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COMMENTARY

Groundwork for my first sixty-three years as an Applied Physiologist

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Commentary

Which people and institutions provided the groundwork for my lengthy career in Applied Physiology? My interest in this discipline was piqued some sixty-three years ago. Approaching the age of nineteen (notice that university teaching began much earlier in the 1940s), I had just completed the intermediate examinations in medicine at Guy's, one of the historic hospitals associated with the University of London. The examination papers were tough, and indeed about a half of the students failed miserably. However, my answers must have shown a gleam of promise, as shortly afterwards the Professor of Physiology (W.S. Spurrell) invited me (along with one of my friends, the late Air Commodore John Ernsting) to take 18 months away from the normal medical stream in order to complete an honours degree in Physiology under his personal direction. Tuberculosis was rampant in both patients and students during this era, and Professor Spurrell had seen a promising career as a surgeon thwarted by the loss of one lung to the tubercle bacillus. Nevertheless, the handicap of severe breathlessness did not deter him from providing invaluable tutoring to his selected neophytes; the two of us were given free access to a large if somewhat gloomy laboratory and an extensive library, with opportunity to repeat many of the classical studies in human and animal physiology, and above all the professor's weekly critique of our endeavours.

The Assistant Professor of Physiology, Dr. Naylor Hunt, was a gastrologist, and visits to his laboratory brought my first experiences as an experimental subject. For four weeks, I was asked to leave home without breakfast, travel for an hour on the "tube," and then force a very large rubbery gastric tube down my throat, allowing Dr. Hunt to pump into my stomach large volumes of a revolting mixture of peptides and pineapple juice. It was little wonder that I quickly saw the mouthpiece of the respiratory physiologist as an icon of my preferred area of study!

One novel opportunity during this year was the chance to look at the oxygen dissociation curves of children with cyanotic heart disease, testing whether their haemoglobin characteristics had been modified by years of severe hypoxia. Sir Russell Brock, then a leading surgeon

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at Guy's, was introducing to England the techniques of open heart surgery that he had learned at Johns' Hopkins University in Baltimore, and the hospital thus had a regular clientele of "blue babies." Their oxygen dissociation curves appeared relatively unaltered, and I concluded that the main factor that allowed these children to function reasonably well despite an arterial oxygen saturation sometimes as low as 70% was the normal sigmoid shape of the oxygen dissociation curve. Professor Spurrell encouraged me to present my findings to the British Physiological Society. This is a formidable assignment even for an adult, as after a paper has been presented, the entire Society votes publicly on whether to accept the material for publication, to amend it, or sometimes even to reject it entirely. Either I had very good coaching from my professor, or the Society took pity on my youth (I had now reached the age of 19); at allevents, my paper was accepted for publication without amendment.

When I rejoined the remainder of the medical students at the end of the year, I found that the research interlude had enhanced greatly my critical faculties. I was now less than impressed with the treatments offered by some of the older hospital consultants-a focus on bed-rest and placebo medication, with agents such as penicillin and sulphonamides regarded as dangerous and largely untried mysteries. At the age of 22, having completed the required three and a half years of hospital rounds and passed the University of London's qualifying examination (an honours M.B.B.S.), I dismayed some of my clinical tutors by not proceeding along the accepted path of clinical internship and hospital residency. Instead, I applied for the post of Research Fellow in the Cardiac Department at Guy's, and (probably through the kind intervention of Professor Spurrell) I was awarded the Fellowship at the princely salary of 600 pounds per year. Tuition continued in the English tradition of learning quickly from one's mistakes. After one demonstration of cardiac catheterization by the previous Fellow, I was provided with a technician, a nurse who knew a little about how to operate an x-ray machine, and a long list of children requiring cardiac catheterization. At my first attempt, I did not succeed in advancing the catheter beyond the right atrium. Over the next few days, I reflected on what went wrong, and subsequently I became quite adept at slipping the catheter through the right ventricle and into the pulmonary artery. The appointment in the Cardiac Department also allowed me to carry out research on cardio-respiratory adaptations to congenital heart disease, and it provided material to write a Ph.D. thesis. I concentrated rather single-mindedly on my dissertation, and did not "waste" too much time on writing a progress report at the end of my first year, to the extent that my appointment nearly came to an untimely end. However, I was granted a reprieve, and by the end of the second year I had published twelve papers (including four in the Journal of Physiology), and had also completed my doctoral thesis. The Cardiologist, Dr. Maurice Campbell, admitted he was quite surprised by how much I had achieved during the second year of my appointment.

Professor Spurrell generously continued to guide my fortunes behind the scenes. By this point, the War Department was becoming loudly insistent that I complete my required two years of military service. Typically, this would involve a rather boring stint as

medical officer at some isolated R.A.F. base where any illness was the event of the month. However, my mentor had sufficient contacts that he was able to arrange for me to be seconded to the R.A.F. Institute of Aviation Medicine (Farnborough, Hants), which was equipped with a then unbelievable array of electronic equipment and environmental chambers (currently mirrored by the Canadian Defence Laboratory at Downsview, Ontario).

At Farnborough, my responsibilities included exploring the vulnerability of test pilots to decompression sickness, developing procedures to assess the return of aircrew to flying after surgical treatment of tuberculosis, and evaluating high altitude partial pressure suits. The atmosphere was light-hearted and not very military. Human Experimentation Committees had yet to be conceived, and some of our rather reckless feats, such as explosive decompression to a simulated altitude of 70,000 feet, would raise many eyebrows today.

As my two years of military service drew to a close, I began to contemplate the prospect of life as a Demonstrator (someone even more lowly than an Assistant Professor) at a minor English university. However, Professor Spurrell continued his guidance of my career path, directing me to a vacancy as Assistant Professor of Applied Physiology in the Kettering Laboratory of the University of Cincinnati, and to a Fulbright scholarship (that provided me a then very scarce passage on the "Queen Mary"). Once arrived in Cincinnati, my assignment was to monitor lung function and air pollution levels in the homes of old people. Again, I had the good fortune to have money to purchase advanced equipment and freedom to explore its potential both in the laboratory and in the field.

After the elapse of two years, a return to England was required by expiration of my Fulbright Visa. But this was a less straightforward matter than I had imagined. Professor Spurrell was now too sick to offer me any further guidance, and I was reduced to scanning the "want" advertisements in the British Medical Journal. The magazine arrived by seamail, and often, details of vacancies reached me weeks after posts had been filled. English universities were also becoming skeptical about hiring scientists who had chosen to go overseas. All too frequently, costly air-mailings of curriculum vitae went unacknowledged. Finally, a now defunct drug company put me on a fifteen-hour flight to England (via Gander and Shannon) for an interview as its possible Medical Director. I did not have any miracle, universally needed and expensive drug to suggest to their Board of Directors, so my interview was quite brief. However, I now had a chance to follow-up on an unacknowledged application to the Ministry of Defence, and I managed to obtain an interview at Shell-Mex House during my week's stay in England.

The Ministry of Defence quickly accepted my application, and on my return to the United Kingdom I began work as a Principal Scientific Officer at Porton Down, the British Chemical Defence Research Laboratory. At the time of my application, they had been working on the harmful constituents of London smog, and further research on this topic seemed a logical progression in my interests. However, as in many government laboratories, priorities changed with dazzling rapidity, and I soon found myself assigned to the exploration of drugs that could be used in riot control. An early premise of the military was that a rioting crowd would be engaged in

vigorous physical activity, so I was asked to begin by looking at a variety of methods of assessing exercise tolerance. Like most civil service appointments in the early 1960s, employees of the Chemical Defence Research Establishment were granted tenure quickly, with automatic progression through the ranks and a generous pension on retirement. However, because of the nature of the work, most of the Establishment's investigations were classed as "Secret." I could see many of my colleagues who had remained at Porton dropping out of sight of their peers; they wished to change jobs, but had become totally unknown. Further, I did not think that seeking methods to degrade human performance offered an attractive lifetime goal, and I was feeling some pressure from working with a Medical Director who was very quick to find fault with experimental protocols, and was even more scathing in his condemnation of less than immaculate prose. The question the porter usually asked on arriving at work was "Who's in the dog house today?" Strict supervision was certainly warranted, as sometimes human volunteers were receiving a third of a lethal dose of the drugs being assessed. Nevertheless, I was delighted when one week the Medical Director at Porton made the tactical error of posting details of a vacancy at the Toronto Fitness Research Unit on the main notice board.

A quick flight to Toronto convinced me that the vacancy as Director of the Fitness Research Unit provided an excellent research opportunity. Moreover, I saw both Toronto and Ottawa (a quick visit to Judy LaMarsh in the Brooke-Claxton building) in all of their autumnal beauty. Finally, it was hard for me to argue with the offer of a tenured appointment as Full Professor at the age of 35. So, extending my stay at the Park Plaza from three to seven days, I ordered the necessary laboratory equipment, rented a house in Willowdale with an option to purchase, and arranged to ship my furniture to Canada before the Seaway froze. When I landed at Heathrow, my wife and two young children were a little taken aback to realize that they had less than four weeks to say good-bye to their friends before we again boarded the Queen Mary.

The remainder of my story as an applied physiologist has already been sketched in over-generous tributes from the various friends and colleagues with whom I have had the pleasure of working since I arrived in Canada. I am still conscious of the great debt I owe to my early English mentors who made such a major contribution to my early development, and I sometimes feel guilty that I may have been less helpful to students under my care. However, I have few regrets about moving to the new world. As a product of a "state" rather than a "public" school, I have welcomed the more egalitarian nature of Canadian society, and as an applied physiologist I have appreciated North America's acceptance of studies with a practical rather than an esoteric value. I am convinced that my career would have been less satisfying and fruitful, and would have attracted much less recognition if I had remained in England. Certainly, the study of human activity and its contribution to human health has been and remains for me a fascinating pursuit. Moreover, and unlike some areas of physiology, I recognize that there is still much to be discovered, and as my active role diminishes I shall watch with interest the new findings and achievements of my successors.