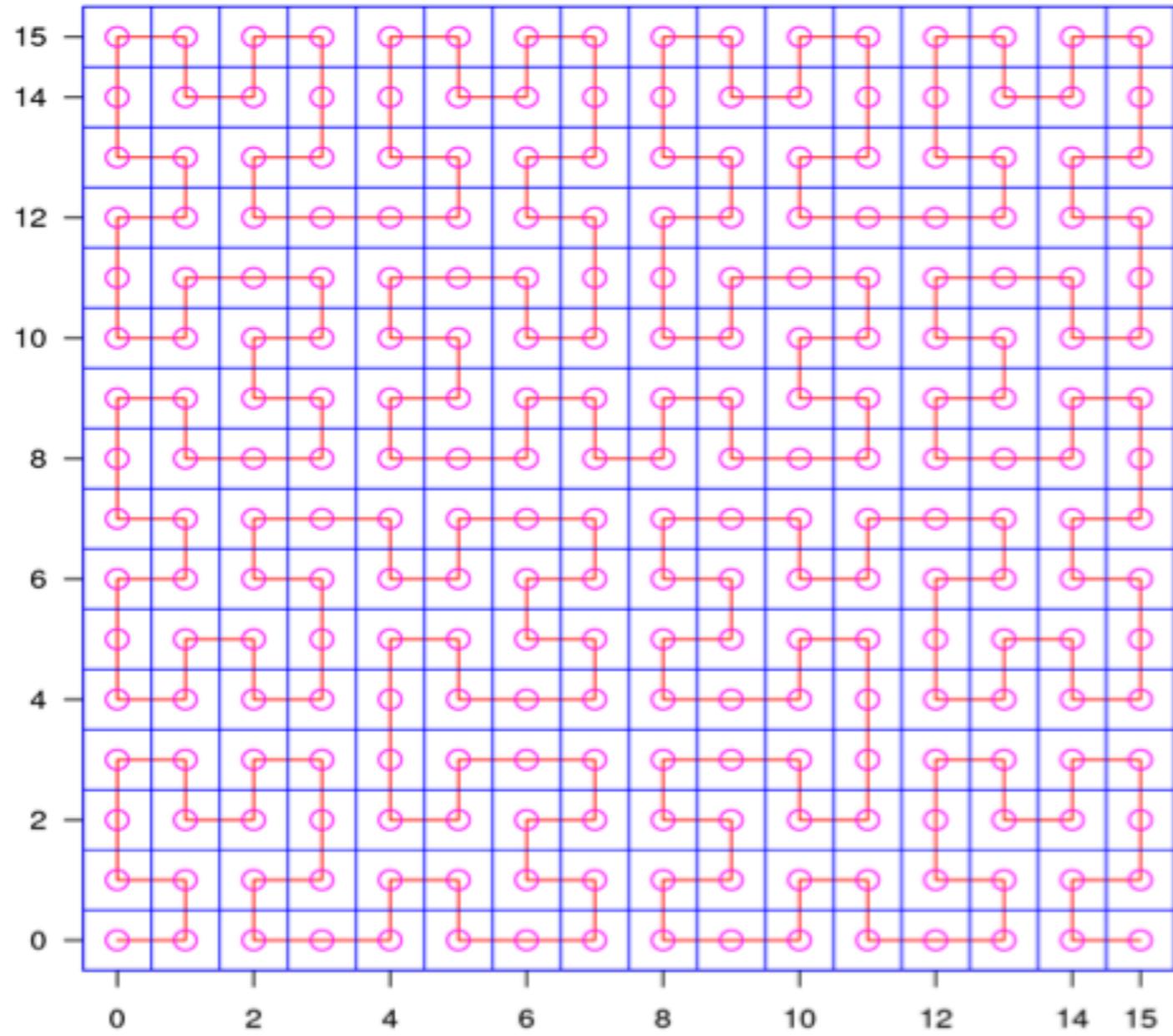
# Hilbert curve, iteration 2



# Hilbert curve, iteration 3

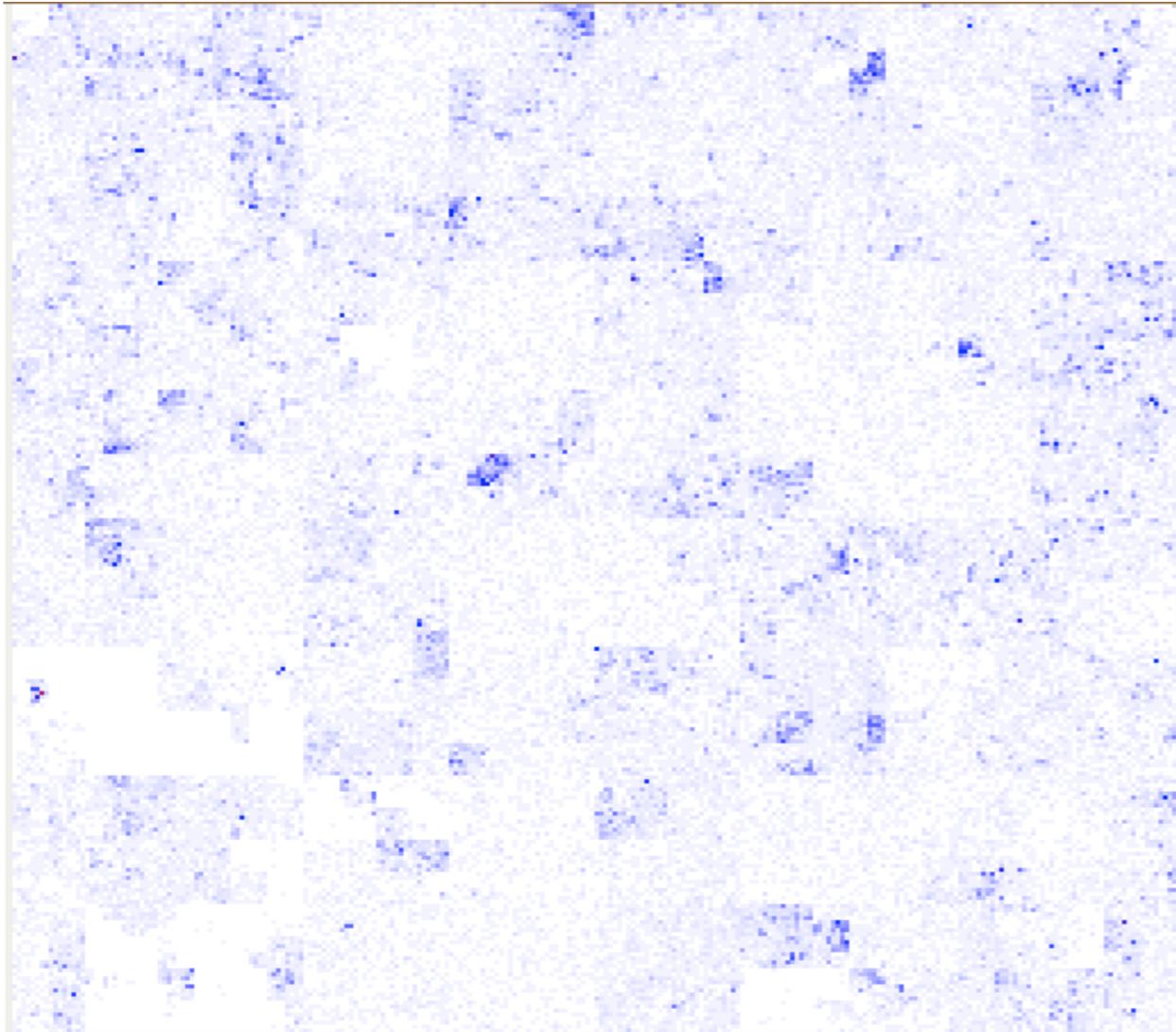


# Hilbert curve, iteration 4

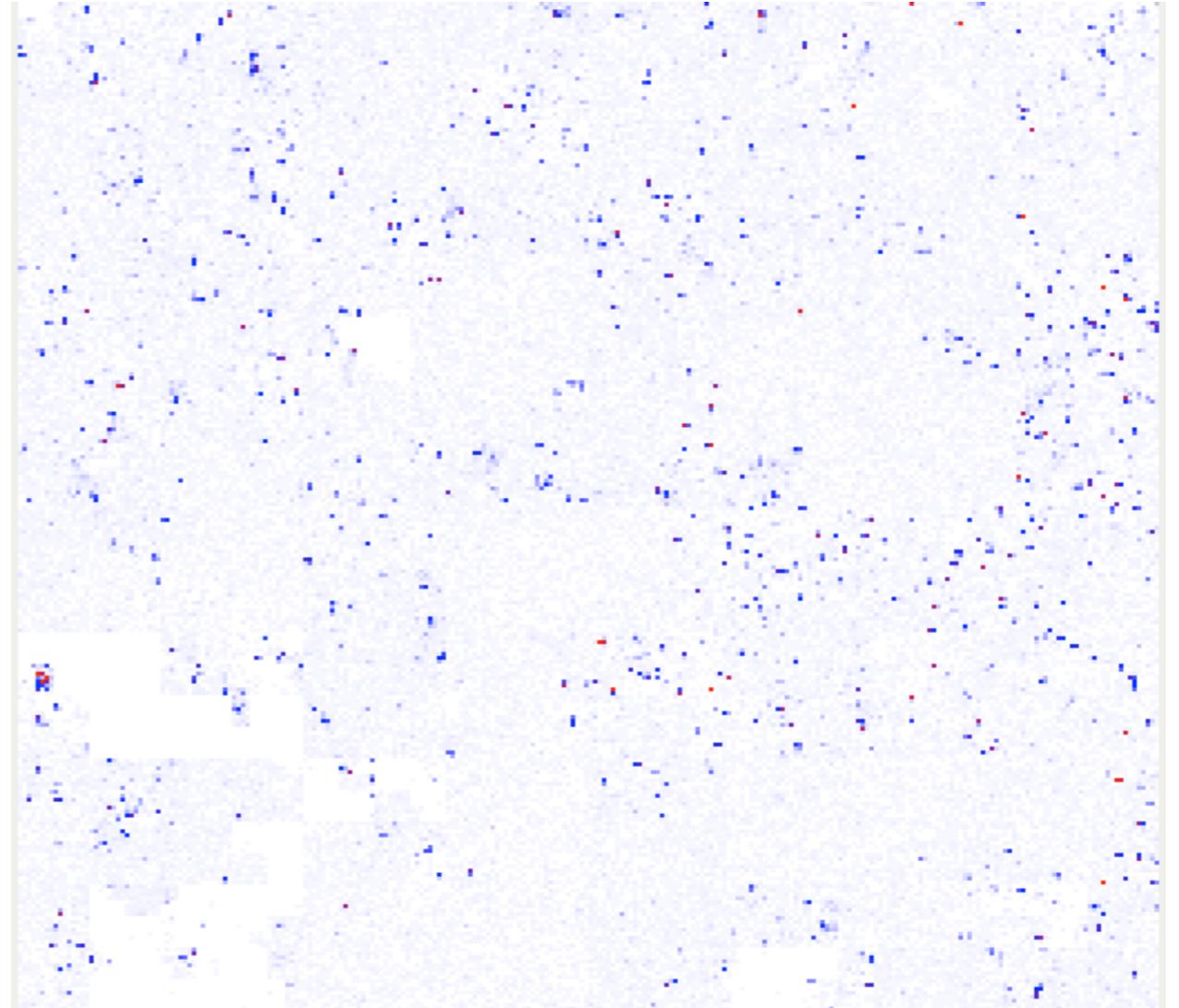


# Hilbert plots of chromosome 10

H3K4me1



H3K4me3

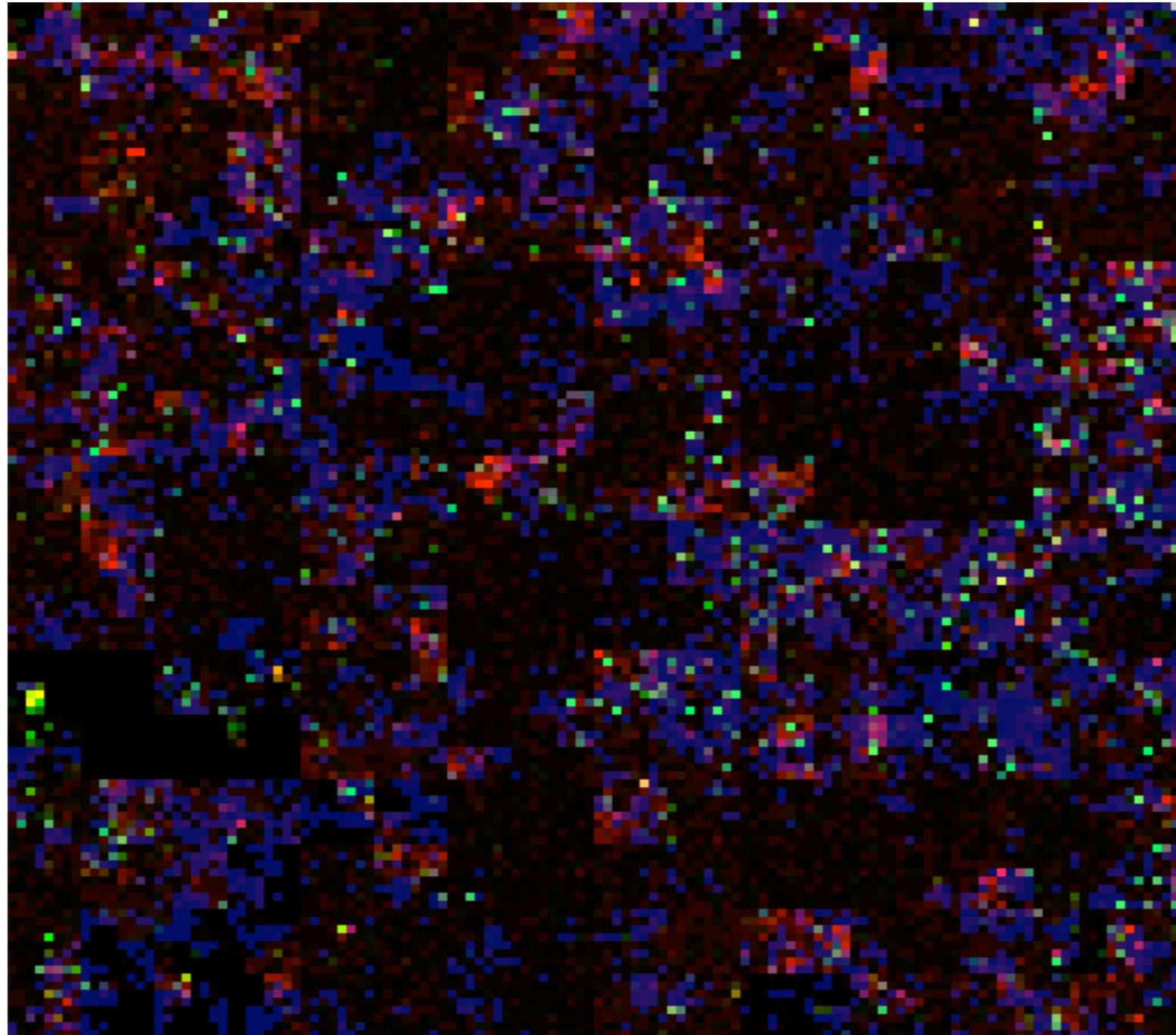


# 3-colour Hilbert plot

red: H3K4me1

green: H3K4me3

blue: exons



# History

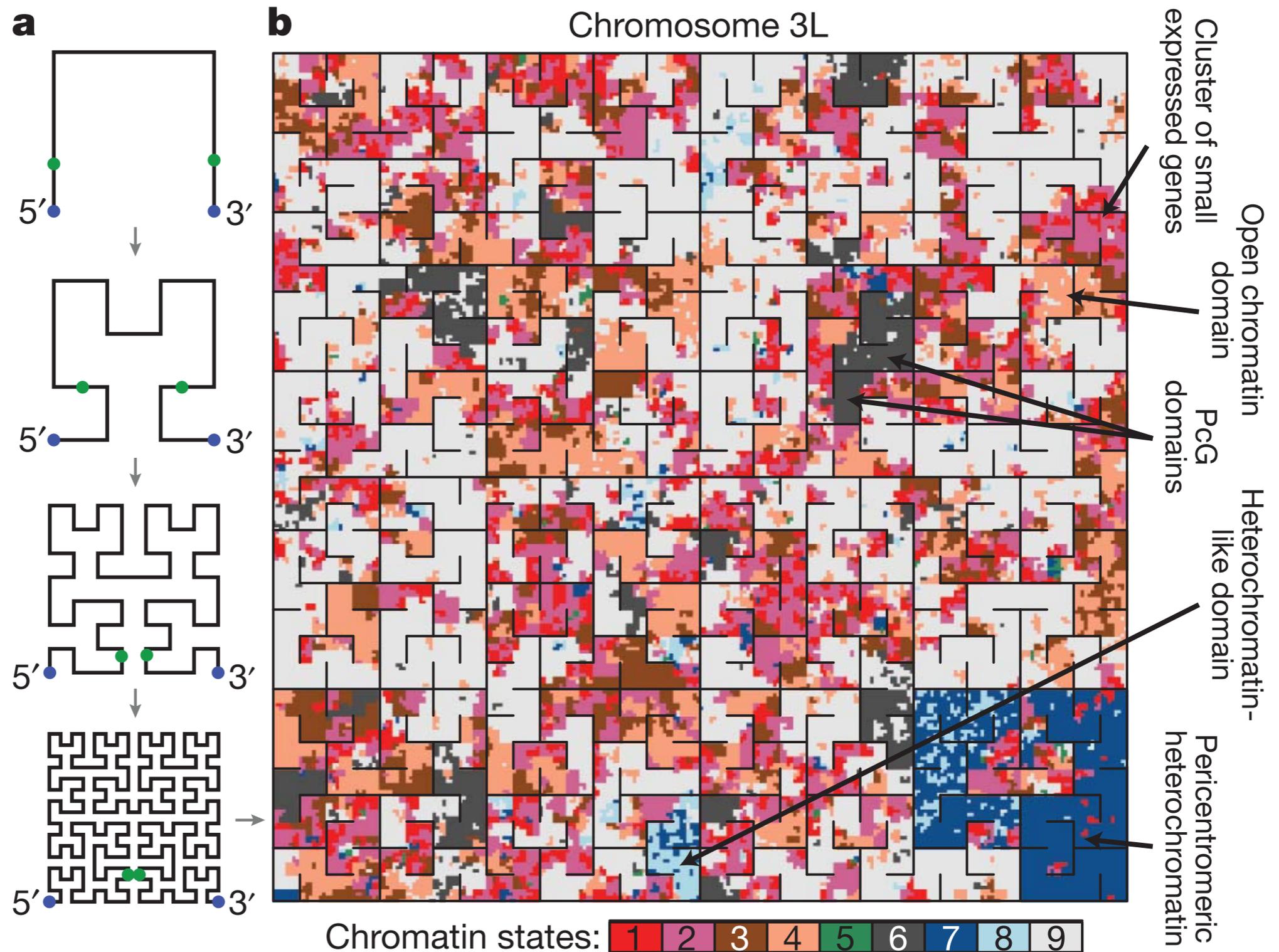
**The concept of space-filling curves is due to Giuseppe Peano (1890).**

**This specific curve has been invented by David Hilbert (1891).**

**The idea to use these curves for visualization was first published by Daniel Keim (1996) for economics data.**

Comprehensive analysis of the chromatin landscape in *Drosophila melanogaster*

Peter V. Kharchenko et al. (modEncode) Nature 2010



**Figure 2 | Visualization of spatial scales and organization using compact folding.** **a**, The chromosome is folded using a geometric pattern (Hilbert space-

# Bioconductor packages HilbertVis & HilbertVisGUI



Simon  
Anders

**Stand-alone application:  
reads GFF and wiggle track  
files (incl. BED)**

