

PART II
PLANT
SCIENCES



Natural Sciences Tripos

Part II Plant Sciences

2022-23

Contents:

Introduction	2
Course Aims and Learning Outcomes	3
Course Structure	4
Michaelmas Term	5
Lent Term	8
Other Course Information	11
Ecology at Part II	14
Part II Biological & Biomedical Sciences	16
Support & Facilities	18
Equality and Diversity	19
Career Opportunities	20



Introduction: Your future with us

“Loved it. Well structured and well taught.” Part II Exit survey

Fundamental to all our futures

Plant Science is *the* fundamental life science. There has never been a more exciting time to study plants. They are the focus of key global issues: How to feed an additional 2-3 billion people; how to replace fossil fuels ; how to maintain biodiversity in the face of climate change. Our course prepares you for these challenges, from the marriage of conventional crop breeding to transgenic methodologies, to the sustainable development of bioenergy crops and their processing, and likely direct or indirect effects on carbon emissions and sequestration by plants. Microbes are integrated throughout the course, whether used in synthetic biology, as models of cellular development, or learning how phytoplankton and bacteria can help to generate sources of second and third generation biofuels.

You will be joining a friendly department with an outstanding teaching record that enjoys working with you. You will be working in internationally renowned research groups involved in generating step changes in plant productivity, protection and conservation.

The choice is yours

Modularity means that you can specialise for an entirely molecular Plant Sciences degree, an entirely ecological Plant Sciences degree, a degree with a significant microbiology component or all in combination - whatever suits your interests!

Helping you be the best

We offer personal development sessions to help you make the most of Part II learning. Whether digesting the literature, writing up practical work or improving essay style, we add value to your learning. The Department offers dedicated library facilities, and a warm welcome in the tea room.

Successful futures

The majority of our class gain a 1st or Iii, and typically over 40% improve their grade from IB. Year on year, our Part II students co-author research papers with us (*e.g.*, *Science* 350, 1521). The majority go on to post-graduate research, not only in plant sciences but also in other biological disciplines such as neurosciences, pharmacology, or in mathematical/engineering fields. Our graduates have successful careers in or out of science. We hope that you will join us!

Course aims and learning outcomes

- The aim of this course is to ensure that you can achieve an up-to-date level of understanding of plant science.
- Our objective is to provide training in scientific and transferable skills through modular lecture courses, research projects, written work, seminars and supervisions.
- At the end of the course you should have increased: your capacity to think critically; your ability to design and execute an experiment; your confidence and ability in communicating ideas. This will serve as a lasting and practical basis for a career, for example, in research - whether industry or academia - as well as teaching, media, law, commerce, government or management.

Previous course requirements

Most students will have taken IB Plant and Microbial Sciences (PMS) but it is not a course requirement. Our students in the past have come equipped with IB CDB, Ecology, BMB, Evolution and Animal Diversity, Earth Sciences, Pharmacology or Biology of Disease. We schedule lectures so that you can also attend IB PMS lectures if you wish to, and you will be able to access the IB PMS Moodle site.

Long Vacation Background Reading

A summary of the modules available at Part II is provided. For each module there is a suggestion of recent related review articles, none of these are compulsory reading but they are intended to introduce you to the material that will be presented. Information from relevant IA and IB lectures is available on request.

For more information please visit <http://www.plantsci.cam.ac.uk/teaching/plants/reading-list/module-summary>

Interested?

This booklet will tell you most of what you'll need to know about the course structure but please do contact the Module Organisers or any of the teaching staff involved if you'd like more information. Appointments with staff can be made in the Easter Term if you want to discuss in more detail how to match your degree with your interests.

Course Structure

We offer seven modules (each comprising a total of 24 hours of teaching, mostly in one-hour lectures) which together cover cellular and ecological options. You choose which *four* modules you'd like to study. There are four modules in the Michaelmas term, three in the Lent term and no teaching in the Easter term. Within a given module you will find (in addition to the traditional one-hour lecture slots) workshops, seminars and discussion groups. An Inter-departmental course in Conservation Science is available to you, as well as some courses in Zoology and one in Genetics. You will also undertake *one* research project and *one* critical review essay.

The Modules*

Michaelmas

- Plant signalling networks in growth and development
- Microbes: evolution, genomes and lifestyle
- Evolution and Ecosystem Dynamics
- Conservation Science (Interdepartmental, based in Zoology)

Lent

- Plant Genomes and Synthetic Biology
- Responses to Global Change (Interdepartmental, based in Plant Sciences)
- Exploiting Plant Metabolism: a focus on food and fuel security (Joint with Biochemistry)

Additional Modules

Departmentally-based ecological courses, mostly of 24 lectures:

- Applied Ecology (From Zoology)
- Evolution and Behaviour: populations and societies (From Zoology)
- Evolutionary Genetics & Adaptation (From Genetics)

** Module structure, teaching staff and content correct at the time of printing.*



Module PLM1 - Plant signalling networks in growth and development

Organiser: Prof. Alex Webb

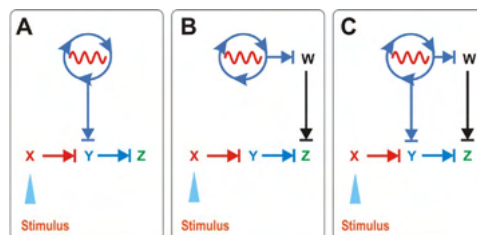
Contact details: aarw2@cam.ac.uk

Teaching Staff: *Alex Webb, Julia Davies, Alexander Jones and Giles Oldroyd.*

Plant survival depends on their extraordinary ability to respond to multiple environmental signals with the appropriate responses. Changes in physiology, gene expression, growth and development allow the plant to tolerate and exploit severe changes in the environment. Sensing and responding to environmental and hormonal signals is a result of sophisticated inter- and intra-cellular signalling networks. In this lecture course you will learn about the components of signalling networks starting at a signal ion and scaling to interactions between organisms. We will discuss events that occur in picoseconds and scale to those that take days. We will discuss the structure and function of elegant signalling networks and how they co-ordinate to regulate stress responses and development.

- The lecture material will introduce you to the elements that make up signalling networks and also place these elements in context.
- You will learn about different ways in which we can consider signalling networks at different scales from ion transport to multi organismal levels.
- We will consider the signalling networks that generate calcium signatures, how they are formulated and decoded. We will also describe the properties of the signalling networks involved in ABA-induced stomatal closure and regulation of development by auxin and growth by gibberellin signalling. We will discover how time is incorporated into signalling. And we will discover how organisms signal to each other for beneficial interactions.
- We will describe how mathematical modelling is complementary to experimentation, providing insight and new approaches.

The course is made up of lectures, supervisions and a workshop. The workshop will comprise analysis of data from a calcium signalling experiment.





Module PLM2 - Microbes: evolution, genomes and lifestyle

Organiser: Prof Uta Paszkowski

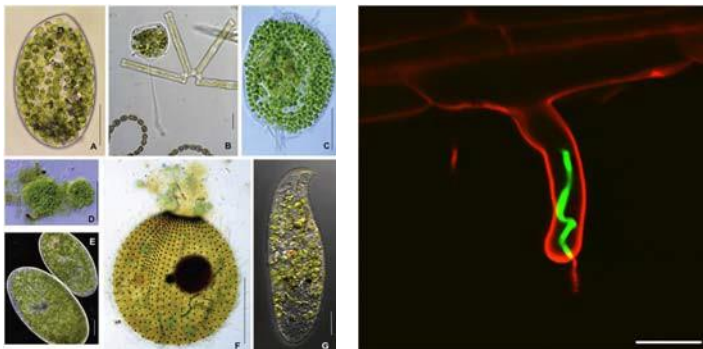
Contact details: up220@cam.ac.uk

Teaching Staff: *Uta Paszkowski, Sebastian Schornack, and others.*

This course explores microorganisms with relevance to understanding plant biology including the major groups of microbes, the environmental and evolutionary transition of microbes to endosymbiotic organelles, as well as beneficial and detrimental interactions between plants and microbes.

- The module starts by considering how the endosymbiosis of a cyanobacterium led to the evolution of chloroplasts, and then how secondary and tertiary endosymbiosis gave rise to the diversity of the algal kingdom, as well as interactions with other organisms
- This leads on to the role of photosynthetic organisms in the global carbon balance, and how environmental drivers such as changes in atmospheric CO₂ and O₂ have affected the evolution of today's plants and algae
- The remainder considers the evolution, genomes and lifestyles of viruses, fungi (saprophytic, mutualistic, and pathogenic), and of several major protista, including the Oomycetes. Many of these organisms have considerable influence on plant productivity.

As part of the module, two essay-writing workshops are included, incorporating approaches to search and assimilate information in the literature, and – using peer review – how to identify key features of a good essay.





Module PLM3 - Evolution and ecosystem dynamics

Organiser: Prof David Coomes

Contact details: dac18@cam.ac.uk

Teaching Staff: *David Coomes, Sam Brockington, Beverley Glover, Lauren Gardiner.*

The phylogenetic progression of land plants allows us to relate palaeohistorical origins, from algae to bryophytes and lycopods, to their evolutionary progression through ferns and conifers to angiosperms. The module will examine the molecular basis to morphological advances, as compared to the physiological progression. The diversity engendered within, and beneath forest canopies, and the historical ecology of today's landscape, complete our review of vegetation history and dynamics.

- From an understanding of the phylogeny of land plants, when and where did the molecular homology of key higher plant traits originate in early land plant life forms?
- What are the ecological determinants of fern, conifer and angiosperm distribution?
- How predictable is evolution and what is the role of chance versus convergence in explaining the evolution of diversity across time and space?
- When conifer and angiosperm canopies diversified, were ferns and bryophytes able to proliferate in the shade?
- What is the evidence for evo-devo origins of the angiosperm flower, co-evolution of flower structure and associated pollinators?
- What determines diversity in modern forests, and how has man shaped the landscape we see in Europe today?

This module allows the molecular phylogenies and homologies of key plant traits to be mapped on to climatic limitations, throughout land plant evolution. It represents an exciting opportunity to study the ecological determinants of diversity and learn how we can integrate modern concepts of ecology and evolution using reproductive and physiological traits.





Module PLL1 - Plant genomes and synthetic biology

Organisers: Prof. Ian Henderson

Contact details: irh25@cam.ac.uk

Teaching Staff: *Ian Henderson, Richard Harrison, Jim Haseloff, Cristobal Uauy and Matthew Naish*

Dobzhansky said in 1973 that “nothing in biology makes sense except in the light of evolution”.

In 2015 he might have gone on to point out that “genomes reflect evolution and so we can make sense of biology by studying genomes”. He would be able to make this point because, from next generation sequencing and other powerful new methods, we now appreciate that nuclear genomes are much more than a linear array of coding sequence genes. They are a complex array of structural and regulatory components interspersed with genes for both coding and non coding RNAs. Genomes are not linear: they are assembled into chromatin with several layers of organization in three dimensions and they are highly dynamic due to frequent whole genome duplications and more localized rearrangements. Superimposed on these genetic features there are heritable “epigenetic” effects that are independent of DNA sequence.

The aim of this module is to introduce recent progress in the understanding of plant biology in the context of their genomes and to provide hands on experience with next generation sequence analysis. In the lectures you will hear about:

- how the dynamic nature of plant genomes has permitted the extraordinary diversity of flowering plants (Darwin’s abominable mystery)
- how genome integrity is protected against the effects of mobile “selfish” DNA
- how the genome can retain memory of its previous environment and whether there may be some truth in Lamarckianism
- why hybrids can be more vigorous than their parents
- asexual reproduction and why it frustrated Mendel
- how new genes evolve
- emerging genomic technology, including genome editing and epigenetic modification and whether or not these methods are GM
- intercellular movement of RNA that affects gene silencing at the RNA and chromatin levels
- the evolution of crops and modern plant breeding
- recombination of plant genomes and the influence of sequence motifs and chromatin states on crossover hotspots.
- functional genomics – assigning function to each of the 30,000 genes in a typical higher plant genome
- synthetic biology and what it means for plants and microbes

Recent articles and reviews will be used to illustrate concepts and principles in lectures and you will critically assess key papers in journal club supervisions. In addition, through a series of three computational workshops you will get hands on experience of assembling genomes, analyzing differential RNA expression and phylogenetic analysis using next generation sequencing data.

The module content illustrates why (plant) biology is being transformed through the understanding of (plant) genomes. It is suitable for those interested in research and technology development related to crops, industrial biotechnology of plants or the societal impact of plant biology as well as those with a basic science interest in plants and plant evolution.



Module PLL2 - Responses to global change

Organiser: Dr Andrew Tanentzap

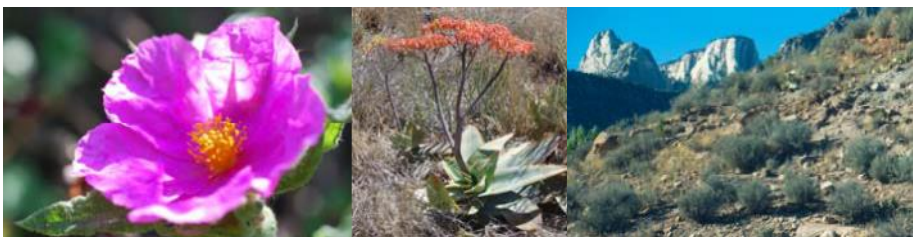
Contact details: ajt65@cam.ac.uk

Teaching Staff: *Andrew Tanentzap, Wanne Kromdijk, Mike Harfoot, James Pearce-Higgins, Nik Cunniffe, Adam Pellegrini and Lynn Dicks.*

This is an interdepartmental module also available to Part II Zoology students

Global temperature is on the increase, extreme climatic events are increasing, and the sustainability of agricultural land use and vegetation cover is being challenged; pest and pathogen impacts are exacerbated in a warming world and their spread accelerated by human interactions. The scientific challenges underpinning these dramatic changes, and our collective response, will shape your future, and that of a growing global population. The module provides a generic background to climate change adaptation and mitigation, before considering a succession of timely issues in depth.

- Global limits to growth: planetary boundary layers and their impacts in key areas of water resources, ecosystem fertilisation and greenhouse gas emissions
- Impacts of seasonality and phenological mismatch on bird population dynamics in a changing world and development of appropriate conservation practices (James Pearce-Higgins, British Trust for Ornithology)
- Use of modelling to scale physiological limitations on plant growth from leaf, via canopy, to ecosystem (Wanne Kromdijk)
- Modelling epidemiology and plant pathogen distribution in a changing world (Nik Cunniffe)
- The “Madingley Model” of ecosystems and biodiversity: development of policy from projections of biodiversity change under different scenarios of human development (Mike Harfoot, UNEP-WCMC)
- Evidence-based analyses of insect declines and invasive species: how should society respond to the need for sustainability in the face of climate change? (Lynn Dicks)
- Impacts of disturbances on ecosystem functioning and the potential for their management to combat climate change (Adam Pellegrini)





Module PLL3 - Exploiting Plant Metabolism

Organiser: Prof. Julian Hibberd

Contact details: jmh65@cam.ac.uk

Teaching Staff: *Julian Hibberd, Wanne Kromdijk, Paul Dupree, Johnathan Napier (Rothamsted Research) and others.*

This is a joint module with Part II Biochemistry

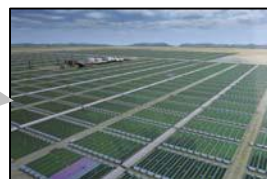
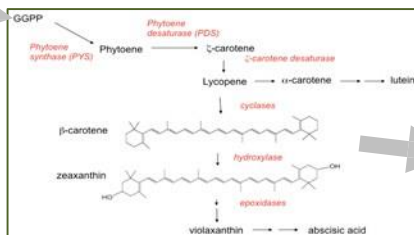
Understanding plant metabolism informs our production of food, fuel and many high-value products. Modifying these metabolic pathways therefore provides the opportunity to contribute to more productive and sustainable societies. However, the complexity of metabolic systems leads to major intellectual challenges, both in terms of understanding but also in manipulating each system. We will address:

- Sustainable biofuels - the metabolism underpinning lipid, carbohydrate and plant cell wall components for biofuel production along with prospects for manipulating these pathways will be presented.
- Food for the future: Enhancing photosynthesis can increase yield and therefore contribute to food security. Ways that this can be achieved will be discussed, with an emphasis on C4 photosynthesis, which allows ~50% increase in productivity.
- High-value products. The biosynthesis of high-value products including vitamins, aromatic compounds, and isoprenoids from sustainable platforms will be covered, as well as approaches to metabolic engineering.

In all cases, evidence from studies of gene expression, regulation of metabolism and compartmentation within cells will be integrated. As part of this module we run a workshop in which answers to past examination questions are marked, discussed and critically compared. The aim is for this process to improve your ability to generate high quality answers in the examinations.



Efforts to grow algae on a large scale for high value products such as β -carotene, or biomass for fuel production, require understanding of the biosynthetic pathways involved.



Other Course Information

Timetable

All Plant Science module lectures take place in the Tom ap Rees Lecture Theatre. Inter-departmental course, seminar and workshop locations will vary. Our aim is to keep your Tuesdays, Thursdays and afternoons as free as possible for reading, project work and supervisions. On Thursdays at 1pm you should attend the Departmental Seminar where you can hear external speakers describing their recent research; this seminar series is designed to cater for all interests. You can find listings on the Departmental web site.

Michaelmas term

M1-M3 are based at Plant Sciences. C is Conservation Science, Departmental Seminars are held on Thursdays at 1pm.

	Monday	Tuesday	Wednesday	Thursday	Friday
10:00	M2		M2		M2
11:00	M3		M3		M3
12.00	M1		M1		M1
13.00				Seminar	
15.00	C		C		C

Lent Term

L1-L3 are based at Plant Sciences. EB is Evolution and Behaviour: populations and societies and EG is Evolutionary Genetics.

	Monday	Tuesday	Weds	Thursday	Friday
09:00	EG	EG	EG	EG	EG
10.00	L2		L2		L2
11.00	L3		L3		L3
12.00	L1		L1		L1
13.00				Seminar	
15:00	A		A		A
16.00	EB		EB	EB	

Please note: Timetables are correct at the time of printing.

Your research project: a life-changing experience

The research project is a major facet of your final year. It provides an introduction to research that you will remember for the rest of your life, as well as helping you decide whether to do a PhD.

You'll receive a list of research project titles during the long vacation. This gives you time to make your selection and if your project requires, start term a little early to set up the project. Investigative work will be undertaken in Michaelmas and the first four weeks of Lent Term. This will give you enough time to obtain a substantial body of data that may even be publishable *and* allow you time to write up and submit by the end of Lent Term. The project should not normally occupy more than an average of 16 hours per week. Your project supervisor and members of their research group will be responsible for your technical training. Examples of past projects are available on Moodle. Students may also undertake Research Projects at the Sainsbury Laboratory. Projects are assessed by the supervisor and another member of academic staff.

Your Critical Review essay

You will submit one essay chosen from a list of titles provided at the start of the Michaelmas Term. The essay should be a critical review as a "Commentary" or "News and Views" style article, and will cover recent developments in Plant Sciences or related areas. These types of articles are published routinely in journals such as *Nature*, *Science* or *Plant Cell* etc when a particularly important piece of work has just been published. Your essay should be 2000-2500 words with 20-30 key references, and will be assessed by two members of teaching staff. Your essay should be submitted on the first full day of the Lent term. Your supervisor for this essay must be different from that of your research project.

Our commitment to Teaching and Learning

We offer a range of additional support activities. These include personal development sessions, with guidance on interrogating the literature, essay writing, practical project compilation and careers options. We also encourage your participation in Research Group meetings, Thursday lunchtime research seminars and the Departmental Plant Society social activities.

What form does the examination take?

- 64% from four theory papers
- 27% from your research project
- 9% from your critical review essay

The papers

You will sit four theory papers. You will write three essays from a choice of six covering an entire module in each paper. Two questions will assume an understanding of the material taught by at least two lecturers in the module concerned. All essays are double marked.

What happens then?

After you have sat the exams you will meet the external examiner informally at a wine reception at the Botanic Garden. You may have a brief *viva voce* conducted by the external examiner and a member of our teaching staff. Having an external examiner is a mechanism which allows a department to ensure that its examination system is fair and comparable to those of other universities. The external examiner chooses a selection of candidates, and the *viva* gives you the chance to display ability deserving of a higher class. The important thing to remember is that *no student will be moved down a class as a result of the viva.*



Ecology at Part II

Introduction

Many students take what is in effect a Part II Ecology course and can be based in Plant Sciences or Zoology. This Ecological Part II is likely to be particularly popular with those who have read NST IN Ecology, Plant and Microbial Sciences and Evolution and Animal Diversity. It is not essential, however, for you to have read any of these subjects before embarking on the study of Ecology at the Part II level.

Various options are offered, from which you may select your preferred combination, with restrictions dependent on whether you are registered in Plant Sciences or Zoology.

There are two ecological inter-departmental 24-lecture modules:

- Conservation Science (based in Zoology)
- Responses to Global Change (based in Plant Sciences)

There are five Departmentally-based ecological courses, mostly of 24 lectures:

Module from Plant Sciences (described above)

- Evolution and Ecosystem Dynamics

From Zoology

- Applied Ecology
- Evolution and Behaviour: populations and societies

From Genetics

- Evolutionary Genetics & Adaptation

Part II Plant Sciences (Ecology) students will take four modules selected from:

- **One** or **both** of the inter-departmental ecology modules
- **One** of the three courses offered by Zoology or Genetics
- **One** Ecology and/or one other module offered by Plant Sciences.

Together with a Research Project and Critical Review Essay supervised by Plant Sciences staff.



Advice

If you need help with your choice of courses please contact the Part II Course Organiser in Plant Sciences or Zoology.

Organisation

If you wish to take this Ecological Part II you should apply formally to read either the Plant Sciences or Zoology Part II, depending on which of the two will provide the home for your practical project and the larger share of the teaching. You may also combine any of the above courses with any other courses offered by your home Department. Each module will have its own exam paper.

In Plant Sciences, we only offer projects that run in Michaelmas and (for practical work) half way through Lent. Details of the arrangements for projects are different in Zoology; please consult the Zoology Part II brochure for that Department's rules.

Biological and Biomedical Sciences Major Subject

Plant Sciences can also be studied within NST Part II Biological and Biomedical Sciences (NST BBS).

NST Part II BBS allows you to maintain some breadth in your study at Part II and requires the submission of a dissertation rather than a practical laboratory-based research project.

The course has three main components:

- a 'major' subject, which will typically draw on the core teaching of a single Part II subject
- a 'minor' subject, normally provided by another department
- a dissertation of up to 6,000 words.

The Department of Plant Sciences offers two major papers within NST Part II BBS:

Paper 412 Plant Sciences - Cellular

- PLM1 Plant Signalling Networks in Growth and Development
- PLM2 Microbes: evolution, genomes and lifestyle
- PLL1 Plant Genomes and Synthetic Biology
- PLL3 Exploiting Plant Metabolism

Paper 413 Plant Sciences - Ecology

- PLM3 Evolution and Ecosystem Dynamics
- Zoology M2 Conservation Science
- PLL2 Responses to Global Change
- Zoology L2 Applied Ecology

There is a range of minor papers, for example:

- Evolutionary Genetics & Adaptation (Department of Genetics Module 5)
- Philosophy of Education (Education Studies Tripos Part II)
- Biotechnology and Society (Social & Political Sciences Part IIB Paper Int 4)

For further information <http://www.biology.cam.ac.uk/undergrads/nst/bbs>

Biological and Biomedical Sciences Minor Subject

Any of our courses can also be studied within NST Part II Biological and Biomedical Sciences as a minor subject:

PLM1 Plant signalling networks in growth and development

PLM2 Microbes: Evolution genomes and lifestyle

PLM3 Evolution and ecosystems dynamics

PLL1 Plant genomes and synthetic biology

PLL2 Responses to global change

PLL3 Exploiting Plant Metabolism

There will be a maximum of three students per course.

For more information about permissible combinations please visit <https://www.biology.cam.ac.uk/undergrads/nst/bbs/Minors>

Support and Facilities

At Part II your association with the Department deepens at both academic and social levels. The research project you undertake will introduce you to life in a research rather than a teaching lab. It will bring you into daily contact with the post-graduate and post-doctoral researchers; indeed you will find a lot of science going on in the tea room. There is a dedicated computer suite for our Part II students where PCs are available at any time of day. Supervisions are conducted by the lecturer, not a third party. In addition, students facing financial hardship are eligible to apply for support from the Tom ap Rees fund. We are proud of our Part IIs and that's reflected in the support they receive. We also offer enrichment sessions to help you improve the quality of your learning throughout the year.

All learning resources for Part II Plant Sciences are made available through Moodle.

Time Management

Please note that we have organised the timetable so that you will have Tuesday and Thursday free to focus on projects, essays and background reading. You are expected to attend Departmental Seminars held on Thursdays at 1pm.



Plants and Microbes – Equality and Diversity

“Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world.”

Pasteur

Ours is an international community with students from diverse cultures. We are committed to equality of opportunity and adhere to the University’s dignity@study policy. We support students with disabilities and liaise closely with the DRC.

Women@plantsci Women are successful here. The first female plant scientist to become a Fellow of the Royal Society (Prof. Arber) took Part II Plant Sciences. Today, our female students have an outstanding track record in graduating with a 1st or 2.1 (the PhD entry requirement).

Too many women don’t fulfil their potential in science, in part due to a belief that it requires a “brilliance” they think they don’t have and that the work ethic they know they can apply isn’t enough (*Science*, **347**; 234).

Well, this is what Charles Darwin¹ had to say:

“At no time am I a quick thinker or writer; whatever I have done in science has solely been by long pondering, patience and industry”.

Join us!

¹OK, in his “Descent of Man” he was bang out of order about women and non-Europeans; more pondering clearly needed there.

The University of Cambridge and Department of Plant Sciences are committed in their pursuit of academic excellence to equality of opportunity and to a proactive and inclusive approach to equality, which supports and encourages all under-represented groups, promotes an inclusive culture, and values diversity.



Career Opportunities

We serve as a springboard for our graduates and introduce you to the Careers Service. The majority of our graduates go on into research. Our aim is to produce the next generation of plant scientists but our graduates are not limited to our discipline. Recent research destinations have included neuroscience and mathematical modelling PhDs. You will have seen our career destination posters in the teaching lab. This link details career developments for past Plant Sciences graduates: <http://www.plantsci.cam.ac.uk/teaching/pms/career>.

Staying with plants and microbes? Plant Sciences at Cambridge has become one of the most important centres for pure and applied plant science research within the UK. Locally, we have collaborations and firm links with the Sainsbury Laboratory in the Botanic Garden, Rothamsted Research, the John Innes Centre, the National Institute for Agricultural Botany (NIAB) and the plant breeding industry. We are also in the process of building the Cambridge Centre for Crop Science, a new research centre for global food security. Our research groups have international collaborations that could help you move further afield.

Whatever your career path, it can have an exciting and secure start with us.



DEPARTMENT OF

Plant Sciences



The Ginkgo is our Departmental logo.

Our Ginkgo grows on the back of the building and started life as a cutting in 1896.

Recent research shows that Ginkgos can live to be over 1,000 years old because they are excellent at resisting stress and do not have a pre-determined ageing programme.

There is so much we can learn from plants!