IN MEMORIAM

Dr Solbert Permutt, 1925–2012

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It is with great sadness that we report to readers of the *European Respiratory Journal* and members of the European Respiratory Society the passing of Dr Solbert Permutt (fig. 1), who died at the age of 87 years on May 23, 2012, after a protracted battle with oesophageal cancer. As many already appreciate, Sol was one of the giants of respiratory medicine and physiology, and his passing is an immense loss to our community. He was a remarkable individual with an unbounded level of enthusiasm, creativity and inspiration. Those who had the good fortune to know him had their lives influenced in many positive ways.

Sol entered this world on March 6, 1925, in Birmingham, AL, 9 years after his mother had a tubal ligation. At the time, his mother confided that learning of this unwanted pregnancy seemed worse than finding out she had cancer; however, Sol soon became a treasured child, in no small part because of his clearly superior intelligence. In elementary and high school, he was a brilliant but undisciplined student, who cut school to spend time at the local library and earned some spending money by teaching calculus to undergraduates at the University of Alabama. In 1942, after the onset of World War II and a single year as a student at this university, Sol was drafted into the US Army. His high scores on a medical aptitude test caused him to be assigned to the army's medical school programme, where he completed one year of premed at the University of California, Berkeley, before entering medical school at the University of Southern California in 1945. He finished medical school in 1949 with the support of the GI Bill, and then pursued clinical training in medicine and research training on the histopathology of the extracellular matrix of the lens at the University of Chicago. In 1953 during the Korean conflict, he was again drafted into the army and eventually assigned to Fitzsimmons Army Hospital in Denver, CO, where his interactions with Bill Harris and William Stead stimulated him to pursue a career in pulmonary research. In 1954 (the peak of the McCarthy era), Sol received an "undesirable" discharge from the Army due to prior association with "suspected" communists. However, a subsequent class action suit was successfully concluded in 1958, with a change to an honourable discharge with back pay. Robert Bloch recruited him to Montefiore Hospital in New York to become chief resident, and this was followed by a fellowship with Dick Riley at Johns Hopkins. Upon completion of his fellowship, he was recruited to be chief of the Division of Cardiopulmonary Physiology at the National Jewish Hospital in Denver; however, Riley was able to recruit Sol back to the Johns Hopkins School of

FIGURE 1. Solbert Permutt, 1925–2012.

Hygiene and Public Health as Associate Professor of Environmental Medicine in 1961. Sol was promoted to professor in 1965 and spent the rest of his career at Hopkins on the faculty of both the School of Medicine and School of Public Health. He came to work daily until a week before he died.

The impact, number, and diversity of the contributions made by Sol during his 50 years in academic medicine boggle the mind. Although we don't have the space to go into details of each, it is nevertheless humbling to list a few highlights, which are grouped below by topic:

1) Flow limitation. In a landmark paper, Sol used a simple Starling resistor model to define the "vascular waterfall" and explain the puzzling nonlinear relation between flow and driving pressure in vascular beds [1]. This model was then used by Sol and others in

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FIGURE 2. Photograph presumably from a symposium organised by Columbia University in 1966. From left to right: William Briscoe, Jere Mead, Ewald Weibel, Sol Permutt, Peter Macklem, Dick Riley and Domingo Gomez.

three distinct areas: first, to explain the effect of alveolar pressure on pulmonary perfusion and to ultimately partition the pulmonary circulation into zones [2, 3]; secondly, to explain the flow limitation during inspiration in patients with obstructive sleep apnoea [4]; and thirdly, the limitation of air flow that occurs during maximal expiration in normal subjects [5]. Figure 2 shows Sol and other well-known experts at a conference on respiratory physiology in New York City in the 1960s (note the heterogeneity of flow-volume curves on the board!).

2) *Mechanical interdependence.* In back-to-back papers, the effects of lung inflation on various elements of lung structure were clearly defined and experimentally evaluated [6, 7]. This work was the spark that initiated the whole field now known as pulmonary interdependence.

3) *Interaction of the heart and peripheral circulation.* In a classic paper, an innovative model analysing how parallel vascular compartments could impact the regulation of cardiac output was presented and used to explain previously puzzling observations [8].

4) *Interdependence between the effects of positive and negative thoracic pressures on the heart.* In several papers, the justification for what has become the standard for cardiopulmonary resuscitation was first presented by Sol and colleagues [9–11].

5) *Clearly demonstrating the importance of tidal breathing in asthma.* In a landmark paper, evidence was shown for the first time in humans, that the absence of tidal breathing could make a normal airway appear asthmatic [12].

No discussion of Sol would be complete without mention of his unique personality. To say that he made his presence known is an understatement. Sol was an accomplished communicator who was passionate, intense, zealous, and talked, talked, talked in a never-ending search for truth. He was an intellectual genius with an unequalled ability to extract unique insights *via* analysis of large masses of data. Most who interacted with Sol recognised that his often vehement arguments were focused on finding the truth. Those who did not appreciate his approach or were unconvinced by his arguments were sometimes ignored but never maligned or denigrated. When Sol was consumed by a problem, it became his life, and if you were lucky enough to be involved with the work, he was always there, often when you might be wanting (nay, needing) respite. Despite his brilliance and accomplishments, he never rested on his laurels or promoted himself personally. It is telling that, despite being invited as a visiting professor all over the world on almost an annual basis, there is no record of these trips in his CV. So if anyone reading this interacted with him on one of these trips, you may have the only record of the visit.

Lastly, it is important to note that Sol's passion for science was a reflection of his passion for life in general. He lived his life guided by one of his favourite quotes (attributed to Mae West): "Too much of a good thing... is simply wonderful." He was an accomplished musician, and he loved opera both emotionally and intellectually, and a few bars of music were sufficient for him to identify the source and composer as his mind became consumed with the piece. His passion for the bow tie was also legendary, and it became something of a trademark for him. After rediscovering the bicycle in the 1980s, Sol used it to commute daily to work 15 miles through downtown Baltimore in any weather, until arthritis forced him to quit in his mid-70s. He had a remarkable and apparently limitless collection of jokes about any topic or event, which he loved to tell. Some were polite, some were vulgar, but all of them were funny.

Sol Permutt was a great scientist and human being, and we will miss him dearly.

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