

DEPARTMENT OF  
**PHYSIOLOGY, ANATOMY  
AND GENETICS**



*We undertake discovery science where we reassemble physiological processes at the molecular, cellular, tissue and systems level of organisation. In so doing we provide a bridge to translational medicine, and interface between physical and life sciences, as we train the next generation of doctors and biomedical scientists.*

# Annual Report 2017-2018



## Defining Excellence

Oxford Anatomy and Physiology ranked #1 in the QS World University Rankings by subject 2017, 2018

### From the Head of Department



Once again, the Department of Physiology, Anatomy and Genetics has had a most successful year. Not only have we been ranked world number one for Anatomy and Physiology for the second year in a row, but we also contributed to the University of Oxford's Medical Sciences Division being named the top medical school worldwide for the seventh year in a row.

I am pleased to highlight and celebrate our research successes from the past year, from a potential treatment for asthma, to the world's first ketone drink. We are proud that our Department's research is not only internationally recognised but also has a significant impact on the health of the public.

“Our mission is empowering discovery in the physiological sciences to improve health and educate the next generation of doctors and biomedical scientists.”

Importantly, at the core of our ethos is the relationship between research and teaching, as key to our advancement. Reading on you will learn that our teaching programme makes a significant contribution to the University of Oxford's undergraduate studies in Medical and Biomedical Sciences, and that such teaching has been awarded Gold Standard by the Teaching Excellence Framework.

The Department's effect on the wider community is not just through scientific discovery and education, but also through public engagement, and members of the Department are involved in a wide range of activities.

We have seen some changes this year not only to our support teams but also to our infrastructure, and such reorganisation is crucial to our progress in attracting and retaining the best academics, so that we can maintain our leading position.

Particular highlights for me over the past year, have been the opening of our Centre for Integrative Neuroscience and the inaugural Sherrington Lecture, which coincided with Andrew King's election as a Fellow of The Royal Society.

I would like to thank all of our staff for their commitment to the Department and unfailing hard work over the past year.

**David Paterson**

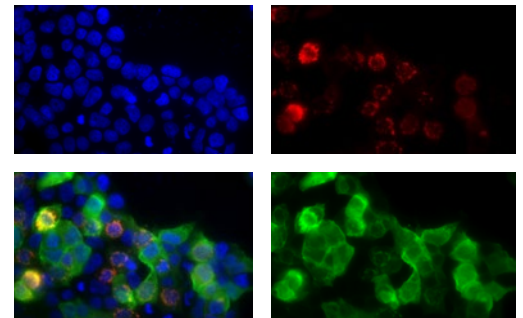
# A Year of



### DPAG on Top of the World

DPAG was ranked world number one for Anatomy and Physiology in the 2018 QS World University Rankings by Subject for the second year in a row. In fact DPAG is the only department within the Medical Sciences Division to have been ranked number one in the world. The Department's ranking is also particularly pleasing given that UK universities topped the QS world rankings this year in predominantly humanities subject areas. The ranking was based on four performance indicators: academic reputation; employer reputation; research citations per paper; and H-index.

<https://www.dpag.ox.ac.uk/news/world-number-1>



© Esther Becker / Lauren Watson

### Potential new route to treatment for Cerebellar Ataxia

A cross-departmental collaboration involving Associate Professor Esther Becker and Laura Watson, has led to an important paper reporting, for the first time, dominant mutations that cause spinocerebellar ataxias. These are a group of disorders that cause degeneration in the cerebellum, the part of the brain responsible for controlling movement. Such mutations lead to an increased receptor activity and since there are drugs available that have the opposite effect, this discovery provides hope that there may one day be therapeutic drugs for cerebellar ataxias.

<https://www.dpag.ox.ac.uk/news/potential-new-route-to-treatment-for-cerebellar-ataxia>

# Progress



## BHF awards £7.6 million to the Burdon Sanderson Cardiac Science Centre

The British Heart Foundation (BHF) awarded a total of £7.6 million to research programmes at the Department's world-leading Burdon Sanderson Cardiac Science Centre. The grants awarded included the renewal of the Oxford BHF Centre for Regenerative Medicine, programme grants to Professor Manuela Zaccolo and Professor David Paterson, an intermediate fellowship to Dr Lisa Heather and an extension of Dr Samira Lakhali-Littleton's intermediate fellowship, and senior fellowships to Dr Sarah De Val and Dr Duncan Sparrow.

<https://www.dpag.ox.ac.uk/news/british-heart-foundation-awards-ps7-6-million-to-burdon-sanderson-cardiac-science-centre>



## Awards for Excellence in Teaching

Four Associate Professors from the Department were awarded for Teaching Excellence by the Medical Sciences Division: Helen Christian for consistently outstanding teaching in Endocrinology; Kristine Krug for designing and organising the implementation of a new practical class; Pawel Swietach for committed and excellent teaching in Cardiovascular Physiology; and Damian Tyler for the very successful development, organisation and implementation of a new two-week Metabolism theme within one of the options for third-year Pre-clinical and Biomedical Sciences students.

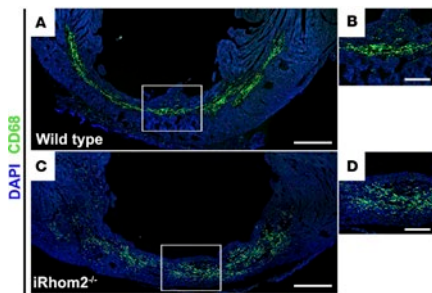
<https://www.dpag.ox.ac.uk/news/dpag-lecturers-recipient-of-medical-sciences-division-teaching-excellence-awards>



## World's first ketone drink

Research undertaken by Professor Kieran Clarke and her group led to the invention of a ketone monoester  $\Delta G^{\circ}$ , which has now been licensed to be used in the world's first ketone drink for high-performance sports persons. A joint study between Clarke and Associate Professor Heidi de Wet also demonstrated that subjects taking a ketone ester drink reported suppressed hunger, indicating that  $\Delta G^{\circ}$  could contribute to weight loss. Further studies have been run on  $\Delta G^{\circ}$  for diseases such as Alzheimer's, Parkinson's, cancer, diabetes, epilepsy, and traumatic brain injury.

<https://www.dpag.ox.ac.uk/news/research-in-dpag-sees-the-launch-of-world2019s-first-ketone-drink-for-training-endurance-performance-and-recovery-after-exercise>

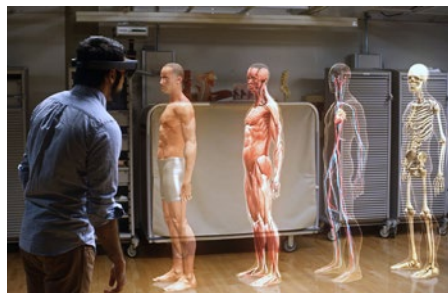


© Damien Barnette

## Insight into how the heart responds to injury

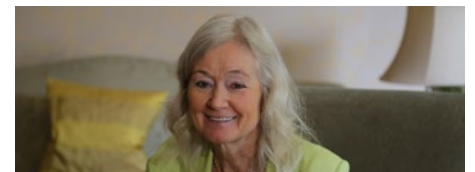
Dr Damien Barnette, a Postdoctoral Research Scientist in the Department, published new data in the journal JCI Insight. His work has important implications for designing strategies to modulate inflammation and repair, as combined therapy with restoring lost cardiovascular tissue after heart attack.

<https://www.dpag.ox.ac.uk/news/research-scientist-gains-insight-into-how-the-heart-responds-to-injury>



## Looking forward to the future

We plan to convert the currently unused anatomy demonstration laboratory within the Sherrington Building into an immersive anatomy teaching laboratory, *Oxford eAnatomy*. We intend to harness a variety of cutting-edge technologies, such as the Microsoft HoloLens, with which you can 'see' a 3D representation of a human body. Such developments are crucial if we are to maintain our edge in digital media and technology.



## Prof Reaches Summit of Drug Discovery

Dame Kay Davies, Dr Lee's Professor of Anatomy, has been working on a clinical trial that announced a potentially life-changing discovery. Summit Therapeutics, for which Professor Davies is a co-founder, have released interim results from a trial, which shows that ezutromid reduces muscle damage significantly in patients suffering from Duchenne muscular dystrophy (DMD). Such discoveries suggest a possible universal treatment for DMD, a progressive muscle wasting disease, for which there is currently no cure.

<https://www.dpag.ox.ac.uk/news/prof-reaches-summit-of-drug-discovery>



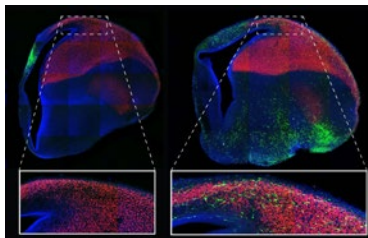
## Centre for Integrative Neuroscience Opens

The Department officially opened its new Centre for Integrative Neuroscience, and Emeritus Professor Sir Colin Blakemore was here to pull the curtain on the commemorative plaque. The event was celebrated with a drinks and canapés reception in the foyer, and marked by the inaugural Sir Charles Sherrington Lecture. The Centre has been established as part of the Department's ongoing re-organisation and its focus will be a multidisciplinary study of mammalian neural circuits.

<https://www.dpag.ox.ac.uk/news/sir-colin-blakemore-opens-new-centre-for-integrative-neuroscience>

## Brainstorm on Cerebral Beginnings

Professor Zoltán Molnár and Fernando García-Moreno (Bilbao) published a study in the journal *Cell Reports*, which found some fundamental differences in the earliest generated neurons between mammalian



© Zoltán Molnár

and avian brains that may have triggered the divergent evolution between mammals with a laminated cerebral cortex and birds with a large ball of neurons comprised of nuclei instead. Understanding the cellular and molecular mechanisms that evolved to generate mammalian brain is fundamental to not only understanding our own origins, but also to understanding the various developmental conditions that can effect cortical functions.

<https://www.dpag.ox.ac.uk/news/dpag-professors-brainstorm>

## Honours, Fellowships and Prizes

The Department is proud to host a number of academic staff who have been honoured with fellowships and prestigious awards. The following list offers some highlights of such honours from the past year, though this is not an exhaustive list: **Professor Dame Frances Ashcroft**, Honourary Doctorate, University of Lund and University of Cambridge (opposite, bottom); **Professor Dame Kay Davies**, Vallee Professorship; **Professor Andrew King**, Fellow of the Royal Society (opposite, top); **Emeritus Professor Sir Colin Blakemore**, President's Research Medal, UK College of Optometrists; **Professor David Paterson**, President-elect, The Physiological Society; **Professor Scott Waddell**, ERC Advanced Fellowship; **Professor Caleb Webber**, conferral of title of Professor of Bioinformatics; **Professor Gero Miesenböck**, Weizmann Memorial Lecture; **Dr Samira Lakhali-Littleton**, International BioIron Society Gunshin Levy Award; **Professor Andrew Parker**, UK Physiological Society GL Brown Prize Lecture; **Professor David Paterson**, American Physiological Society Carl Ludwig Distinguished Lecture.



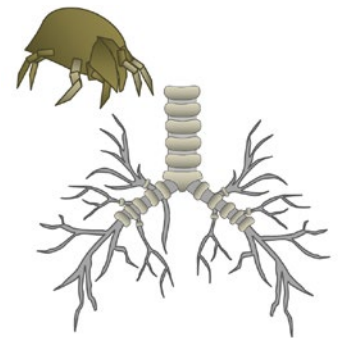
## Inaugural Sir Charles Sherrington Lecture

The Department hosted the inaugural Sir Charles Sherrington Lecture, delivered by Professor Mu-ming Poo on Neural Plasticity from Synapse to Cognition. Sherrington came to the Department in 1913 as the Waynflete Professor of Physiology, and went on to receive the Nobel Prize in Physiology or Medicine in 1932. Poo is the Founding Director of the Institute of Neuroscience of the Chinese Academy of Sciences, where in 2017 he led a team of scientists that produced the world's first truly cloned primates.

<https://www.dpag.ox.ac.uk/news/professor-mu-ming-poo-delivers-inaugural-sir-charles-sherrington-lecture>

## Possible Treatment for Asthma

Professor Anant Parekh and postdoctoral scientist Yu-Ping Lin published a paper in *Molecular Cell*, which looked at a strategy of targeting risk factors associated with the development of asthma, one such factor being exposure to inhaled allergens, particularly those derived from the house dust mite. Allergens from house dust mite stimulate multiple cell types in the lung to release chemical signals that help orchestrate the subsequent inflammatory response, and this study demonstrated a combination therapy to target this, raising the real possibility of a new treatment for combating asthma.



© Anant Parekh

<https://www.dpag.ox.ac.uk/news/dpag-research-groups-discover-possible-treatment-for-asthma>





## Refurbishing Space

In order to maintain our world number one position in research and teaching, we must recruit and house the best academics. This is dependent on providing state-of-the-art infrastructure that welcomes and enables scientific discovery. The Department is therefore currently undergoing a major consolidation and refit of sub-optimal real estate. Such changes are visible so far in the modernisation of the central area of the Department, the Sherrington Building, such as: new windows; a refurbished café; the refurbished IT, Digital Media and Communications Office; and new impressive lighting in the west and east staircases.

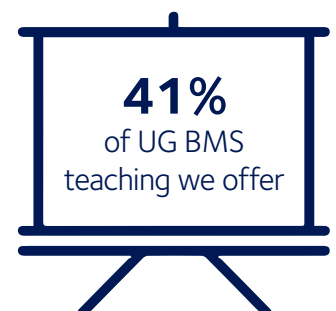
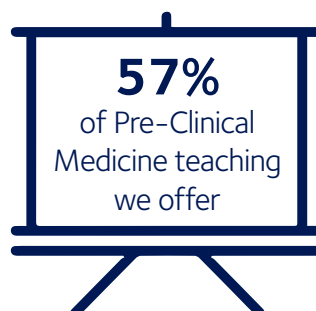


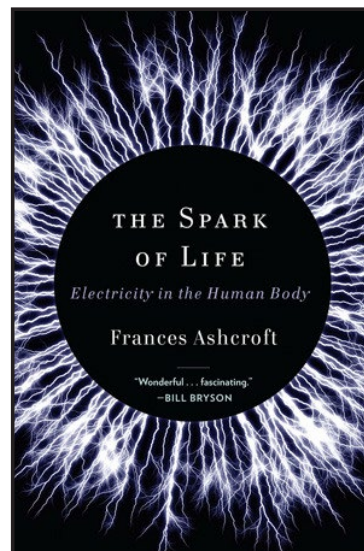
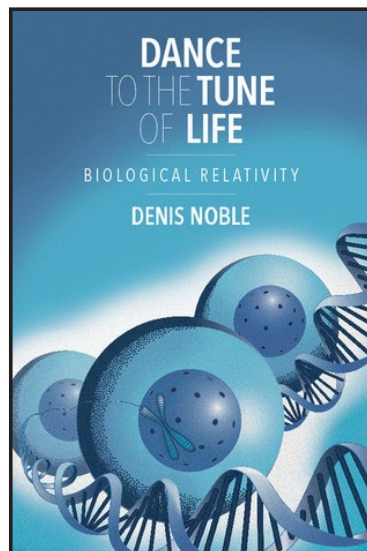
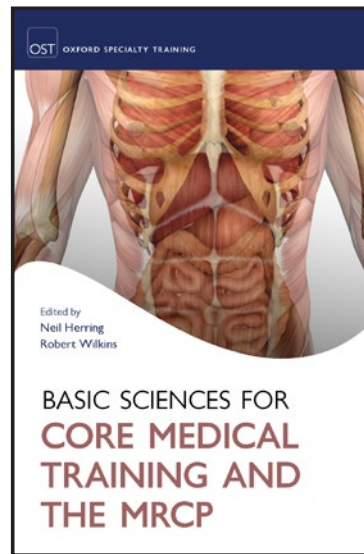
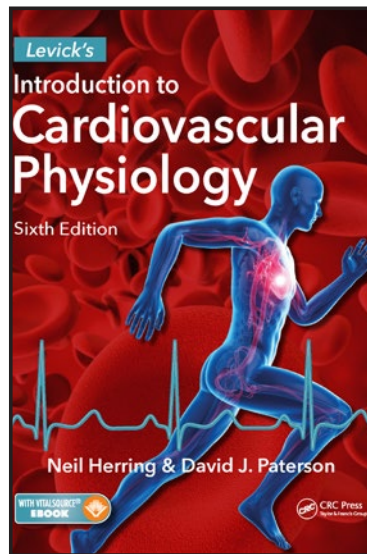
## Love Notes go a long way

To mark Valentine's Day 2018, the British Heart Foundation broke the world record for the longest chain of paper hearts. With the help of volunteers, the charity created a chain of 17,939 hearts, surpassing the previous record of 11,288. Multiple research groups in the Department got involved by filling out and then donating 'Love Notes', which formed part of the world record-breaking chain. The money raised from the project will fund the kind of life-saving research into cardiac health, that goes on here in the Department.

<https://www.dpag.ox.ac.uk/news/love-notes-go-a-long-way-for-dpag-research-group>

## Statistics for 2017-2018





Our academics have written text books for undergraduate study, as well as popular science books aimed at a non-specialist audience: *Levick's Introduction to Cardiovascular Physiology*, by Associate Professor Neil Herring and Professor David Paterson (top left); *Basic sciences for Core Medical Training and the MRCP*, by Neil Herring and Associate Professor Robert Wilkins (top right); *Dance to the Tune of Life*, by Emeritus Professor Denis Noble (bottom left); *The Spark of Life* by Professor Frances Ashcroft (bottom right).



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[www.dpag.ox.ac.uk](http://www.dpag.ox.ac.uk)

01865 272548 website@dpag.ox.ac.uk  
Sherrington Building, Parks Road, Oxford, OX1 3PT