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PETER MARTIN BIGGS

13 August 1926 — 27 December 2021

The autobiography of Professor Biggs is available at:
<https://aaap.memberclicks.net/assets/documents/Bio%20biggs.pdf>



Peter Biggs.



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13 August 1926 — 27 December 2021

Elected FRS 1976

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Peter Biggs was a towering figure in poultry health research, making substantial contributions in avian infectious diseases in the second half of the twentieth century and first two decades of the twenty-first century. The world's poultry industry owes an immense debt to his pioneering research into Marek's disease (MD), a major threat to poultry health in the early years of intensive poultry production. On graduating from the Royal Veterinary College, London, in 1953, Peter chose a research career studying avian diseases. Peter's dedicated research in the 1960s led to the identification of the MD virus and the subsequent development of a vaccine against MD. The development of MD vaccine, the first ever vaccine against a virus-induced cancer, had a major impact on sustaining the fledgling poultry farming that was crucial for the thriving modern poultry industry. Later, as the director of the Houghton Poultry Research Station in Cambridgeshire, UK, Peter led a programme of innovative scientific research exploiting scientific developments and technological advances to meet the needs of the rapidly expanding poultry industry. In addition to his outstanding leadership on research, Peter also contributed immensely to the formation of the World Veterinary Poultry Association, a global professional association for avian health specialists, and establishment of the journal *Avian Pathology*. Even after retirement, Peter continued to make valuable contributions to avian science through august bodies such as the Royal Society, Animal Health Trust, British Egg Marketing Board, British Veterinary Association and Houghton Trust. Peter was also a great mentor to many scientists who went on to leading roles.

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EARLY LIFE

Peter Martin Biggs was born on 13 August 1926 in the White House on Bell Hill near Petersfield and Steep in Hampshire. Peter's parents, Ronald and Cecile Biggs, both taught at Bedales School, where Ronald was the director of music. Peter spent his early childhood in Steep and Petersfield in Hampshire and Dartington in Devon. His schooling between 1934 and 1940 was at the Totnes Grammar and Bedales schools. Peter remembered little about his time at the Totnes Grammar preparatory school except that the class was seated according to achievement. On entering the school, a pupil was placed and seated at the bottom of the class and climbed up places on the basis of performance in tests. Peter saw this as a challenge and was determined to make his way to the top—which he did.

Music played a significant role in his time at Bedales, with Peter playing cello and taking part as an active member of the choir and junior orchestra. An uncle, Claud Biggs, who was a pianist and participated in school concerts, was to become the teacher at the Royal Northern School of Music of John Ogden, the celebrated pianist and composer. Peter also enjoyed playing a variety of games, including first team football and cricket, athletics (sprint distances and the javelin, holding the record for javelin throwing for his age group for a number of years) and some other sports, including gymnastics, which he thoroughly enjoyed and in which he managed to back and forward flip.

The threat of the Second World War had a major effect on Peter's early life. After the military evacuation at Dunkirk, when it became clear that England was likely to be invaded, preparations for saving life from the impact of the war started. The school had dug and constructed trenches and had air raid alarms and training drills almost every night. During the summer of 1940, at the age of just 14, Peter was evacuated to Massachusetts in the USA, to join the family of Mr and Mrs Frank Wigglesworth, who lived in the small village of Harvard, about 30 miles west of Boston. Peter was then able to join Cambridge School, a progressive private school where Mr Wigglesworth was head of the Arts Department. For four years between 1940 and 1944 Peter was a weekly boarder, often staying for the weekend so that in the winter he was able to ski locally and ice skate on a small pond within the school grounds. Again, he was good at team sports, played American football and basketball and had the distinction in his last year of playing for the first team when, for first time, it was undefeated during the season. Peter recollected the science education system in the USA with teaching and weekly assignments that taught him to learn and enjoy more, as well as how to organize one's personal learning. After graduation in 1944, Peter returned to England with a desire to join the Royal Air Force (RAF) and later to become an aeronautical engineer after the war.

UNIVERSITY EDUCATION

With the Royal Air Force

Peter's first experience of university education was as a student on an RAF University Short Course at Queen's University, Belfast. This was because he joined the RAF in 1944 as a trainee for aircrew and had to spend the first six months of this service at Queen's University studying physics, engineering, climatology and geology as part of this University Short Course. Peter's stint in the RAF gave time for reflection, resulting in the change in his

interests from engineering to biological subjects, especially in the ecology of wildlife. After further considerations of his background working on farms with animals, Peter chose to take up veterinary training and joined the five-year course at the Royal Veterinary College (RVC), London, in 1948.

The Royal Veterinary College

Veterinary education at the RVC was daunting and consisted of lectures and practical classes designed to gain membership of the Royal College of Veterinary Surgeons (RCVS), which qualified one to practise the art and science of veterinary surgery. It was a relief to Peter that almost all of the 80 students in his starting year were ex-service, like himself. This is what Peter wrote himself about his time there: 'although we played hard and gave some of our teachers a hard time, we were motivated because we had made the decision to be a veterinary surgeon at a mature age and all felt having had four or more years taken out of our lives, we wanted to get on with it.' During the veterinary degree course at the RVC, Peter particularly enjoyed the subjects of pathology, bacteriology, virology and parasitology, and long remembered some of the lectures that inspired him. In particular, the most stimulating series of lectures and discussions on the embryology, anatomy and physiology of the domestic chicken given by Dr A. S. (Tony) King during the second year greatly influenced him. Peter later commented that these lectures were indeed a significant factor from the veterinary course that influenced the choice of subsequent research career, as it stimulated a major interest in the chicken and avian species. As the RCVS membership was not sufficient to study for a PhD, Peter took additional courses to study for the degree of BSc in veterinary science (BSc Vet. Sci.) from the University of London. Peter successfully completed both the BSc Vet. Sci. course and membership of the RCVS (MRCVS) examinations in 1953 with good academic scores, which enabled him to get sufficient support for doing a post-graduate research degree.

Post-graduate research career

Although Peter was duly admitted as MRCVS after completing his course at the RVC in 1953, he did not wish to go into veterinary practice, and instead opted for a research career. He wanted to study for a PhD focused on some aspects of viruses and cancer, having been influenced by the book *The leucosis of fowls and leukaemia problems* (Ellerman 1921). However, with the advice of Tony King, who by then had moved to the Department of Veterinary Anatomy at the new Veterinary School in Bristol, Peter took up a research assistantship in the Faculty of Medicine at Bristol. Soon after, Peter joined as a PhD student in the Veterinary Anatomy department, starting his research on the subject 'Lymphoid tissue in the endocrine glands of the domestic fowl: its significance in health and disease', with Tony as his mentor. As part of this PhD, Peter learnt about the histology of tissues and organs of the fowl (1)*, and developed great interest in the lymphoid nodules and lymphatics (2). From the lymphatic canulation experiments he conducted, he was able to confirm that, unlike ducks, with two pairs of primitive lymph nodes, chickens did not have lymph nodes.

After his research assistantship tenure in 1955, Peter's passion and continued research interest in avian tumours and viruses appealed to Professor Frederick Blakemore, the head of Bristol Veterinary School's field station at Langford. Professor Blakemore offered him the post of lecturer in veterinary clinical pathology, which allowed him to complete his PhD,

* Numbers in this form refer to the bibliography at the end of the text.

as well as pursue his interest in what was then called the ‘avian leukosis complex’. Peter accepted the offer and moved to Langford in the summer of 1955. Sadly, Professor Blakemore passed away soon after Peter arrived in Langford, with the result that Peter lost immediate support for the work he wished to do. However, the newly appointed head, Professor Charlie Grunsell, arranged for Peter to spend time in other laboratories in Cardiff, at the National Institute for Biological Standards in Hampstead, and at Westminster Hospital. Peter very much enjoyed these opportunities and learnt considerably about chicken embryo fibroblast culture, vaccine production and safety testing, as well as the biology of lymphocytes. Peter successfully completed his doctorate studies and was awarded a PhD by the University of Bristol in 1958.

Owing to the limited facilities and resources to initiate research on the avian leukosis complex at Langford, Peter’s interest turned to other research areas, such as transplantation, immunological tolerance and graft versus host reaction. These topics were of great interest to biologists and immunologists at that time, largely stimulated by the works of Peter Medawar FRS, Leslie Brent and Rupert Billingham (FRS 1961) (Billingham *et al.* 1953). During this period, L. N. (Jim) Payne, who was a final year veterinary student at Bristol, had similarly shown great interest in research on avian viral tumours. After his graduation in 1956, Jim Payne joined Peter in the pursuit of their research interests on avian leukosis complex and graft versus host reaction. This was the beginning of a successful research collaboration and a close friendship that was to last for more than six decades. Exciting studies on graft versus host reaction carried out by Peter and Jim during that time resulted in three publications, including one in the journal *Nature* (3). Using the sex chromosome as a marker, these studies showed that the pathology of the graft versus host reaction was due to donor as well as host cells—probably in equal amounts. Peter and Jim also described the pathology of the reaction in the developing chicken embryo over several days after the inoculation of donor cells (5, 6). Peter gained valuable experience in avian haematology, pathology and the handling of avian chromosomes and intravenous inoculation of avian embryos.

During this period Peter actively established many research contacts, mostly through the colleagues he met at scientific meetings, many of whom were based at the Chester Beatty Institute for Cancer Research.

JOINING THE HOUGHTON POULTRY RESEARCH STATION

Peter’s career at the Houghton Poultry Research Station (HPRS) in Cambridgeshire marked a pivotal shift in his academic trajectory. It was here that he was given the opportunity to immerse himself in his passion to do research on viruses and cancer. This was fortuitously enabled by the decision of the then Agricultural Research Council (ARC) to fund a programme on the avian leukosis complex, a devastating disease that was threatening poultry health worldwide. With very little understanding of this complex disease existing at that time, the ARC propitiously recognized the importance of scientific research on the disease, which was economically becoming very important to the rapidly growing poultry industry. As the ARC was looking for someone to lead this programme at HPRS, Peter was offered the opportunity, which he accepted, and he moved to Houghton in the early summer of 1959.

Upon his arrival at Houghton, Peter was appointed head of the new Leukosis Experimental Unit (LEU), a position that provided him with the resources and freedom to pursue his research passions. The first task that Peter took on was the setting up of the laboratory block

for tissue culture, together with the isolation rooms for experimental animals, which were completed and opened in January 1962. A few months later and about 10 miles away, the Leukosis Production Unit was also opened for holding the breeding stock of chicken lines that were to be used for experimental studies at the LEU. Through these efforts to provide high-quality experimental and livestock facilities, Peter quickly established a world-class laboratory that attracted exceptional scientists from across the world, creating a very dynamic and collaborative research environment. Jim Payne joined HPRS in 1961, along with further new staff members who were recruited to manage the technical aspects of the work, and moved into the LEU.

In the very early days at HPRS, despite his enthusiasm to embark on ground-breaking research endeavours to gain deeper understanding of the avian leukosis complex, Peter had to wait to initiate experimental work as the construction of LEU was not complete. However, this did not curtail his enthusiasm as he started pathological investigations into the disease using samples from field cases. Some of the pathological studies used the developing chick embryo in a graft versus host assay to examine the immunological potential of cells from tumours of Marek's disease (MD) in comparison with a transplantable lymphoid leukosis tumour, RPL 12 (7). Despite the limitations of not being able to include all the appropriate controls in the experimental design, the development of MD tumours in chicks that were allowed to hatch after inoculation of the developing chick embryos with tumour cell suspension convinced Peter that successful transmission required inoculation of the tumour cells and good isolation facilities.

VISIT TO TUMOUR VIRUS LABORATORIES IN THE USA

As part of a tour arranged through the ARC and funded by the Astor Foundation in New York, in the spring and early summer of 1960 Peter was given the opportunity to visit laboratories in the USA that were working with tumours and tumour-associated viruses. This tour, which included visits to different laboratories as well as participation in a symposium on tumour viruses in New York, was very useful for Peter as he was able to meet many scientists, including R. E. Shope and Charlotte Friend at the Sloan Kettering Institute, who would become friends for decades later. The tumour virus symposium in New York was also very valuable for Peter, and one of the talks by Dr Harry Rubin from California on the 'Resistance inducing factor' (RIF) was particularly interesting to him (Rubin 1960). Peter understood the significance of Dr Rubin's suggestion that the RIF exhibited by a proportion of the chicken embryos was probably an avian lymphomatosis virus, most likely to be the one associated with lymphoid leukosis or neurolymphomatosis. At the National Cancer Institute, near Washington, he talked with a number of scientists, and in particular those working on isolates of mouse leukaemia, Rous sarcoma and polyoma viruses. Peter learnt a lot from this visit and made useful contacts for future research collaborations, especially with Drs Rauscher, Moloney and Bryan.

During this trip, Peter also visited the Regional Poultry Laboratory, East Lansing and Cornell University, where he spent valuable time in the post-mortem rooms and discussing the pathology of the condition with which each laboratory was working. It was clear to him at the end of his visits that the former was working with lymphoid leukosis and the latter with MD. This judgement clarified in Peter's mind the differing results and disagreements there had been between the two laboratories. Peter was back at HPRS by mid June in 1960

after the tour of the US laboratories and, as he writes in his memoirs, 'I would recommend a tour of this nature to anyone starting up in an area of research which is novel to them. One not only benefits from the expertise of individuals whom one visits and the workings of their laboratories, but also from the friendships and valuable contacts that can be made'.

DEMONSTRATION THAT AVIAN LEUKOSIS COMPLEX COMPRISES TWO DISTINCT DISEASES

From his early work at Houghton and from the observations and discussions during his visit to the different laboratories in the US, Peter had recognized that the avian leukosis complex might actually be at least two different diseases, which were later to be named as Marek's disease (MD) and lymphoid leukosis (LL). However, there was not enough evidence at that time to confirm whether these were indeed two distinct diseases with separate aetiologies or were just different manifestations of the same disease.

Mindful of the need to solve this conundrum, Peter set out his research mission with a focus on the question of identity. However, he had to first establish some important techniques and assays, such as setting up of chick embryo fibroblast (CEF) cultures, Rous sarcoma virus (RSV) focus assays, RIF test and the growth of RSV in the chorioallantoic membrane (CAM) of the developing chick embryos (Rubin 1957), before he was able to progress with the research questions. At the same time as the development of these techniques, Peter and Jim set about attempting transmission of MD and LL. They were successful in serially transmitting MD virus (MDV) through six passages, which had never been possible until then (9). Peter recollected that the major breakthrough in the successful transmission of MD was the result of many factors, such as the use of whole-cell preparations, excellent isolation facilities at LEU and, serendipitously, using a strain of chicken that was highly susceptible to the disease. They also managed to obtain several LL virus isolates stored in the freezer. Using information from the transmission studies of several different strains of chicken and cell culture studies, Peter made a comparison of the properties of the causative agent and the pathology of MD with those of LL (8). The results of these comparisons provided strong evidence that these were different diseases with distinct aetiologies. Results of these studies were presented at the 1964 International Conference on Avian Tumour Viruses at Duke University in the USA, where he also first met Bruce Calnek from Cornell University, who later became a close friend and collaborator on MD research. On having obtained the data to establish that avian leukosis complex was indeed two distinct diseases, LL and MD, Peter's resolution to name the latter as Marek's disease (MD), after the Hungarian veterinary pathologist Jozsef Marek, who first reported the condition in 1907, was approved at the First Congress of the World Veterinary Poultry Association (WVPA) in Utrecht in 1960 (4).

REVELATION OF THE CAUSATIVE AGENT OF MD AND ITS DISTINCT CELL-ASSOCIATED PHENOTYPE

Having developed the MD transmission model, Peter turned his focus mainly to identify the aetiological agent, with Jim Payne putting his efforts more into studies on its pathogenesis. Using standardized shorter-term quantitative experiments that they developed, Peter and Jim demonstrated the critical need for whole live-infected cells for transmission of MD, thus

suggesting the cell-associated nature of the causative agent. Nevertheless, all attempts to grow the agent in CEF were unsuccessful, although the infectivity could be maintained in tumour cell cultures. Success came after Tony Churchill joined Peter's group in 1966, when he observed syncytia and intranuclear inclusions, characteristic of herpesvirus infections in chicken kidney cell cultures inoculated with MD material. Electron micrographs of the cell cultures clearly showed the presence of herpesvirus, and the findings were published in *Nature* in 1967 (11). Following the identification of the virus, Peter and his team successfully attenuated virulent virus by continuous passaging in chicken kidney cell cultures to produce an attenuated form of the virus that was effective in protecting chickens against virulent MDV challenge (12). The progress made by Peter and his team from the identification of the disease, its transmission and elucidation of its aetiology to the development of an attenuated virus for use as an effective vaccine in less than a decade is very remarkable. Peter always attributed this success to the right tools, right people and the commitment of funds for research. Among the number of things that he considered important for a successful research career, Peter valued the significance of keeping in touch with other researchers and scientific developments, which enabled him to choose the right questions or test a hypothesis in his quest for scientific excellence.

At the same time the research on MD was happening, Peter also made sure that parallel studies took place on leukosis and sarcoma viruses. These studies led to the feasibility of applying RSV challenge on CAM in progeny-testing studies for genetic resistance to avian leukosis (10), although subsequent development of strategies for eradication of avian leukosis viruses took precedence. Similarly, Jim Payne and Roger Chubb, working with Robin Weiss (FRS 1997) at University College London, showed the importance of integrated endogenous retroviruses in the germline of almost all chickens. Peter also had a brief foray investigating lymphoid tumours in turkeys, a condition that was of concern to the industry. Peter named it lymphoproliferative disease of turkeys, which he showed was transmissible and caused by an unrelated oncovirus (13). While pursuing his interest in leukaemia and related cancers, Peter served as vice president and later president of the International Association for Comparative Research on Leukaemia and Related Diseases, and organized a symposium in Cambridge in 1983.

DIRECTORSHIP OF HOUGHTON POULTRY RESEARCH STATION AND THE INSTITUTE FOR ANIMAL HEALTH

At the end of 1973 Bob Gordon retired and Peter was appointed his successor as director of the HPRS (figure 1). The directorship is a testimony of his vision and leadership to ensure that the work of the station was of utmost relevance to the needs of and emerging disease threats to the poultry industry, with sound science embracing all the scientific and technological advances. As director, Peter maintained an effective balance between the demands of administration and hands-on science by also leading a small group from the LEU through which he was able to continue work on lymphoproliferative disease of turkeys and vaccination and vaccine breakdowns in MD.

Despite facing an abundance of financial difficulties arising from funding shortfalls, Peter continually worked to retain the best of the existing programmes, with the addition of new expertise into cutting edge areas such as molecular biology and immunogenetics, to keep the

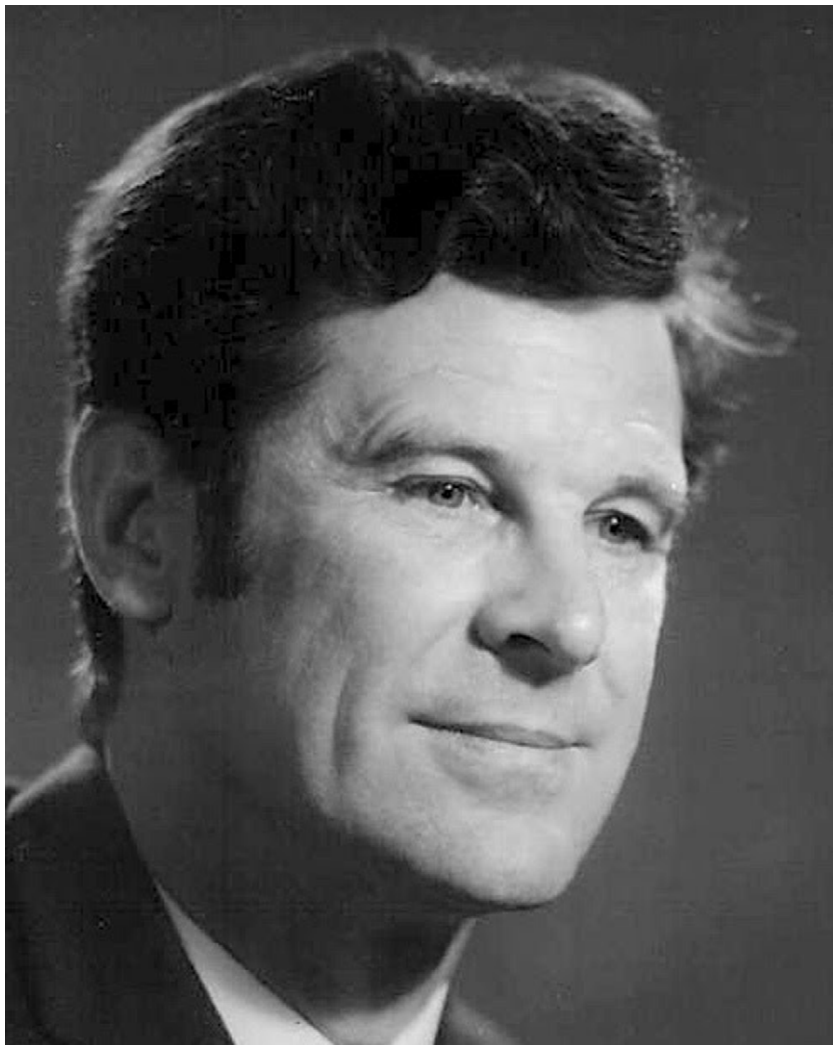


Figure 1. Director of HPRS in *ca* 1973. (From the family collection.)

research output from the station fit-for-purpose and of international excellence. A particular challenge faced by Peter in the context of continuing attrition of funding was partly due to a political change of view over the importance of agriculture and the question of who should pay for the research supporting agriculture. A view by some of the funders at the time that infectious disease was over-supported made it difficult for Peter to maintain both the facilities and resources of the station. Even so, research output was maintained and HPRS remained a centre for scientific excellence.

At the personal level, and as a result of his outstanding research accomplishments in the field of MD and other avian diseases at HPRS, Peter's international standing increased even further and he was invited to give lectures in several countries, such as Australia, Belgium,

Bulgaria, Canada, Czechoslovakia, France, Germany, Holland, Israel, Italy, Japan, Lebanon, New Zealand, Norway, Russia, Spain and the USA. Peter highly regarded the privileges for scientists to present their research accomplishments in international scientific forums. His personable style also enabled him to make more acquaintances and provided opportunities to help with training in the technologies he developed.

The later years of his directorship presented some further very difficult times, as the UK government was considering a major restructuring of animal disease research, with the threat of the closure of HPRS in spite of its worldwide reputation and scientific impact. Despite the opposition from Peter, and against the wishes of many scientists and those within the large poultry sector, the Institute for Animal Health (IAH) was created by bringing together the four Agriculture and Food Research Council institutes that were involved in animal disease research, *viz.* HPRS, the Animal Virus Research Institute at Pirbright, the Neuropathogenesis Unit in Edinburgh and the Institute for the Research on Animal Diseases at Compton (Berkshire).

Closure of HPRS in 1992 resulted in the relocation of some of the staff to Compton, while others left the station. Peter was appointed as the director of the new IAH, headquartered at Compton, where he continued until his retirement in August 1988. The challenges he faced at IAH were different but no less demanding than in the final years at HPRS. Specifically, whilst having responsibility for the delivery of a larger portfolio of science, an early task for Peter was the setting up of an appropriate administrative structure. This was especially time-consuming, not least because there had been directors of each component laboratory who, understandably, found it hard to accommodate to their new positions as heads of a site.

LIFE AFTER RETIREMENT AND CONTRIBUTIONS TO OTHER SCIENCE-RELATED ACTIVITIES

After retirement as director of IAH, Peter took the decision to continue to stay active and involved in science, particularly in those areas related to veterinary and poultry science, in order to broaden his experience.

Peter was very pleased with his six-year appointment as A. D. White professor-at-large at the Department of Microbiology, Parasitology and Immunology at Cornell University in the USA, which allowed him to have a 2–3 week annual visit there. As part of this appointment, Peter gave public lectures on topics such as ‘Society’s changing view of science and the effect on scientific research’ and ‘Vaccines and vaccination—ancient and modern’, which were well received by the audience, particularly by the microbiologists. He also gave a lecture to the Veterinary Faculty at Cornell University on ‘Lymphoproliferative disease—a retroviral disease of turkeys’.

Peter was involved with the Institute of Biology, a professional body for all biologists in the UK, which included medical, veterinary and agricultural as well as basic biologists and teachers. He was elected a fellow of the Institute of Biology in 1973 and appointed to the executive committee—he later became the president for a two-year term. As the chairman of the accreditation panel and later of the board for courses for animal licence holders, Peter was involved in the accreditation of training programmes for personnel involved in scientific procedures on animals, which was officially recognized by the Home Office in 1993. Peter also took an active role in the Animal Health Trust, where he first joined its scientific advisory

committee in 1976. Later he became its vice chairman and then chairman in 1987, continuing in that role for 20 years.

Peter played a role as part of the scientific advisory group of the Equine Virology Research Foundation, which was set up to support fundamental and applied research in the field of equine virology. The foundation supported 48 research projects across multiple institutions, which had a very positive impact on equine research in the UK. He also served as the vice president of the British Veterinary Association, and a member of the Veterinary Policy Group.

Some of the other activities that Peter was involved with included membership of the Council of the Royal Society, the Council of the Academy of Medical Sciences and the Royal Veterinary College Council, as well as the chairmanship of the technical advisory committee of the Board of Assured Chicken Production.

He also made a significant contribution to the British Egg Marketing Board (BEMB) Research and Education Trust, established in 1971 to support research and education in science related to egg production. Peter was elected chairman in 1994 and continued in this role until 2019, at the age of 93. The trust supported pump-priming grants and PhD scholarships to sustain research on topics related to the poultry egg industry. At the twenty-fifth anniversary of the BEMB, Peter was pleased to make the announcement that the trust had spent over £1.5 million in support of the poultry egg industry.

Contributions to the activities of the Royal Society

Peter was elected a Fellow of the Royal Society in 1976. He recollected in his memoirs that becoming a Fellow changed his life in many ways, particularly by the increased recognition. At the Royal Society, he had the opportunity to serve on a number of committees and working groups. Peter enjoyed participation in the committee on scientific aspects of international security and the Commission on the Application of Science to Agriculture, Forestry and Aquaculture.

Following the suggestion of the Royal Society, Peter also became a member of the Advisory Committee on Dangerous Pathogens when bovine spongiform encephalopathy (BSE) became a threat in the late 1980s. As chairman of the working group, he made major contributions in developing the Reference and Guidance documents related to the precautions for work with human and animal transmissible spongiform encephalopathies. He was also heavily involved in the BSE Inquiry chaired by Lord Phillips.

World Veterinary Poultry Association and Avian Pathology journal

Peter's involvement with the WVPA started with the first conference in Utrecht in 1960, although his formal role as the secretary/treasurer of the association began in 1971. During his 10-year tenure in this position, Peter worked with three distinguished presidents: Philip Levine, Imgarade Gylstorf and Ben Burmester. In 1981 Peter was elected president of the WVPA on a four-year term, and continued in the role as an honorary life president of the association. In 2013, in recognition of his outstanding contribution for the furtherance of poultry veterinary science, Peter was elected as the founding member of the WVPA Hall of Honour. Soon after the launch of the scientific journal *Avian Pathology* by the WVPA in 1972, Peter became the editor-in-chief, with Jim Payne as the assistant-editor-in chief. Peter continued in this role until 1987, by which time the journal was well established as a mainstream scientific publication in the field of avian diseases.



Figure 2. Peter at the tenth International Symposium on Marek's Disease and Avian Herpesviruses, East Lansing, Michigan, USA, 20–23 July 2014. (Copyright unknown.)

**PETER'S RESEARCH LEGACY: A JOURNEY OF DISCOVERY, INNOVATION
AND GLOBAL IMPACT IN POULTRY HEALTH**

Peter's career stands as a testament to his remarkable intellect, his unwavering commitment to scientific discovery and his profound dedication to improving the lives of poultry and the communities that rely on them. From the outset, Peter focused his efforts on understanding the intricate mechanisms underlying the avian leukosis complex. In a series of landmark studies, he demonstrated the role of viruses in the pathogenesis of the disease, provided the molecular



Figure 3. Peter Biggs' sons, John Biggs (left) and Andrew Biggs (right), in front of the Biggs Avian Research Building inaugurated in February 2023 at the Pirbright Institute. (© The Pirbright Institute.)

explanation for the disease's aetiology and paved the way for the development of effective diagnostic tools and control strategies.

Peter recognized the need to translate his findings into practical applications that could soon benefit the poultry industry. For this, he spearheaded efforts to develop vaccines and control measures that could effectively mitigate the disease impact. His tireless advocacy for disease prevention and control played a significant role in safeguarding poultry health and contributed to preserving the sustainability of the poultry industry. Peter's contributions had a profound effect on the poultry industry, enabling the production of healthy and safe poultry products for human consumption worldwide, thus helping to safeguard the economic stability of nations reliant upon poultry production. Peter continued his interest in MD research post-retirement, participating in international symposiums on the disease (figure 2). It is a fitting tribute to Peter's outstanding contributions that the new Poultry Experimental Facility at the Pirbright Institute has been named the 'Biggs Avian Research Building' (figure 3). His legacy as an eminent avian pathologist will continue to inspire and guide future generations of scientists who seek to understand and combat animal diseases.

A FAMILY, COLLEGIATE AND WELL RESPECTED MAN

Peter had a strong love of family, and the devotion between Peter and his wife Jan was absolute. The Biggs spent more than 70 years together, having married in 1950 (figure 4),



Figure 4. Wedding day of Peter and Jan Biggs, 9 September 1950. (From the family collection.)

but knew each other from the time that Peter was living in Dartington as a six-year-old. His parents had made close friends with Malcolm and Thelma Molteno and were to remain friends with them for their whole lives. The Moltenos had two children, Jan and her younger brother. Peter and Jan lived in St Ives, Cambridgeshire, for more than 60 years (figure 5) and Jan taught at Hinchingsbrooke Grammar School. Jan was wonderfully gregarious and chatty, and together



Figure 5. Peter and Jan were happily married for over 70 years. Photograph taken at Southwold in July 2005. (From the family collection.)

they breathed a huge amount of fun and loyalty into the working life of HPRS. A particular virtue of HPRS was its relatively small size. Both Peter and Jan got to know most of the staff well and both of them joined in the many social and sports events that made HPRS such an interesting and satisfying place of work for so many of the staff.

With a warm persona and the huge fund of knowledge that he was willing to share, Peter made himself a magnet for many scientists across the world and across all age ranges. As Bruce Calnek (Cornell University) observed at the time of Peter's sixtieth birthday: 'Peter Biggs is well known, well liked and well respected for his good humour, his infectious enthusiasm, his humaneness and his moral integrity. His friendship is valued by many.'

The death of Peter was followed five months later by that of Jan. They are survived by two sons, Andrew (a veterinarian specializing in bovine health) and John (an electronic engineer). Their daughter, Alison, predeceased them. Peter was especially delighted when Andrew was also awarded the Dalrymple-Champneys Cup and Medal of the British Veterinary Association, 42 years after his own success.

The last words perhaps should be those from Peter himself: 'Looking back on my life I have few if any regrets. It has been a happy and rewarding life and I would not hesitate to do the same again if I had the opportunity of a second bite of the cherry. The work has been stimulating and rewarding and throughout my career I have met so many wonderful people and made many friends and visited much of the world. What more could one ask for?'

AWARDS AND RECOGNITION

- 1964 Tom Newman Memorial Award, jointly with Dr L. N. Payne, for poultry husbandry research, the Poultry Association of Great Britain
- 1968 British Oil and Cake Mills Poultry Science Award
- 1969 J. T. Edwards Memorial Medal, the Royal College of Veterinary Surgeons, for outstanding work in the fields of pathology and virology
- 1969 Speakers Award, the Australian Poultry Science Association
- 1970 Poultry Stock Association Distinguished Service to the Poultry Industry Award
- 1971 Brian Hanson Memorial Award, the British Veterinary Poultry Association
- 1973 Dalrymple-Champneys Cup and Medal, the British Veterinary Association, to mark and recognize scientific work of outstanding merit
- 1973 Elected Fellow of the Institute of Biology
- 1975 Doctor of Science (DSc) degree, the University of London
- 1976 Fellow, the Royal Society, for work on tumours of chickens, on the virus causing Marek's disease and on the development of a successful vaccine against the condition
- 1976 Honorary life membership, the UK branch of the World Poultry Science Association
- 1976 Honorary Doctor of Veterinary Medicine, the Ludwig-Maximilians-Universität, Munich, Germany
- 1977 Bledisloe Veterinary Award, the Royal Agricultural Society of England
- 1978 Fellow, the Royal College of Veterinary Surgeons, in recognition of eminence in and services to veterinary science
- 1978 Fellow, the Royal College of Pathologists
- 1979 Jozsef Marek Memorial Medal, the Veterinary University of Budapest
- 1981 Central Veterinary Society Victory Medal for outstanding service to veterinary science
- 1982 Visiting Professor of Veterinary Microbiology, the Royal Veterinary College
- 1983 Fellow, the Royal Veterinary College, in recognition of distinction in science and public life
- 1985 Honorary Member, the Association of Veterinary Teachers and Research Workers
- 1985 Honorary Life President, the World Veterinary Poultry Association
- 1986 Honorary Fellow, the Royal Agricultural Society of England
- 1986 Honorary Member, the British Veterinary Association
- 1987 Created Commander of the Order of the British Empire (CBE) by Her Majesty Queen Elizabeth II
- 1988 A. D. White professor-at-large, Cornell University, USA, for a six-year period
- 1988 Chalmers Watson Turkey Award, the British Turkey Federation
- 1989 Wolf Prize for Agriculture for distinguished contributions to basic science and its successful translation into practice in the field of animal health
- 1989 Honorary Member, the British Veterinary Poultry Association
- 1991 Honorary Doctorate, the University of Liège, Belgium
- 1992 World Poultry Science Association's Poultry Hall of Fame election
- 1999 Chiron Award, the British Veterinary Association, with the citation 'who, by his commitment to agriculture, biological sciences and the veterinary profession in animal disease research regulatory veterinary medicine and veterinary education has commanded the respect of veterinarians and scientists worldwide'

- 2013 Founding Member, the WVPA Hall of Honour, in recognition of his outstanding contribution for the furtherance of poultry veterinary science

AUTHOR PROFILES

Venugopal Nair



Dr Venugopal Nair OBE received his veterinary degree and PhD in veterinary medicine in India before moving to the United Kingdom in 1989 as a post-doctoral scientist at the Institute of Virology, Oxford. After a six-year tenure investigating molecular biology of flaviviruses, Dr Nair moved to the Pirbright Institute, Compton, to start research on avian oncogenic viruses under Dr Jim Payne, with the mentorship of Peter Biggs. Dr Nair became the head of the Avian Oncogenic Virus Group and carried out extensive research on the molecular biology of Marek's disease and avian leukosis viruses. He has published more than 150 scientific papers and several book chapters, as well as editing books on Marek's disease, and *Diseases of poultry*. Currently Dr Nair is emeritus professor at the Pirbright Institute, also serving as visiting professor in avian

virology at the Department of Biology, University of Oxford, and Jenner investigator at the Jenner Institute, Oxford. In recognition of his contributions in avian disease research, Dr Nair was awarded the OBE in 2015.

Martin W. Shirley



Dr Martin W. Shirley CBE joined the parasitology department at the Houghton Poultry Research Station (HPRS) in 1967 immediately from school having taken O-levels. Martin prospered under the guidance of Peter L. Long and the positive culture of life at the HPRS led by Peter Biggs, and went on via a series of part-time and full-time studies with ARC and HPRS support to gain a PhD. Martin led several programmes of research on avian coccidiosis, including epidemiology, taxonomy, approaches to vaccination and, most recently, the genetics and genomics of the seven species of *Eimeria* from the chicken. Live vaccines developed commercially from his laboratory have been used globally for more than 30 years in tens of billions of egg-laying and meat-producing birds for the control of avian coccidiosis. From

2006 to 2010 Martin followed Peter Biggs in both becoming a director of the IAH and being awarded a CBE.

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The frontispiece portrait photograph was taken in 1977 for the Royal Society and is © Godfrey Argent Studio.

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