Artist’s conception of the complex network of relationships between disease and the human genome. Hundreds of diseases and traits (represented by colored dots) have been mapped to specific chromosomal positions in the genome. Most disease-associated genetic variants fall outside of protein-coding genes, instead affecting the genome’s regulatory circuitry by modifying the DNA “switches” (some of which are depicted here as gray triangles, many others not shown) that control gene activity. See page 1190.

Image: Rachael Ludwig and John Stamatoyannopoulos
1186  How Cells Know the Size of Their Organelles  
Y.-H. M. Chan and W. F. Marshall

1190  Systematic Localization of Common Disease-Associated Variation in Regulatory DNA  
M. T. Maurano et al.  
Genetic variants that have been associated with diseases are concentrated in regulatory regions of the genome.  
>> News story p. 1159; Perspective p. 1179; Science Podcast

1196  Unconventional Sequence of Fractional Quantum Hall States in Suspended Graphene  
B. E. Feldman et al.  
A scanning single-electron transistor is used to measure the local compressibility of graphene’s electronic states.

1200  Electron Small Polarons and Their Mobility in Iron (Oxyhydr)oxide Nanoparticles  
J. E. Katz et al.  
X-ray spectroscopy highlights the influence of local structure on electron transport in iron minerals.

1203  Photo-Tautomerization of Acetaldehyde to Vinyl Alcohol: A Potential Route to Tropospheric Acids  
D. U. Andrews et al.  
Enol tautomers may play a bigger role in atmospheric chemistry than previously suspected.

1207  Direct Mapping of Nuclear Shell Effects in the Heaviest Elements  
E. Minaya Ramirez et al.  
Highly precise mass measurements of nobelium and lawrencium isotopes provide insight into superheavy element stability.  
>> Perspective p. 1183

1210  Evidence for NOx Control over Nighttime SOA Formation  
A. W. Rollins et al.  
The growth of particulate organic nitrates can account for much of the nighttime increase in organic aerosol mass.

1212  Predatory Fish Select for Coordinated Collective Motion in Virtual Prey  
C. C. Ioannou et al.  
Computer-generated prey evolve coordinated group behaviors when attacked by bluegill sunfish.  
>> Perspective p. 1181

1215  Molecular Mechanics of Cardiac Myosin-Binding Protein C in Native Thick Filaments  
M. J. Previs et al.  
A myosin thick filament–associated sarcomeric protein modulates cardiac contractility in a phosphorylation-dependent manner.  
>> Perspective p. 1182

1218  Conformational Control of the Ste5 Scaffold Protein Insulates Against MAP Kinase Misactivation  
J. G. Zalatan et al.  
A scaffold protein controls signal transmission by using an auto-inhibitory domain as a gate.  
>> Perspective p. 1178

1222  Rad51 Is an Accessory Factor for Dmc1-Mediated Joint Molecule Formation During Meiosis  
V. Cloud et al.  
Duplication of a central protein in mitosis facilitated the evolution of a highly related protein required for meiosis.

1225  The Molecular Mechanism of Thermal Noise in Rod Photoreceptors  
S. Gozem et al.  
In rhodopsin, the transition state for thermal activation has the same electronic structure as that for photoexcitation.

1228  Ecological Populations of Bacteria Act as Socially Cohesive Units of Antibiotic Production and Resistance  
O. X. Cordero et al.  
Natural antibiotics enforce competition between, rather than within, bacterial populations.  
>> Perspective p. 1184

1231  Transforming Fusions of FGFR and TACC Genes in Human Glioblastoma  
D. Singh et al.  
A fusion gene detected in a small subset of human brain tumors encodes a potentially druggable target.
A GPS for Navigating DNA
E. Schadt and R. Chang
10.1126/science.1227739
A CPS for Navigating DNA
E. Schadt and R. Chang
10.1126/science.1225057
E. Schadt and B. Chang
10.1126/science.1224631
E. Schadt and R. Chang
10.1126/science.1224953

TECHNICAL COMMENTS
Comment on “Orthographic Processing in Baboons (Papio papio)”
W. Bains
10.1126/science.1223821
Response to Comment on “Orthographic Processing in Baboons (Papio papio)”
J. Grainger et al.
10.1126/science.1224631

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5 September issue: http://scim.ag/stm090512

RESEARCH ARTICLE: Structural Basis for Benzothiazinone-Mediated Killing of Mycobacterium tuberculosis
J. Neres et al.
FOCUS: Bridging the Gap Between a TB Drug and Its Target
G. M. Cook and A. Heikal
The crystal structure of the mycobacterial DprE1 reveals how the TB drug benzothiazinone BTZ043 blocks this microbial enzyme target.

RESEARCH ARTICLE: Disruption of the Sleep-Wake Cycle and Diurnal Fluctuation of Amyloid-β in Mice with Alzheimer’s Disease Pathology
J. H. Roh et al.
FOCUS: The Nexus of Aβ, Aging, and Sleep
J. R. Gerstner et al.
Decreased sleep and attenuation of circadian fluctuations in Aβ reflect amyloid-associated pathology in Alzheimer’s disease.

RESEARCH ARTICLE: An Intravaginal Ring That Releases the NNRTI MIV-150 Reduces SHIV Transmission in Macaques
R. Singer et al.
An intravaginal ring loaded with the NNRTI MIV-150 prevents transmission of the HIV/SIV chimera SHIV-RT in macaques.
FOCUS: Regulatory Science Innovation—A Rate-Limiting Step in Translation
N. S. Sung and J. Burris
Sustained funding for academic regulatory science will drive innovation and implementation, forge a viable career path, and build an educated workforce.

SCIENCE BACKDROP
A CPS for Navigating DNA
E. Schadt and R. Chang
10.1126/science.1225057
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10.1126/science.1224631
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