

# Congress News

#6 FRIDAY 26 JULY



Sponsorship

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Edited by

REAL JARDÍN  
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## Botanists from all over the world have contributed more than a hundred ideas and suggestions to the 20<sup>th</sup> IBC Declaration

The XX IBC Declaration Committee has received 140 ideas, considerations and suggestions on the content of The Madrid Declaration that will be announced at the end of the Congress.

The botanists from around the world who have contributed ideas or suggestions to the Madrid Declaration have given a “yes”, “yes, with modifications” or “no” on the following 10 call for action (or have suggested new ones): #1 Taxonomy as a Foundation, #2 Collaborative Transdisciplinary

Approaches, #3 Addressing Inequalities in the Plant Sciences, Call for Action, #4 Recognizing Bio-cultural Diversity, #5 Protecting and Restoring Ecosystems and Landscapes, #6 Plant Science at the Center of Policy, #7 Harnessing True Nature-Based Solutions, #8 Plants at the Center of a Net Zero Economy, #9 Sustainability-aligned Values, #10 Increasing Awareness of the Centrality of Plants for Planetary Health and Resilience.

These actions are aimed at scientists and other

sectors of society, including governments, the corporate sector, and civil society, to nurture the relationships between plants and people so we can maximize their interconnectedness and mutual benefits. These actions are crucial to mitigating the impact of human activities on plants and securing planetary health and resilience.

Throughout yesterday and today, the XX IBC Declaration Committee is considering and preparing the final Declaration, which will be announced tomorrow at the closing ceremony.

## STRONG PARALLEL ACTIVITY



The workshop ‘Queer Flora and Funga’.

### WORKSHOPS

#### High attendance at practical lessons from scientific experts

Interacting and contributing with the botanical community is an essential part in scientific research, therefore, the IBC’s workshops have been an important complement to the event, offering attendees hands-on experiences and thorough learning opportunities. Designed to cater to a diverse range of interests and expertise, these sessions cover innovative topics and practices in the field of botany.

From advanced techniques in manufacturing low-cost hardware for laboratories to the latest genomics research, the workshops provide insights that go beyond traditional lectures. In these spaces, the participants have the chance to engage directly with experts and other peers, fostering a collaborative environment that encourages the exchange of ideas and skills.

[Continued on page 2]



Society of Ethnobiology (SdEB) meeting.

### SATELLITE MEETINGS

#### The most relevant botanical associations get together at the IBC

The celebration of an international congress of the scale of the IBC brings an excellent opportunity for many botanical-related associations and working groups to hold in-person meetings taking advantage of the spaces provided by the event. These meetings serve to upgrade on the progress and future perspectives of their activities, make decisions about their actions and address administrative matters. Over twenty meetings have already occurred during

these days, with a few more scheduled for tomorrow. For example, the Chair and Secretary of the International Association of Botanical and Mycological Societies (IABMS) met on Wednesday with the IBC2024 Organizing Committee and other people who participated in selecting the next IBC venue, to discuss organizational matters for the XXI IBC in Cape Town.

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High abundance of attendees to the 'Queer Flora and Funga' workshop.

## WORKSHOPS

### HIGH ATTENDANCE AND PRACTICAL LESSONS...

[...Comes from the front page]

The following workshops are a great example of the variety of addressed topics:

**3D PRINTING FOR PLANT SCIENCE WITH MASON MCNAIR:** This project starts during the covid-19 pandemic, responding to the many supply issues the labs suffered in those times. Luckily, recent technical advancements such as affordability, and accessibility of 3D printers has allowed researchers to manufacture the low-cost hardware needed for their specific research workflows.

Mason McNair, from Clemson University, showed in his Sunday workshop several applications of this technique, which can be used to create and replace expensive supplies or customize existing equipment. An example could be the material used for DNA extraction protocols including tube racks, gel electrophoresis units, electrophoresis replacement combs or microscope adapters.

**THE 10,000 PLANT GENOMES PROJECT:** In this workshop, advances in two significant sequencing projects were presented: the 10KP Plant Genomes Project, developed by the Beijing Genomics Institute (BGI-Shenzhen) and the China National Gene Bank (CNGB), and the Darwin Tree of Life Project, which aims to sequence the genomes of 70,000 species of eukaryotic organisms in Britain and Ireland.

**The Pride Botany workshop of IBC is the first of its kind, and aims to connect, support, and empower LGTBQIA+ individuals in botany worldwide.**

The workshop provided an opportunity to review the progress made on both initiatives and discussed the various challenges and troubleshooting encountered. Both projects emphasize promoting open access to genomes, protocols, and all gathered information. They also aim to collaborate with other sequencing initiatives to consolidate data and prevent duplication of efforts.



A researcher during the debate in the '10,000 genomes project' workshop.



Assistants at the SEBOT meeting.



The meeting between IABMS and IBC2024 organizing committee.

**QUEER FLORA AND FUNGA AND PRIDE BOTANY:** This year's IBC has introduced an unprecedented theme: Pride Botany. This workshop is the first of its kind, and aims to connect, support, and empower LGTBQIA+ individuals in botany worldwide.

Alongside this, "Queer flora and funga" offered a casual lunchtime conversation session open to all, focusing on interdisciplinary ideas about queerness in science, terminology about sex and gender in botany, and intersections of queer theory with science. Additionally, an informal gathering allowed participants to explore Madrid and build community.

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## SATELLITE MEETINGS

### ... ASOCIATIONS GET TOGETHER AT IBC

[...Comes from the front page]

Botanical societies such as the 'International Association of Plant Taxonomy' (IAPT) was the first society to meet in this conference on Sunday afternoon, to hold their annual council meeting. On Wednesday afternoon, it was the turn of 'Spanish Botanical Society' (SEBOT), which held their annual assembly, where almost 100 of their members were present to discuss about the organization of the II Spanish Congress of Botany that will take place in Seville, and the fifth annual symposium scheduled for November 2024 in Granada, as well as the initiative of supporting small research projects proposed by young researchers with grants.

As an example of project upgrading, members of the eFlower project, led by Hervé Sauquet, held a meeting where they could discuss on the last advances and future stages on this collaborative project for the development of a database of floral traits. These meetings can also serve as a seed for initiating new research projects. The meeting of the 'Nectar Working Group' (part of the International Commission for plant-pollinator relationships) brought the opportunity to gather researchers on flower nectar from all over the world with the idea of setting up the development of international research projects on nectar.

Taking advantage of the fact that ethnobotany has been one of the topics of the symposia in this congress edition, the Spanish Society of Ethnobiology has also held its meeting. With around 60 members, this society is affiliated with SEBOT and has used the opportunity at IBC2024 for in-person discussion and to review the society's activities, including online seminars.

**These meetings can also serve as a seed for initiating new research projects.**

# OUR YOUNG ORANGE TEAM

## Around 150 volunteer botanists ensure the smooth running of IBC

Some 150 young people with a passion for Botany, still immersed in university studies or in the first phase of their research career, are working these days as volunteers at the XX International Botany Congress being held in Madrid. They are girls and boys between 20 and 28 years of age, mainly Spanish, but also of other nationalities who, with their daily work, contribute an important grain of sand to the development of the different and numerous activities that shape the Congress.

**“The volunteering was an initiative from SEBOT to give young people access to the congress”**

Among these volunteers is Guillermo Santos, a 26-year-old biologist from Madrid. Guillermo is pursuing a master's degree in diversity at the Autonomous University of Madrid is a member of both SEBOT and *Jóvenes por la Botánica Española (JxBE)* as well as a passionate botanist. In addition, he is not only volunteering, is also presenting a talk and a poster at the congress.

“The volunteering was an initiative from SEBOT to give young people access to the congress” Guillermo explains. “It has been a great option for those of us who wouldn't have been able to attend otherwise.”

The flexibility of the volunteering organization has been a significant advantage. “This has allowed us to attend talks and adjust our duties if we are giving



A group of young volunteers pose at the congress entrance.

presentations ourselves,” Guillermo adds. “Is like the Olympics of botany.” Says Elisa Forgiione, a volunteer Venezuelan biologist pursuing a master's degree in ecology. “An immense opportunity to

learn how a scientific congress works, along with huge networking possibilities”.

Reflecting on this experience, Guillermo highlights the global scope of the IBC. “The previous congress was held

in Shenzhen (China), and the next one will be in Cape Town (South Africa). Attending the IBC congress in Madrid is a once-in-a-lifetime opportunity for young Spaniards”.

**CARLOS JARAMILLO**

## A travel to the origin of tropical forests

“One must be a bit crazy to study the tropics”, joked Dr. Carlos Jaramillo at the beginning of his lecture yesterday, as these are very complex ecosystems whose research implies the consideration of many species simultaneously. However, for millions of years, these areas harbored a much sparser vegetation dominated by gymnosperms such as *Araucaria* trees. To reveal the key processes involved in the origin of tropical forests as we know them, Dr. Jaramillo took the full plenary room of the Congress into a travel of 65 millions of years back in time, to the end of the Cretaceous, when a meteorite the size of Madrid impacted the Yucatán peninsula, releasing a huge amount of carbon to the atmosphere and triggering a massive extinction event of which angiosperms took advantage to outcompete gymnosperms. The uncovering of this fascinating story is possible thanks mainly to the palynological record. Pollen is highly resilient, prone to long-term preservation and specific for genera or even single species. Therefore, “you can see the whole environment looking at the pollen”, highlighted Dr. Jaramillo.

These insights into the past also give some hints for our



future. The increase of CO<sub>2</sub> in the atmosphere and the consequent rise of temperatures could benefit the expansion of tropical forests, but anthropogenic impacts such as deforestation are destroying them at a disproportionate rate.

In an era when looking into the past seems futile and humanity is focused solely on moving forward, Dr. Jaramillo's lecture serves as a powerful reminder of how we can learn from our very deep past to reduce the impact of the human footprint.



**RACHEL V. GALLAGHER**

## It's our moment for conservation

There is no doubt that the risk of plant species extinction is high. Professor Rachel Gallagher has given an encouraging talk emphasizing the importance of translating our vast science knowledge into valuable conservation actions.

One of the critical questions the scientific community has been striving to answer is why do species go extinct in the wild, meaning that they can only survive outside their natural range or under cultivation. The accumulation of significant threats, such as changing fire regimes, disease or urbanization, lead to population losses that can ultimately result in wild extinction.

In recent years, tremendous efforts have been made in seed banking, with the Svalbard Seed Bank being a prime example. Other measures include habitat protection, establishing colonies, and maintaining living collections. However, these efforts remain insufficient without successful ecosystem restoration. Although some progress has been made, challenges such as the loss of beneficial growth bacteria, reduced capacity to adapt to climate change, and failures in population reintroduction necessitate the development of new strategies to save plants from extinction in the wild.

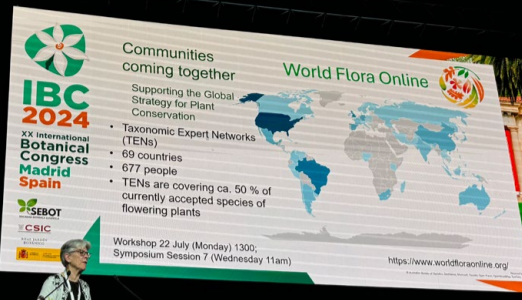
Explore the data

Find out about

Check a plant name

WFO

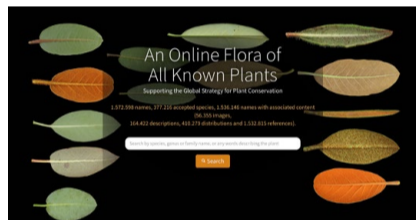
The World Flora Online



IBC Opening lecture of Sandra Knapp.

## An outstanding example of the joint efforts of the botanical community

Sandra Knapp's call for collaboration and community action during her opening lecture has been a major theme of this congress. The World Flora Online (WFO) is a standout example of the botanical community coming together to find solutions for the Earth's problems. WFO and has been extensively included in presentations throughout the congress, including its own workshop and symposium.



WFO is a community-led effort established in 2013, managed by a council of 52 partners from around the world. It is endorsed by the 196 parties to the Convention on Biological Diversity and recommended by SBSTTA 25 as part of the Global Strategy for Plant Conservation in support of the Global Biodiversity Framework. Underpinning the WFO is a global consensus classification, the WFO Plant List, which is curated by Taxonomic Expert Networks (TENs). As well as providing an authoritative resource for a wide range of users, the WFO Plant List is now being used in meta-analyses, bringing together diverse ecological plot datasets, revealing progress in tackling the taxonomy of big genera, and proving plant classification data to Catalogue of Life.



Mark Watson, Co-chair of WFO's Council, said "it is fantastic to see such tremendous support for WFO at the IBC. People are coming together to form new TENs, covering a further 45,000 species so far, and seeing other opportunities to work with WFO. We would be delighted to hear from people wanting to form a TEN, join an existing one, or otherwise get involved."



worldfloraonline.org  
contact@worldfloraonline.org

## TODAY LECTURES

### One third backwards! The varied ways plants have already changed in response to climate change and the implications for plant communities and conservation



Angela Moles

Angela Moles leads the Big Ecology Lab, at the Evolution & Ecology Research Centre at the University of New South Wales, Sydney. She studies plant responses to climate change, invasive species and global patterns of plant growth and reproduction. She is also a member of the NSW Threatened Species Scientific Committee.

the equator rather than shifting to cooler areas. This variation in species responses to climate change means that broad change in plant communities seems inevitable. I will finish by discussing implications of all these changes for conservation.

#### PLENARY LECTURE

09:30 - 10:25

Plenary Room

Traditionally, evolution was assumed to move slowly over geological timeframes. Recent work has found that evolution can happen within just a few years, but can plants adapt fast enough to keep up with the current pace of climate change? Plant species are already responding to climate change by undergoing rapid evolution, altering their phenology, and undergoing remarkably rapid shifts in distribution. Some species are changing the timing of biological events, flowering and fruiting earlier than they did in the past; others are moving their ranges toward the poles, or uphill to remain within suitable climatic conditions. I will review current understanding of these changes, highlighting the fact that different species are changing in different ways and at different rates, and that not all of the responses are as we would expect. Most strikingly, a third of species seem to be shifting their distributions downhill or toward

### State of the World's Plants and Fungi



Alexandre Antonelli

Alexandre Antonelli is the Director of Science at the Royal Botanic Gardens, Kew, Professor at the University of Gothenburg and Visiting Professor at the University of Oxford. He studies the distribution, evolution, conservation and sustainable uses of species and develops methods to speed up scientific discovery and innovation.

latest report focused on how our communities could collectively work to fill in the most critical knowledge gaps – through innovative and sometimes unexpected approaches.

#### PUBLIC LECTURE

19:05 - 19:55

Plenary Room

To date, we have not been able to answer the question: How many species are there globally and in different parts of the world? The race is on to scientifically describe the world's plants and fungi, so we can better understand, protect, and sustainably use biodiversity. But how do we accelerate scientific research and conservation, while strengthening local capacity and equity? These are questions at the heart of Kew's State of the World's Plants and Fungi reports, which bring together global scientific expertise, large data sets and practical experiences to synthesise current knowledge on plants and fungi. It relies on two major advances: the release of the World Checklist of Vascular Plants and the extraction of new information on fungal diversity from analyses of environmental DNA in soil samples across the world. In this talk I will provide a short overview of the themes published so far and then take a deep dive into the

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### What do we know about mutualism? A thirty-year retrospective on a very young field

#### KEYNOTE LECTURE

08:30 - 09:25

N104



Judith L. Bronstein

Judith Bronstein University Distinguished Professor of Ecology and Evolutionary Biology at the University of Arizona, Tucson. She is co-editor of Annual Review of Ecology and Evolution and Systematics and has been granted the American Society of Naturalists Distinguished Achievement in the Conceptual Unification of the Biological Sciences Award 2023.

The study of mutualism (interspecific, mutually beneficial interactions) is a surprisingly young subfield of ecology and evolutionary biology; key patterns and processes only started to attract intensive attention in the 1990s. I will start by briefly summarizing the best-understood mutualisms in which plants are involved: nutritional mutualisms (including symbioses with mycorrhizal fungi and Rhizobium bacteria), transportation mutualisms (biotic pollination and seed dispersal) and protection mutualisms (involving ants that attack herbivores). I will then offer a capsule history of the study of mutualism, focusing on its origins and development and highlight key research questions that have emerged in recent years. Finally, I will lay out questions likely to drive mutualism research in the coming years. My approach throughout is to highlight features uniting mutualisms that differ radically in natural history, as well as features that make mutualisms similar to and different from other types of interspecific interaction. We are only now beginning to recognize what we need to know about these critically important interactions to help secure the future of plants and the larger systems in which they occur.

### Diploidization, Polyploidy, and the Evolution of Plant Diversity

#### KEYNOTE LECTURE

08:30 - 09:25

Plenary Room



Michael S. Barker

Michael Barker is an Associate Professor and Associate Department Head of the Department of Ecology & Evolutionary Biology at the University of Arizona, Tucson. His research focuses on the origins of biological diversity, particularly how sudden genomic events such as polyploidy and hybridization have contributed to the evolution of life.

Polyploidy, or whole-genome duplication, is widely recognized as an important force in the evolution of plants, but there are still many unresolved issues surrounding its role in evolution. Among them is reconciling the apparent success of ancient polyploid species with observations that contemporary polyploids have much lower net diversification rates than their diploid relatives. Here, I present new analyses of polyploidy across the plant phylogeny and explore the impact of species tree topology on WGD (whole-genome duplication) inferences. We find that multiple rounds of polyploidy occur in the ancestry of lineages when diploid species have higher net diversification rates than polyploid species, both using arbitrary rates as well as parameters derived from empirical analyses. Using empirical estimates of diploid and polyploid diversification rates from plants and estimates of the rate of polyploid speciation from diploids, our simulations indicate an average of 3.5 rounds of WGD in flowering plant species. Our simulations also indicate that the rate of diploidization is an important driver of the evolutionary dynamics of polyploidy and may explain variation in the numbers of ancient WGDs inferred in different lineages of eukaryotes.

### Machine learning and new inference algorithms: expanding what is possible in evolutionary biology and phylogenetic analysis

#### KEYNOTE LECTURE

08:30 - 09:25

N103



Isabel Sanmartín

Isabel Sanmartín is a Researcher at the Royal Botanical Garden of Madrid, Spain, and the Deputy Director of Research, as well as Editor-in-Chief of Systematic Biology. Her research focuses on the evolutionary and ecological processes behind general patterns of biodiversity distribution, with special focus on endemism, rarity and geographic disjunctions.

Attention across different fields of evolutionary biology is increasingly turning to more integrative and complex inference models, fueled by the emergence of next generation sequencing technologies and the rapid expansion of databases. In this context, a standing challenge is how to hybridize lineage-based, individual-based, and gene-based models to address all aspects of biodiversity to explain the biotic impacts of climate change. Statistical models in evolutionary biology are typically built around stochastic parameters interconnected by rigid dependencies, but there is a growing demand for models that allow for hidden, unobserved components. Moreover, some commonly employed models for evolutionary inference face challenges related to non-identifiability, where distinct model parameters induce the same probability distributions and are structurally or practically indistinguishable. Here, I review some possible solutions and paths forward in relation to these challenges, including the advent of online Bayesian phylogenetics, the popularization of (deep) machine learning approaches, and the introduction of probabilistic programming languages that promise to speed up analyses and tackle more complex biological questions in fields as diverse as phylogenetics, epidemiology, community ecology and phylogeography.