View this email in your browser

The Week in Botany 25

November 27, 2017

Skip to links from: Botany One | News and Views | Scientific Papers

Welcome to the Week in Botany. I've changed the system we use to send the emails again, to make sure someone else at Botany One can send a newsletter as well as me. One change is that to unsubscribe you need to use the link at the foot of the email, but MailChimp, our new partner have plenty of experience so it's a reliable system. As always the links below have been selected by followers of @botanyone on Twitter as the most interesting links of the week.

From Botany One

Bamboosting growth: why does bamboo grow so fast?
What is it that gives bamboo its rapid growth? One team has been looking for the answer not with the fastest plants, but with the slower variants to see what they lack.

Start from here: SPL Theory links regenerative and life history strategies
The best chance of growing to maturity is to have the best start. A new theory connects seed and leaf size with phytomers to describe the relationship between regeneration and growth through a plant's lifetime.

Plant survival, on a wing and a prayer...*
Nigel Chaffey on how plants dupe animals into spreading their seeds.

From cocks and hens * to cockroaches (and elephants...)
NIgel Chaffey returns with more stories of plants using animals to travel.

Physiological variation of Prosopis species under drought conditions

Carevic et al. evaluate the physiological resistance to drought stress of Prosopis (mesquite) seedlings from different collection sites in the Atacama Desert, northern Chile. Their results show that seedlings from the most hyperarid habitats had higher tolerance to water stress than seed collected from less arid sites.

Call for Papers: Special issue on the Ecology and Evolution of Plant Reproduction

Botanists have long been fascinated by the extraordinary diversity in flowering plant reproductive patterns and have sought to understand theecological processes and genetic mechanisms influencing plant mating. Over the last five years, research progress in this discipline has rapidly accelerated. Important new insights in this field often combine elegant theoretical models with innovative field and laboratory experiments. *Annals of Botany* will release a Special Issue on the Ecology and Evolution of Plant Reproduction in January 2019, and it will highlight papers from 3 symposia at the XIX International Botanical Congress in Shenzhen, China. See the full call for papers for more information.

News and Views

GM banana shows promise against deadly fungus strain

A field trial in Australia has shown that genetically modified banana trees can resist the deadly fungus that causes Panama disease, which has devastated banana crops in Asia, Africa, and Australia and is a major threat for banana growers in the Americas. The transgenic plants might reach some farmers in as few as 5 years, but it's unclear whether consumers will bite. The work may encourage plant breeders using traditional techniques to create resistant varieties.
Science

Stem rust attacks in Sweden heralds the return of a previously vanquished foe

Stem rust or black rust has long been seen as the bubonic plague of wheat farming – a once dreaded pathogen that has now been neutralized and is

now hardly worthy of attention, let alone concern. In summer 2017, a vast outbreak occurred in Uppland in Sweden, and the fungus is now feared to have returned to the north.
Sveriges lantbruksuniversitet

Seagrass is a marine powerhouse, so why isn't it on the world's conservation agenda?
Seagrass has been around since dinosaurs roamed the earth, it is responsible for keeping the world's coastlines clean and healthy, and supports many different species of animal, including humans. And yet, it is often overlooked, regarded as merely an innocuous feature of the ocean.
The Conversation

The tragic story of Soviet genetics shows the folly of political meddling in science
Every plant breeder or geneticist knows of Nikolai Vavilov and his ceaseless energy in collecting important food crop varieties from all over the globe, and his application of genetics to plant improvement. However, things did not go well for Vavilov politically. How did this visionary geneticist, who aimed to find the means for food security, end up starving to death in a Soviet gulag in 1943?
The Conversation

Interview With Nikolay Dzubenko, Director of VIR
To celebrate the 130th anniversary of Vavilov, I interviewed Nikolay Dzubenko, Director of the N.I. Vavilov Institute of Plant Genetic Resources (VIR). Born in USSR in 1952, Dr. Dzubenko is also a professor and a botanist.
Crop Trust

Australian research 'has a Daversity problem': Analysis shows too many men work mostly with other men
When Deb Verhoeven first saw the data, broken down into clusters of bright red and blue, she cried. A professor at the University of Technology Sydney, she was familiar with gender inequality, having spent years researching the issue in the film industry. Even so, it was a shock to look at the networks that routinely lock women out of research funding in Australia.
ABC News

Keeping the salt out of grapes

New research published in New Phytologist points the way towards the breeding of salt tolerant grapevines that are likely to improve the sustainability of the Australian wine sector.
New Phyt Blog

Seeds hold hidden treasures for future food

More than 70,000 of the world's most precious seeds have been sent from the UK's Millennium Seed Bank to the Middle East, in its largest export to date. The consignment contains more than 50 wild relatives of cultivated crops, such as wheat, barley and lentils. The seeds will be used for food security research at a seed bank in Lebanon, which is recreating collections stranded in Syria.
BBC

Saving the world's trees on the edge of extinction

Almost 60% of the world's 60,000 tree species are found in a single country, and at least 400 species have <50 individuals remaining. Many occur on islands where BGCI's Global Trees Campaign programme supports local botanic gardens to conserve them in their gardens and protect them in the wild.
The Big Give

Call for papers: Developing sustainable bioenergy crops for future climates

Rapid progress has been made over the last five years with respect to emerging new genomic technologies for crop improvement and this Annals of Botany Special Issue will be devoted to highlighting the latest findings and considering the potential of these technologies for the future deployment of bioenergy crops in the face of climate change. At the same time, cutting-edge research that provides insights into the complex plant traits underpinning drought tolerance and response to other abiotic and biotic stresses is required for these relatively new crops. Knowledge in this area will be brought together in this Special Issue, and there will be a focus on recent advances in high throughput phenotyping to unravel these complex responses. See the full call for papers for more information.

Scientific Papers

The promise of plastics from plants
A nearly inexhaustible supply of annually renewable carbon is embedded in plant-derived macromolecules (including cellulose, lignin, and other polysaccharides) and small molecules (including sugars, vegetable oils, and terpenes). Carbon dioxide is also overly abundant. From these renewable feedstocks, it is possible to prepare nearly all of today's polymers.
Science

Multiple strategies for pathogen perception by plant immune receptors
Here, I review recent insights demonstrating that nucleotide-binding domain and leucine-rich repeat-containing proteins are more mechanistically and structurally diverse than previously thought. I also discuss how these findings provide exciting future prospects to improve plant disease resistance.
New Phytologist

Nucleic acid purification from plants, animals and microbes in under 30 seconds
Nucleic acid amplification is a powerful molecular biology tool, although its use outside the modern laboratory environment is limited due to the relatively cumbersome methods required to extract nucleic acids from biological samples. To address this issue, we investigated a variety of materials for their suitability for nucleic acid capture and purification. We report here that untreated cellulose-based paper can rapidly capture nucleic acids within seconds and retain them during a single washing step, while contaminants present in complex biological samples are quickly removed. Building on this knowledge, we have successfully created an equipment-free nucleic acid extraction dipstick methodology that can obtain amplification-ready DNA and RNA from plants, animals, and microbes from difficult biological samples such as blood and leaves from adult trees in less than 30 seconds.
PLOS Biology

Glyphosate Use and Cancer Incidence in the Agricultural Health Study
In this large, prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall, including NHL and its subtypes. There was some evidence of

increased risk of AML among the highest exposed group that requires confirmation.
Journal of the National Cancer Institute

Rethinking phylogenetic comparative methods
As a result of the process of descent with modification, closely related species tend to be similar to one another in a myriad different ways. In statistical terms, this means that traits measured on one species will not be independent of traits measured on others. Since their introduction in the 1980s, phylogenetic comparative methods (PCMs) have been framed as a solution to this problem. In this paper, we argue that this way of thinking about PCMs is deeply misleading.
bioRxiv

All roads lead to the vacuole—autophagic transport as part of the endomembrane trafficking network in plants
In this review, we focus mainly on possible functions of endosomal trafficking components in autophagy.
JXBot

An automated confocal micro-extensometer enables in vivo quantification of mechanical properties with cellular resolution
Here we present an automated confocal micro-extensometer (ACME), which greatly expands the scope of existing methods for measuring mechanical properties. Unlike classical extensometers, ACME is mounted on a confocal microscope and utilizes confocal images to compute the deformation of the tissue directly from biological markers, thus providing 3D cellular scale information and improved accuracy.
The Plant Cell

Origin and evolution of the nuclear auxin response system
Here we use a deep phylogenomics approach to reconstruct both the origin and the evolutionary trajectory of all nuclear auxin response protein families. We found that, while all subdomains are ancient, a complete auxin response mechanism is limited to land plants.
bioRxiv

A protocol for combining fluorescent proteins with histological stains for diverse cell wall components
Higher plant function is contingent upon the complex three-dimensional

architecture of their tissues, yet severe light scattering renders deep, 3D tissue imaging very problematic. Although efforts to “clear” tissues have been ongoing for over a century, many innovations were made in recent years. Among them, a protocol called ClearSee efficiently clears tissues and diminishes chlorophyll autofluorescence, while maintaining fluorescent proteins - thereby allowing analysis of gene expression and protein localisation in cleared samples. To further increase the protocol's usefulness, we developed a ClearSee-based toolbox in which a number of classical histological stains for lignin, suberin and other cell wall components could be used in conjunction with fluorescent reporter lines.
The Plant Journal

Strategies to enhance the resilience of the world's seagrass meadows
Urgent action is required to stem the loss of the world's seagrass meadows, prioritize their protection and recognize the array of ecosystem services (ES) that they provide. The reasons for continued decline are complex, driven by an array of cross-sectoral forces with solutions consequentially difficult to conceptualize.
Journal of Applied Ecology

Next week and onwards

That closes the email for this week. There will be some disruption to emails in the run up to Christmas. First, I'll at at the *Ecology Across Borders* meeting in Ghent between 11-14 December. Also, I have to unexpectedly move the Botany One office pronto, and that's likely to be scheduled around... well 4-15 December at the moment. Until next week, take care.

UPCOMING EVENTS

Ecology Across Borders: Joint Annual Meeting 2017
11 - 14 December 2017
ICC, Ghent, Belgium

Follow us on Twitter Friend on Facebook