The following PhD vacancies and research topics within the School of Veterinary Medicine were compiled in November 2013 and were correct at the time of publication.

For further guidance on pursuing a PhD in any of these areas, please consult the School of Veterinary Medicine website or contact the relevant members of academic staff as listed below.

**The effect of early life malnutrition as a predictive feature of poor adult health**

Supervisor: **David Gardner** ([david.gardner@nottingham.ac.uk](mailto:david.gardner@nottingham.ac.uk))

The primary research question that I have been investigating is, ‘How does prenatal malnutrition affect development and subsequent adult function of the kidney and cardiovascular system?’ The work involves characterisation of short-term effects in the fetus with related physiological outcomes in the adult offspring. An extension of this programme of work has considered further effects on development of the reproductive axis and subsequent adult fertility. The main objective of my research is to understand how early life malnutrition predicts poor adult health. This research aligns with the Reproduction theme in The School of Veterinary Medicine and Science. I would welcome applications from postgraduate students to the following projects (all of which involve collaborations internal and external to the university):

- The influence of a high salt-diet on maternal blood pressure and placental microstructure
- Investigating a role for steroid hormones maintaining hypertension in the offspring of salt-exposed dams
- Investigating the critical period for induction of neurogenic hypertension after maternal salt-loading
- Does variation in birth weight account for variation in fertility in a large population of pedigree sheep
- Investigating the relationship between maternal protein-energy malnutrition and fetal microvascular development: a role for epigenetics?
- The effect of monosaccharides on in-vitro fertilisation potential of sexed embryos

**Approaches to pre-operative and remote protection against acute ischaemic kidney injury**

Supervisor: **David Gardner** ([david.gardner@nottingham.ac.uk](mailto:david.gardner@nottingham.ac.uk))

Using a model of ischaemia-reperfusion induced Acute Kidney Injury (AKI) I am interested in the potential renoprotective efficacy of pre-operative erythropoietin or remote ischaemic preconditioning. With colleagues on the Sutton Bonington Campus and in the Renal Unit, NUH
NHS Trust, City Hospital, Nottingham we have a number of research projects exploring AKI using \textit{in silico}, \textit{in vitro} or ultimately \textit{in vivo} approaches. The main objective of the research is to better understand the aetiology of acute kidney injury and to investigate potential renoprotective (preventative or pharmacological) techniques. This research aligns with the Comparative Medicine theme in The School of Veterinary Medicine and Science. I would welcome applications from postgraduate students to the following projects (all of which involve collaborations internal and external to the university):

- Investigating the intra-renal inflammasome during acute kidney injury
- Organ cross-talk after acute kidney injury
- The role of macrophages in the transition from acute-to-chronic kidney disease
- Investigating the renoprotective role of erythropoietin using in vitro model of ischaemia-reperfusion injury
- Investigating the mechanism by which remote ischaemic-preconditioning prevents renal fibrosis developing after acute kidney injury

\textbf{Application of high throughput sequencing in Comparative Genomics and Bioinformatics}

Supervisor: Richard Emes (richard.emes@nottingham.ac.uk), Associate Professor and Reader in Bioinformatics; Director Advanced Data Analysis Centre

The utilisation of high throughput sequencing technology has revolutionised how modern biological science is conducted. Allowing insight into gene regulation-expression and genome evolution of humans, animals and pathogens.

Projects in a variety of systems are available in the School of Veterinary medicine in Science in collaboration with the University of Nottingham Advanced Data Analysis Centre (www.nottingham.ac.uk/adac).

Example projects are:

1) Environmental metagenomics to identify animal pathogens, using high throughput sequencing. The detection of bacteria/virus directly from the environment allows identification of novel pathogens or co-infections.

2) Comparative genomics to understand animal gene evolution.

Other projects relating to applicants interests can be proposed. Applicants with experience in bioinformatics/computer programming or a strong interest in applying computational approaches to biological problems will be particularly welcome.

**Molecular analysis of mitochondria in ageing**

Supervisor: **Dr. L Chakrabarti** ([Lisa.Chakrabarti@nottingham.ac.uk](mailto:Lisa.Chakrabarti@nottingham.ac.uk))

The incidence of neurodegenerative disease will rise as the population ages. About 30% of those born in 2012 can expect to live to the age of 100. Of those born in 1908 just 1% received a congratulatory centenarian telegram from The Queen. Research efforts have naturally converged on diseases that have a high incidence. Alzheimer’s disease (AD) is regarded as the most common form of dementia. The National Institutes of Health, USA website describes this as a disease of ageing, ‘an irreversible, progressive brain disease that slowly destroys memory and thinking skills, and eventually the ability to carry out the simplest tasks’. In addition, Parkinson’s disease (PD) is estimated to affect 40 out of 1000 people aged over 80. Even for those who escape the discomfort, disorientation and unrelenting decline described as neurodegenerative disease - there is the human and social cost of caring for the rising numbers of sufferers, which is long term. These are some of the greatest social and economic challenges that the UK and many developed nations now have to address. However, in the UK ~800,000 individuals are already facing the reality of dementia.

We now know that many factors may alter our susceptibility to debilitating neuron loss as we age. There is evidence pointing to genetic factors, the production of reactive oxygen species, mitochondrial dysfunction, microtubule defects, environmental factors, smoking, body-fat, exercise, social interaction, pollutants, hypoxia and many others. This project will aim to integrate some of the current theories and observations about the links between neurodegeneration and age. Techniques will be employed to examine changing neuronal proteins and lipids using molecular biology and biochemical methodologies.

**Parasite burden in exotic production animals**

Supervisor: **Dr Ruth Blunt** ([ruth.blunt@nottingham.ac.uk](mailto:ruth.blunt@nottingham.ac.uk)),
**Dr Robin Flynn** ([robin.flynn@nottingham.ac.uk](mailto:robin.flynn@nottingham.ac.uk))

Exotic production animals are becoming increasingly common in the UK. D’Alterio et al (2006) suggested there were approximately 10,000 camalids in the UK in 2001, of which alpacas were by far the most common species. As a result the need for veterinary care and welfare advice has also increased with only a limited increase in education or awareness of the problems surrounding these species.

A number of studies have suggested that the control of parasites can be a particular issue in exotics. Camels appear to be very susceptible to fascioliasis Duff et al (1999) and can be
infected with a range of endoparasities including, Haemonchus, Cooperia, Trichostrongylus species, Capillaria, Nematodirus and Trichuris species Tait et al (2002). Ectoparasite control can also be a problem Foster 2008 reports that camelids are affected by Chorioptic, Psoroptic and Sarcoptic mange as well as biting lice.

This PhD will assess the burden parasite infection places on exotic species in the UK and any risk they may pose to other production animals. The project will also examine the current level of owner and veterinary knowledge of parasite control. The work will involve surveys and interviews in addition to lab work such as faecal egg counts.

**Mammalian and avian host innate resistance to highly pathogenic and emergent influenza virus infections**

Supervisor: **Prof. Kin-Chow Chang** (kin-chow.chang@nottingham.ac.uk),
**Dr. Suresh Kuchipudi** (suresh.kuchipudi@nottingham.ac.uk)

Influenza A virus infection is a major veterinary disease that affects a wide range of mammalian and avian species, and is a serious zoonotic threat to public health. We are a substantial research group with a major research programme on understanding the mechanisms of host innate disease resistance to influenza infections. Our strategic approach is to compare host response to virulent influenza virus infection (such as highly pathogenic avian influenza H5N1 virus) between resistant (e.g. pig and duck) and susceptible (human and chicken) species to identify targets for the development of intervention therapy to reduce disease severity. To this end we utilise the latest research tools of molecular and cellular biology, such as next generation sequencing and quantitative SILAC proteomics, and work in close collaboration with colleagues nationally (e.g. Prof. Ian Brown, Animal Health and Veterinary Laboratories Agency) and internationally (Prof. Jinhua Liu, China Agricultural University) to elucidate mechanisms of pathogenicity and pathogenesis to identify host targets for therapeutic modulation.

Recent references:


**The carrier state in Salmonella Dublin infection in cattle**

Supervisor: **P. Barrow** (paul.barrow@nottingham.ac.uk),
**N. Foster** (n.foster@nottingham.ac.uk)
Salmonella Dublin infection in cattle is associated with persistent carriage without immune elimination with transmission to the foetus. Although an immune response is mounted to the bacteria the reason for the absence of clearance is unknown. This Salmonella serovar represents a small group including S. Pullorum in chickens and S. Typhi in man where persistence is an important aspect of the infection biology. We want to dissect the immune response and see how this differs to infection with a taxonomically related serovar S. Enteritidis. This has implications for new approaches to eliminate persistent carrier infections.

The role of flagellin in Salmonella Gallinarum and S. Pullorum infection in chickens

Supervisor:  M. Jones (michael.a.jones@nottingham.ac.uk),
P. Barrow (paul.barrow@nottingham.ac.uk)

Salmonella Gallinarum and S. Pullorum are the avian-specific agents of typhoid-like infection and the only two non-flagellate Salmonella serovars. We can see from genome sequence information that the flagella loci contain several pseudogenes. However, the gene encoding flagellin is entire and functional. This presupposes a role for flagellin in infection which is not related to motility. We wish to determine this role in terms of innate immune stimulation using standard molecular bacteriology and immunological assays.

The early immune response of the pig to Clostridium difficile infection

Supervisor:  P. Barrow (paul.barrow@nottingham.ac.uk),
N. Foster (n.foster@nottingham.ac.uk)

Clostridium difficile is an important pathogen of man especially in old hospitalised patients. It produces a very similar disease in neonatal pigs. We wish to explore approaches to infection control one of which will utilise a combination of competitive exclusion and stimulating the innate response to infection. The project will revolve around gaining an understanding of the early immune response to enteric infection.

Viruses or protozoan parasites – a case for their use for infection control

Supervisor:  P. Barrow (paul.barrow@nottingham.ac.uk),
R. Atterbury (robert.atterbury@nottingham.ac.uk)

Viruses and virus-like particles have increasingly been identified associated with protozoan parasites such as Eimeria and Trypanosoma. We will explore the infection biology of these viruses in chicken infection with different Eimeria species. This will include their prevalence, the kinetics of their multiplication in vivo during Eimeria infection and whether there is any potential for biocontrol using Eimeria viruses.
The use of lytic bacteriophages to control *Vibrio cholera* infection

Supervisor: P. Barrow (paul.barrow@nottingham.ac.uk), R. Atterbury (robert.atterbury@nottingham.ac.uk)

Bacteriophages have been demonstrated under experimental conditions to be highly effective in controlling enterotoxigenic *Escherichia coli* (ETEC) infections. The pathogenesis of human cholera infection is identical to ETEC and should be amenable to the application of phage to control infection under carefully controlled conditions. Some work has been done in this area but little has been done systematically. We are collaborating with colleagues in India, Kenya and Surrey to exploit the lytic activity of phage in the intestine using animal models. The project will be based around the application of phages to *Vibrio cholera* infection and their lytic kinetics *in vitro* and *in vivo*.

The role of pseudogenes in *Salmonella* Pullorum infection in chickens

Supervisor: P. Barrow (paul.barrow@nottingham.ac.uk), M. Jones (michael.a.jones@nottingham.ac.uk), R. Emes (Richard.emes@nottingham.ac.uk)

Host-adapted bacterial pathogens generally show either reduced genome size or accumulate pseudogenes in a variety of metabolic and nutritional functions indicating that the macrophage environment is relatively benign. We will explore the genome sequence of the avian pathogen *S. Pullorum* and related serovars together with colleagues at the Wellcome Trust Sanger Institute to identify key pseudogenes. In collaboration with colleagues at Jiangsu Agricultural University, China, the study will restore function to these genes and monitor changes in biological activity. A parallel study will involve mutating the same genes in the taxonomically related *S. Enteritidis*.

Molecular Basis of Resistance to Influenza A in Ducks Main

Supervisor: Steve Dunham (stephen.dunham@nottingham.ac.uk)

Ducks are natural hosts for most subtypes of influenza A, yet rarely succumb to disease. We have recently shown that this resistance correlates with the induction of rapid cell death by influenza of duck cells in culture. The mechanism of cell death appears to involve both apoptosis and autophagy. This PhD will unravel the cell pathways underlying the death response in duck cells and attempt to identify the cellular and viral determinants. The recent availability of the duck genome is timely and opens up a number of new approaches for studying cellular responses to disease in ducks.
**Epigenetic determinants of metastatic cancer**

**Supervisor: Nigel P. Mongan** ([nigel.mongan@nottingham.ac.uk](mailto:nigel.mongan@nottingham.ac.uk))

Advances in early diagnostics and surgical approaches have improved overall survival rates of individuals diagnosed with localized cancers. However, metastatic cancers remain clinically very challenging. Current clinical trials are resulting in only modest improvements in survival for those patients with metastatic disease. The goal of this project is to determine the mechanisms whereby localized cancers adopt the capacity to invade and metastasize with the ultimate goal of developing novel pharmacological approaches to prevent, delay or reverse metastatic progression.

Cancer is associated with the loss of function of critical genes, termed tumor suppressors. For example in normal, non-cancerous prostate cells, these tumor suppressor genes act to limit cellular proliferation and invasion. Therefore the loss of these genes endows prostate cancer cells with the ability to hyper-proliferate and escape beyond the prostate gland. This loss of tumor suppressor gene function is associated with changes in the chemical composition of tumor cell DNA, most commonly methylation of DNA and changes in associated histone modifications. Such epigenetic changes result in the altered gene expression changes associated with cancer. We have recently identified multiple androgen receptor signaling and epigenetic-associated proteins which are increased in prostate and other urological cancers. The focus of this doctoral project will be to determine (i) the mechanisms leading to the increased expression of these epigenetic transcriptional coregulators and (ii) how these proteins cooperate to promote poorer survival. The project will involve the use of molecular biology (cloning, siRNA, shRNA), epigenetic tools (chromatin immunoprecipitation, DNA methylation methods) and integrated genomewide analyses (RNAseq, ChIPseq) to identify the transcriptional networks involved in driving metastatic cancer. Further details are available on request from nigel.mongan@nottingham.ac.uk.

**Identification of novel cancer biomarkers to distinguish normal and malignant tissues**

**Supervisor: Nigel Mongan** ([nigel.mongan@nottingham.ac.uk](mailto:nigel.mongan@nottingham.ac.uk)), **Kevin Gough** ([kevin.gough@nottingham.ac.uk](mailto:kevin.gough@nottingham.ac.uk)), **Mark Dunning** ([Mark.Dunning@nottingham.ac.uk](mailto:Mark.Dunning@nottingham.ac.uk)), **Richard Emes** ([Richard.emes@nottingham.ac.uk](mailto:Richard.emes@nottingham.ac.uk))

Biomarkers are used in cancer screening, diagnosis and for guiding treatment decisions for many types of human malignancies. To date biomarkers have been less extensively used in companion animal oncology. Current biomarkers are typically oncogene-encoded proteins which are over-expressed in cancer. An ideal biomarker would be specifically and selectively expressed by malignant tumor cells and be detectable in blood or urine. However some widely used biomarkers often do not accurately distinguish indolent from aggressive tumors. Secondly, many biomarkers require invasive procedures including fine needle aspirates (FNA) and/or surgical intervention followed by pathological evaluation. Furthermore, no reliable biomarkers...
exist for some common aggressive malignancies, most notably pancreatic cancer and lymphoma, where clinical and pathological staging remains the best available approach to stratify patients. There is therefore an urgent need to develop new tools to detect tumor-unique characteristics. In this project we propose to apply an unbiased antibody-phage display approach to identify novel tumor-associated features. This approach offers the potential to develop new tools to enable novel diagnostic approaches to detect tumor specific features in urine and blood.

**Endometrial vasculature: regulation and function during the post-partum period in the cow**

Supervisor: **Bob Robinson** ([bob.robinson@nottingham.ac.uk](mailto:bob.robinson@nottingham.ac.uk))

Impaired vascular remodelling in the endometrium adversely affects the ability of the uterus to recover post-partum and re-establish pregnancy.

Infertility is a massive problem still facing the dairy industry. The two principal problems affecting reproductive efficiency in dairy cows today are: (1) Post-partum disorders associated with uterine involution, extensive endometrial tissue repair, bacterial clearance and resumption of ovarian activity. (2) Failure to establish a pregnancy, where it is estimated that up to 40% of all embryos are lost before implantation, a period where the embryo is dependent of uterine histotroph secretions for its development. However, remarkably little is known about the huge changes in the vasculature that must occur during the post-partum period.

Vascular remodelling is an essential and integrated component of tissue remodelling. Indeed, an appropriate vasculature is necessary for removal of debris, delivery of immune cells as part of the innate response and ultimately the supply of nutrients, growth factors and oxygen required for embryo survival. Furthermore, an impaired immune response to the endometrial bacterial contamination could attenuate vascular remodelling. Transcriptomics have highlighted that angiogenesis-related genes are regulated in the oestrous cycle/early pregnancy. Intriguingly, treatment of four previously subfertile women with intra-uterine Viagra increased uterine blood flow and resulted in 3 pregnancies. We have developed a culture system to study luteal angiogenesis, which will be adapted to investigate uterine angiogenesis. Thus this project offers a timely opportunity to investigate an overlooked aspect of bovine reproduction. An increased understanding of endometrial biology will lead to novel targets/strategies to improve reproductive performance in dairy cows. For example, the collection and analysis of an endometrial biopsy prior to starting a breeding programme could be an invaluable diagnostic tool as to the state of breeding potential. These studies will help to provide the necessary knowledge as to whether this is feasible.

**Metabolic profiling of Toxoplasma gondii intracellular infection using Human microvascular endothelial cells**
Supervisor: **Hany Elsheikha** ([hany.elsheikha@nottingham.ac.uk](mailto:hany.elsheikha@nottingham.ac.uk))

The apicomplexan protozoan parasite *Toxoplasma gondii* strongly depends on host cell metabolism to obtain energy and host cells provide the metabolic resources vital for microbial replication. The utilization of molecules rich in energy for protein, membranes and parasite DNA synthesis needs to be rigorously controlled to ensure parasite propagation. The mechanisms by which *T. gondii* interacts with host metabolism, altering and recruiting biosynthetic molecules for their own replication remain largely unknown. *T. gondii* infection stimulates ATP production of the host cells by increasing glycolysis. ATP is imported to *T. gondii* by ATP/ADP-translocases. Nonetheless *T. gondii* organisms are also capable of producing partially their own energy. *T. gondii* genome sequencing project has revealed that the *T. gondii* genome encodes several genes for glucose metabolizing and respiratory chain enzymes. The exact function of these metabolic enzymes in *T. gondii* development is unclear. The goal of the project is to clarify the role of host cell and parasite metabolic changes in the progression of *T. gondii* infection and to selectively target *T. gondii* energy consumption to prevent intracellular *T. gondii* growth. We use several complementary approaches (two-photon microscopy, biochemical methods and metabolomics) to analyse the metabolism in *T. gondii* infected cells.

**Novel live cell imaging of Toxoplasma gondii rhoptry effector proteins**

Supervisor: **Hany Elsheikha** ([hany.elsheikha@nottingham.ac.uk](mailto:hany.elsheikha@nottingham.ac.uk))

This project will develop a powerful, novel approach to illuminate how disease-causing (pathogenic) parasites invade host organisms. A wide range of microbial agents use a set of proteins, called ‘effectors’, to invade and infect host cells. Upon entry, these effector proteins work cooperatively to hijack cellular signaling and to reprogram the host cell to enable pathogen survival. Over 50 effector proteins have been identified in *T. gondii* that are injected into the host cell through secretory parasitic organelles (rhoptries). Although these effector proteins are essential for mediating invasion and manipulating host cell biology, it is not fully understood how they work because there are no methods to visualize their movements in real-time during cellular invasion and growth.

This project will develop a new label-free method that will directly allow visualization of these effector proteins movements during infection of a host cell. Label-free imaging will be validated by another imaging technology via tagging the broad spectrum of effector proteins with fluorescent molecules in order to visualize their movements during infection of a host cell. The focus of this project is *T. gondii*, but the method that will be developed could potentially transform the understanding of the mechanism of infection for a wide variety of other pathogens that utilize effector proteins to infect host organisms and will further contribute to the scientific understanding of protein secretion by microbes.

**Coronaviruses of rodent populations**
Supervisor:  Rachael Tarlinton (rachael.tarlinton@nottingham.ac.uk)

The emergence of MERs coronavirus in the middle-east recently has highlighted how little is known about the diversity of animal coronaviruses that may be transmissible to people. This project will use molecular and classical virological methods to describe the diversity of rodent coronaviruses and examine their impact in wild rodent populations and those associated with human habitation and primate housing facilities. Projects on non-HIV retroviruses, rabies, bunyaviridae (Schmallenberg and RVF type viruses) or exotic animal or rodent viruses may also be considered.

Immunology and pathogenesis of infectious disease, particularly of livestock

Supervisor:  Professor David Haig (david.haig@nottingham.ac.uk)

- Immune mechanisms contributing to either the control of infectious disease or contributing towards disease pathogenesis. Both innate and adaptive immune mechanisms.
- Vaccine strategies for controlling infectious disease, including novel adjuvants, routes of immunisation and vector-delivered antigens.
- Mechanisms of pathogenesis of infectious disease, particularly but not exclusively to viruses.
- The biology of the DNA viruses that include herpesviruses and poxviruses.
- Mechanisms of immunity to parasites.

Developing the role of hand-held computing devices in veterinary education

Supervisor:  John Burford (john.burford@nottingham.ac.uk)

This project will focus on the vast possibilities created through the advent of mobile computing devices such as smartphones and tablets. The extraordinarily rapid progress in these technologies has meant that very few of the capabilities have been tested, and possible applications have not yet been envisaged. The research will involve review of the way that tablets are currently used, and look to identify how these may be developed. This will involve the development of apps and so the candidate will need to have an interest in technology; have a good depth of knowledge of computing technologies and ideally some experience of programming languages such as C++ and Java.

The use of augmented reality in veterinary surgery
Supervisor:  **John Burford** ([john.burford@nottingham.ac.uk](mailto:john.burford@nottingham.ac.uk))

Augmented reality provides the possibility to create a paradigm shift in the way that routine surgeries are performed in the veterinary field. The advent of wearable computing devices and the exponentially-advancing development of smart phones means that access to devices capable to revolutionising surgical experiences is almost ubiquitous. The project will investigate how using augmented reality can benefit the surgeon through the amalgamation of advanced imaging technologies and the live-surgical field, and through the direction and improved interpretation of the real-world environment. The candidate will need to have experience and understanding of basic veterinary surgery together with a demonstrable ability to generate computer code and app development.

**Cancer epigenetics and reprogramming**

Supervisor:  **Dr Cinzia Allegrucci** ([cinzia.allegrucci@nottingham.ac.uk](mailto:cinzia.allegrucci@nottingham.ac.uk))

Our lab is interested in understanding the epigenetic mechanisms involved in carcinogenesis and cancer reprogramming. Gene function is regulated by epigenetic remodelling of chromatin via DNA methylation, histone modification and RNA interference. These epigenetic modifications play a fundamental role during development and are altered in cancer. A fundamental question in cancer research is the identification of molecular mechanisms that initiate and sustain tumour growth. By employing next generation sequencing, we are studying the cancer epigenome and to discover how altered epigenetic regulation of gene function can transform tissue stem cells and/or somatic cells to cancer stem cells. We are also investigating how cancer-associated epigenetic alterations can be reverted by cellular reprogramming. To this end, we use oocyte extracts and the induced pluripotent stem cell (iPSC) technology to study how epigenetic alterations can be erased to induce tumour reversion.

Candidates interested in joining our lab to work in these research areas can contact Dr Allegrucci by sending an e-mail to [cinzia.allegrucci@nottingham.ac.uk](mailto:cinzia.allegrucci@nottingham.ac.uk)

Please visit [www.nottingham.ac.uk/Vet/People/cinzia.allegrucci](http://www.nottingham.ac.uk/Vet/People/cinzia.allegrucci) and [http://beta.nottingham.ac.uk/Genetics/Research/staff.aspx](http://beta.nottingham.ac.uk/Genetics/Research/staff.aspx) and [http://www.nottingham.ac.uk/cancerresearchnottingham](http://www.nottingham.ac.uk/cancerresearchnottingham) for further information.

**Signalling pathways during embryonic stem cell differentiation**

Supervisor:  **Dr Cinzia Allegrucci** ([cinzia.allegrucci@nottingham.ac.uk](mailto:cinzia.allegrucci@nottingham.ac.uk))

Our lab is interested in understanding how to differentiate stem cells to different lineages for regenerative medicine and disease modelling (including cancer). By using mouse and human
PhD Vacancies 2014
School of Veterinary Medicine
www.nottingham.ac.uk/vet/research

Embryonic stem cells together with induced pluripotent stem cell (iPSC) technology, we are studying the signalling pathways involved in lineage specification and differentiation during embryonic development and recapitulating these events in vitro. To this end, we use transgenic approaches to elucidate the function of developmental genes to induce different lineages, with particular emphasis in the germline, hematopietic system and mesoderm differentiation. Candidates interested in joining our lab to work in these research areas can contact Dr Allegrucci by sending an e-mail to cinzia.allegrucci@nottingham.ac.uk

Please visit www.nottingham.ac.uk/Vet/People/cinzia.allegrucci and http://beta.nottingham.ac.uk/Genetics/Research/staff.aspx and http://www.nottingham.ac.uk/cancerresearchnottingham for further information.

The role of Notch signalling in ovarian angiogenesis

Supervisor: Katie Woad (katie.woad@nottingham.ac.uk)

The corpus luteum requires an extensive vascular supply to support its rapid growth and steroidogenic function and inadequate progesterone production has been associated with poor embryo development and increased pregnancy failure in the cow. Angiogenesis, the development of a new blood supply, is a tightly regulated process driven and controlled by both pro- and anti-angiogenic factors. Dysregulated angiogenesis may also contribute to a number of significant reproductive pathologies.

This project aims to determine the key periods and processes that occur during luteal angiogenesis, with a particular focus on the regulation of endothelial cell sprouting and vascular branching by the Notch signalling pathway.

Notch signalling is critical to vascular development in other body systems but little is known about its role in ovarian function. This project will utilize our novel cell culture system that simulates luteal angiogenesis and provides a powerful means to manipulate the Notch system in vitro. Complementary studies will use immunohistochemistry and quantitative RT-PCR to further investigate the role of the Notch system in the bovine ovary.

Understanding the fundamental events that regulate normal ovarian function is key to improving our management of reproductive inefficiency and ovarian dysfunction.

Identifying genetic causes of canine cardiovascular disease

Supervisor: Catrin Rutland (catrin.rutland@nottingham.ac.uk)

The Cardiovascular Genetics Research Group at The School of Veterinary Medicine and Science have been using a combined approach using both clinical and scientific data and techniques to establish causes for a variety of cardiovascular disorders that we see in our clinics. The
supervisors are both clinical (Prod. Malcolm Cobb) and basic scientists (Associate Prof. Nigel Mongan and Dr Catrin Rutland) whose expertise enables the clinical, molecular, physiological and histological combination to provide comprehensive research. Skills will range from essentials such as DNA extraction, PCR, bioinformatics, project design, anatomy and histology, clinical histories and data base mining up to using a wide range of the latest gene analysis technology. We are an active research group and hold fortnightly research and analysis meetings. This project would suit both clinicians and scientists.