

EDITORS' CHOICE

edited by Gilbert Chin

CLIMATOLOGY

Long-Term Rain Forecasts

The ability to anticipate multi-annual regional rainfall patterns is an important part of water resource planning and management. One factor that regulates the amount and distribution of precipitation in North America is the Atlantic Multidecadal Oscillation (AMO), a cycle of North Atlantic sea surface temperature variability with a period of 65 to 80 years.

Enfield *et al.* outline the geographical pattern of variability in North American rainfall for the last century. They supplement these findings with river discharge data for two representative hydrological provinces and then compare them to the AMO. During warm phases of the AMO, the United States receives lower than normal rainfall, particularly over the eastern Mississippi Basin. Other areas, however, such as Florida and parts of the Southeast, experience more precipitation. Because the current trend in the AMO is toward higher temperatures, the forecast is for decreased annual rainfall over much of the United States. The nonstationary pattern of the expression of El Niño–Southern Oscillation in North America is found to be connected to the AMO, too. — HJS

Geophys. Res. Lett. **28**, 2077 (2001).

STRUCTURAL BIOLOGY

Marked for Destruction

One of the critical enzymatic mechanisms that regulates progression through cell division is the tagging and degradation of proteins. The anaphase-promoting complex (APC) functions as a ubiquitin ligase and attaches a small protein, ubiquitin, to those mitotic components, such as cyclins, that need to be



Pamlico Sound before (left) and after (right) the influx of brownish floodwaters produced by Hurricane Floyd.

effects of floodwaters generated by three successive 1999 hurricanes (Dennis, Floyd, and Irene) on the estuarine ecosystem of Pamlico Sound, North Carolina, USA. Hydrological, biogeochemical, and ecological baseline data had been collected in monitoring programs installed the previous year. The floodwaters from the surrounding watershed were sufficient to displace 75% of the saline estuarine waters, producing a cascade of effects on water chemistry and on nutrient availability to phytoplankton, with significant depression of the estuarine food chain and fisheries. Although some ecosystem properties rebounded, these results suggest that the effects of the floodwaters might persist in the shallow estuary (average depth of 4.5 meters) for several years. — AMS

Proc. Natl. Acad. Sci. U.S.A. **98**, 5655 (2001).

ECOLOGY

Winds of Change

Infrequent major disturbances of ecosystems are, by definition, hard to study. They don't happen often, and pre-disturbance baseline data may not have been gathered. Hence, it can be difficult to determine whether an ecosystem recovers to its former state or switches to a new trajectory.

Paerl *et al.* studied the effects of floodwaters generated by three successive 1999 hurricanes (Dennis, Floyd, and Irene) on the estuarine ecosystem of Pamlico Sound, North Carolina, USA. Hydrological, biogeochemical, and ecological baseline data had been collected in monitoring programs installed the previous year. The floodwaters from the surrounding watershed were sufficient to displace 75% of the saline estuarine waters, producing a cascade of effects on water chemistry and on nutrient availability to phytoplankton, with significant depression of the estuarine food chain and fisheries. Although some ecosystem properties rebounded, these results suggest that the effects of the floodwaters might persist in the shallow estuary (average depth of 4.5 meters) for several years. — AMS

Proc. Natl. Acad. Sci. U.S.A. **98**, 5655 (2001).

CELL BIOLOGY

Two Roads Diverged

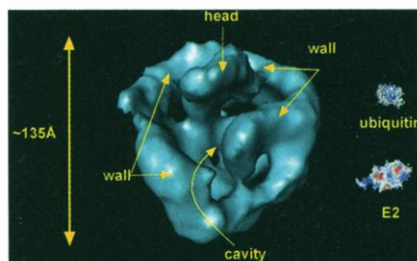
The posttranslational modification of proteins by the attachment of the protein ubiquitin is known to play a role in the regulated degradation of many proteins by the proteasome. A role for ubiquitination in triggering the internalization of membrane receptors in yeast also is well established.

Now, Helliwell *et al.* define another function for ubiquitination in controlling the intracellular roadmap followed by

versely, when the *bul1* and *bul2* genes were deleted, the Gap1 protein was delivered predominantly to the plasma membrane. Ubiquitinated forms of Gap1p were abundant in the former situation and greatly diminished in the deletion strains. Furthermore, truncation of Gap1p, which forestalled ubiquitination, enhanced delivery to the cell surface. Thus, it appears that ubiquitin can direct the paths taken upon exit from the Golgi complex, as well as during endocytosis from the cell surface. — SMH

J. Cell Biol. **153**, 649 (2001).

destroyed. The ubiquitin tag serves as a signal that is recognized by the 26S proteasome, a large recycling center that digests proteins within a cylindrical reaction chamber. Gieffers *et al.* have prepared an 11-subunit 22-23S APC, which retains a ubiquitin-transferring activity



Features and relative sizes of the APC.

and has a molecular mass of approximately 850,000. Visualization of these particles by cryoelectron microscopy revealed an asymmetric globular object of 135 angstroms in diameter. Substrate access to an internal cavity large enough to hold ubiquitin and the upstream ubiquitin-conjugating enzyme E2 could be dictated by regulatory factors. — GJC

Mol. Cell **7**, 907 (2001).

GEOLOGY

Dating the Great Barrier Reef

Coral reefs are important as marine ecosystems, and their growth has been linked to the carbon dioxide content in Earth's atmosphere. However, the timing of major reef growth has been uncertain for many reefs, including Earth's largest, the Great Barrier Reef of Australia. Analysis by an international consortium of two

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Geology **29**, 483 (2001).

Bound to Give an Explanation

J. Am. Chem. Soc., in press.

Escort Service

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Proc. Natl. Acad. Sci. U.S.A. **98**, 5521 (2001).

Form and Function

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J. Phys. Chem. B, in press.

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