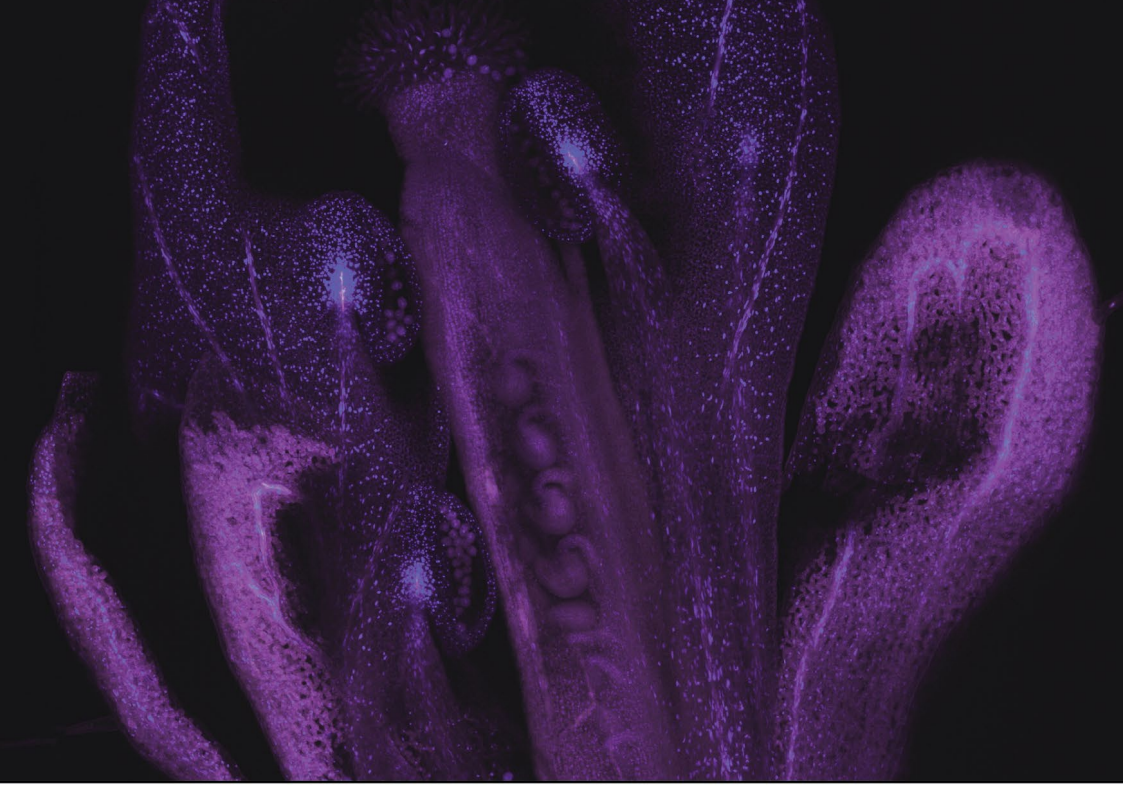

Sainsbury Laboratory Cambridge

BLOOMING NUMBERS

UNIVERSITY OF CAMBRIDGE

THE SAINSBURY LABORATORY UNIVERSITY OF CAMBRIDGE

GreenSTEM Site 5
#RHSChelsea

RHS Chelsea Flower Show 2025

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THE SAINSBURY LABORATORY
UNIVERSITY OF CAMBRIDGE

Sainsbury Laboratory Cambridge

Decoding how plants work

At the Sainsbury Laboratory we're fascinated by the dynamic systems that drive plant growth and development.

Plant research isn't simple—it's a puzzle starting with the tiniest molecules to whole plant populations spanning forests and fields.

Sainsbury Laboratory
University of Cambridge
47 Bateman Street
Cambridge
slcu.cam.ac.uk
enquiries@slcu.cam.ac.uk

Blooming Numbers

Flowers are more than just beautiful. Their colours, shapes and patterns have evolved to attract pollinators, protect vulnerable pollen and even help to distribute their seeds.

Blooming Numbers is an interactive exhibit that highlights the latest discoveries in plant science research by tracing a flower from its beginning as a single cell to a fully developed flower, exploring its evolutionary adaptations that enhance pollination, seed dispersal, and ultimately, its survival.

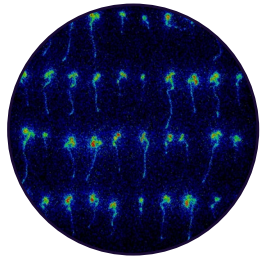
Discover why we take a quantitative approach to how we study plants by combining experiments with computational modelling.

Starting with the flower

Starting with the flower, *Blooming Numbers* explores the complex processes of plant development—a field still full of scientific questions.

Research across scales

We investigate the fundamental regulatory systems of plants across multiple scales, from molecular biology and cells to plants, populations and ecosystems.



Interdisciplinary approach

We bring together specialists and techniques from diverse fields—mechanics, molecular biology, genetics, genomics, imaging, computational modelling, evolution and mathematics.

New technologies

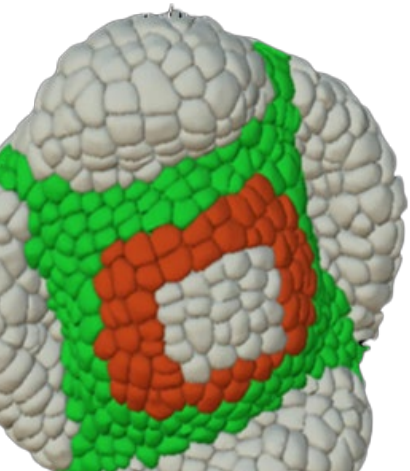
We work with a broad range of species, use and develop cutting-edge tools, including high resolution microscopy, advanced modelling and specialised genetic reporters.

The Exhibit

Floral Genetics: We begin our journey with a broad view of the fascinating diversity in flower structures

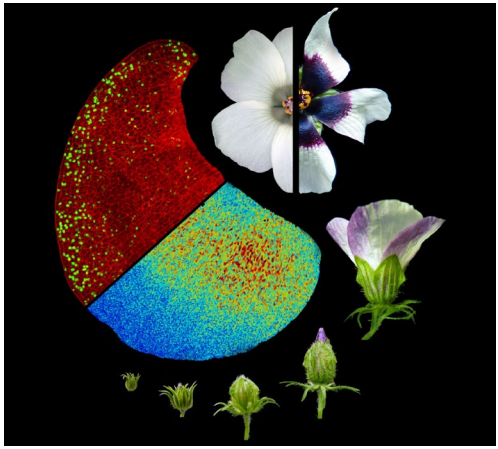
Zooming In: Building on our exploration of floral diversity, we now zoom into the cellular level to see floral organs under the microscope. Using a scanning electron microscope (SEM), you can explore the intricate structures of these organs in incredible detail. This microscopic view reveals the hidden beauty of flowers.

Focusing on Petals: While petals are often admired for their beauty, their primary purpose is to attract pollinators. At this station, visitors will discover the fascinating mechanisms behind petal patterning and how they serve as signals to guide pollinators to nectar and pollen.

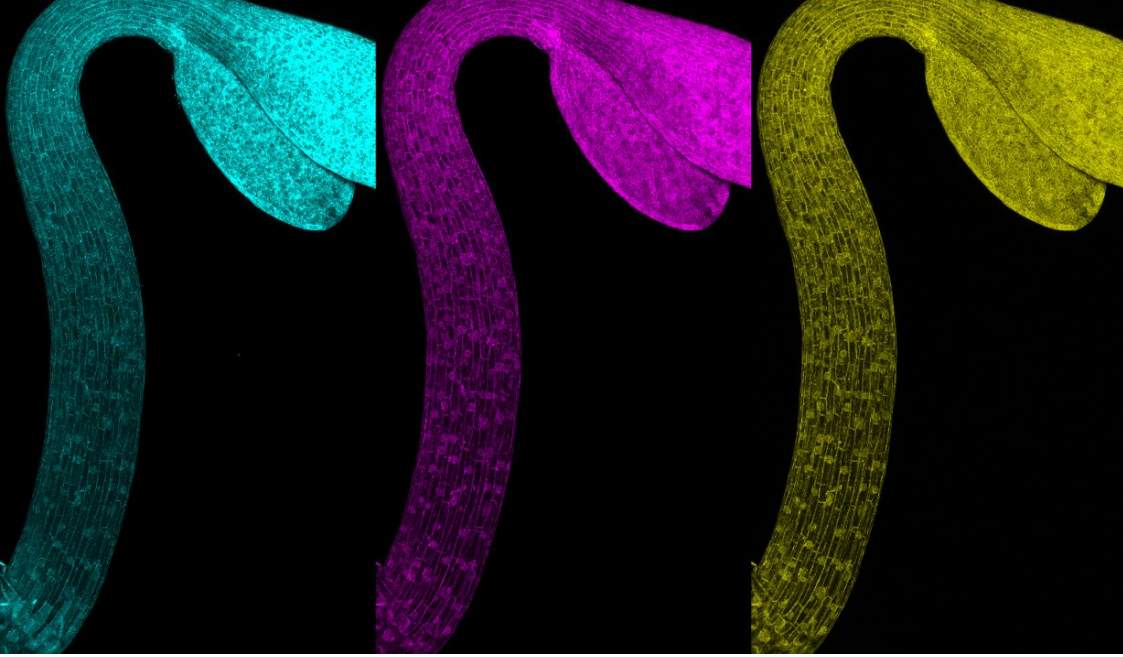


Seeing like a Bee: Most flowers have petal patterns to guide pollinators to locate nectar and pollen, but some patterns are not visible to us. Use a mini-UV camera to see like a bee.

Evolution of Plant Development: To understand how flower traits have evolved over time, we need to take an evolutionary developmental biology (evo-devo) approach. At this station, visitors will learn how computational models are used to simulate the long-term evolution of plant development.



Building a 4D Virtual Flower: How does a clump of identical cells turn into a flower? Find out about an international project to build a 4D virtual flower.



Seeds of Uncertainty: Next, we move into the realm of gene expression and how it influences plant development. At this station, you will learn about research revealing how plants hedge their bets for survival.

Dynamic Plants: Gene regulatory networks and gene expression all contribute to how a plant responds to its environment. Plant hormones are the messengers that tell specific parts of plants how to grow and respond. Find out about advanced biosensors that are revealing for the first time hormone dynamics.

Plant Biomechanics: Biomechanics also plays a crucial role in plant development and growth by influencing structural integrity, mechanical signaling, and the ability to adapt to environmental forces. Discover how plants employ clever biomechanics strategies.

Power to the Flower: Plants and microorganisms have interacted for more than 450 million years in ways that shaped diversity and helped plants colonise land. Discover how friendly microorganisms living inside plant cells help plants grow better.

Arabidopsis thaliana hypocotyl. Image by Maxime Josse

The Pollinator Patch

A mini garden to champion pollinators

Flowers are beautiful to us, as they are to their pollinators. Through coevolution, flowers and pollinators have developed specialised traits that benefit one another.

While the rest of the *Blooming Numbers* exhibits explores the science behind the growth and development of these specialised floral organs, 'The Pollinator Patch' provides inspiration and practical ideas to support pollinators.

'The Pollinator Patch' showcases the incredible diversity of plants that can be grown in a small area to support bees, butterflies, and other important species.

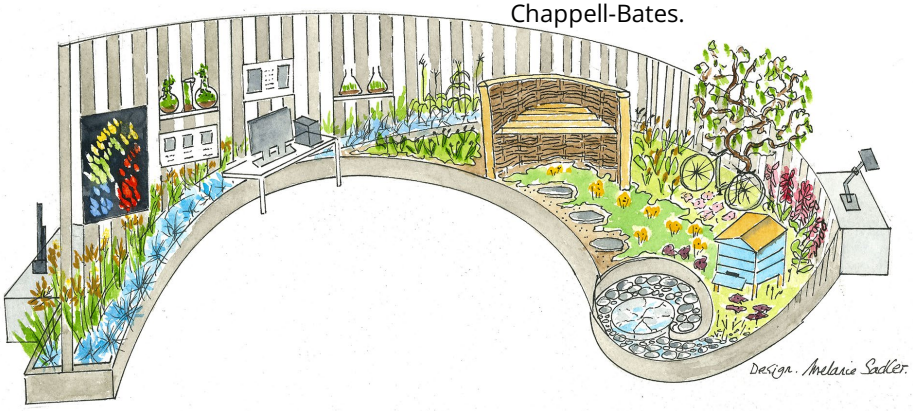
Additionally, it demonstrates simple things that everyone can do to support pollinators, such as providing resources for them to build their nests, housing and, most importantly, a safe source of water.

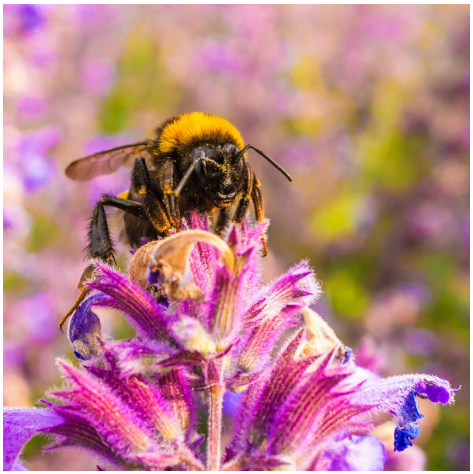
Passion behind the design

The Pollinator Patch was designed by Melanie Sadler, who has been instrumental in fostering wildlife-friendly spaces for decades at her family's Oakington Garden Centre.

The design also pays homage to iconic elements of Cambridge, featuring a willow bicycle, a water feature symbolising the River Cam, and a beehive repurposed for solitary bees that is painted in the signature Cambridge Blue.

All the plants were selected and grown onsite by Nursery Manager Ali Chappell-Bates.





Melanie Sadler (right), her daughter Patricia (middle) and Ali Chappell-Bates (left) have been enthusiastic and supportive of the Sainsbury Laboratory's idea to exhibit at Chelsea and help us to share our passion for plants.

It has been an absolute privilege to have them join us on this once-in-a-lifetime Chelsea adventure.

Oakington Garden Centre
Dry Drayton Road
Oakington
Cambridge CB24 3BD
oakingtongardencentre.co.uk

Baskets for Bees

Celebrating 30 years of nurturing people, plants and nature

Darwin Nurseries, a thriving therapeutic horticultural project and farm shop in Cambridge, is celebrating its 30th anniversary this year.

A unique NHS service provided by Cambridgeshire and Peterborough NHS Foundation Trust, Darwin Nurseries supports adults with learning disabilities, neurodiversity and mental health challenges to build confidence, develop new skills, and stand at the centre of the service and community.

Set across 7.5 acres, the site is home to greenhouses filled with seasonal plants, newly planted woodlands, an ancient orchard and a collection of friendly animals including goats, pigs, sheep, chickens, ducks and rabbits.

Each year, Darwin's hanging baskets bring colour and joy to homes and businesses across East Anglia. For their 30th year, they've taken this tradition one step further with "Baskets for Bees"—a vibrant display created for the *Blooming Numbers* exhibit at the RHS Chelsea Flower Show.

This special display showcases how traditional hanging baskets can be transformed using pollinator-friendly plants to support wildlife.

True to their values, the Darwin Nurseries team uses sustainable practices like peat free plant production, rainwater harvesting, composting, no dig and permaculture to nurture biodiversity and promote how green spaces can foster health, well-being, and happiness for all.

NHS
Cambridgeshire and Peterborough
NHS Foundation Trust

Darwin Nurseries
encouraging growth

Darwin Nurseries
5 Quy Water
Newmarket Road
Teversham
Cambridge CB1 9AT
cpft.nhs.uk/darwinnurseries

Image captions

Plant List

Plant science's model species

Arabidopsis thaliana (thale cress)
Nicotiana benthamiana
Brachypodium distachyon
Hibiscus trionum (black-eyed Susan *flower of an hour*)
Hibiscus richardsonii
Hordeum vulgare (barley)
Lunularia cruciata (crescent cup liverwort)
Marchantia polymorpha (common liverwort)
Medicago truncatula (barrel medic)
Physcomitrium patens (spreading earth moss)
Tradescantia zebrina 'Violet'
Zea mays (maize)

Science demonstrations

Avena sterilis (wild oats)
Calendula officinalis (marigolds)
Xerochrysum bracteatum (strawflower)
Triticum aestivum (wheat)

Hidden UV petal patterns

Bidens ferulifolia (sundrop)
Bidens aurea
Calendula officianalis (sunset bath)
Geranium × johnsonii Johnson's blue (Cranesbill/hardy geranium)
Geranium pratense (Cranesbill/hardy geranium)
Taraxacum officinale (dandelion)

The Pollinator Patch And Basets for Bees

Grasses
Festuca glauca (Blue fescue)
Lagurus ovatus (Bunny tails)
Setaria italica (Foxtail millet)
Stipa gigantea (Golden oats)
Zea mays Fiesta (Sweet corn)
Zea mays Early bird (Sweet corn)
Zea mays Earli king (Sweet corn)

Dicots
Bellis perenis (Lawn daisy)
Bidens aurea Aurea (Tickseed/Arizona beggar's ticks)
Bidens ferulifolia Sun Drop (Tickseed)
Calendula officinalis Sunset buff (Pot marigold)
Calendula officinalis Snow princess (Pot marigold
Cerinthe major purpurascens (Honeywort)
Consolida ambigua Fancy Belladonna (Larkspur)
Cynoglossum zeylanicum Mystery rose (Chinese forget-me-not)
Daucus Carota (Wild Carrot)
Digitalis purpurea Excelsior mix (Foxglove)
Phacelia tanacetifolia (Scorpionweed)

Calendula officianalis (snow princess)
Eschscholzia californica (Californian poppy)
Geranium x jonsonni (Johnson's blue)
Gerarnium sylvaticum (Mayflower)
Hibiscus trionum (black-eyed Susan/flower of an hour)
Oenothera biennis (common evening primrose)
Digitalis purpurea Apricot delight (Foxglove)
Erigeron karvinskianus (Mexican fleabane)
Eschscholzia californica Single mixed (Californian poppy)
Geum avens Totally tangerine (Geum)
Gypsophila elegans Covent Garden (Baby's Breath)
Hesperis matronalis (Sweet rocket)
Iberia umbellata (Candytuft)

Luna annuaria (Honesty)
Oenothera biennis (Evening primrose)
Penstemon (Electric blue)
Saliva pratensis Fashionista Midnight Model
Salix tortuosa (Twisted willow)
Salvia greggii Amethyst Lips
Salvia greggii Hot lips
Salvia nemorisa Lyrical white
Salvia x sylvestris Marvel dark blue
Salvia x sylvestris Marvel rose
Scabiosa caucasica Fama White (Pincushion flower)
Scabiosa columbaria Butterfly Blue (Pincushion flower)
Taraxacum officinale (Dandelion)
Trifolium pratense (Red clover)
Vicia faba Witkiem (Broad bean)

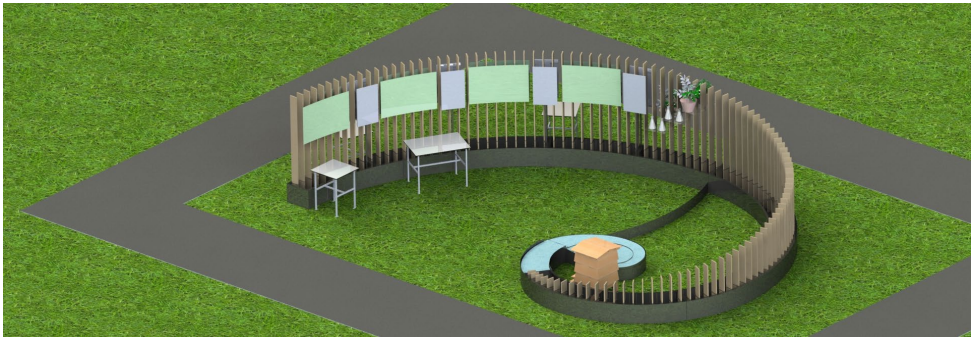
Engineering Nature

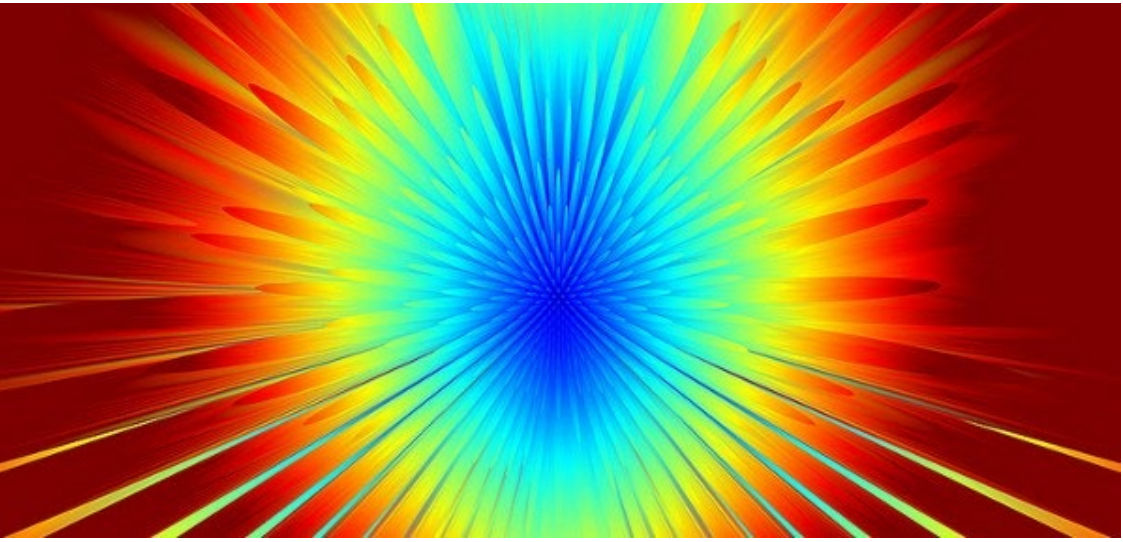
Building a Fibonacci spiral

The *Sainsbury Laboratory Cambridge: Blooming Numbers* exhibit is inspired by mathematical principles found in nature – in this case the Fibonacci sequence – a mathematical pattern commonly found in plants and that also fascinated famous Cambridge alumni Charles Darwin and Alan Turing.

Starting with the initial idea of the Fibonacci sequence, the University of Cambridge's Department of Engineering brought this mathematical beauty to life. Designed, fabricated and built onsite by the Design and Technical Services team led by Thomas Glenday, the exhibit features a curved wall constructed from raw steel planters and redwood timber.

The exhibit uses sustainably sourced timber while the planters have been designed to minimise metal waste by incorporating cut-offs. Once the Show is over, the accessible lab benches will be used in the Sainsbury Laboratory as mobile lab workstations, and the modular Fibonacci spiral exhibit will be relocated to community gardens in Cambridge, where it will serve as raised planter boxes with trellis screens for growing climbing plants.





The exhibit design for the RHS Chelsea Flower Show 2025 is just one of the many fascinating projects that the team of engineers and technicians work on.

Current projects include (but are not limited to) developing accessibility solutions, design and manufacture of medical devices and supporting instrumentation, 3D printing high-performance stainless steels (advanced materials with superior qualities); and trialling innovative materials for use in industry sectors varying from aerospace to civil engineering.

Founded in 1875, the Department of Engineering is the largest department at the University of Cambridge and one of the leading centres of engineering in the world.

UNIVERSITY OF CAMBRIDGE | Department of Engineering

Design & Technical Services
Department of Engineering
University of Cambridge
Trumpington Street
Cambridge CB2 1PZ
eng.cam.ac.uk

Sponsors

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Leica Microsystems' life science research microscopes support the imaging needs of the scientific community with advanced innovation and technical expertise for the visualisation, measurement and analysis of microstructures.

Modern microscopy for life science research, demands imaging resolution up to and beyond the 200 nm Abbe barrier.
To see life in context at the sub cellular level, novel imaging methods are required. Only then can we see the full spectrum of life.

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Milton Keynes MK14 6FG
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Strulch

Strulch ® is a light and easy to use garden mulch made from wheat straw for organic gardening. A patented process developed by Dr Geoff Whiteley at The University of Leeds, is used to 'preserve' the straw so that it lasts for up to two years and gives an earthy brown colour.
cultivated fruit and on vegetable plots.

Strulch has a neutral pH and can be used throughout the garden on borders, raised beds, around cultivated fruit and on vegetable plots.

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The Gatsby Charitable Foundation

The Gatsby Charitable Foundation was set up by Lord David Sainsbury to realise his charitable objectives. He has given Gatsby more than £1.7 billion to distribute to charitable causes.

Gatsby works in areas that David Sainsbury and the Trustees are particularly passionate about and where they believe charitable funding can make a real difference. Gatsby is currently active in:

- Plant Science
- Neuroscience
- Education
- Africa
- Public Policy
- Arts

Gatsby funded the building of the Sainsbury Laboratory at the University of Cambridge — a state-of-the-art research institute that opened in 2011 and is set within the Cambridge University Botanic Garden.

This was Gatsby's largest ever commitment to plant science and the charity continues to provide core funding of fundamental plant development research.

GATSBY

The Gatsby Charitable Foundation
The Peak
5 Wilton Road
London SW1V 1AP
gatsby.org.uk/