The Legacy of Charles David Marsden: A Role Model in the Field of Movement Disorders

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Keywords

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Abstract

David Marsden was one of the most renowned neuroscientists of the twentieth century. His scientific contributions in the specialty of movement disorders are recognized worldwide, particularly in the area of Parkinson's disease and also in hyperkinesias, such as dystonia and myoclonus.

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It is now 21 years since David Marsden's premature death on September 29, 1998. He excelled at both research and patient care in the field of movement disorders and published widely, mainly on Parkinson's disease pathophysiology and treatment, dystonia and myoclonus [1–8]. In this article, we will describe one of the most remarkable neuroscientists of the 20th century and review his greatest scientific contributions.

Early Life

David Marsden (Fig. 1) was born in 1938 into a medical family. His father was an Australian captain and surgeon in the Royal Army Medical Corps, while his mother was a nurse. David started his medical studies in London at St. Thomas' Medical School in 1956 [1–7]. During his time, there he won 3 scholarships, 5 prizes, and 2 medals. He was also a distinguished sportsman with aptitude in cricket, rugby, and sailing.

After preclinical training, he obtained first class honors in his intercalated Bachelor of Science (BSc) degree. In 1959, under Professor D V (Dai) Davis, formerly editor of "Gray's anatomy," who discovered, encouraged, and fed his interest in the neurosciences. Marsden obtained his Master's degree (MSc) in 1960 with a thesis on the pigmentation of the substantia nigra, in 1963 obtained his Bachelor of Medicine degree (MB), and in 1965 was awarded membership of Royal College of Physicians of the UK (MRCP) [1–8]. At this point, David had already published papers, 3 of them in *The Lancet*. In the following years, he became senior resident house physician at the heart of British neurology, the National Hospital for

Fig. 1. Professor Charles David Marsden (1938–1998). Reproduced from *Journal of Neurology, Neurosurgery & Psychiatry* 1989;52:2–5 with permission from BMJ Publishing Group Ltd.

Neurology and Neurosurgery, Queen Square, in Bloomsbury. There, he continued his academic career researching in the field of neurophysiology with Pat Merton, one of the most influential UK neurophysiologists in the latter half of the 20th century, and Bert Morton, a very talented engineer who had worked on radar during World War II [1–8]. Together, they were known as the “3 Ms,” publishing 23 breakthrough papers from 1971 to 1983 [1–10].

Career

In 1970, Marsden was appointed senior lecturer in neurology at the Institute of Psychiatry and consultant neurologist to the Maudsley and King’s College Hospitals. In

addition, in 1972, at the young age of 34, he was the first appointee to the newly created Joint Chair of Clinical Neurology at King’s College Hospital Medical School and the Institute of Psychiatry [1–8]. This time in neuropsychiatry provided significant exposure to movement disorders, whether they presented primarily as a neurological disease or as psychiatric disorder or induced by drugs. Marsden pursued his passion of research, and within 5 years, he had set up an impressive research center and continued to study clinical neuropharmacology, neuropsychology, and neurophysiology, while prospective fellows were queuing to visit and learn from him [1–7]. Among these fellows, all subsequently renowned international leaders in the field of movement disorders were Roger Duvoisin (USA), Paul Bedard (Canada), Mark Hallett (USA), Dan Tarsy (USA), Wolfgang Oertel (Germany), Reiner Benecke (Germany), Anthony Lang (Canada), Jose Obeso (Canada), Fabrizio Stocchi (Italy), Giovanni Abbruzzese (Italy), Niall Quinn (UK), and Philip Thompson (Australia) [1–7]. In 1983, he was the second clinical neurologist of 11 in history to be elected Fellow of the Royal Society whose Fellows have included, among others, Isaac Newton, Charles Darwin, Albert Einstein, Alan Turing, Maria Spillanti, and Angela Vincent. In the following year, he was awarded a Doctorate of Science from London University. He was on the Council of the Royal Society from 1991 to 1993, of the Royal College of Physicians from 1995 to 1998, and of the Medical Research Council from 1989 to 1994. With his Fellowship of the Royal Society, David was considered the most outstanding UK clinical neuroscientist of his generation. Along with Andrew Lees, he created the Parkinson’s Disease Society Brain Bank of the United Kingdom. Subsequently, after 17 years at King’s and the Maudsley, he was appointed in 1987 to the Premier Chair of UK Clinical Neurology at the Institute of Neurology, Queen Square, from 1987 until 1995, then becoming Dean of the Institute, a role he did not enjoy [1–8]. In August 1998, he gladly stood down as Dean, and in September started his first sabbatical year as Fogarty Fellow at the National Institutes of Health in Bethesda, Maryland, where he intended to conduct numerous studies, particularly regarding apraxia. Unfortunately, 4 weeks later, on September 29th, he died suddenly at the age of 60 [1–7].

Marsden and his Influence on Movement Disorders

Marsden’s research profile was extraordinary, with 1,368 publications. He coauthored >800 original papers, 200 book chapters and books, (Fig. 2), and over 60 invited

Fig. 2. Reproduced from Donaldson, I. et al: Marsden's Book of Movement, 2012 with permission from Oxford University Press (OUP).

reviews. He was one of the most frequently cited clinical neuroscientists, as well as biomedical scientists, in the world [1–9]. In 2011, Sorensen and Weedon [11] evaluated the productivity and impact of the top cited Parkinson's investigators over the 25-year period from 1985 to 2010. In this evaluation, Marsden appeared in second place (22,395 citations), with Andrew Lees in first place (23,095 citations). However, Marsden had died only half way through the evaluation period!

Marsden's most important collaboration was with Stanley Fahn, Houston Merritt Professor of Neurology at the Neurological Institute in Columbia Presbyterian Hospital in New York. They founded the Movement Disorder Society in 1985 and the Movement Disorders Journal in 1986, which they coedited until 1996. Before his time as co-editor of Movement Disorders, he had gained experience in editing journals, for example, the Journal of Neurology, Neurosurgery and Psychiatry, which he edited for a decade, and serving on the editorial boards of other 21 other journals [1–8]. Marsden published outstanding papers on Parkinson's disease, including the discovery, with Schapira et al.

[12], of the mitochondrial defect in substantia nigra that is specific to PD and not present in other forms of Parkinsonism. Marsden was one of the first to elegantly describe the complications of levodopa treatment, such as motor fluctuations, "on – off" phenomenon, freezing episodes, and dyskinesias, in 1976 [13]. With Hallett et al. [14], he developed the now widely accepted classification of myoclonus into cortical, subcortical, and spinal types. Until David Marsden came along, blepharospasm and spasmodic torticollis were frequently considered psychogenic disorders [15, 16]. He established these conditions as organic and classified dystonia into several types such as adult-onset focal dystonias and young-onset progressive generalized primary dystonia, the latter frequently having a positive family history [15, 16]. He also defined primary writing tremor, writer's cramp, painful legs, and moving toes and gait ignition failure [17–20]. In his Wartenberg Lecture published in 1982, entitled "The mysterious motor function of the basal ganglia," he set out his research and views on the motor physiology of the basal ganglia [21].

In 2012, with the assistance of Ivan Donaldson, Susanne Schneider, and Kailash Bhatia, "Marsden's book of movement disorders," the definitive authoritative textbook on the subject, which David Marsden had started to write in 1983, finally saw the light of day, after a gestation of 29 years!

Conclusion

David Marsden was a supreme clinical neurologist and neuroscientist of the 20th century, and left us a remarkable legacy of extraordinary papers and world-renowned followers in the field of movement disorders. Despite the passage of time, his contributions remain important for all who are involved in this field.

Disclosure Statement

We have no conflict of interest to declare.

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