organelles, and is likely to be replicated in other lipid–protein complexes at different stages of endocytosis and recycling.

Ketel and colleagues' study marks a step forward in our understanding of how PIPs act as a 'lipid code' to direct the sorting of cell-surface molecules in endosomes. Moreover, they provide a neat demonstration of the importance of this code to preventing diseases such as X-linked centronuclear myopathy. Getting a grip on the molecular underpinnings of this debilitating disease may help scientists to devise strategies to improve its outcomes. ■

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This article was published online on 13 January 2016.

ECOLOGY

Biodiversity and productivity entwined

A systems-level analysis of grasslands across the planet provides stimulating insight into the interlaced pathways that connect species diversity and biological productivity in ecological communities. SEE LETTER P.390

KEVIN GROSS

An abiding goal of ecology is to understand how the biological diversity of natural communities is linked to the rate at which those communities produce biomass, if it is linked at all[1–5]. Elucidating this connection and the processes behind it is useful, among other reasons, for anticipating how ecological communities may change in response to anthropogenic perturbations, such as alterations to the abiotic environment, the introduction of new species or the loss of established ones. Yet despite more than 40 years of study and debate, a comprehensive, mechanistic understanding of the relationship between biodiversity and ecosystem productivity remains elusive. On page 390 of this issue, Grace *et al.*[6] argue that the interplay between these factors is more fully understood when both are placed in a rich network of cause-and-effect pathways, as opposed to being regarded as entities engaged in an isolated back-and-forth.

The authors considered data generated by the Nutrient Network[7], a global scientific cooperative that examined several dozen grass-dominated plant communities from across the planet. Grace and colleagues analysed these data using a structural-equation model — a statistical method that examines whether a hypothesized system of cause-and-effect pathways is consistent with covariation in a collection of variables. The starting point for this analysis was a putative network of cause-and-effect relationships for several aspects of ecosystems and their associated environments, devised from the authors' synthesis of the literature. The confrontation between data and model then occurred at two nested levels: between the sites of the Nutrient Network, and across replicate communities within each site.

Several provocative results emerge (Fig. 1). First, the authors find that the rate of biomass production increases with the number of species found at a site (its species richness). What is notable here is that this effect holds steady across the observed variation in species richness, instead of saturating in communities with greater richness, as a generation of experimental and theoretical work has suggested that it may[8]. Second, both between and within sites, a greater stock of accumulated above-ground biomass (live plant tissue and dead litter) decreases species richness. The authors suggest that this provides evidence that competition between species — primarily for light, at least at smaller spatial scales — is an important force in determining why communities contain as many species as they do. Again, the

50 Years Ago

It is particularly rewarding to investigate the experience of chronosystole, or time contraction during sympathetic excitation, as this state, which is connected with an increase in metabolic rate, can be elicited at will through psychotomimetic, pyretogenic drugs such as mescaline, marihuana, D-lysergic acid diethylamide (LSD), 'Psilocybin' … No effort has been made … to quantitatively differentiate the degrees of reactivity in subjects who have ingested the same dose of 'Psilocybin' … We have refined the use of two already existing variables for the measurement of time contraction — handwriting samples and finger-tapping rates.
From *Nature* 22 January 1966

100 Years Ago

To discover whether the various objects carried about on the spines of the purple-tipped sea-urchin (*Echinus miliaris*) were accidentally picked up or deliberately placed there has recently formed the subject of a series of experiments by Mr. H. N. Milligan. He gives the results of his inquiry in the *Zoologist* for December. While usually stones, sea-weed, or shells are carried, tube-worms, hydroids, periwinkles, or tunicates, as chance may determine, are also used, apparently for the purposes of disguise and protection from enemies. That such objects are borne with a purpose, and not as a result of accident, is shown by the fact that when all foreign bodies are removed from the spines of urchins living in an aquarium, they will invariably be speedily replaced as soon as their loss is perceived, the tube-feet being used to perform this office. Young individuals were more assiduous in this regard than adults, but in all cases particular care was taken to conceal the anus, which is apparently a very vulnerable spot.
From *Nature* 20 January 1916