John Murray, whose work played a large part in quantifying and projecting the need for pulmonary physicians in the United States, in creating mechanisms to fund training of future academicians in pulmonary medicine, and, subsequently, in determining the content of pulmonary training programs, had, himself, no formal training in pulmonary medicine, or, for that matter, no training in any sub-specialty of internal medicine. Thus, this hugely influential figure in pulmonary medicine would not be qualified by current criteria to take the board examination in the subspecialty that in many ways, he defined. But John Murray did things his own way.

Immediately following completion of his residency in internal medicine, John went to London to study hepatic blood flow in the laboratory of Sheila Sherlock, a founder of the science of hepatology. It isn’t clear how much of an influence Dame Sheila had on John, but she was said to be an outstanding clinician who did not suffer fools gladly, both qualities that John demonstrated throughout his career. (A few examples of these qualities are presented later.)

John returned from London to take up a faculty position at UCLA, where he focused more on circulatory and cardiac physiology and not so much on the physiology of the lung. He quickly rose through the academic ranks, becoming an associate professor of Medicine and Physiology in 1964, the same year that he sat for (and passed) the Pulmonary Board examination (despite the lack of formal training). Soon thereafter he took the first of his many sabbaticals (John never missed an opportunity for a sabbatical.) at the UCSF Cardiovascular Research Institute (CVRI) under Julius Comroe. During that year he must have impressed Dr Comroe and Dr Lloyd (Holly) Smith, the recently-hired Chair of the Department of Medicine at UCSF because, shortly after returning to UCLA, he was recruited back to UCSF to lead the rejuvenation of Chest Service at San Francisco General Hospital (SFGH). At that time, SFGH was being integrated as a full component of the UCSF clinical training and research programs. John was an essential contributor to that integration. At SFGH, John developed a comprehensive clinical/academic pulmonary training program that included a respiratory intensive care unit, a chest disease specialty ward, and a modern
pulmonary function laboratory, all of which of which, for many years, have served as important venues for training and clinical research.

John was part of an early wave of the “new breed” of chest physicians, a group that by-and-large did not have its roots in tuberculosis as the nearly sole focus of the specialty, although, as will be noted later, he did not ignore this still-important disease. Prior to John’s arrival, the Chest Service at SFGH had been primarily concerned with tuberculosis and, thus, the existing physician staff was largely made up of “older style” chest clinicians, several of whom were well past their prime. A colleague recalls that during a weekly conference one of the older clinicians lit a cigarette (remember, this was the late 1960’s) which prompted an admonishment from another attendee. At this point John said, “Leave------ alone. I’m encouraging him to smoke.”

John had a very productive research career that was largely focused on relevant clinical problems and the pathophysiology of lung diseases. But it was not so much his research that made him a leader in the field. His greater talent was his ability to identify relevant issues and to take a leadership role in developing approaches to addressing the issues. The skills that enabled him to lead so effectively were the ability to think and to communicate clearly, both verbally and in writing. He was very precise both in writing and in speaking. As an example, a sure way to raise his ire was to say in the course of a verbal or written clinical presentation “---the patient was diagnosed with----.” His universal response was “Patients are not diagnosed, diseases are.” Likewise, excessive or imprecise verbiage was sure to draw fire from John. In reviewing a draft manuscript from an enthusiastic but disorganized fellow, John said, “Yes, you’ve identified the important points and then disguised them very effectively.”

**Areas in which Dr Murray made important contributions**

**Teaching and knowledge transfer in Pulmonary and Critical Care Medicine**

The talents noted above served to make John a skilled teacher. From early in his career at SFGH, he chose Saturday mornings in the ICU, not generally a popular time among the housestaff for a teaching session, to discuss some aspect of clinical respiratory
physiology that was illustrated by a patient in the unit, making the physiological principles relevant to critically ill patients. As an aside, it should be noted that he was a skilled clinician who regularly attended in the ICU. The value of these sessions was not lost even on the most sleep-deprived interns and residents, and they were widely regarded as extraordinary learning experiences.

Much of John’s talent as a teacher as well as his skills in written communications plus his emphasis on solid scientific foundations for his teaching are reflected in the textbook of which he was the founding co-editor Murray & Nadel’s *Textbook of Respiratory Medicine*, now with its 7th edition recently released. Murray & Nadel has influenced the practice of respiratory medicine throughout the world for generations. The first edition, published in 1988, was a hard-copy single volume of 1167 pages. The 7th edition is two volumes of 1848 pages, together with a fully digital version, 200 imbedded videos, and audio files. John kept up with all the technological changes and continued to exert an editorial hand until nearly the end of his life. The book will likely be his longest lasting legacy.

**Adult Respiratory Distress Syndrome**

Relatively soon after coming to SFGH, John’s research focus shifted from examinations of blood flow and oxygen delivery under various conditions to studies of the pathophysiology and management of the recently described acute lung injury/adult (now “acute”) respiratory distress syndrome (ARDS). This proved to be a clinical and research area that would occupy him for a large part of his career.6-10 ARDS is not a disease but a constellation of clinical, radiographic, and pathophysiologic features that result from a wide variety of insults but have in common excess fluid in the lungs caused by leaky pulmonary capillaries. Because there was no single cause, not surprisingly, the term “ARDS” was applied imprecisely and inconsistently. The imprecision of the terminology and the multiplicity of disorders associated with ARDS was an impediment to the conduct of good clinical research, which John, in his usual clear-thinking way, sought to remedy. His initial approach was to appeal to the clinical and research communities to be much more specific in making a diagnosis of ARDS
and including the specific cause as part of the diagnosis. He put this argument forward in a 1975 editorial entitled *The Adult Respiratory Distress Syndrome (May It Rest in Peace)* in which he concluded, “Our knowledge about these diseases (the diseases associated with ARDS: words in italics added for clarity) is woefully incomplete at present but undoubtedly will increase in the future. Accordingly, the classification will also change as new information becomes available. A decade from now, we might be quibbling over how much further splitting is advisable. But we should start by putting the axe to the ARDS log before we worry about how many pieces of kindling it will make.”

In fact, over the next decade and in spite of the eloquent argument to make kindling of the ARDS log, little progress was made in improving the precision of the ARDS diagnosis. While advances were made in understanding the pathogenesis and management of ARDS, the lack of a generally accepted definition continued to hamper the field. John did not address this issue again until 1988 when he, together with UCSF colleagues, Michael Matthay, John Luce, and Michael Flick, proposed a standard definition for ARDS. As the authors state, “We believe that much of the controversy concerning ARDS is explained by the lack of a satisfactory definition of this elusive syndrome. How can you collect, much less compare, epidemiologic data and mortality figures when there is no uniformly accepted (and used) definition? How can you study basic pathophysiologic mechanisms, understand natural history, and above all, evaluate new therapeutic approaches in what appears now to be an amalgam of many different disorders?” The group developed a 3-component definition as well as a severity grading score. This definition served as a framework for data collection that enabled more precise definitions of ARDS including the, now standard, Berlin definition developed by an international consensus group in 2012.

**Acquired Immunodeficiency Syndrome**

Early in the 1980s, San Francisco was the west coast epicenter of what came to be called AIDS and SFGH was quickly flooded with young, previously healthy, men with severe acute lung diseases. John realized that this new disease was going to be a major problem and that the lungs would be frequently involved. He requested and received support from the Division of Lung Diseases at NHLBI to convene the first
meeting on the pulmonary complications of HIV infection. The investigators and clinicians attending the meeting pooled their experience, and from that pool emerged the outlines of the spectrum of lung disease in HIV infection. This led to a large multicenter study across the US that provided a much more complete picture of HIV-related lung diseases. John then went his own way and conducted a series of studies in Africa to examine the spectrum of lung diseases in HIV infection under much different epidemiological and resource conditions.

**Tuberculosis**

Although, as noted above, John did not have his roots in tuberculosis and was not focused on the disease in his early career, he recognized that it remained a significant global health issue, especially in the context of HIV infection, which was ravaging Africa. In 1989, John was selected to give the annual Amberson Lecture at the International Conference of the American Thoracic Society. Rather than a presentation of his own research, as was customary, he chose to use this high-profile forum to deliver the message that tuberculosis was a resurgent global threat: the title of the presentation was *The white plague: down and out, or up and coming?* As Dr, Murray stated in his introduction, “I wanted to talk about tuberculosis because, as I will show you, the incidence of the disease is increasing dramatically in the United States and in several other countries.” He went on to emphasize the influence of HIV infection on the global incidence of tuberculosis. “--- it follows that tuberculosis should be a special problem in sub-Saharan Africa where there is a high prevalence of HIV infection in many countries that also have an extremely high prevalence of tuberculosis; in some of these countries, the annual rates of new tuberculous infection are among the highest in the world. And, as expected, data are beginning to be reported showing that HIV infection is having a powerful effect on tuberculosis in Central Africa---." To provide context, this presentation was given only 4 years after the first publication of the effects of HIV infection on tuberculosis in Africa when the association was still very underappreciated. John concluded, “Finally, I hope I have convinced you that tuberculosis is not down and out; it has relocated from developed to developing countries where socioeconomic conditions favor its persistence. And, at least for the two decades of the 1980s and 1990s,
tuberculosis is up and coming, especially where HIV is prevalent.” The presentation provided an important wake-up call to chest physicians as well as to policy-makers that tuberculosis was, in fact, up and coming and deserved substantial global attention as well as financial support.

Putting his money where his mouth was, John continued to sound the alarm on the devastating association between tuberculosis and HIV infection. In addition, he proceeded to develop research collaborations within Africa that enabled him to conduct a series of studies especially focused on the diagnosis of tuberculosis in persons with HIV infection, as well as on the spectrum of lung diseases in the presence of HIV infection. One of the important observations emanating from these studies was that in high-tuberculosis-prevalence areas, the most common pulmonary manifestation of HIV infection was, not surprisingly, tuberculosis, and that Pneumocystis pneumonia, very common in the US and Europe, was surprisingly uncommon in Africa.

The subspecialty of pulmonary medicine
In 1970, John was asked to chair a joint committee of the American Thoracic Society and the American College of Chest Physicians to assess the current and future needs for pulmonary physicians in the United States. After a comprehensive assessment of five topic areas the committee concluded as follows: “The Committee believes that the data from the survey present an accurate but depressing picture of the status of professional manpower in pulmonary diseases in the United States. Clearly there are significant shortages of chest physicians practicing in hospitals and clinics, and teaching and carrying out research in medical schools and other institutions. Furthermore, not enough chest physicians are being trained to fill the existing vacant positions and those anticipated during the next 2 years.” A direct result of the recommendations from this committee was the creation of the National Pulmonary Faculty Training Program funded by the (then) National Heart and Lung Institute. The main goal for this innovative program was to strengthen pulmonary faculties at schools of medicine and osteopathy in the United States which did not yet have adequate training programs in respiratory diseases. This training program has led to a series of training grants in pulmonary and
critical care medicine that persist today. The final foundational piece of the training programs was the development of the goals and content of training programs in pulmonary medicine by the Subspecialty Board on Pulmonary Disease of the American Board of Internal Medicine, of which John was a vocal member.21

In the early 1970s, the selection of trainees in medical subspecialties was a bit of a wild west affair, with no rules to govern and to provide uniformity in the process. To standardize the process of trainee selection in pulmonary medicine and to ensure that applicants were treated fairly, John catalyzed the creation of the “Western Uniform Acceptance Date” program. The program initially involved four western training programs, the Universities of Oklahoma, Washington, Colorado and UCSF. Other institutions subsequently joined, and the program became the pulmonary matching program, the first subspecialty matching program in the country.

The American Thoracic Society

John played an important role in the evolution of the American Thoracic Society. He assumed the editorship of the (then) American Review of Respiratory Disease in 1974 and proceeded to enlarge the scope and size of the editorial board, as well as to implement rigorous criteria in judging manuscripts.22 He sought and published a broader range of papers than had been customary for the journal, reflecting the evolution of pulmonary medicine to encompass a wider array of topics, including critical care.

Importantly, during his editorship, John took a leading role with the International Committee of Medical Journal Editors (ICMJE). A committee of the ICMJE, chaired by John, met in Vancouver and agreed to implement a unified set of requirements for manuscripts. This meeting led to the establishment of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (URMs). Part of the URMs is the reference style, known as the “Vancouver style” after the meeting site.

John, as ATS President in 1981-82, was influential in the structure of the Society, spearheading the formation of specific scientific assemblies for the purpose of broadening the scientific base of the Society and providing a means by which younger members could assume leadership positions. He made important strides in securing
increased administrative autonomy and fiscal flexibility from the Society’s then parent, the American Lung Association (ALA). This was a critical step in the process that, ultimately, led to the Society becoming independent of the ALA.

The International Union Against Tuberculosis and Lung Disease

John had a long association with the Union, facilitated by his living part-time in Paris within walking distance of the Union headquarters after his retirement from UCSF in 1994. He served in editorial positions with The Union’s journals for more than 30 years, most notably as an associate editor of the International Journal of Tuberculosis (now the International Journal of Tuberculosis and Lung Disease) since 1997. In addition to his roles with the journals, John was chairman of The Union’s Committee on Respiratory Disease from 1986-1988, chairman of Scientific Committees in 1991-92; and Chairman of the Executive Committee and Council from 1992 to 1994. In these roles, he introduced major reforms and innovations, including broadening The Union’s focus from tuberculosis to include other lung health issues. Specific structural changes that John promoted and that were accepted by the Executive Committee included the creation of scientific sections focused on specific areas of interest within the organization. In addition, he argued that the Union should hold annual meetings rather than having an international conference every fourth year, a suggestion that has proved to be highly successful. For his contributions to the Union John was awarded the Union’s highest honor, The Union Medal, in 2011. As noted in the Union’s online tribute to John, “Dr Murray was an essential part of The Union’s past and present” and “---one of the architects of the modern Union”.

John’s involvement with the Union and its global mission, plus his focus on tuberculosis and HIV-associated lung diseases, not surprisingly led him to emphasize the moral imperative of a more equitable distribution of health care. In his millennial lecture to the European Respiratory Society delivered in 2001 entitled, “A Thousand Years of Pulmonary Medicine: Good News and Bad,” in which he reviewed progress in pulmonary medicine during the past 1000 years, he stated, “But as I have emphasized, this progress has favoured the lives of a small fraction of the world's population a great deal more
than it has improved the lives of the much larger remainder. One of the challenges for the millennium that is just beginning, clearly, is to correct this imbalance to ensure that all people share the benefits of contemporary medicine.”

Concluding comments

All of the foregoing attributes John Murray’s writing skills to John himself. It should be noted, however, that John’s wife, Diane Johnson (Dinny), while well-known and best-known as a novelist, is also a critic, biographer, and essayist. It seems highly likely that John sought and valued Dinny’s input, her critique of his drafts, at least in some of his less technical undertakings. But the collaboration was at least to some degree bidirectional: John is a thinly-disguised character in several of Dinny’s novels and explicitly mentioned in a dedication of one. So far as we are aware there are only two publications the two of them undertook together, both reviews and both in the New York Review of Books.24,25 Perhaps, not surprisingly, the subjects of the reviews are several books on serious illness and death, and the reviews written by John and Dinny nicely present the focus of the books in a larger medical context (John) while at the same time placing the stories as a whole in a larger social, cultural, and literary context (Dinny).

Ironically, given John’s interests in both ARDS and tuberculosis, he died on March 24, World TB Day, and the proximate cause of death was ARDS due to COVID-19. We suspect John would be gratified to know that the ARDS from which he died had a known specific cause and was not simply an ill-defined constellation of clinical and radiographic features with all the imprecision and uncertainty that entails.

References

*Note: The references cited are intended to be illustrative of Dr Murray’s work in the areas discussed*


