

# Congress News

#7 SATURDAY 27 JULY



Sponsorship

GOBIERNO  
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Edited by

REAL JARDÍN  
BOTÁNICOSEBOT  
SOCIEDAD BOTÁNICA ESPAÑOLA

**Introduction.** Interactions between plants and people over millennia have profoundly shaped societies by providing essential services like food, medicine, clothing, building materials, and bioenergy. Nevertheless, much remains to be understood about plant relationships with other organisms and their roles in ecosystems. To address the biodiversity crisis, collaborations across science, technology, arts, humanities, and

local and Indigenous communities are crucial. More than ever, we must leverage the power of plants through approaches that weave together different ways of knowing, doing, and being so we can better understand plant-human interactions, safeguard knowledge, and ensure that our planet remains diverse, healthy, and habitable for future generations.

## The Madrid Call for Action.

We propose ten strategic actions for plant scientists, botanical institutions, governments, the corporate sector, and civil society, aiming to address plant life degradation caused by human activities. These actions seek to strengthen the connection between plants and people, nurture mutual benefits, and enhance planetary health and resilience. The ten actions are the following:

### 1. Plant Diversity as the Foundation.

Identifying and naming plant diversity is crucial for conservation, restoration, and the sustainable use of ecosystems. Knowing the organisms surrounding us provides perspective on the rich diversity and complexity of the natural world and helps shape our identity. Understanding plant diversity depends on herbaria and other well-curated natural history collections, where specimens provide historical records and the ultimate source of verification of individual species.

**We call for improved support and recognition of the critical role of plant diversity studies, natural history collections, and botanical gardens.**

### 2. Botanical Education at all Levels.

Botanical education, both formal and informal, is essential from early childhood to adulthood to raise awareness of the importance of plants and equip new generations with fundamental knowledge of plant form and function. The World is changing rapidly, and understanding how plants grow, reproduce, adapt, interact with their environment, and contribute to human well-being is crucial to our ability to address the biodiversity crisis and ensure a sustainable future.

**We call for increased emphasis on botanical education from early childhood through life-long learning.**

### 3. Collaborative Transdisciplinary Approaches.

Plants are vital to life on Earth and indispensable for human existence. Integrating local and Indigenous knowledge, arts, humanities, and diverse scientific approaches broaden our understanding of plants. Diverse perspectives are central to understanding and managing our interactions with the natural world and preserving the ecological and evolutionary processes sustaining plant diversity for the future.

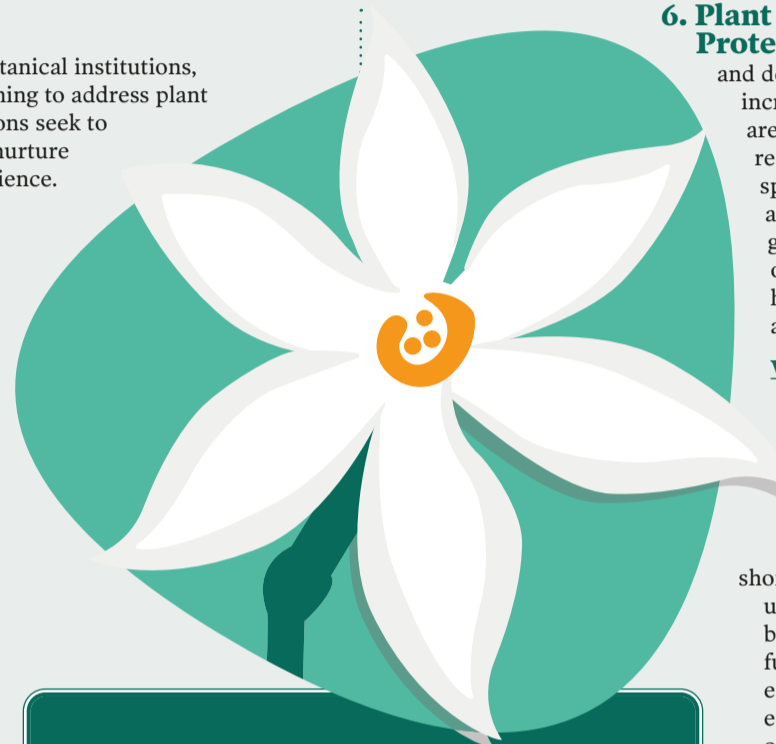
**We call for collaborative and transdisciplinary approaches to plant research, including local and Indigenous knowledge, the arts, humanities, and diverse scientific approaches.**

**4. Addressing Inequalities in the Plant Sciences.** Plant sciences have evolved through complex and unequal ways, from colonial extractive practices to the constraints imposed by long-standing inequalities in science funding and infrastructure. To achieve equitable coexistence, it is essential to understand biases in biodiversity knowledge, address unequal relations, and remove barriers to access and benefit-sharing. Inclusive and collaborative partnerships with local scientists and diverse stakeholders are crucial for building trust, facilitating horizontal knowledge exchange, and ensuring fair distribution of benefits and resources.

**We call for respectful, inclusive, and equitable approaches that benefit all stakeholders involved in research, policy formulation, and product development.**

**5. Recognizing Biocultural Diversity.** Plant diversity is closely connected to cultural diversity. Traditional knowledge is central to plant knowledge and links the plant sciences with local and Indigenous communities. Biocultural diversity includes the connections between species, ecosystems, and cultures and is reflected in language, spiritual practices, medicinal uses, and food traditions. Recognizing and sustaining the cultural services provided by plants is essential for a healthy planet.

**We call for improved recognition and support for biocultural diversity, including the co-production of knowledge.**



## THE MADRID DECLARATION

*Flourishing Together:  
Healthier Connections  
Between Plants and People  
for a Resilient Planet*

*"Plants are our past, present, and future.  
They sustain life on Earth."*

### 6. Plant Diversity is Central to Ecosystem Protection and Restoration.

Habitat loss and degradation threaten ecosystem integrity and increase the risk of extinction. Societal actions are urgently needed to safeguard natural systems, restore degraded habitats, protect biodiversity and species interactions, and sustain the ecological and evolutionary processes that maintain and generate biodiversity. A systemic transformation of global efforts is essential to prevent biotic homogenization and ensure ecosystem protection and restoration in ways that benefit all organisms.

**We call for conservation and restoration strategies that prioritize plant diversity while protecting the functioning of ecosystems and landscapes.**

### 7. Better Integration of Plant Knowledge into Policy.

Pursuing short-term, narrowly focused policy goals undermines the societal resilience provided by plants and habitats. Deep knowledge of the functions and benefits provided by plants is essential for an improved understanding of the ecological impacts of land use, the importance of preserving native species, and the benefits of habitat restoration. Informed strategies that promote ecological balance, enhance ecosystem services, and ensure long-term environmental resilience require better integration of plant knowledge into policy.

**We call for evidence-based decision-making, integrating botanical knowledge into sustainable long-term policy decisions.**

### 8. Harnessing Nature-Based Solutions.

Nature-based solutions can help address environmental, social, and economic challenges by enhancing biodiversity, improving water quality, and bolstering climate resilience. Restoring wetlands to mitigate flooding, reforesting areas to enhance carbon sequestration, and protecting coastal regions from extreme weather can help foster harmony between human development and the natural environment. Such strategies require a holistic understanding of ecosystems and a commitment to long-term ecological stewardship.

**We call for increased nature-based solutions that maximize species diversity, increase resilience to climate change, enhance plant conservation, and encourage sustainable management and ecosystem restoration.**

### 9. A Stronger Role of Plants in Achieving Sustainability and a Net Zero Economy.

Plants play a crucial role in achieving sustainability and a net-zero economy due to their exceptional ability to sequester carbon, regulate climate, and support biodiversity. Prioritizing the conservation and restoration of forests, grasslands, and wetlands can enhance carbon sinks, reduce atmospheric CO<sub>2</sub>, and sustain global processes. Plants also provide renewable energy, improve soil health, and boost resilience to climate change. Transformative change is essential for a just and sustainable future for both plants and humanity.

**We call for an increased recognition of the role of plants in achieving sustainability and establishing a net-zero economy.**

### 10. Increasing Awareness of the Centrality of Plants for Planetary Health and Resilience.

Plants have been the driving force for the evolution of biological diversity on Earth. They provide the air we breathe, the food we eat, the wood we use, and the many cultural services that are the building blocks of diverse human activities. Lifelong learnings that reinforce a deeper understanding of how plants impact our lives and those of other organisms are crucial for planetary health and resilience.

**We call for increased awareness of the importance of plants for planetary health and resilience.**

MICHAEL BARKER

## The role of polyploidy in plant evolution

“The story of plant evolution is the story of polyploidy evolution”, enthusiastically explained Professor Michael Barker to the assistants at his yesterday's lecture. The footprint of polyploidy, or whole-genome duplication (WGD), in the DNA of plants is evident. Nearly 30% of the current flowering plants are recent polyploids, but all plants have an average of 3.5 rounds of WGD in their history. However, the question remains as to how to reconcile the apparent success of ancient polyploid species with the lower rates of diversification of contemporary polyploids compared to the diploid relatives.

Based in new analyses of polyploidy across plant phylogeny and phylogenetic simulations conducted at his lab, Prof. Barker showed that the rates of diploidization are key to understand the reported low rates of polyploidization.

Furthermore, Prof. Barker highlighted the strong legacy of ancient WGDs events, which are important in the domestication processes. To explain current evolution and adaptation patterns. “Even after millions of years”, he explained, “polyploidy is still influencing genetic variation in plants, and its research is essential to understand the evolution of plants”.



# TAGS & TOPICS OF IBC 2024

Speakers at lectures and symposia have debated the great challenges of botanical science during the congress. These are some of the topic tags discussed.

## #Systematics

**PILAR CATALÁN** The XX IBC hosted a large number of symposia related to Plant Systematics and its related topics. 39 symposia corresponded to different Systematic approaches, 25 to Phylogenetics and Phylogenomics, 6 to Macroevolution, and 5 to Taxonomy. Among the key advances in these XX IBC symposia were the incorporation of different sorts of NGS genomic data, and larger taxon sampling, which has increased the phylogenetic resolution of the studied groups. In most cases, it was coupled with functional analysis of adaptive traits and a more thorough taxonomic revision, which has resulted in a better understanding of the ongoing biological processes and has helped to improve the classifications.

Several systematic and evolutionary symposia have revised and updated the knowledge of some of the largest orders or families of angiosperms (e.g., Asteraceae, Orchidaceae, Fabaceae, Poaceae, Brassicaceae, Solanaceae, Euphorbiaceae, Liliaceae) and other flowering plants (e.g., Cyperaceae, Moraceae, Areaceae, Apocynaceae, Myrtaceae, Salicaceae, Lamiales, Ranunculales, Magnoliales, Zingiberales), and of gymnosperms, pteridophytes and bryophytes.

Various symposia were devoted to an integrative taxonomy of regional floras, incorporating in some cases the genomic characterization of its elements (e.g., Australia, Mediterranean, Eastern Asia, pan-Tropical areas). Some symposia targeted more specific issues such as genome dynamics and karyotype evolution, ecophysiology, and evo-devo research, as complementary tools for modern systematics. Other symposia dissected the importance of biological events, like hybridization, polyploidization, sexual vs. asexual reproduction, and the effect of selection on plant evolution and speciation. The valuable contributions to these symposia have greatly fostered the scientific knowledge on plant systematics and diversity.

## #Global Change

**JUAN LORITE** The congress showcased a wide array of symposia addressing various aspects of global change ecology, with ten sessions dedicated to this leading theme. Session on “Ecological and Evolutionary Dynamics at the Rear Edge under Climate Change” explored how species at the trailing edges of their ranges are adapting to changing climate, highlighting the critical importance of these dynamics for conservation strategies. “Assessing the Interplay Between Genetic and Non-Genetic Mechanisms Contributing to Phenotypic Variation and Adaptation Over Time” symposium delved into the complex mechanisms driving phenotypic plasticity and evolutionary responses to environmental shifts.

The two-part series “African Taxonomy: A Collaborative Effort Towards Biodiversity Conservation” spotlighted the collaborative efforts in cataloging and preserving Africa's rich biodiversity, emphasizing the need for international cooperation in taxonomic research. In the session on “The Functional Role of Non-Charismatic Biodiversity in the Face of a Changing World” discussions focused on the often-neglected species and their fundamental role in ecosystem functioning and resilience in the face of global change.

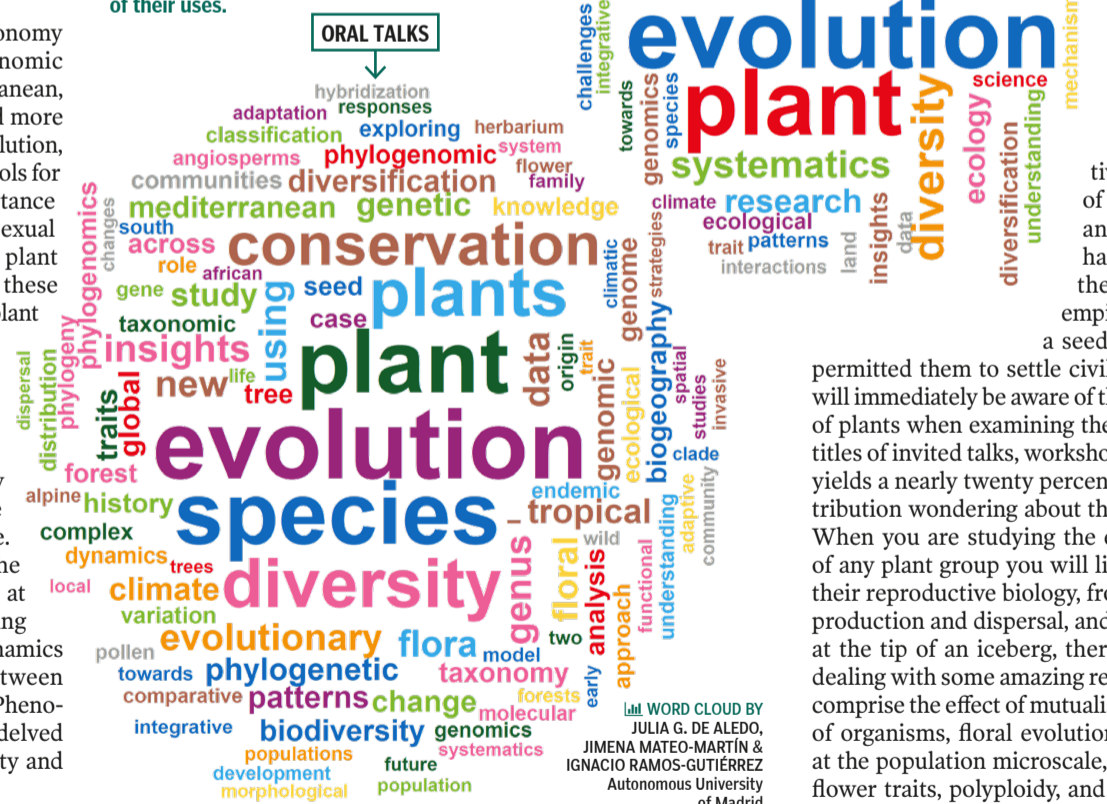
“Assessing and Classifying the Positive and Negative Impacts of Alien Plants” provided a nuanced view of invasive species and provided insight into their detrimental and beneficial effects on ecosystems. “Climate Change Effects on Alpine Plant Species and Communities: Insights from the GLORIA Network” highlighted

ongoing research on alpine ecosystems, presenting valuable data on how climate change is altering alpine habitats worldwide.

Symposium on “Global Change and Evolutionary Adaptation of Plants in Coastal Areas” focused on the adaptive responses of coastal plant species to rising sea levels and increased salinity. Finally, “Relict Plant Vulnerability to Climate Change” examined the threats faced by plant species that have persisted through past climate fluctuations, but now face increased risk due to ongoing climate change.

## WHAT ARE BOTANISTS TALKING ABOUT?

Around 700 symposia and 1500 oral talks have been presented during this week at Madrid IBC, but what are the most repeated words? From their titles we can see that of course diversity and evolution are hot topics in the botany world, but also their conservation and concern about global change and preservation of their uses.



## #Genetics

**MYRIAM HEUERTZ** Plant science has clearly arrived in the era of genetics! Of the 268 symposia held at the IBC only 40 did not contain the word “genetics” in any of the abstracts! The popularity of genetic applications is not surprising as genetic studies allow us to elucidate the origins of plant diversity, understand the genetic basis underlying the diversity of their traits and adaptations, estimate the genetic connection between species, the diversification of clades and much more. Genetic connectivity vs. isolation was for example a central topic to explain biogeographic patterns in the symposia on Mountain Biodiversity and Evolution and on

Evolutionary trends in sky-islands. Genetic and genomic studies of adaptation were presented in symposia on evolutionary ecology, floral evolution and specialization, the evolution of plant sexual reproduction, plant responses to stress and adaptation to climate change, to just name a few. Several symposia also focused on the development and interpretation of genomic resources such as new reference genomes for a variety of plant species and on the development of methods for the production and processing of genomic data. For example, a hugely popular Symposium was titled “New Frontiers in Phylogenomics”, comprising four sessions. Genetic approaches have also revolutionized conservation science, from applications in herbariomics and conservation of seed collections, to informing decision-making for the conservation and restoration management of endangered species or complexes of hybridizing species.

## #Reproductive biology

**JUAN ARROYO** Reproduction is a key process in any organism to persist itself or their genes. It might imply sex or not. Plants attain a huge diversity of reproductive strategies, which are at the core of their ability to colonize the world and to diversify. Plant reproduction has intrigued humans at least since the Neolithic revolution when they empirically discovered how to germinate a seed and started to grow cultures that permitted them to settle civilizations. Any attendee of IBC2024 will immediately be aware of the diversity of reproductive features of plants when examining the programme, as a rapid look at the titles of invited talks, workshops, satellite meetings and symposia yields a nearly twenty percent possibility of confronting a contribution wondering about the intricacies of plant reproduction. When you are studying the ecology, evolution and systematics of any plant group you will likely have to disentangle aspects of their reproductive biology, from pollination to fecundation, seed production and dispersal, and seed and seedling emergence. Just at the tip of an iceberg, there are several invited talks directly dealing with some amazing reproductive aspects of plants. These comprise the effect of mutualistic relationships with multiple kind of organisms, floral evolution across geological times, but also at the population microscale, genomics and development of key flower traits, polyploidy, and the conundrum of sex and gender in plants, a complicated issue also in plants, just to return to the start of this brief report.

## #Biogeography

**FERNANDO OJEDA** In essence, biogeography is the study of patterns of spatial distribution of biodiversity on Earth, encompassing their origin, expansion into their present area, and future distribution. In this XX IBC, different biogeographical subjects have been discussed, including historical (at the geological scale), ecological, and conservation biogeography. The role of long-distance dispersal in the distribution of taxa in isolated areas, from oceanic archipelagos to sky islands, has been

## CLOSING CEREMONY

OF THE XX INTERNATIONAL BOTANICAL CONGRESS

🕒 16:00 - 17:00 h 📍 Plenary Room

### AGENDA

- ▶ **Conclusions** of the XX International Botanical Congress
- ▶ **Resolution** to accept the decisions and appointments of the **Nomenclature Section** of the XX International Botanical Congress

#### ▶ Awards Ceremony

- ▶ IAPT Vicki Funk Award for Distinguished Service
- ▶ IAPT Engler Medal in Gold

#### Awards to contributions presented at the XX IBC

- ▶ Student poster awards sponsored by PeerJ
- ▶ Student talk awards sponsored by PeerJ
- ▶ Early career researcher talk award on taxonomy or systematics sponsored by Pensoft
- ▶ Student poster award sponsored by the Royal Botanic Garden (CSIC) Madrid
- ▶ Student talk award sponsored by the Royal Botanic Garden (CSIC) Madrid
- ▶ Best student poster awards sponsored by the organizing committee of the XX IBC
- ▶ Best student talk awards sponsored by the organizing committee of the XX IBC

#### ▶ Final resolution

of the XX IBC (Madrid Resolution)

- ▶ **Presentation** of the venue of the XXI International Botanical Congress 2029 **Cape Town** by **Dr. James Stephen Boatwright** (president of the organizing committee) | University of the Western Cape

#### ▶ Institutional closing Words



## #Conservation

📌 **JULI CAUJAPÉ** ■ Fast global changes are undermining the intrinsic survival assets of plants, and the predicted species losses entail major negative impacts on all ecosystems on Earth. Challenges faced by Conservation Biology were discussed in over 36 symposia, most of which brought together several major disciplines, illustrating the multifaceted nature of questions under this topic.

These symposia casted their geographical and ecological foci on islands, alpine plants, freshwater habitats, ultramafic soils, cliff floras, biodiversity-rich regions (e.g. Eastern Asia; or Mediterranean-type regions), small refugia, and relict plants. Taxonomically, they cover widespread lineages (e.g. heathers; or threatened trees), alongside not-so-well known organisms (bryophytes; cycads;

lichens). Securing agro-biodiversity as a source of models for biological and evolutionary questions was another outstanding topic, addressed in symposia about seed conservation of the genetic diversity of wild species, and crop relatives (on cultivated grapevines, or on frankincense).

The contributions of genetic, phylogenetic and trait diversity methods to suggest conservation priorities impregnated different symposia, and include spatial phylogenetics and geographical information systems, the applications of population genetic techniques to in-situ conservation and habitat restoration, the quantification and consequences of gene-flow and hybridization, plant ecology, and new developments in the use of DNA sequencing for plant identification,

encompassing continental alliances around plant genomics.

Global information repositories and consortia are deservingly gaining ground to tally biodiversity, also encompassing digital integration of data and publications. Advances to develop a consensuated taxonomy for land plants were updated in symposia about World Flora Online, for alien floras, and for cultivated plants.

Regarding education and outreach, one symposium investigated society engagement as an increasingly important factor for the long-term preservation of ecosystems and species at-risk, and other symposium was dedicated to reverting 'Plant blindness' and to discuss the needed shifts in the social perception of plants and their scientific conservation.

## THE 2030 DECLARATION ON SCIENTIFIC PLANT AND FUNGAL COLLECTING

Arising from discussions at the 2023 State of the World's Plants and Fungi symposium, and presented at the IBC by Professor Alexandre Antonelli of the Royal Botanic Gardens, Kew, the 2030 Declaration on Scientific Plant and Fungal Collecting contains five commitments towards filling key knowledge gaps in plant and fungal diversity. It aims to achieve this through providing guidance on collaborative and targeted collecting and research activities to maximise efficiency, facilitate knowledge exchange and promote equitable collaborations.

The five commitments can be summarised as follows:

- 1. USE EVIDENCE-BASED COLLECTION STRATEGIES.** Be guided by evidence – data, analyses and knowledge – when deciding where to focus collecting activities, through iterative, inclusive and reproducible processes.
- 2. STRENGTHEN LOCAL CAPACITY.** Support professional development and research infrastructure in collecting regions and ensure specimens are deposited in the country of origin, where facilities exist.
- 3. COLLABORATE ACROSS TAXA AND DISCIPLINES.** Increase collaboration to cover multiple taxonomic groups and scientific disciplines, to gain a more complete understanding of biodiversity.
- 4. COLLECT FOR THE FUTURE.** Collect and store samples in ways that maximise their potential for future use, while safeguarding existing collections.
- 5. SHARE THE BENEFITS.** Share the benefits of collecting efforts widely, particularly with the source communities and national data centres.

This Declaration is a first step towards increased global and regional coordination of scientific collecting efforts. We hope conversations will continue during and in between botanical and mycological congresses at international, regional, national and local levels to foster more decentralised and complementary efforts.

The botanical and mycological communities have already shown strong support for the Declaration, with more than 800 signatories from 83 countries, including 106 organisational signatories.



IT'S NOT TOO LATE TO SHOW YOUR SUPPORT!  
TO ADD YOURSELF OR YOUR ORGANIZATION TO  
THE LIST OF SIGNATORIES, FOLLOW THIS QR CODE.



Alexandre Antonelli at his public lecture on the State of the World's Plants and Fungi.

© DAVID GARCÍA HERRÁEZ

a frequent topic. Some contributions focused on the importance of plant-animal mutualistic interactions in explaining biogeographic patterns. There have also been contributions dealing with transitions of plant taxa to disparate climates, with diversification mostly occurring prior to climate shifts.

Tectonic convergence zones and straits connecting large land masses have long been viewed as key regions for the study of biogeographical processes. In this sense, some contributions have highlighted the relevance of glacial refugia and dispersal corridors – exposed by the glacial drops in sea level – for the reconstruction of ancestral areas and postglacial expansions. Glacial climatic refugia not only facilitate a comprehensive understanding of present-day biogeographical patterns but are also relevant to biodiversity conservation in the light of ongoing drastic changes in habitat and climate.

Most phylogeographical questions were addressed through the use of next-generation sequencing techniques, with machine

learning employed to model spatial distributions. Furthermore, population genomics approaches have been employed to investigate geographic patterns of genetic structure. It is thus indisputable that we can speak of "next-generation biogeography". However, most studies have also used herbarium collections, floristic inventories and fossils, which illustrates the continued value of classic botanical work. Alexander von Humboldt would have surely enjoyed this XX IBC. I certainly did.

## #Plants & Society

📌 **JOAN VALLÉS** ■ Botany is no longer the study of plants by humans. Other focal points must be added to this definition of this congress' discipline, particularly relationships between people and plants –generating a huge corpus of traditional knowledge on plants names, uses and management-, perception of plants by humans,

the influence of human activity in plant populations, and the issues derived from this contact. Ethnobotany and citizen science are key terms in this field, implying the investment of people without formal scientific education in scientific activity linked to plants. Collaboration exists between ethnobotany and other botanical matters, e.g. molecular phylogeny and evolution, biogeography, conservation or phytochemistry.

Ethical (regarding, among others, obtaining traditional knowledge information) and outreach (one of the aims of ethnobotanical research being preserving traditional knowledge and returning it to the society from which it comes, particularly the youngest generations) issues are associated to this focus of botany. In this IBC, this has been abundantly addressed, with many symposia, oral and poster contributions, either thematically monographic or at the crossroad with other botanical areas, definitely enlarging botany's reach in a multidisciplinary context, and showing the results of plants and society interaction as a promising subject for further research.

# SEE YOU IN CAPE TOWN

**Botanists have a new date  
from 21-28 July 2029 in South Africa**

The South African Botanical community is honoured to be hosting the 21st International Botanical Congress in Cape Town, South Africa, from 21-28 July 2029. The congress will take place at the world-class Cape Town International Convention Centre, a 20-minute drive from the award-winning Cape Town International Airport, which offers direct flights to all major global hubs. Located in the city's central business district, the Convention Centre is within walking distance of travel services, the popular Victoria & Alfred Waterfront, and a variety of top hotels and accommodation options.

Not only is South Africa rich in cultural diversity (with 12 official languages), but it is also home to three of the world's biodiversity hotspots, two of which are found in the Greater Cape Floristic Region.



Cape Town is home to the globally celebrated Table Mountain, one of the Seven Natural Wonders of the World, as well as Kirstenbosch Botanical Gardens. The flora of the region is world famous, and unique in its exceptional diversity and high levels of endemism, comparable to those of island systems. It is therefore fitting that the theme of the conference is 'A celebration of diversity', celebrating not only the botanical treasures across the world, but also the exceptional global community studying these.

As the number one convention destination in Africa, Cape Town has extensive experience in hosting leading international conferences, working closely with stakeholders to deliver safe, secure, and successful events. The conference promises meaningful academic engagement and knowledge sharing. A vibrant program



Aerial view of Cape Town with Table Mountain in the background.



*Protea cynaroides*,  
the national flower of South Africa

will be compiled through symposia, invited and plenary lectures. It aims to cover a diverse number of areas in the plant sciences, hopefully with participation of both established and early-career scientists.

It is long overdue for the IBC to be held on the African continent. Cape Town, often called the gateway to Africa, offers a spectacular venue for this event, and its botanical community looks forward to welcoming plant scientists from across the globe to the city in 2029.

## Morphological and genomic consistency for 20 million years

### KEYNOTE LECTURE

08:30 - 09:25

N103



**Elizabeth A. Kellogg**

Elizabeth Kellogg is the Robert E. King Distinguished Investigator at the Donald Danforth Plant Science Center in St. Louis, Missouri, where she has been a Principal Investigator since 2014. Her specialty is the evolution and classification of flowering plants, studying both their morphological and molecular characteristics.

Nearly one fifth of the world's land area is inhabited by wild grasses of a single clade, the tribe Andropogoneae. A cultivated member of this tribe, maize, now replaces wild grasses in many areas, dominating the landscape and the world's economy. The tribe is dispersed by spikelets borne in pairs whose aerodynamic properties are consistent with long-distance dispersal by wind for most, but not all, species. We have generated de novo genome sequences for about 40% of the 1200 species in the tribe using a combination of long-read and short-read sequencing. The 33 new long-read genomes are high quality as shown by several measures of completeness and contiguity. Genome alignments indicate collinearity of genomes, with the ancestral haploid number and architecture of 10 chromosomes being preserved even through polyploidization events. We have developed data and tools to improve annotation of the maize genome, inferred the chromosomal evolution of maize, investigated amplification of transposable elements, and begun to identify conserved regulatory sequences. Together these resources can enhance breeding for environmental change in the crops and illuminate the history of wild species.

## Save the male – reflections on the male function of flowers and flowering plants

### KEYNOTE LECTURE

08:30 - 09:25

Plenary Room



**John R. Pannell**

John Pannell is Professor of Plant Evolution at the University of Lausanne, Switzerland. His research focuses on the evolution and ecology of plant sexual systems, particularly evolutionary transitions between combined and separate sexes and the evolution of sex chromosomes, as well as the implications of metapopulation dynamics for plant trait evolution.

Plant sexual reproduction involves strategic decisions in the context of variation in sex and gender, such as who to mate with and how often (the mating system), whether and when to mate as a male or a female partner, and how much resources to allocate to each sexual function (the sex allocation). How does selection on the mating system interact with selection on sex allocation? How well do we understand the costs and benefits of being both male and female? Can we satisfactorily address why hermaphrodite plants should ever have been rendered dioecious? Can current theory explain the distribution of combined versus separate sexes among individuals in a population? I will reflect on variation in sex and gender in plants, especially on the benefits and costs of being male, drawing upon: observations of plant and floral sex ratios; evidence of sexual selection in wild and experimental populations; observations of rapid transitions between combined and separate sexes under experimental evolution; the association between mating pair identity and sex allocation strategies; and the phylogenetic distributions of reproductive and other traits.

## Beyond regional flora's: what do we know about the ecology and evolution of the African flora?

### KEYNOTE LECTURE

08:30 - 09:25

N104



**Muthama Muasya**

Muthama Muasya is Associate Professor and Head of Department of Biological Sciences, University of Cape Town, and also the President of the Southern African Association for Systematic Biology. His research includes the systematics of the plant family Cyperaceae, and the evolution of the Cape and African Flora.

Studies on the diversity of African plants have historically been limited. Efforts to document the floral wealth have spanned nearly two centuries, but the tropical regions of the continent have only been more recently studied, and knowledge gaps remain. The continent has a rich diversity of vascular plants, with over 65,000 species, distributed in five major vegetation types (lowland forests, savannas, temperate, montane and alpine, and desert). Africa position, straddling the equator and its earlier emergence of open habitats, drove the origin of the earliest savanna lineages, particularly C4 graminoids and associated fauna. The temperate (Cape) flora, together with the montane and alpine flora, has assembled more recently. Most intriguing is the assembly of the arid flora, where there is evidence for both antiquity and recent origin, and hypotheses on an African arid corridor persist. Heterogeneity in topography, soils and climate, together with fire and biotic interactions, drives the wide species richness and functional diversity. With a focus on the Cenozoic, the current knowledge and gaps on the ecology and evolution of African flora will be interrogated.

Lecture sponsored by



## Evolution and development of iridescent petals

### PLENARY LECTURE

09:30 - 10:25

Plenary Room



**Beverly J. Glover**

Beverly Glover is Professor of Plant Systematics and Evolution at the University of Cambridge and Director of the Cambridge University Botanic Garden. Her research combines molecular genetic and functional analyses, taking an eco-evo-devo approach to understand floral traits that function in pollinator attraction, plant fitness and evolutionary radiations.

The petal surface affects the optical properties of the flower, its temperature and how it feels to foraging insects. The enormous diversity of flower colour is largely the result of modifications to and combinations of chemical pigments. But some plants also use physics to modify the colour of their flowers. Specifically, iridescence occurs when the colour of a surface appears different when that surface is viewed from different angles, and can only be produced using structural methods, not pigments. Iridescence constitutes a novel way in which flowers attract insect pollinators and its study can give new perspectives on plant-pollinator interactions, as well as approaches to generate structurally coloured materials for a range of applications. In this talk I will describe how diffraction gratings, formed from folds of the epidermal cuticle, can produce structural colour in flowers. I will summarise our recent work, analysing the distribution and diversity of this trait in the angiosperms, its function in pollinator attraction and the developmental programmes underlying the formation of floral iridescence, that is, the molecular changes underpinning their evolution.



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