Structure of the Wnt signaling molecule (red) in complex with the Frizzled ligand-binding domain (yellow), schematically depicted as connected to the cell surface. A key feature of this structure is the visualization of a lipid group (blue) on Wnt directly engaging Frizzled. The Wnt/Frizzled mode of binding paves the way for the design of Wnt-based therapeutics. See page 59.

Image produced by Eric Smith and Chris Garcia
RESEARCH ARTICLES

54  Eddy-Driven Stratification Initiates North Atlantic Spring Phytoplankton Blooms  
A. Mahadevan et al.  
Oceans eddies can trigger springtime plankton blooms previously attributed to surface heating.  
>> Perspective p. 46

59  Structural Basis of Wnt Recognition by Frizzled  
C. Y. Janda et al.  
The structure of the morphogen Wnt bound to its receptor provides a basis for understanding Wnt’s functional pleiotropy.  
>> Perspective p. 44

64  Evolution and Functional Impact of Rare Coding Variation from Deep Sequencing of Human Exomes  
J. A. Tennessen et al.  
Most functionally consequential variants in protein-coding genes are rare and, thus, difficult to find.  
>> Perspective p. 39; Report p. 100

REPORTS

69  Interferometric Identification of a Pre–Brown Dwarf  
P. André et al.  
Observations by millimeter-wave interferometry reveal a substellar object not massive enough to sustain hydrogen fusion.  
>> Perspective p. 43

72  Heralded Entanglement Between Widely Separated Atoms  
J. Hofmann et al.  
Heralded entanglement between single atoms 20 meters apart is a promising step toward long-distance quantum communication.  
>> Perspective p. 40; Science Podcast

75  Cavity Cooling Below the Recoil Limit  
M. Wolke et al.  
Rubidium atoms are heated and cooled by single-photon absorption and emission in a narrow-bandwidth optical cavity.

78  Large Volcanic Aerosol Load in the Stratosphere Linked to Asian Monsoon Transport  
A. E. Bourassa et al.  
Even moderate volcanic eruptions can inject sulfur dioxide into the stratosphere with the help of the Asian monsoon.

81  ENSO Drove 2500-Year Collapse of Eastern Pacific Coral Reefs  
L. T. Toth et al.  
A 6000-year record captures the influence of the El Niño–Southern Oscillation on coral reefs off the coast of Panama.  
>> Science Podcast

85  The Dynamics of Cooperative Bacterial Virulence in the Field  
B. Raymond et al.  
Toxin-producing individuals enable Bacillus thuringiensis to invade its host; once inside, nonproducing cheaters take over.

88  A Single Promoter Inversion Switches Photorhabdus Between Pathogenic and Mutualistic States  
V. S. Somvanshi et al.  
A stochastic switch allows a bacterium to toggle between virulent and symbiotic forms in its hosts.

93  Identification and Functional Expression of the Mitochondrial Pyruvate Carrier  
S. Herzig et al.  
Two components of the mitochondrial pyruvate transporter confer transport activity when expressed in bacteria.

96  A Mitochondrial Pyruvate Carrier Required for Pyruvate Uptake in Yeast, Drosophila, and Humans  
D. K. Bricker et al.  
The genes encoding two components of the pyruvate transporter in mitochondria have been identified.  
>> Perspective p. 41

100  An Abundance of Rare Functional Variants in 202 Drug Target Genes Sequenced in 14,002 People  
M. R. Nelson et al.  
A pharmacogenomics analysis shows how challenging it will be to associate rare variants with phenotypes.  
>> Perspective p. 39; Research Article p. 64

104  Recurrent Hemizygous Deletions in Cancers May Optimize Proliferative Potential  
N. L. Solimini et al.  
The genomes of cancer cells have preferentially lost genes that inhibit cell growth.  
>> Perspective p. 47

109  A Distinct Role of the Temporal–Parietal Junction in Predicting Socially Guided Decisions  
R. McKell Carter et al.  
A single region of the brain is particularly engaged when one is beating an opponent at poker.

CONTENTS continued >>
Is Acid Rain a Thing of the Past?
Northeastern soils are recovering but still show signs of damage.
http://scim.ag/Acid-Rain

Ancient Hunter-Gatherers Kept in Touch
A study suggests close cultural ties across vast distances.
http://scim.ag/Hunter-Gatherers

RESEARCH ARTICLE: Perinuclear Mitochondrial Clustering Creates an Oxidant-Rich Nuclear Domain Required for Hypoxia-Induced Transcription
A.-B. Al-Mehdi et al.
Hypoxia triggers a transcriptional response initiated by mitochondria.

RESEARCH RESOURCE: Quantitative Imaging of Epithelial Cell Scattering Identifies Specific Inhibitors of Cell Motility and Cell-Cell Dissociation
D. Loerke et al.
Imaging analysis tools identify drugs that inhibit different aspects of cell scattering.

PERSPECTIVE: New Targets for Acetylation in Autophagy
A. Hamai and P. Codogno
Yeast and mammals use protein acetylation to promote the formation of the autophagosome.

PODCAST
K. C. Garcia and A. M. VanHooK
Structural analysis reveals how a Wnt binds to its receptor.

Is Acid Rain a Thing of the Past?
Northeastern soils are recovering but still show signs of damage. [Link]

Ancient Hunter-Gatherers Kept in Touch
A study suggests close cultural ties across vast distances. [Link]

RESEARCH ARTICLE: Perinuclear Mitochondrial Clustering Creates an Oxidant-Rich Nuclear Domain Required for Hypoxia-Induced Transcription
A.-B. Al-Mehdi et al.
Hypoxia triggers a transcriptional response initiated by mitochondria. [Link]

RESEARCH RESOURCE: Quantitative Imaging of Epithelial Cell Scattering Identifies Specific Inhibitors of Cell Motility and Cell-Cell Dissociation
D. Loerke et al.
Imaging analysis tools identify drugs that inhibit different aspects of cell scattering. [Link]

PERSPECTIVE: New Targets for Acetylation in Autophagy
A. Hamai and P. Codogno
Yeast and mammals use protein acetylation to promote the formation of the autophagosome. [Link]

PODCAST
K. C. Garcia and A. M. VanHooK
Structural analysis reveals how a Wnt binds to its receptor. [Link]