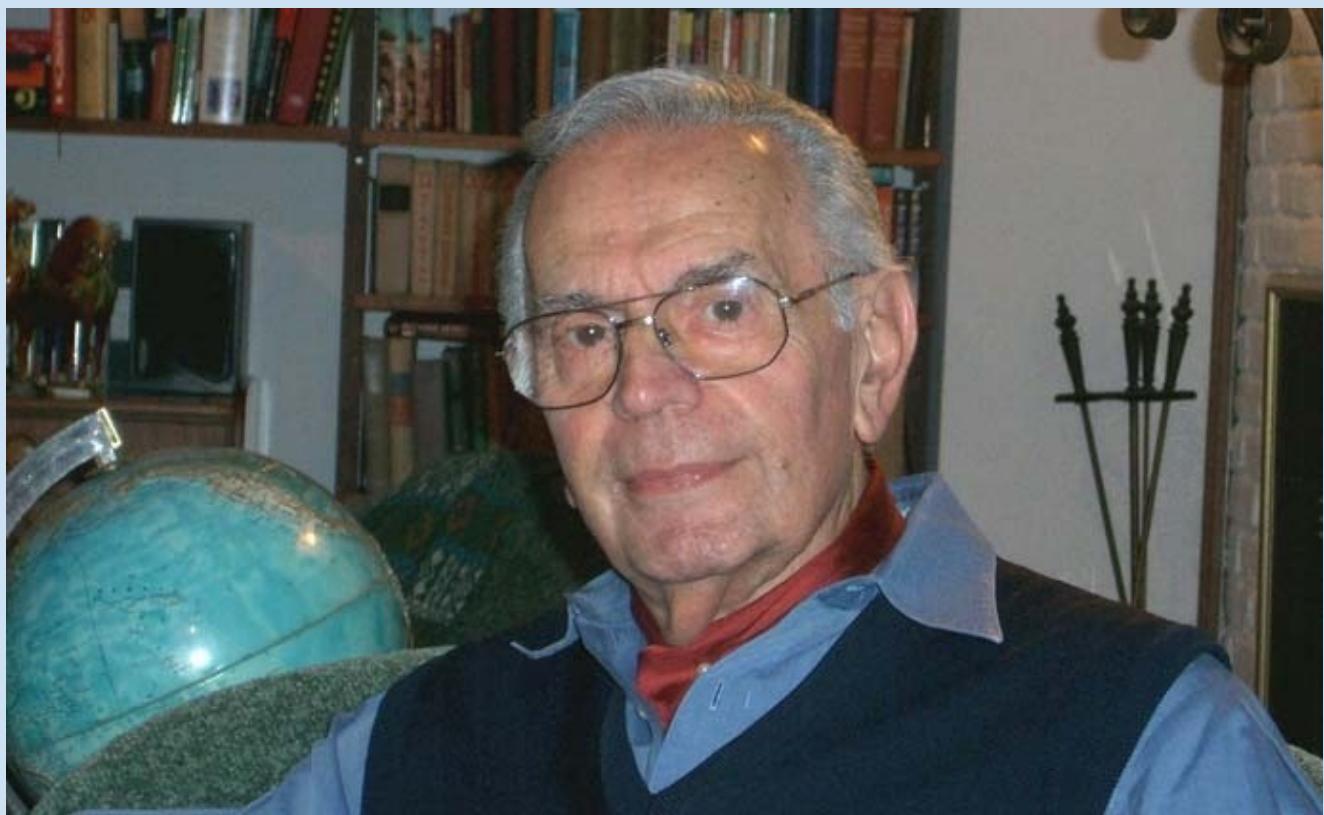


REMEMBERING

Professor

János Miklós Beér

February 27, 1923 – December 8, 2018



In this article the authors provide a brief history of János (John) Miklós Beér, from childhood through his interests that provided lasting memorable impact on many students, scientists and engineers, from academia and industry throughout the whole world.

This is a historical review of Beér's life and his interests and accomplishments, his standing in the combustion community, his leadership, and his well-regarded gentlemanly nature from all who met or knew him, throughout his entire professional career.

Childhood, Music Education, and Music in His Life

János Miklós Beér was born on February 27, 1923, to Sándor and Gizella (Trismai) Beér in Budapest, Hungary. At that time, following the 1867 Compromise with Austria, Budapest had changed from mainly a place of rudimentary agricultural people to a more complex population of higher-educated people in the commerce, science and business industries. Indeed, many historians had concluded that the period of 1900-1939 was the “Golden Age” of art and science in Hungary. Dozens of Nobel Laureates, and a number of great mathematicians, scientists, and musicians from Hungary were associated with that period.

The Beér family operated a business that made small mechanical devices with an engraving workshop. It is understood that the business was not big but did well. János was the only child of the family. He had a

normal but surely happy childhood. He always enjoyed visiting his farmer-grandfather from his mother's side where he could ride horseback. At age 5, he started violin lessons. His tal-



János with his parents and grandparents

ent was noticed by a distinguished violinist-musician-teacher, Mr. Imre Waldbauer, who took him as his student when János enrolled at the Franz Liszt Academy of Music at the age of 16. János studied with Waldbauer from 1939 until 1945 when Mr. Waldbauer moved to the USA.

Franz Liszt Academy of Music, at that time, was a musical heaven on earth. With musical giants like Béla Bartók and Zoltán Kodály on its faculty, this conservatory produced many internationally renowned musicians such as conductors Fritz Reiner, Eugene Ormandy, and Georg Solti, pianists Géza Anda and Tamás Vásáry, cellists David Popper and János Starker (who was János's classmate for chamber music), and violinists Zoltán Székely, Victor Aitay and Kato Havas.

With his remarkable talent and devotion, he could have become a professional musician. But the time was not right. Upon his graduation from gymnasium in 1941, WWII was at its darkest moment with London being constantly bombed by the Luftwaffe of Nazi Germany and the attack on Pearl Harbor in December of that year. Survival, certainly not music, was on everybody's mind. In a personal discussion in his late 80s about why János did not become a professional violinist, János sighed and said that during the war it was impossible, and after the war it remained impossible as the economic sit-



János' parents Sándor and Gizella (Trismai) Beér

uation was very difficult. Thus, one had to find some other way to make a living.

Not becoming a professional musician did not stop him playing music at all. In fact, he played all Beethoven's string quartets (16 of them in total) in Budapest, a feat that not many of today's string players could claim. János once remarked that he should have far better understanding of Beethoven's string quartets than most people because he had played them all.

When asked in which position he played at these quartets, he answered "first violinist, of course." It was the only time that he showed a somewhat proud feeling during the conversation. It is worth to note that the Beethoven blood in his veins lasted to the very end of his life. At one occasion visiting János, String Quartet No. 7 in F major (Op. 59, No. 1, Razumovsky Quartet No. 1) was played for him; upon hearing János smiled and said, "That's Beethoven."

János got his last violin in 1937. It was made by a Hungarian violin maker named János Toth. Toth made some excellent violins but while János' was adequate, it was not outstanding. For some performances of great importance, his teacher, Mr. Waldbauer, would lend his violin to him to play, showing that not only János was an excellent violinist but also his teacher was a great kind person. Note that it is definitely not common practice that a teacher would let students use his/her instruments, let alone if the teacher were a world-class violinist.

In the West, János played a lot of chamber music (twice a week) at Pennsylvania State University and later in the Sheffield University Orchestra. For the chamber music, it was trios and quartets. On these occasions, his partners were a meteorologist (2nd violin), a combustion kineticist (viola), and a computer scientist (cello). The first quartet this group ever played was the great Mozart D Minor Quartet, K. 421, at his choice.



The Franz Liszt Academy of Music, Budapest



Even though he had a very busy schedule as Newton Drew Professor and Head of the Department of Chemical Engineering & Fuel Technology, and also Dean of Engineering at Sheffield University, UK, János still found time to practice the violin and made sure he was ready for any rehearsal and performance with the orchestra since he always gave his best in everything he did.

Naturally he expected the same from the others. In fact, at times he would complain mildly to his wife that some members of the orchestra needed more practice.

He once said that the Waldbauer's chamber music lessons he had received at the academy were so legendary that they had an everlasting impact. Throughout his life he always loved to play and attend concerts. As he remarked once to his wife, "that we, who are especially music-oriented people, should" never "deny ourselves the pleasure of music". His favorite form of music was chamber music. He was a season-tickets subscriber to the Boston Symphony Orchestra and Tanglewood Music Festival.

It was also evident that his music training was deeply reflected in his professional work as a combustion scientist. In 1993, his long-time friend Prof. Howard Palmer of Pennsylvania State University remarked that János' "background as a musician and his training as an artisan have influenced his work, or it may be that one could say that he approaches research and teaching as a

composer or an artisan approaches his art. He exhibits the care and attention to detail of an artisan; his papers, his design of research programs, apparatus, and practical devices, and his way of presenting his work often exhibited very attractive esthetical qualities. Perhaps one cannot speak of cause and effect here, but the artistic qualities in his work are quite striking."

Association with Raoul Wallenberg, the 20th Century Saint

After graduating from gymnasium in 1941, János took one year as an engineering apprentice at a guild school to study engraving. Naturally the thought was to join his

marched on the streets of Budapest and a new Nazi-backed government led by the Arrow Cross Party's leader was established in Hungary, János managed to carry out his daily life activities unaffected. In 1940, when he was 17, in addition to music, he started to row competitively for about four years, in shells of four and eight on the Danube. He rowed in national regattas in Hungary and was considered for, but did not make, the Hungarian Olympic Team for the 1944 London Olympics (the 1944 event was cancelled anyway due to the WWII but restaged

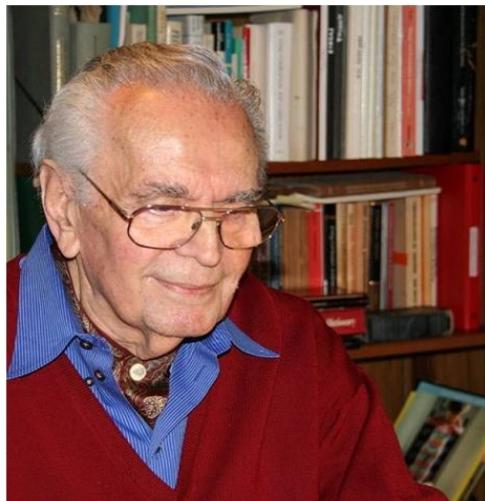


Photo from Raoul Wallenberg Foundation

"Raoul Wallenberg is the greatest hero of my life. Brave, risking his own life selflessly and being highly effective in his mission of saving the lives of tens of thousands of Jews he did not know and whose religion he did not share. I am most grateful to my fate for having known him personally and working for him."

Janos Beer

family business once he became a master engraver. To better prepare himself for the world of business, in 1942 he entered the University of Technical and Economic Sciences, Budapest (today known as Budapest University of Technology and Economics) to study economics.

During World War II, Hungary, being adhered to the Tripartite Pact, was not occupied by Nazi Germany until March 1944. To a large degree, before the Nazi Germans

in 1948). Rowing remained a lifelong passion for János as he would often be found rowing from the MIT Boathouse on the Charles River in a single scull, even at age 70.

Nazi Germany invaded Hungary in the Spring of 1944 when it discovered that Hungary was secretly negotiating with the Allies and about to leave the war. The puppet new Hungarian government led by the Arrow Cross Party rapidly rounded up and trans-

ported hundreds of thousands of Hungarian Jews to Nazi concentration camps, where most died.

In April 1944, János was conscripted into the army's labor battalion. In August, the battalion was brought to Budapest and was prepared to be sent to Germany. "I deserted from the battalion and joined a university squadron which had the secret objective of getting the country out of the war," János wrote in a testimony for the International Rauol Wallenberg Foundation. "When the Arrow Cross came to power in October 1944, they disbanded the squadron."

At this humanity crisis of unprecedented scale, the most effective help came from a special envoy of the Swedish Embassy in Hungary, who was a member of the famous Swedish Wallenberg family. Raoul Gustaf Wallenberg (August 4, 1912 – January 17, 1945), an architect educated at the Universi-



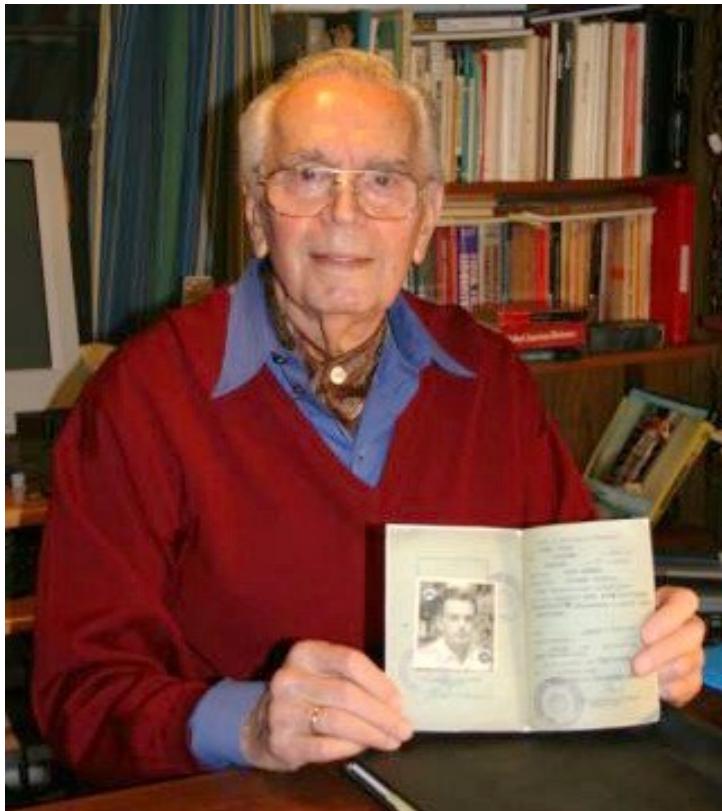
ty of Michigan, was a businessman and diplomat. He created and issued Swedish Schutzpass (protection) papers to tens of thousands of Jews that saved their lives. In this one-leaf document with the holder's picture, it was claimed that the owner of this document is under the protection of the Swedish Government and when the war condition permits, the owner could go to Sweden.



János looks over the identification papers that he used during WWII during an interview at the Raoul Wallenberg Foundation

After the disbanding of the university squadron, János was introduced to Wallenberg by a photographer in the Swedish Embassy and immediately began work as Wallenberg's personal assistant. On the very first day of his work, he joined Wallenberg, Vilmos Langfelder (Wallenberg's driver), and his photograph friend (Tommy Veres) on a drive to a train station where Jews were stocked in cattle wagon waiting for deportation to concentration camps. With

Swedish diplomatic emblems displayed, under the watch of the Nazi SS (Schutzstaffel) with their guns drawn, they asked the poor Jews if any of them had a Swedish Schutzpass. If answered affirmative, they would take the person out of the wagon and send him/her to a house under the protection of the Swedish Embassy. When an opportunity presented itself, János would whisper



János and his wife donated the WWII documents to the U.S. Holocaust Museum in Washington, D.C.

Photo from Raoul Wallenberg Foundation

to some to pretend to be somebody else whose name was on the list in the book of Swedish Schutz.

“When we got back into his car, it occurred to him that the people he rescued have not eaten all day and, instead of calling it a day and going back to the Legation, Wallenberg asked his driver to head for the safe house to make sure that the group of men will be met by food, a warm soup when they arrive,” János recalled in his testament. “I should mention that Wallenberg had not

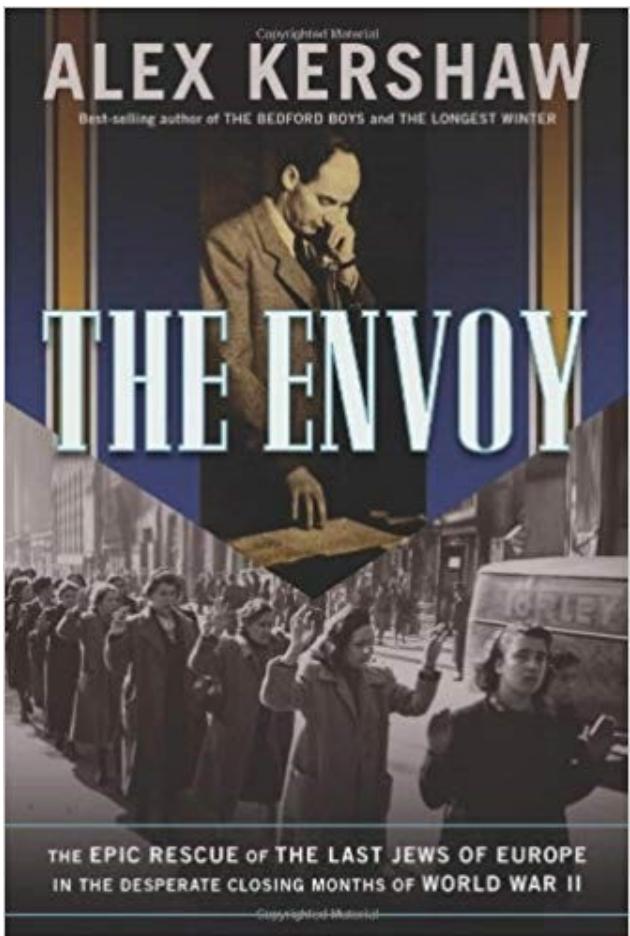
eaten either all day; we brought sandwiches but Tom Veres inadvertently sat on Wallenberg’s sandwich in the car, but Wallenberg could only be concerned about the people he just rescued. A small event that, for me however, underlined this great man’s humanity.”

The rescue work was not always that easy.

In fact, there were great dangers involved. “The next day, we returned to the train station, but this time we were not successful. The SS man in charge accused Wallenberg of having gotten the men under false pretenses the previous day and threatened to shoot us if we did not leave immediately,” János stated. “Wallenberg signaled to us and the driver to leave.” In retelling years later, János described the heroic Wallenberg, who was entirely free of fear, as he looked at János and the others with a smile and said, “Shall we make a diplomatic incident, gentleman?”

Train stations, ghettos, and the Arrow Cross houses were János’ most frequent places to bring Jews out sometimes with Wallenberg, sometimes by himself. “Wallenberg got me a certificate from the Commissioner of the Jewish Ghetto to permit entering and leaving the ghetto within certain hours of the day, as a liaison of the Swedish Legation,” János recalled. “During December, I made about five forays in the ghetto to take about 70 people who showed evidence to the authorities of being Schutzpass holders, from the Jewish ghetto to Swedish protected houses”

János association with Raoul Wallenberg had an enormous impact on his life. Yet he never mentioned this part of history, let alone his own heroic contribution, to his colleagues and friends. Even his very close friend Prof. Howard Palmer, who gave a keynote lecture at an international forum honoring János’ 70th birthday, did not know about this. It was not until 2010, with the



János' recollections of WWII were included in the 2010 book by Alex Kershaw.

publication of "The Envoy" by Alex Kershaw that it was brought to some people's attention. "On the recommendation of the late Tom Lantos, a member of the U.S. Congress, my wife and I have left our documents relating to our connection with Wal-

lenberg, including the mentioned certificate issued by the Commissioner of the Ghetto, to the U.S. Holocaust Museum in Washington, D.C.," János told the Wallenberg Foundation in 2010.

The papers donated by János and his wife Marta to the Holocaust Museum consist of five photographs by Tom Veres, three lists of Jews in different localities (prison camps) who fell under the protection of the Swedish Legation in Hungary, a letter signed by Raoul Wallenberg to free Dr. Georg Ballint (a Swedish citizen), a document issued by the Royal Swedish Embassy in Budapest stating that János Beér is a permanent employee of the Humanitarian Department, an identification card for János Beér issued by the Office for Jewish Issues, and a work identification card signed by Wallenberg.

Several others who worked with Wallenberg in Budapest included: violinist Victor Aitay (later concertmaster of the Chicago Symphony Orchestra under Fritz Reiner and Georg Solti) who was the telephone operator; and Eva Uranyi, the girlfriend (later his wife) of world famous cellist János Starker. János Beér's schoolmate at the Music Academy, George Lang (György Deutsch) in his book "Nobody Knows the Truffles I've Seen" also gives a very detailed description of wartime Budapest and how to survive as a Jew.

Refugees in another country

In January 1945, the Red Army liberated Budapest from the Nazi Germany. Yet, it was "an enormous disappointment. "We thought nothing can be as bad as the Nazis, but it was worse. These were mostly undisciplined wild and primitive men, who stole, killed unarmed civilians, burned houses while they were looking for looting, and for women to be raped." Gradually life came

back to normal. János switched to engineering in 1945, studying at the Technical University of Budapest. While this was where his real interest lay, he also was considering job opportunities at the time. In 1950 János graduated with first-class honors.

There were several factors that contributed to why it took János nine years to graduate

The Budapest University of Technology and Economics. János received The Knight's Cross of the Order of Merit of the Hungarian Republic for his support of Hungarian higher education and research in 2008.



from university. First, WWII was going on, and life as a Jew was dangerous in Budapest especially during the period from Spring 1944 to January 1945. Thus only after the war did he start to focus on engineering. Second, his father died unexpectedly in 1946, forcing him to devote considerable amounts of time looking after his family business.

With his excellent credentials upon graduation, János was immediately hired by the Heat Research Institute of Budapest. His talent in conducting research was soon noticed and he was promoted to the rank of section head. He published his first research paper in 1951 and also became an adjunct faculty member at the Technical University of Budapest. By October 1956, he had published a total of eight technical papers.

After the war, Hungary was under the Soviet Union's sphere of influence. The Hungarian Communist Party took control of the country and ran it as a puppet state of the USSR. In October 1956, Technical University (where János was teaching) students re-established the outlawed student union which led to countrywide calls for free elections and withdrawal from the Warsaw Pact.

"In the whole country there was a feeling of common purpose and brotherhood," János' father-in-law said at the time, "I am 70

years old, and for the first time in my life I am proud to be a Hungarian." This widely supported movement lasted only about 20 days before being crushed by the Soviet tanks that thundered through the streets shooting at everything and everyone.

On November 21, 1956, János and his wife Marta joined hundreds of thousands of people to leave Hungary. Before the Russian tanks rolled through the streets of Budapest, the thought of leaving their beloved country had never occurred to them; They believed they could just work hard and make a somewhat decent living in their beautiful city. They first took a train to the border town Győr. They dressed in sporty excursion outfits with rucksacks and hand luggage. A colleague of János wrote a letter to the director of the power station of Győr and asked him to provide any assistance he could to this young couple.

Upon arriving in Győr, they took a little pass through a field in the direction of the power generation station. They asked a man for directions to the station, and the man told them and then asked whom they were looking for at the station. János replied the director and to their great surprise and delight, the man answered that he was the director! With his help, they managed to get a room to sleep at the station and even took a shower as Russian soldiers stationed in their army post offered "friendly help," while tot-

ing their fully loaded rifles on their shoulders and with German shepherds at their side as they looked for signs of trouble.

On the second day, the power generation station people drove them towards the border until the road ended. The border was just about 1,000 meters away. Under the guidance of a local boy, János and Marta approached to the border but were met by three Hungarian border soldiers. The soldiers, with an understanding and sympathy, told them just run no matter what they hear. So they ran like crazy up the hill to Austria with the soldiers shouting and aimlessly shooting in the air.

Finally, they reached Austria and stepped into the land of freedom and liberty. It was

November 22, 1956. They started a new life in the West first as refugees. János was 33 years old – he needed to find a country to live in, and a job to make a living.

As refugees in Austria, they met many generous people who gave them rides, cash, and discreetly paid for the food they bought in the shops. The Austria government worked closely with the Red Cross and other international organizations to settle more than 200,000 Hungarian refugees. In the meantime, all museums were free for refugees.

János' wife later wrote, "I inspected everything that was to see in Vienna, and decided, that as a rich old lady I will certainly come back, because this place means civilization."

Marta, his lifelong soulmate

In 1939, János met a sweet girl at a birthday party in his Latin and ancient Greek teacher's house. This beautiful girl named Márta Gabriella Csato was singing in the choir of Academy of Music directed by Zoltán Kodály. It was love at first sight for János and soon she became his girlfriend. By 1944, the two had been together for five years. In the words of Márta, they had "matched each other like the two halves of a nutshell." With the war situation and the danger of being sent to a concentration camp, they decided to get married.

This highly intelligent and kind girl became János' true soulmate — for 78 years. She bravely supported his work with Wallenberg; together they fled Hungary for the west and started a new life. She loved music, art, literature, and also was a very good painter. She provided a warm house for him and a friendly place for all his friends and students.

János always had her in his heart – even in his 90s, he still carried a photo of her in his wallet. Marta passed away on August 20, 2017, at age 92.



Marta and János at the 2010 Clearwater Conference.

His association with Prof. Meredith Thring

The only thing in János' hand when he crossed the border to Austria was a small briefcase which had all his publications. He knew these would help him find a job as a refugee. Indeed, he was offered a job at a power generation station in Cincinnati, Ohio.

But they preferred to stay in Europe. Indeed, the United Kingdom accepted them and, through a professor at University College London, he was interviewed and given a job at the research section of Babcock & Wilcox in Glasgow, Scotland.

It took them no time to enjoy the new life in the west. They were somewhat astonished to find that food was very cheap, and the Scottish people were very friendly. After working at the research section for some time, János started to have other thoughts. Even though the work was advantageous and he had better prospects and a higher salary than many of his colleagues, only a corporate promotion was in the cards for the future. And intellectually he would never have a free hand to direct his own course.

It was at this time, a letter from a Hungarian friend who was working for his Ph.D. under the supervision of Professor Meredith Thring at Sheffield University in England led to significant change in János' life.

Prof. Meredith Wooldridge Thring (1915 – 2006) was a leading authority in fuel science and Head of the Department of Fuel Technology and Chemical Engineering at the University of Sheffield, England. Prof. Thring was elected as one of the first Fellows of the Royal Academy of Engineering.

After receiving János' letter expressing the desire to study under him, he invited János come to Sheffield for an interview and ac-

cepted him as his Ph.D. student. Furthermore, considering János' experience, Prof. Thring made the exception that János could complete his thesis in two years.

Being a student, this meant major reduction in János' income. As a staff member of B&W, he was making £1,100 a year. But as

*Prof.
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a Ph.D. student, his scholarship was only £300 a year. He was 34 years old and also had a family. But János was determined, and he had the full support from Márta. Together they felt that the future was on a good track.

Just as János and Márta were about to move to Sheffield, Prof. Thring brought exciting news. With the help of the Central Electricity Generating Board (CEGB) authority, he was able to raise the stipend to £850 a year due to the experience that János had. This was almost triple the original offering.

Prof. Thring's lab, at that time, was "intense, highly creative, and slightly crazy." This environment made János' research very fruitful. He designed and built the first "controlled mixing history furnace" (CMHF). The CMHF and tests conducted on it became the central piece of his dissertation.

Later, with the publication of this work in

the Journal of Combustion and Flame, the CMHF attracted lots of attention and copies were made at Pennsylvania State University, Combustion Engineering's research center, and elsewhere in the world.

Upon his Ph.D. graduation in 1960, János was named as the new head of station at the International Flame Research Foundation (IFRF) in IJmuiden, Netherlands. This appointment was recommended strongly by Prof. Thring, one of the founders of this non



János earned his Doctorate of Philosophy at the University of Sheffield, UK, in 1960, and his Doctorate of Science in 1968

-profit research association and network that could be traced back to as early as 1948.

Head of IFRF Research Station

At first glance, IFRF's research station, located at IJmuiden, Netherlands, was not very inviting at all. In fact the grim steel plant and the belching furnaces at the station would turn most people back to the tranquillity and stimulating university environment. Yet János was determined to conduct serious scientific experiments here. With his "smiling face and positive attitude" this naturally led to an amicable way that he worked with his new colleagues at IFRF. The focus of the research was combustion aerodynamics. Under János' leadership, IFRF conducted a series of very successful experiments with improved instru-

of the fumes and smoke of the steel mills of IJmuiden, János and his team "established a heaven for academic research and lifelong friendships".

IFRF's ground breaking work in aerodynamics attracted lots of attentions worldwide. And János was in constant contact with other leading authorities in combustion, such as Thring, Hottel, Leuckel, Loison, Gunther, and Chedaille, and was by now building a strong reputation on his own. This is also where Norman Chigier worked with János on industrial furnace flames involving swirl flows. Together they were awarded the Lewis F. Moody Award by ASME for excellence in research. Furthermore, work conducted at IFRF period laid down the foundation for the publishing of the monumental book "Combustion Aerodynamics" that he co-authored with Norman Chigier in 1972. It is here at IFRF where much of the fundamental understanding and diagnostics developed led to improved understanding of industrial flames.



János was named honorary Superintendent of Research for the International Flame Research Foundation in 1991.

mentations and refurbished furnaces. All test results were carefully calibrated, analysed, communicated to the technical community, and finally published. In the midst

Pennsylvania State University

As János' reputation and visibility steadily grew, many organizations and universities made offers. Among them were Air Liquide in Paris, Babcock & Wilcox in the USA, Pennsylvania State University, and the Delft University. IFRF made a combined offer that would make János a part time professor at Delft and permanent director of research at IFRF. After some considerations, in 1963 János decided to move to Pennsylvania State University, since the offer was a full professorship with tenure and his friend Howard Palmer was the department head.

Even though Prof. Howard Palmer wanted to build Penn State University as a top-rated center in fuel science, upon arriving János found that it had the severe problem of not being able to provide the kind of research facilities that he needed.

Under these circumstances, most of János' colleagues turned their attentions to fundamental research in combustion science. Needless to say, he missed his research establishment, international connections, large auxiliary work force, competent colleagues, good financial background, and interesting work that was conducted at IFRF.

Despite the difficulties, János put forth a great effort to set up a sizeable IJmuiden-type of furnace at Penn State. The university could not offer much help and investments from industry were slow to come. As time went on, Prof. Palmer sensed János' frustration, and he really wanted János to stay so he offered him the chairmanship of the department. János declined and explained that he was not interested in administrative power.

János initiated the Penn State summer short-course program on modern developments in combustion technology and he gave three lectures of the 15 or 16 offered during the week. In addition, he gave generously of his time and knowledge during discussions. He brought films from IJmuiden, which were invariably of great interest and provided theoretical implications with the visual images. As Prof. Palmer further put it, János "always had an extraordinary talent in what you might call the 'eyeball analysis' of flames."



Pennsylvania State University

János's lectures covered a wide range of topics. He naturally his specialty of combustion aerodynamics, but also included experimental methods and measurements, fluidized-bed combustion, industrial furnaces, and mathematical modelling.

Due to his elegant clarity and well-organized presentations, all his students loved his lectures. Humor was also sprinkled in his lectures. On some advanced topics that required deep mathematical skills, he would say, "I apologize in advance for putting this on the board."

Back to Sheffield University

In 1964, Sheffield University was actively looking for the best people to fill the vacant chair left by Prof. Thring. Given the fact that Sheffield was a top ranked center for fuel science research known internationally, the vice-chancellor of the university took the matter into his own hands. He wrote to all the leading authorities in fuel science and asked their recommendations. In the end, the chair was offered to János.

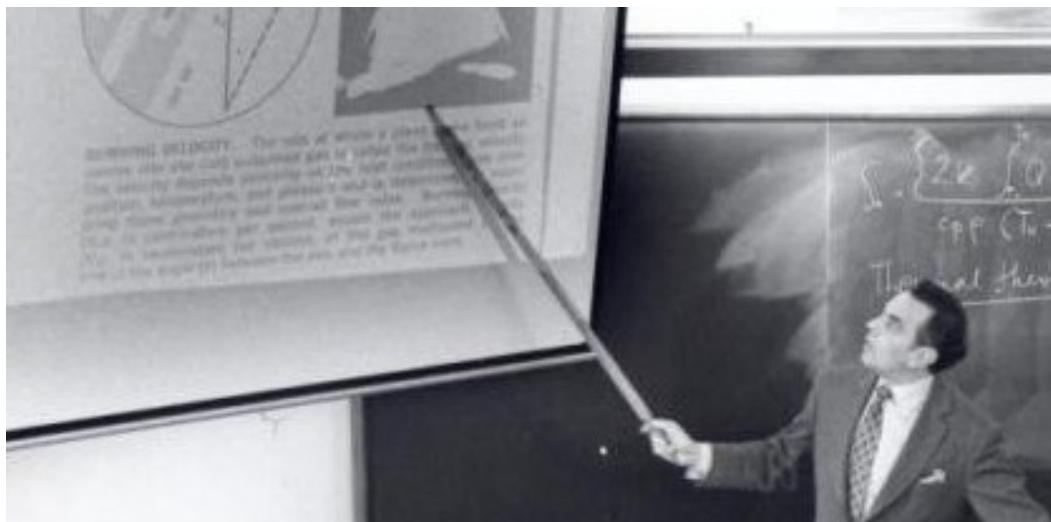
Even though the work conditions at Penn State were not what János had in mind, by this time, both he and Marta had started to enjoy the United States. He knew Prof. Thring had left Sheffield for Queen Mary College of the University of London, and the professor had asked János to apply for the Sheffield position. But he was reluctant and did not apply. He was torn when the offer landed on his desk. From the view of professional development, Sheffield's offer was too good to turn down. Not only was the fuel science area very well equipped, it had 12 excellent faculty members and many technicians, various laboratories, and workshops.

At the end, the desire to do first-rate research outweighed the costs of change, and the Beérs packed their belongings and crossed the pond again.

It was the right move at the right time for János. As Newton Drew Professor and head

of the Department of Chemical Engineering and Fuel Technology, his hands were free to do his best. In the 12 years he served there, with his high standards, his gift for diplomacy, his persistent pursuit of significant research problems, his generosity in collaboration with junior colleagues, the clarity with which he always expressed his thoughts, and his cheerful personality, fuel technology research at Sheffield ranked as one of the best in the world.

In this period, with more than 100 publications to his name, he established himself as one the foremost combustion scientists. He



János gives a lecture at Sheffield University.

also served as Dean of Engineering for three years at Sheffield University.

And it was here at Sheffield University where János invited his old friend, Norman Chigier, to join him in the department that led to writing their masterwork "*Combustion Aerodynamics*" which was published by Elsevier in 1972.

The Beérs also obtained their British citizenships and went to back to visit Budapest in 1969 for the first time since they fled 13 years before.

Massachusetts Institute of Technology

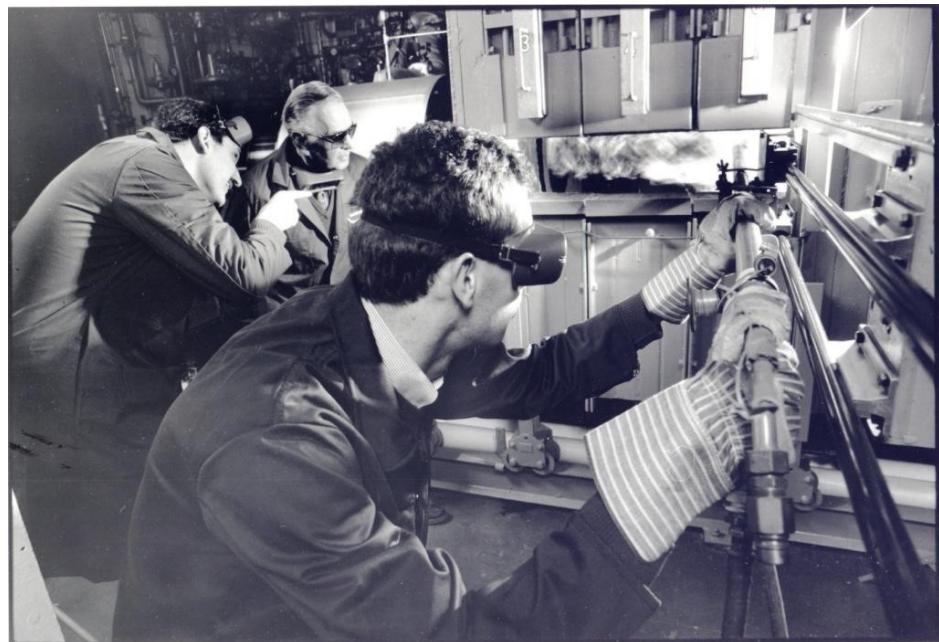
Prof. Glenn Williams of the Massachusetts Institute of Technology was at Sheffield University in 1973 attending the European Combustion Symposium that János hosted. In a casual conversation with János, he mentioned that due to the energy crisis, the chemical engineering department of MIT was being expanded and an energy laboratory had been formed. János replied that he would enjoy working at MIT. Glenn was surprised to hear János was serious about leaving such an important and prestigious position and world-class research program behind to join MIT.

Why would János even consider moving to MIT at the age of 50-plus? Perhaps he desired a new challenge.

This would be the fourth time in his career that he would leave a well-established position and start fresh, literally empty handed again. He certainly relished the prospect to work at the best technical university in the world with its outstanding faculty and students.

With the full support of his several good friends at MIT, such as Adel Sarofim, Hoyt Hottel, and Glenn Williams, János started to work very seriously at MIT in 1976 as Professor of

Chemical and Fuel Engineering and Director of Combustion Research Facility. They were all astonished to find out how quickly the MIT system had absorbed János as he would work 18 hours a day, including



János performing flame sampling experiments in the MIT-CRF with Majed Toqan and Ian Thijssen in 1982.

weekends, and his phone would ring every five minutes. It took Marta no time to get used to this as she observed, “MIT people are all a little crazy and mad.”



At his office at MIT

Here at MIT, János set up a highly sophisticated and fully instrumented furnace, rated at 3 MW thermal having a 4x4-foot cross section. It was used extensively to develop high-efficiency, low-emission combustors using different kinds of fossil and alternative fuels.

He also set up a fluidized bed combustor rated at 0.75 MW having a 2x2-foot cross sec-



tion. Many of his research results, especially on burner designs, were transferred to and implemented in industry.

For example, his multiple annular burner (with initial work started at Sheffield University) for gas turbines was commercialized by the Siemens Westinghouse Company and his radially stratified flame core burner was widely used by Alstom in large industrial and electrical utility boilers. János served as a consultant to Combustion Engineering (later called Alstom) since the early 1970s.

János always emphasized hands-on experience, as noted by one of the industry leaders: “Some professors are referred to as ‘academics,’ a referral to their tendency to evaluate everything on paper, as it were.”

Though his fundamental knowledge is world class, Professor Beér preferred to be invited to their laboratory (Combustion Engineering) to witness a test in progress, or to an operating field unit where he could view the combustion process first-hand, followed by the opportunity to discuss and consult with them on what he saw.”

MIT Professor Emeritus

After seventeen years of service at MIT, János retired at age 70 in 1993 and became Professor Emeritus. This arrangement enabled him to still have an office at MIT and also use their administrative services. Retirement did not slow him down at all. In fact, he not only went to work on weekdays but on many weekends, too. His service and expertise were constantly sought by the U.S. Department of Energy and its Secretary, as well as many international organizations such as the World Bank, industry groups, and universities.

In 2013, he was asked what kept him busy these days. János pointed to a set of documents he had on his desk that were a foot high, and answered that he was working on an expert panel for the World Bank’s project building a coal-fired generation station in Kosovo. He further added that his recommendation on drying the coal would be important and beneficial. The amount of reading was truly demanding for anybody, let alone for someone at the age of 90 years old.

His Association with Clearwater Clean Energy Conference

Since its inception in 1972, János had been very actively involved with the Clearwater Clean Energy Conference (then called Coal Water Slurry Conference, which then became the Clearwater Coal Conference). Every year, he and his wife would travel to Florida to meet old and new friends and share the latest development in science and technology.

Going to the conference was never meant as relaxation for János. This was as true after his retirement as prior to it. In fact, every year, he worked with other members of the conference committee to set up themes and topics for the conference, organize and then chair major conference panel discussions, and attend technical sessions.

For example, in 2005, the Clearwater conference was the first major international conference to have a special session focusing on the development of oxy-fuel technology. János attended all three oxy-fuel sessions, asked questions, and gave directional comments and inputs.

It was amazing to see the leading authority of fuel utilization patiently listen to one presentation after another at age 82, while giving his full support.

In 2010, János chaired a major conference panel on “Speeding up of CCS Deploy-

ment: High Efficiency Power Plants with Partial Capture of CO₂.” The panel started 8:00 am and lasted for two hours. He invited four people to serve as panel members: Dr. Jeff Phillips of EPRI; Dr. Thomas Stringer of Alstom Switzerland Ltd.; Prof. Lars Stromberg of Vattenfall; and Dr. Ligang Zheng of CanmetENERGY.

First, he asked each member to give a 20-minute presentation about his thoughts and views on the topic. After the four presentations, he astonishingly gave a perfect summary of each member’s view and outlined their differences. This was from an 87-year-old man who had never seen the presentations before, nor had any communications about each member’s view prior to the panel. What a

sharp concentration and a great mind!

The last time János attended the Clearwater conference was in 2015 at age 92 on the occasion of a special banquet held to honor Prof. Klaus Hein, who served as Chair of the Clearwater Clean Energy Conference.

János gave a commendable speech that reviewed their long-time friendship, congratulated Klaus on all his achievements, and offered his best wishes for the future. At this conference, he again mentioned the idea of coal CO₂ slurry and asked if there were any development in this area.



Top: János and Jianxiong Mao of Tsinghua University, Beijing. Bottom: Janos Beer with Profs. Adel Sarofim, and Jianxiong Mao

Mentor to Chinese scholars and researchers

In the early 1980s, when China just opened to the world, Profs. Junkai Feng and Jianxiong Mao initiated a connection with János when he was the chair of the Department of Chemical Engineering at MIT.

With courage and wisdom, János accepted the first generation of Chinese visiting scholars from Tsinghua University and other research institutes to MIT. Under János and his colleagues' supervision, the visitors learned not only the new concepts and knowledge in coal combustion, but also the advanced methodology, management and more importantly the spirit in doing research.

"Prof. Beer's help was important for them to develop their research career," said Jianxiong Mao and Guangxi Yue, Department of Energy and Power Engineering, Tsinghua University, Beijing, China

"Among them, many visitors including Profs. Guangxi Yue, Mingchuan Zhang, Changhe Chen became the principal researchers in coal research and utilization in China. Indeed, over the past three decades, we believe hundreds of Chinese scholars and graduate students have been directly or indirectly influenced by Prof. Beer's research activities.

"Prof. Beer is one of the most respectful supervisors and friends for Chinese researchers in combustion science and engineering."

Tsinghua is perennially ranked as one of the top academic institutions in China, Asia, and worldwide, and was recognized as the 14th best university in the 2017 *Times Higher Education World Reputation Rankings*. Since 2015,



The Old Gate is a symbol of Tsinghua University while the modern building have expanded the campus.

In 1987, the first "International Symposium on Coal Combustion" was held at Tsinghua University. At the time, China was much less internationalized than today, lacked experience in organizing such a symposium.

"Prof. Beer is one of the most respectful supervisors and friends for Chinese researchers in combustion science and engineering."

"It was Prof. Beer who helped us in organizing the symposium without any hesitation," said Mao and Yue. "His keynote speech on coal combustion at the opening panel session was very impressive and encouraging for the attendants and organizers."

Today, the four-year-series symposium is an important platform for the knowledge exchange and personal communication in coal combustion area.

"Prof. Beer's great contribution to this symposium will never be forgotten," said Mao and Yue.

A Lifetime of Work

The book *Combustion Aerodynamics* that János co-authored with Norman Chigier, published in 1972 by Elsevier, was a monumental work. Ever since its publication, it serves as a standard reference that provides practical methodologies for the design and development of combustors and furnaces used in power plants.

Researchers and engineers in combustion science use his book on *Combustion Aerodynamics* to find answers to many recurring and vexing questions, and see in it a source of valuable insight and elegant exposition of complex phenomena. This book has been translated into Japanese and Chinese. Almost 50 years later, this remains a classic text.

János also coedited two widely used books with his colleagues: *Combustion Technolo-*

gy with Howard Palmer published in 1974 by Academic Press; and *Heat Transfer in Flames* with Naim Afgan published by Wiley in 1974. Both of these books continue to be widely quoted in combustion research.

János was always one of the leading voices promoting high efficiency generation technologies and has constantly emphasized their roles on a carbon constraint world. In one of his research papers published in 2006 (at the age of 83) in the *Journal of Progress in Energy and Combustion Science*, he systematically reviewed all high efficiency electric power generation technologies and the environmental and economic roles they play.

He stressed that high efficiency generation is the most predictable cost effective tool

In his lifetime, János authored or co-authored more than 300 scientific papers. Prior to 1993 his work was mainly focussed in the areas of:

- ◆ Swirl flow aerodynamics
- ◆ Concentric burning jets and swirl; Multi-annular swirl burner (MASB)
- ◆ Noise emission from swirl combustors
- ◆ Combustion of finely divided solids and liquids (pulverized fuel, droplets and fuel sprays)
- ◆ Luminous flame radiation and radiative energy transfer
- ◆ Aerodynamic recirculation, flame stabilization, wake flows, turbulence,

residence time distributions in combustors, noise emission/reduction from swirl combustors

- ◆ Measurements in flames: radiation, flowfield manifestation (with 5 hole pitot probes, hotwire anemometry and laser Doppler velocimetry), temperature, species
- ◆ Mathematical modelling of combustors; scaling
- ◆ Fluidized-bed combustion: experiments, modelling, heat transfer, internal and freeboard characteristics, pollutant formation and reduction, elutriation of particles
- ◆ Mineral matter, its transformation into ash, fly ash, deposit formation

for reducing all emissions, including CO₂. In writing this paper, he had many discussions with industrial leaders from Alstom and EPRI and with prominent scholars such as Adel Sarofim, Klaus Hein and Terry Wall. The main conclusions of this paper were fully absorbed in the monumental work *The Future of Coal – Options for a Carbon-Constrained World*, published in 2007 by a group of renowned academics, including János, of MIT.

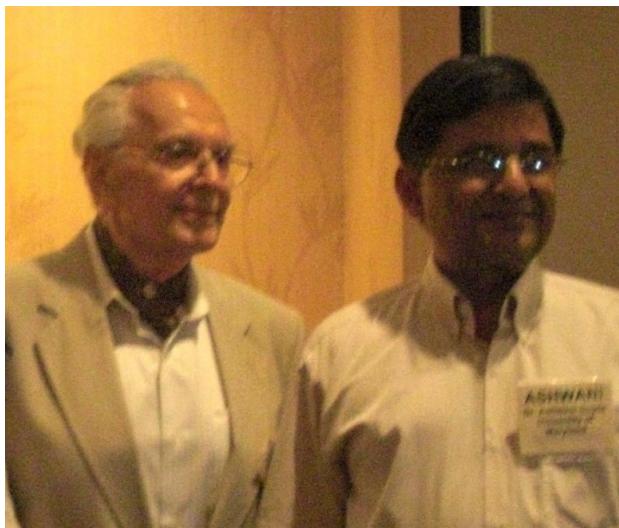
The last known published work of János was the Foreword he wrote for the book *Oxy-fuel Combustion for Power Generation and Carbon Dioxide (CO₂) Capture*, edited by Ligang Zheng and published in 2011 by

The screenshot shows the MIT Joint Program on the Science and Policy of Global Change website. The top navigation bar includes links for About Us, Research, Publications, News + Media, Events, and Sponsorship. A sidebar on the left under 'PUBLICATIONS' lists Signature Publications, Peer Reviewed Publications, Joint Program Publications, Other Publications, and Publication Search. The main content area features a green header 'WORKING PAPER' followed by the title 'The Future of Coal: Options for a Carbon-Constrained World, an interdisciplinary MIT study'. Below the title is a short summary and the citation: 'Ansotobehera, S., J. Beer, J. Deutch, A.D. Ellerman, J. Friedman, H. Herzog, H. Jacoby, P. Joskow, G. McRae, R. Lester, E. Moniz and E. Steinfeld (2007) MIT Interdisciplinary Study Report, Massachusetts Institute of Technology, Cambridge, MA'.

Woodhead Publishing. For this book, it was János who suggested the title to the publisher and invited the author to be its editor. He volunteered and wrote with enthusiasm the foreword in this book. One of his last academic activities was attending a Ph.D. student's (Lei Chen) thesis defense at MIT in January 2013 when he was almost 90 years old.

A Man of Unlimited Kindness

After finishing his MS at Southampton University (advisor Prof. Ken Bray) in 1970, Ashwani Gupta applied to Sheffield Univer-



János and Ashwani Gupta

sity as a doctoral student since he was interested in conducting research in Swirl Flows with Combustion. Not only did János accept him as his student but also kindly helped him to obtain the prestigious SRC graduate research assistantship.

Note that there was a post office strike at that time and there was no way to send the SRC application to London. János personally took the author's application from Sheffield and hand-delivered it to SRC in London and obtained the approval.

In 2011, Ligang Zheng was vacationing in Cambridge, Mass., and had written previously to János about scheduling a visit at his home in Winchester, Mass.

János wrote back, "We are looking forward



Ligang Zheng with Marta and János at the Clearwater Conference.

to your and your daughter's visit on Tuesday. You have our home address, but we are not sure how you will be coming out to Winchester. It may be more convenient for us to meet in my office at MIT in Bldg 66 on 25 Ames Street, Room 301, and I would then drive you to our home. Please let me know what your preferences are.”

Upon receiving this e-mail, Ligang was deeply moved. An 88-year-old gentleman would trouble himself to drive to town to pick up somebody who is almost 40 years younger to drive to his home, then drive him back to town!

János was always very kind to everyone. To a certain degree, everyone has a kind side. Yet, as the great Hungarian mathematician George Pólya pointed out: “You talk to a boring student. Then you are kind because you feel it is your duty to be kind to a student.

Or you talk to a nasty colleague and you are kind because you don't wish to collide with him, so you are kind out of duty or self-interest.”

But János was naturally kind, as Pólya further added that “to be kind was an inborn instinct” for him.

A Great Teacher, Mentor, and Friend

In 2010, under the leadership of Ashwani Gupta and Ligang Zheng, the Clearwater Clean Energy Conference held a special banquet to honor János' life and work.

A string quartet was hired to play music for the banquet and the performance of Beethoven's string quartet No. 10 in E-flat major, Op. 74 “Harp” was dedicated in his honor.

Ligang Zheng gave a keynote speech titled “*A Burning Passion for Freedom, Music, Rowing, Combustion, Environment, Friendship, and most of all for Life*” that summed up his life and work. More than 60 letters had been sent from his colleagues, students,

associates and various organizations that commented on their own previous involvement with János over the years. Ashwani Gupta had collected them and banded them into a leather-bound book imprinted with his name and presented it to János at the banquet.

From these letters, it was very evident that everybody who knew János regarded him as a teacher, mentor, and friend in the highest esteem. To close this article, we would like to quote some of these letters to pay our deepest respect and affections to János.

“The service and leadership you have pro-

vided to your country, your university and the many professional organizations you have given your time to over these many years is exemplary and of the highest standard.”

– **Robert Beck, Executive Vice President and CEO, The National Coal Council**

“Under his leadership the International Flame Foundation made a major impact on industrial combustion systems by the application of fundamental scientific principles. I remember traveling on the train to London with Janos and commenting that I did not understand the significance of the devaluation of the UK pound that was happening at that time. His vast experience in international economic theory was then revealed during the next two hours.”

– **Jim Swithenbank, Sheffield University**

“I became enormously impressed by your broad and in-depth range of knowledge in the area, your abilities to work with and bring out the best in those working with you

and the overall contributions you were making to the fields of energy and combustion generally.”

– **Nick Syred, Cardiff University**

“One of your innovations in Sheffield proved to be well ahead of time; that was the new degree of ‘Energy’, for which the need has by no means disappeared. That exercise demonstrated your foresight. Also, I am still grateful to you for widening my horizons on ‘Combustion’, especially on dimensional analysis and coal, interests which I still have,”

– **Prof. Alan Hayhurst, Cambridge University**

“You provide effective industrially-oriented advice, and have helped us with an emphasis on the practical side of problem solving. We also admire your character and grace. You diplomatically provide feedback in in private and public forum, and have always been sensitive about giving proper credit to others.”

– **John Marion, Alstom, Senior Program Director at Gas Technology Institute.**

“I was immediately impressed by your smiling face and the positive attitude with which you approached your work here in IJmuiden.

“I recall that we worked very well together not only at the scientific level but also on a personal



Ligang Zheng, Marta and János, and Ashwani Gupta at the honorary dinner.

level. Indeed I remember very well your bright personality.”

— G.W. van Stein Callenfels, IFRF

“You can look back with pride on the great many researchers, colleagues, students and friends whose lives and careers have also been enhanced by your teaching, guidance and influence.”

— Norman Chigier, Professor Emeritus, Carnegie Mellon University



János Beér received the Knight's Cross of the Order of Merit of the Hungarian Republic for his support of Hungarian higher education and research in 2008. The award was recommended by the Hungarian Academy of Sciences and the Hungarian Power Industries.

Photo from MIT News

“Every year the graduating class of 1965 meets somewhere in the UK for a weekend of celebration and reminiscence, and I have to say that the combined lifetime contributions of those who passed through Sheffield in the Glory Years stand as a permanent tribute to your efforts during your time as an Honorary Yorkshireman, and remind me of the adage that the purpose of life is to plant trees without ever expecting to sit in their shade. May your shadow never grow

smaller!”

— Tom Davies, University of Exeter, UK

“You possessed both a clear notion of the direction of the work and the diplomatic qualities to both release and support your active staff.”

— P.J. Foster, University of Sheffield

“In this day when we are being continually disappointed by the inappropriate actions of our political leaders or sports super stars, it is important to remember that there are people who are super stars in their field and they happen to be very decent and honorable human beings – János Beér is one of these people to me. You not only have been at the top of your profession for many decades, but you have always conducted yourself in such as exemplary manner.”

— Dick Borio, Combustion Engineering

“What struck me was your humility and empathy for everyone in the conversation, which tend to differentiate truly accomplished men. His communication skill was noticed by industry as well. If President Reagan was the ‘great communicator’ among presidents, then Professor Beér was certainly the great communicator among combustion scientists. One of Professor Beér’s assets was his ability to clearly and concisely articulate complex combustion phenomena in a very understandable way.”

— Murray Abbott, Fuel & Furnace Consulting

“You have not only been a great teacher but also a friend. I always enjoy my visits with you, as you graciously make the time and take the trouble to meet with me. What amazes me, as I reflect on these meetings is

the insight and foresight that you continue to have."

– Srivats Srinivasachar, Envergex LLC

"You have been a great inspiration to many, and I am sure we all acknowledge your most significant contributions, and we all honor a uniquely talented individual who has provided university and industry many years of outstanding service."

– David Lilley, Oklahoma State University

"With your success in both academia and industry in combustion science and technology, you have been an idol for me. I do not think I would have been where I am now without you."

– Nevin Selcuk, NTU, Turkey

"In particular there was a strong re-emphasis on the development and application of in-flame measurement techniques which were applied within systems. This work laid an excellent basis for the redevelopment for the mathematical modelling capability."

– Peter Roberts, IFRF

"I knew Professor Beer, for many years and talked with him at various conferences. He was always very kind and friendly, and was an excellent professor who knew how to translate from theory into application. But the most striking point which he mentioned to me was that after his IJmuiden period he took the Dutch furniture which he bought in Holland with him to America – and he always has kept it!"

– Willem van de Kamp, ex-director IFRF

"There is no doubt the great successive enjoyment at the Clearwater Clean Energy Conference is in great part due to your (János) support."

– Barbara Sakkestad, President, Clearwater Clean Energy Conference

DOE PRESS RELEASE 2003

Secretary of Energy Spencer Abraham announced that the Department of Energy's 2003 Homer H. Lowry Award will go to a Massachusetts Institute of Technology professor emeritus whose research in combustion science continues to be critical to the design and commercialization of high efficiency, low NO_x, combustion systems widely used in the fossil fuel power industry.

Dr. Janós Miklós Beér, who has made a broad range of contributions to combustion science, will receive the 2003 award, the highest honor given by the Energy Department for outstanding contributions to fossil energy science and technology.

Secretary Abraham will present the award and \$25,000 to Dr. Beér at an awards ceremony in Washington D.C. on January 30, 2004.

"Dr. Beér has made pioneering research and development contributions for 45 years to combustion science and technology of coal, oil, and gaseous flames," Secretary Abraham said.

"He has also been a major influence on industry through his publications and lectures to professionals at national and international meetings, his leadership with students on university campuses, and his service as a consultant to many power and utility companies both in the U.S. and abroad."

Dr. Beér's research has revolutionized many aspects of the technology, Abraham said.

János Beér received numerous honors

- ◆ The Knight's Cross of the Order of Merit of the Hungarian Republic for his support of Hungarian higher education and research in 2008. The award was recommended by the Hungarian Academy of Sciences and the Hungarian Power Industries
- ◆ H.M. Carl XIV Gustaf, King of Sweden, presented Beér with the Axel Axelson Johnson medal from the Royal Swedish Academy Engineering Sciences in 1995.
- ◆ In 2003, U.S. Energy Secretary, Spencer Abraham awarded him the Homer H. Lowry Award, the Department of Energy's highest honor, for his work leading to commercial burners that achieved high efficiencies while minimizing noxious emissions such as nitrogen oxides.
- ◆ The Alfred C. Egerton Gold Medal in 1986, one of the highest awards the Combustion Institute bestows. Beér was an inaugural fellow of the Institute.
- ◆ The Worcester Reed Warner Medal from the American Society of Mechanical Engineers, in 2012. This medal, established in 1930, is awarded for outstanding contributions to the permanent literature of engineering.
- ◆ The ASME Fluid Engineering Division's Lewis F. Moody Award in 1965,
- ◆ The ASME Percy W. Nicholls Award from the Fuel and Combustion Technologies Division/the American Institute of Mining, Metallurgical and Petroleum Engineers' Coal Division in 1988.
- ◆ The ASME George Westinghouse Gold Medal in 2001.



AIAA Energy Systems Award in 1998.

- ◆ The Energy Systems Award from the American Institute of Aeronautics and Astronautics in 1998.
- ◆ The Melchett Medal from the Institute Energy of the Royal Academy Engineering United Kingdom in 1985.
- ◆ The Coal Science Gold Medal from the British Coal Utilisation Research Association in 1986.
- ◆ Named honorary Superintendent of Research for the International Flame Research Foundation in 1991.

His honorary degrees and advisory positions

Education: First-class degree in engineering from the Technical University of Budapest in 1950. Doctorate of Philosophy at the University of Sheffield, UK, in 1960. Doctorate of Science from the University of Sheffield in 1968. Honorary doctorates from the University of Miskolc, Hungary, (1987) and from the Budapest University of Technical and Economic Sciences (1997). Visiting fellow Australian Commonwealth in 1972.

International Advisory Councils: Advisory Council research and development fuel and power, United Kingdom Department Energy, 1973-1976; Clean Air Council, Department Environmental, United Kingdom, 1974-1976; Chemical technical committee United Kingdom Science Research Council,

1972-1975; Combustion Science Committee for Italian National Research Council, since 1974. Chairman, clean coal utilization in China project National Academy of Sciences, 1987-1988; Advisor for the United States Secretary of Energy National Coal Council, since 1992.

Fellowship: Royal Academy of Engineering and Senior Fellow of the Institute of Fuels, UK; American Society of Mechanical Engineers: Institute Energy, Royal Academy Engineering United Kingdom; American Institute Chemical Engineers; Hungarian Academy of Sciences (honorary); Hungarian National Academy Engineering (honorary); and Finnish Academy Technology (foreign).

About the Authors

Finally, János, it has been our privilege to have known you over many years. Thank you for being such an inspiration and a visionary man; thank you for being someone that we can look up to not only in the field of combustion, but in all aspects of life. You will never be forgotten.

Ashwani Gupta, Distinguished University Professor, University of Maryland, College Park, Maryland
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Ligang Zheng, Research Scientist, CanmetENERGY-Ottawa, Natural Resources Canada
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COMMEMORATING Professor Janos M Beer

Jianxiong Mao

Department of Energy and Power Engineering,
Tsinghua University, Beijing, China

Professor Janos M. Beer is a world well-known scientist and engineer in the area of combustion. I knew his name before my visit to the United States.

In 1983, I got a chance to be a visiting scholar in New Jersey, this gave me the opportunity to realize my long desire to visit MIT and see Professor Beer. It was not difficult to get Professor Beer's telephone number in the U.S. When I called him in April 1984 trying to make an appointment to see him in MIT, I was not sure with uneasy mood if he could make this visit happen due to he is so famous and always very busy, especially because he never knew me, a strange Chinese teacher from Tsinghua University.

When I called him to express my desire to see him and visit his laboratory, I was deeply moved by his kindness, he immediately invited me to visit MIT and told me the detailed arrangement for my visit.

So my first meeting Professor Beer was in his office at the Department of Chemical and Fuel Engineering of MIT. He gave me a brief introduction about his work and guided me to his combustion laboratory to show me his equipment and facilities with re-

search programs, which surprised me very much and left a very deep impression on me.

After a whole morning visit, he kindly invit-



Marta and Janos Beer with Jianxiong Mao

ed me for lunch together at MIT's faculty dining hall. This MIT visit made me understand why and how he is so well-known as a world top expert of combustion, including theory and practice, and his moral quality.

In September 1997, as vice dean of the Department of Thermal Engineering, I was in charge of organizing the first "International Symposium on Coal Combustion" held in Tsinghua University of Beijing. My first thought was invite Professor Beer to give the Symposium a keynote speech on coal combustion at the opening panel session.

His response was very encouraging, and this was just my second time to meet him. Dur-

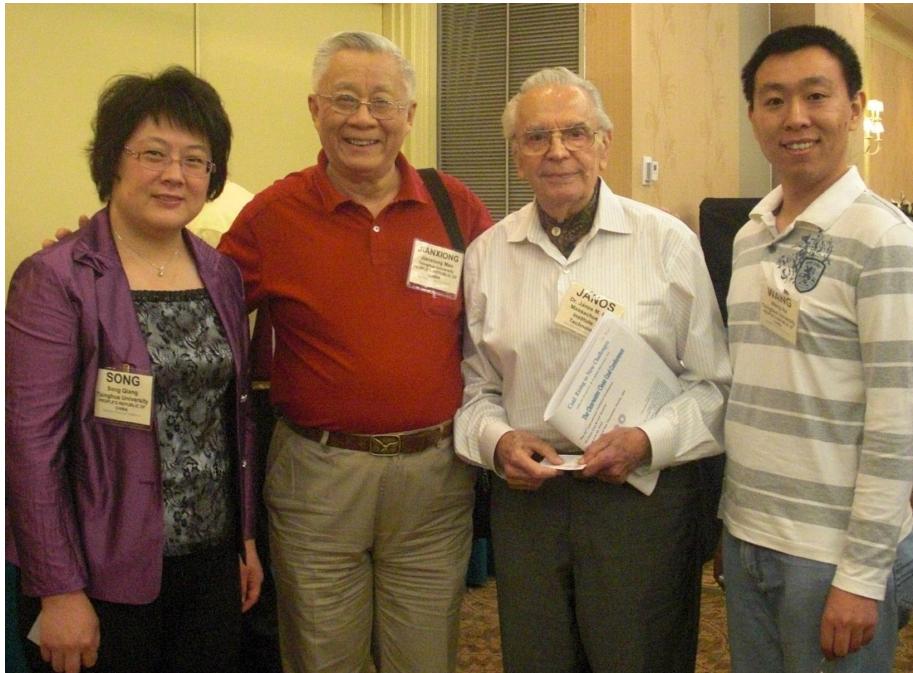
ing his stay in Beijing, I had the opportunity to accompany him to visit Summer Palace and some other activities.

In 1991, Tsinghua University invited Professor Beer to visit Beijing again and give us a lecture on coal combustion at the Department of Thermal Engineering. His lecture was impressive and very successful.

I was invited by my old and very close friend

Professor Klaus Hein in 2002, that was my first time to attend Clearwater Conference.

Since then, I have attended the Clearwater Conference six times until my age up to 80 years old when it was no longer suitable for busy international traveling. My Clearwater



Jianxiong Mao and other Clearwater attendees with Janos.

Conference experiences gave me excellent opportunity to meet Janos again and again, through his presentations, and our conversations and discussions after the session I got much more chance to learn from him.

My Clearwater experiences also made me know how important role Janos played to make the success of Clearwater Conference.

In 2010, I had the honor to attend a special banquet at Clearwater to honor Janos' life and work organized and chaired by Professor Ashwani Gupta and Dr. Ligang Zheng, Ligang gave a keynote speech titled "A Burning Passion for Freedom, Music, Rowing, Combustion, Environment, Friendship, and most of all for Life" that summed up his life and work.

I fully agree with Ligang, Professor Janos M Beer is a great man, not only he is an outstanding scientist and engineer, he is also a great teacher, mentor and friend. I will never forget Janos and he will live in my heart forever!



Jianxiong Mao with his friend Janos Beer

A TRIBUTE

Professor Janos M. Beer

John L. Marion
Senior Program Director,
Energy Supply & Conversion
Gas Technology Institute

I want to thank and acknowledge Professor Janos Beer' for his outstanding contributions to our Industry and to his support and personal impact to me.

My relationship with Professor Beer began in the early 1980s while I was a young engineer at Combustion Engineering's Kreisinger Development Laboratories in Windsor, Conn. Prof. Beer was an MIT Chemical Engineering professor with an active energy and combustion research program. MIT in Cambridge, Mass., was a relatively short drive away and Prof. Beer supported Combustion Engineering through a consultative retainer agreement that began in 1975. His engagement with Combustion Engineering was first established in 1963 while he was a professor at Sheffield University.

For me, I remember Prof. Beer's guidance and input on many on-going combustion-related developments and experiments. Prof. Beer guided my colleagues and me on non-dimensional scaling parameters for cold flow modeling and for experimental facilities design.

He assisted us with our drop tube furnace kinetic studies and the building of a plug flow combustion test facility to study NOx formation and control. Prof. Beer helped in the design of the 15 MWth Boiler Simulation Facility and supported me in the interpretation of its experimental results.

I was involved with Prof. Beer and his students

to develop and commercialized the MIT RSFC low NOx wall-fired burner design. A classic example of Prof. Beer's understanding of aerodynamics and their impact on combustion processes. I benefited from attendance to MIT meetings, including the MIT Co-op Program. These meetings provided an opportunity to become aware of MIT's combustion and energy-related research activities and gave C-E, and later ABB, and Alstom, an "inside track" to other MIT collaborations.



Additionally, these interactions gave exposure to Prof. Beer's students. Many of these outstanding individuals became members of the Alstom team after being trained at MIT as Chemical Engineers under Prof. Beer's mentoring.

I have admired you, Professor Beer, for the depth and breadth of technical knowledge you shared. I admired your effective communication and your delicate touch in providing feedback. I admired your character and grace. Through Prof. Beer's life he distinguished himself and inspired and nurtured many, including me personally.

I thank you Prof. Beer for all that you have done, for your support to our Industry, and to your impact on me.

MEMORIES FROM MIT NEWS

János Miklós Beér, professor emeritus of chemical and fuel engineering and a pathbreaking researcher in the field of flames, combustion, and cleaner-burning fossil fuels, died peacefully on Dec. 8, in Winchester at the age of 95.

Beér served on the MIT faculty from 1976 to 1993, helping to launch the Combustion Research Facility as part of the Institute's Energy Laboratory. In 2003, U.S. Energy Secretary Spencer Abraham awarded him the Homer H. Lowry Award, the department's highest honor, for his work leading to commercial burners that achieved high efficiencies while minimizing noxious emissions such as nitrogen oxides.

"Dr. Beér has made pioneering research and development contributions for 45 years to combustion science and technology of coal, oil, and gaseous flames," Abraham said at the award ceremony. "He has also been a major influence on industry through his publications and lectures to professionals at

"János was a delightful, warm person — a great gentleman as well as teacher," said Edward W. Merrill, the C.P. Dubbs Professor of Chemical Engineering, emeritus.

national and international meetings, his leadership with students on university campuses, and his service as a consultant to many power and utility companies both in the U.S. and abroad."

"János Beér was a giant in his field of combustion," said Gregory Stephanopoulos, the Willard Henry Dow Professor in the Department of Chemical Engineering. But he was not just an accomplished researcher.

"János Beér was a giant in his field of combustion," said Gregory Stephanopoulos, the Willard Henry Dow Professor in the Department of Chemical Engineering.

Colleagues recall a friend distinguished by a certain old-world charm.

Paula Hammond, the David H. Koch Professor of Engineering and head of the MIT chemical engineering department, recalls: "I knew János personally as he was my next door office suitemate when I started as a faculty member. He was the ultimate gentleman, warm, kind and ever thoughtful — asking me about my work and offering his support for me as a new junior faculty member.

"Although Janos will always be known for his many outstanding achievements in establishing and expanding the area of combustion engineering, his lasting contributions are his many past students, who were inspired and influenced by his mentorship," Hammond said.

Yiannis A. Levendis, distinguished professor of mechanical and industrial engineering at Northeastern University remembers Beér's arrival for a PhD student's thesis defense, when Beér carefully fastened a pin on his ascot. "The occasion of such an important event in a student's life called for respectful formality," Beér told Levendis.

Adds Stephanopoulos: "As a true Hungarian, he appreciated good coffee and had mastered the full art of brewing temperature, duration, and amount of coffee to get a perfect cup."



Tribute to Professor Janos Beer

Jianxiong Mao, Guangxi Yue
Department of Energy and Power Engineering,
Tsinghua University Beijing, China

On behalf of our colleagues, we would like express the sincerest gratitude to Professor Janos Beer for his great contribution to Tsinghua University and China.

Prof. Beer is a preeminent scholar in combustion science especially in coal combustion. His book *Combustion Aerodynamics* has been a key reference since its publication and it is still used as a standard textbook for advanced combustion course around the world. Moreover, Prof. Beer is an old friend of Tsinghua University and today we like to express our deepest appreciation for his kindness and friendship one more time.

In the early 1980s, when China just opened to the world, Profs. Junkai Feng and Jianxiong Mao initiated the connection with Prof. Beer when he was the chair of the Department of Chemical Engineering at MIT. With courage and wisdom, he accepted the



Professor Janos Beer with Profs. Junkai Feng, Weidong Niu, and Jianxiong Mao at Tsinghua in 1991 during the 2nd International Symposium on Coal Combustion

first generation of Chinese visiting scholars from Tsinghua University and other research institutes to come and study at MIT. At MIT, under Prof. Beer and his colleagues' supervision, the visitors learned not only the new concepts and knowledge in coal combustion, but also the advanced methodology, management and ,more important, the spirit in doing research. Prof. Beer's help was important for them to develop their research career. Among them, many visitors, including Profs. Guangxi Yue, Mingchuan Zhang, Changhe Chen, became the principal researchers in coal research and utilization in China. Indeed, over the past three decades, we believe hundreds of Chinese scholars and graduate students have been directly or indirectly influenced by Prof. Beer's research activities. Prof. Beer is one of the most respectful supervisors and friends for Chinese researchers in combustion science and engineering.



Professor Janos Beer at Tsinghua in 1991 during the 2nd International Symposium on Coal Combustion



In 1987, the first “International Symposium on Coal Combustion” was held in Tsinghua University. At the time, China was much less internationalized than today, and we lacked experience in organizing such a symposium. It was Prof. Beer who helped us in organizing the symposium without any hesitation. His key note speech on coal combustion at the opening panel session was very impressive and encouraging for the attendants and organizers. Today, the four-year-series symposium is an important platform for the knowledge exchange and personal communication in coal combustion area. In next month, the 9th one will be held in Qingdao, Shandong Province, China. Prof. Beer’s great contribution to this symposium will never be forgotten.



Professor Janos Beer, Marta Beer, and Prof. Guangxi Yue in New Hampshire, 1988



Professor Janos Beer, Mrs. Marta Beer, and Prof. Jianxiong Mao at Clearwater, Florida, 2008

Prof. Janos Beer was very friendly to the young Chinese scientists. Though he was well known in the combustion society, he was so charming and approachable. He gave many encouraged words to the young scientists to do better research in coal combustion. Prof. Janos Beer is a great man, not only he is an outstanding scientist and engineer, he is also a great teacher, mentor and friend. We will never forget Prof. Janos Beer and he will live in our heart forever!



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On scaling and mathematical modelling of large scale industrial flames

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ABSTRACT

Gaseous flames and pulverized coal flames, semi-industrial scale and input range from the lowest scale of primary questions are whether effect and whether mathematical models industrial flames.

It has been observed that disparity large-scale flames can be as large as scale experiments one observes a measured data is sensitive to small sensitivity almost disappears at large mechanism. In other words, different mechanisms are controlling. Although the sions are also relevant to gas turbine combustion system scaling, the wo parted.

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Roman Weber and Marco Mancini, Chausthal University of Technology, Institute of Energy Process Engineering and Fuel Technology, Chausthal-Zellerfeld, Germany, wrote the article “*On Scaling and Mathematical Modelling of Large Scale Industrial Flames*,” which is scheduled to be published shortly by the *Journal of the Energy Institute*.

The articles includes a special dedication to Professor Janos Beer and the late Dr. Roy Payne, recognizing their past work at the International Flame Research Foundation and their influence on the authors and other researchers.

DEDICATION

The reader will notice that the paper is based on the work of the International Flame Research Foundation (Ijmuiden, The Netherlands) which spans almost two decades of research of the past century. The flame scaling issue was one of the key topics of the IFRF and, as pointed out in the text, remains unresolved. Dr. Roy Payne, Scientific Manager of the IFRF in the period January 1977-December 1979, was instrumental in organizing and executing the scaling project with CEGB.

Roy passed away on September 1, 2015. A year before, I, Roman Weber,) visited Roy in his place at Santa Barbara, CA; obviously we talked at length about the scaling of combustion systems.

On December 8, 2018, Professor Janos (John) Beer passed away in Winchester, MA. John was Head of the IFRF Research Station in the 1960-1963 period and later, being already a MIT professor, acted as Superintendent of Research of the Foundation. At the time, the Research Station at Ijmuiden was directed by Peter Roberts and I acted as Scientific Manager. During that period, I had numerous discussions with John, particularly in swirling flows and flames – and other key research topics at Ijmuiden. It is perhaps fair to say that John’s research philosophy made a profound impact on the Ijmuiden’s research team.

We dedicate this paper to the memory of Dr. Roy Payne and Prof. Janos Beer—two remarkable colleagues and friends.

WITH GREAT FONDNESS

Srivats Srinivasachar
President, Envergex LLC



From the Tribute Dinner to Janos Beer in 2010

Dear Janos,

It is with great fondness and appreciation for all you have given me throughout my graduate education and professional career that I write this letter.

I came to MIT in 1981, first time in a foreign country, away from family and friends. It was a nervous time, everything was new and, in addition to the intense academic challenges of MIT, I had to secure funding for continuing beyond the first year. When I was exploring various professors to work with, you were very gracious to offer me a Research Assistantship position in your group, allaying my fears and the challenges of the transition.

The first incident that sticks in my mind from those early days was a Program Review Meeting, which happened within a month or so of joining your group. This was an annual review, I believe of a consortium program, where EPRI and several industry representatives were present. It included presenting projects for the upcoming year, and on which the ongoing funding depended.

You suggested that I present the plans for one of the coal-oil slurry combustion projects. At that time, I wondered how cruel it was to thrust me in front of such a tough audience (Arun Mehta was in the audience and you know how he can be when he smells blood), only to realize later what a great opportunity you gave me and had the utmost confidence in me to deliver. That was only the first of so many instances where you always first showcased your students and colleagues before any focus on yourself.

You are a great teacher, and a teacher by example. You never sought to impose your opinions; only suggest, add what was productive, and sure enough it would sprout within us (the student) and bloom. You always aimed to grow the student with experiences and free expansion much more than by instruction. You encouraged me to not just focus on my thesis work but also inquire and learn about other related topics, broadening my horizons and making me a more complete prac-

titioner. This opportunity for self-discovery and growth has stood me in good stead throughout my career.

After graduation and while working at Physical Sciences Inc., I had the opportunity to work with you on ash slagging and fouling, and the deep understanding of the overall combustion process that you brought enabled me and others to connect the advances in chemical analysis with computer-controlled scanning electron microscopy to computational tools that the industry could use to better predict and mitigate the negative impacts of ash deposition in boilers.

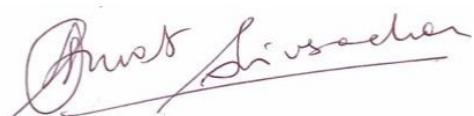
My next stint was at ABB Combustion Engineering (now ALSTOM Power) from 1993 through 2006. I had the opportunity to continue working with you on several topics including NOx control; your phenomenal intuition on boiler aerodynamics fostered many ideas regarding fuel and air staging and burner design both for tangentially-fired boilers and wall-fired burners. These ideas were developed commercially by us and others and implemented in boilers operating today not just in the US but throughout the globe.

Prof. Beer, you have not only been a great teacher but also a friend. In the recent past, after I started up Envergex, you have provided me a good listening ear on my ideas and projects. I always enjoy my visits with you, as you graciously make the time and take the trouble to meet with me. What amazes me, as I reflect on these meetings, is the insight and the foresight that you continued to have, and the progress in your thinking in addressing the pressing issues of today – you are as much a continuing student as a teacher and it is that characteristic that I hope to emulate in my own life. I also admire your grace and concern as you always enquire about my well-being and my family on these visits.

गुरुब्रह्मा गुरुविष्णूः गुरुदेवो महेश्वरः ।
गुरुः साक्षात् परब्रह्म तस्मै श्रीगुरवे नमः ॥ ॥

"Guru (teacher) is indeed the Creator and the Sustainer.... In fact, he is All Knowing and Limitless and to Him I salute"

With Warmest Regards and Memories,



IN MEMORIAM

Janós Miklós Beér

Simon Hanson
Professor (Retired)
Chemistry Department,
Principia Collage, St. Louis. Mo.

I was in my first year of graduate school at the Massachusetts Institute of Technology fulfilling the course requirements and preparing for the doctoral admission examination. I could do this because I had received a one-year fellowship upon acceptance to graduate school. I took my doctoral examination and, surprisingly, passed.

It was at this time that Adel Sarofim approached me and proposed that I consider working with a member of faculty who would be arriving the summer of 1976. Upon Adel's advice I committed myself to an association with a person I did not know on the basis that he came from Britain, worked in my field of interest, and was called John Beér.

It was only when he arrived that I found him to not be from Britain, had a far less defined specification of his interests, and was called Janós Beér. It was clear that I knew nothing of this man and I cannot say that I know him well after forty years of association.

The first meeting with Janós was social to learn whether we could endure each others' company and work together. However, the most evident feature was that Janós spoke English as well as any Englishman and that his manners were faultless. The question of compatibility never arose and we

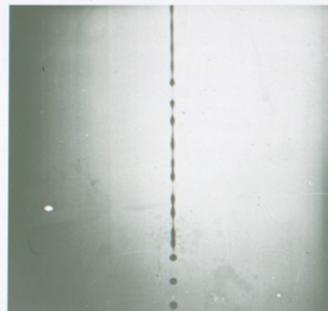
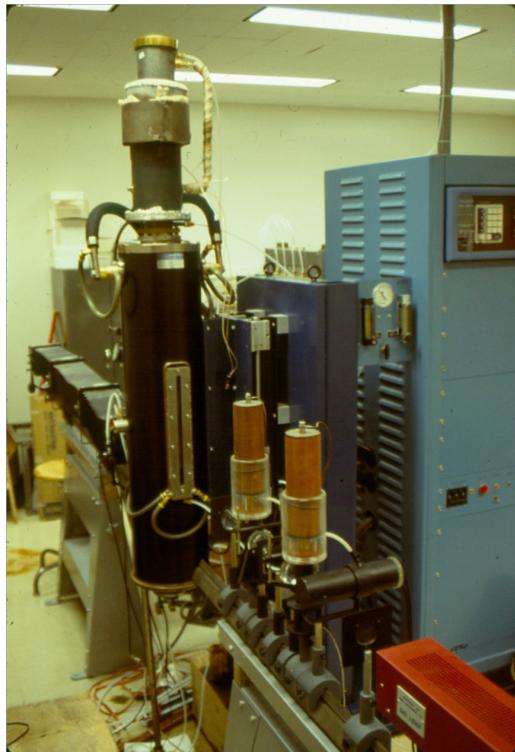


Janós "John" Miklós Beér in 1976.

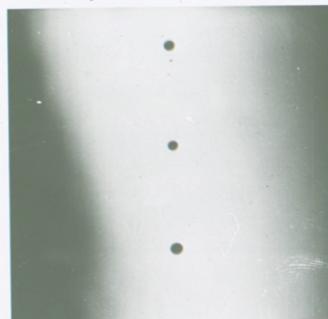
spoke about what was necessary to complete his move to MIT. The most concerning item on his agenda was to take care of his car that he had brought with him from England via the USA. The car was a Camaro from a research project to see if a standard automobile could be practically operated with a turbine engine. My task: to transport him to the offices of the Camaro's insurance company. From this activity sprang the decades of mutual friendship, respect and affection between me and Janós.

Our professional relationship developed more slowly with an introduction to the work he had performed before. The need for optical measurement of the size and velocity of a droplet was introduced to me when he has a double-spark photographic system brought from England.

This system did not meet my needs but pointed me in the right direction and helped define the subject of my thesis which became "*The Evolution of Fuel Nitrogen during the Vaporization of Heavy Fuel Oil Droplet Arrays.*" The thesis consisted of two part: one theoretical and the other experimental.



(a)



(b)

The picture of the equipment at top shows the setup with a double spark photographic system which was replaced by a stroboscope.

Janós advised on the experimental component and never questioned how much the equipment would cost but somehow it always materialized. The picture of the equipment on the previous page shows the setup with a double-spark photographic system which was replaced by a stroboscope. Sample images from the system are shown in the picture below at two points along the path of vaporization.



These droplets were sampled and analysed to complete the experimental portion of the thesis, but this experiment was only a small portion of the work Janós supervised at MIT. One example was a pilot scale fluidized bed shown below. This experimental work only complimented an extensive consultancy which included many of the largest and highly recognized corporations.

MEMORIES: János Miklós Beér

It was June of 2005. I was standing in the front of a conference room about to chair the first oxy-fuel technical session at the Clearwater Coal Conference. With the support of the conference organization committee, this conference was the first major international conference to have special and devoted sessions to examine the development of the oxyfuel combustion technology. Naturally, I was a little nervous. **Then I saw you walking into the room. “The great man is here. What could the master learn from us?” I said to myself.** To my surprise, you sat down in the second row. This was unusual for famous professors in my experience. They generally like to sit at the back so they can get out when they find that there is nothing new and the session is boring.

You stayed for the whole session and also asked a few questions. I remembered that there was once that you did not get your chance to ask a question as there were many others who wanted to ask questions and not enough time. You participated in the entire session with full enthusiasm, sympathetic understanding and support, and you offered your guidance to all of us who call you maestro.

I was amazed to find that you joined us for the next two oxy-fuel sessions as well. Your presence was the best support that I could hope for. But I knew this was not easy for you since it was not even easy for me, as there was one session that started at 3:30 p.m. and finished at 6:00 p.m. And I remembered on that day you chaired a panel at 8:30 in the morning.

I was very excited and surprised when you walked towards me and congratulated me at the end of the conference. For a young man who has read your great work over the years, what is more encouraging and exciting than when the master shakes my hand and praises my work?

Over the years, I have learnt from your colleagues more about you, since you almost never talk about yourself. Your life has really fascinated me. To me, you are my hero, for the courageous work you did with the legendary Raoul Wallenberg during the Second World War; you are a great scientist, for the profound work you have done in coal combustion; you are an environmentalist, for your tireless efforts to find the solutions to reduce the impact of fuel utilization; you are a musician, for the many Beethoven string quartets you have played and the deep understanding associated with the music; last but not the least, as several people told me, you were an international class rower. You exemplify all that is human dignity, the desire and will of living in a free society, the curiosity to understand nature, the conscience of humanity and the willingness to care about the future, and most important of all, the perfect example of enjoying life.

At the beach party in 2008, there was a guitarist playing the classical Spanish guitar music. I sat beside you and Marta and all of us were immersed in the beautiful music especially the “Recuerdos De La Alhambra” by Tárrega. At that time, there was a beautiful sunset on the horizon. The great human spirit is just like the water in the music running from one fountain to another of the great Alhambra Palace, it is passed from one generation to another as well.

It is my privilege to know you. Thank you for being such an inspiration and a visionary man; thank you for being someone that I can look up to not only in the field of coal combustion, but in all aspects of life.

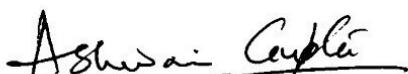
Ligang Zheng, Research Scientist, CanmetENERGY -Ottawa, Natural Resources Canada

**From the nomination letter for the 2003 Homer H. Lowrey Award
that was given to Janos Beer by the U.S. Secretary of Energy**

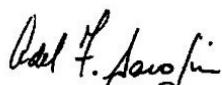
He has had a major influence on industry through his publication and presentations at national and international meetings, service as a consultant to many power and utility industries in the USA and UK. He has been a consultant to the major combustion equipment suppliers **Combustion Engineering (now Alstom Power)** for over 35 years and **Siemens Westinghouse**. The Siemens Westinghouse Company has commercialized Prof. Beér's multiple annular burner for gas turbine applications and Alstom has commercialized his radially-stratified flame-core burner for use in large industrial and electrical utility boilers. His burner designs are based on his fundamental understanding of flame aerodynamics and pollutant formation and are noted for their low NOx emission levels. He was also responsible for directing the planning of the cogeneration facility involving an ultra-low NOx combustor for the gas turbine for the MIT physical plant. This facility is now fully operational and provides heat and electricity via efficient energy transformation of fuels. Because of his extensive knowledge and contributions in combustion and power area he has served since 1992 on the **National Coal Council, that provides advice to the US Secretary of Energy**. He has and continues to provide invaluable advice to government agencies on the clean and efficient transformation of fossil fuels in the USA and worldwide. As Professor Emeritus at MIT, he is still active in Combustion Consultants International that he founded, as an independent consultant to industry, co-supervising graduate students, service on national and international committees, publishing research papers and making presentations at technical society meetings.

In summary, Professor Beér has made **outstanding contributions to the combustion science and technology of coal, oil and gaseous fuel flames** through extensive research and development efforts over 45 years. Professor Janos M. Beér is an exceptional candidate for the **Homer H. Lowry Award**.

Sincerely



Ashwani Gupta
Professor of Mechanical Engineering
University of Maryland



Adel F. Sarofim
Presidential Professor
University of Utah

Tributes to Janos Beer from 2010 Letters

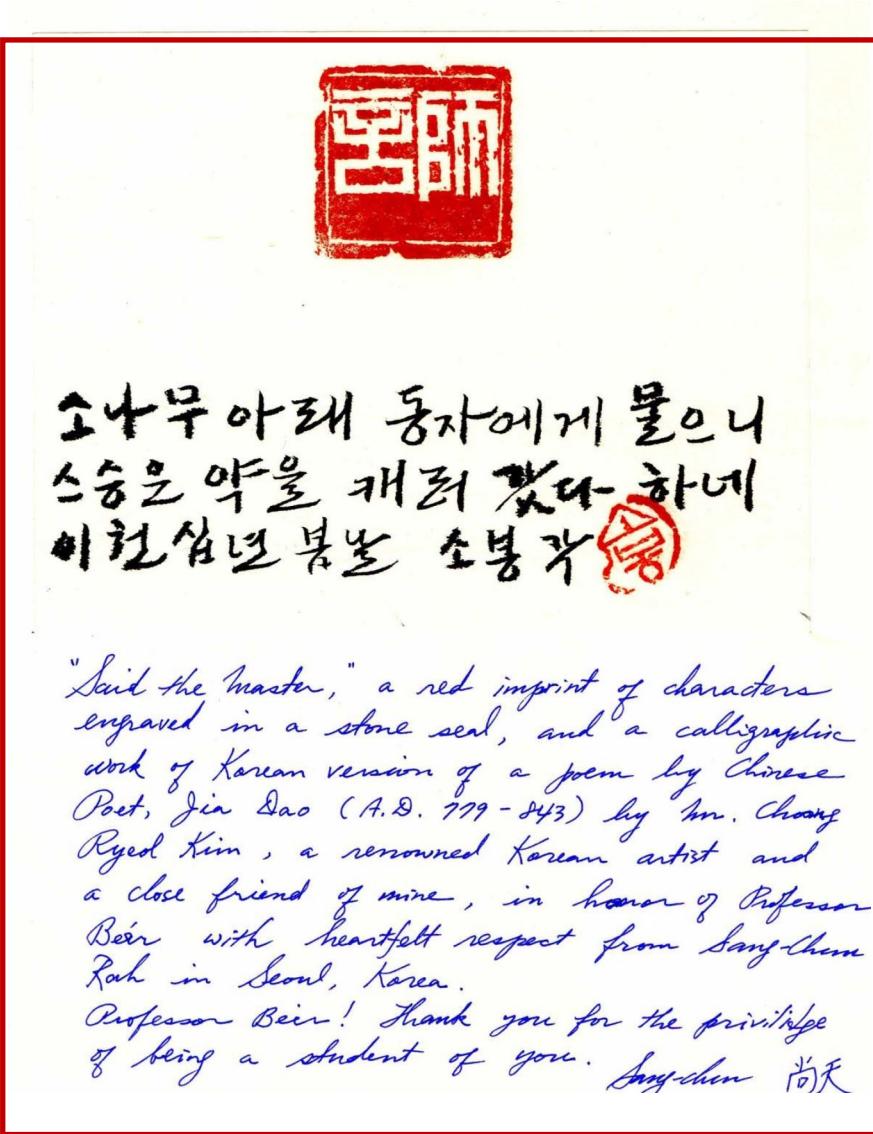


UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
Climate Program Office
1100 Wayne Ave, Suite 1202
Silver Spring, MD 20910-5603

In setting such a remarkable standard for professional and personal excellence you provided me with a role model that I have sought to emulate ever since. You warmly mentor those who thirst for learning, and you elevate everyone around you with a graciousness that leads them to stretch to become their very best. This lesson is a gift you gave me, and for which I am truly grateful.

It is clear why so many accomplished colleagues gather now to honor you: you are not only a man of extraordinary letters, but a kind and caring human being and, above all, a true gentleman. Despite the intervening years I do wish you to know that you touched my life in a significant and lasting way.

Joel Levy





School of Civil and Environmental Engineering

What an extraordinary career in combustion engineering you have had! You have left your mark on the field in so many ways, both via your technical contributions and in the inspiration you provided to students and colleagues. My interpretation of the Beér leitmotiv is that of the balanced use of theory and practice, chemistry and physics, applied to clean energy from fuel combustion.

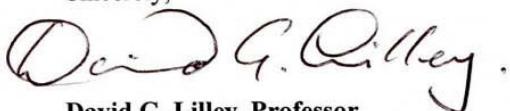
Sincerely


Jim Mulholland
Professor and Program Coordinator
Environmental Engineering
School of Civil and Environmental Engineering



In summary, János, you have been an inspiration to many, and I am sure that we all acknowledge your most significant contributions, and we all honor a uniquely talented individual who has provided university and industry with years of outstanding service. It is for these outstanding exemplary contributions that we honor you as an educator, researcher and consultant in techniques, design, development and applications in the field of combustion and power production, with emphasis on fuels, flames, aerodynamics, heat transfer, radiation, and pollution.

Sincerely,


David G. Lilley, Professor

You were one of the very few colleagues I have worked with to whom people asked to be remembered at meetings and conferences throughout the world. I remember that this was a confidence booster for me when I presented my first paper, to the Winter Annual Meeting of the ASME in New York in 1968, when I was greeted by a total stranger with the words "How's John Beer?".

Vic Hanby, Professor of Building Services Engineering

Carnegie Mellon

For three years you and I interacted daily; we rode our bicycles, ate our meals, and led research teams from France, Germany, Holland and further afield, pushing water-cooled probes into flaming furnaces. Our papers, presented by you at the ASME, received the Moody Award for excellence in research. Our research in Ijmuiden laid the foundation for our first book, Combustion Aerodynamics. In the midst of the fumes and smoke of the steel mills, we established a haven for academic research and lifelong friendships. When we completed our terms of office in 1964, you moved to Penn State and I went to the Technion. In 1966, when you became Head at the University of Sheffield, you remembered me with an invitation to join you and continue our collaboration. From Sheffield I was able to obtain research contracts from NASA and the US Army, Air Force and Navy. You moved on to a prestigious chair at MIT and I took a chair at Carnegie Mellon.

In recent visits, you and Marta and I have reminisced about 50-years of a personal and professional relationship which enriched both of our lives and careers, and you can look back with pride on the great many researchers, colleagues, students and friends whose lives and careers have also been enhanced by your teaching, guidance and influence.

Norman Chigier

I am now owner and managing partner of Primaira, LLC, a product development and commercialization company in Woburn MA. We are a small but growing business, developing novel yet practical products for global industry leaders and start-up companies alike.

I frequently reflect on my time with you and your lab at MIT with fondness and appreciation. You may remember that we had numerous discussions about whether I should pursue a master's degree in mechanical or chemical engineering. I had some stubborn insistence on being a mechanical engineer. Now, naturally, I wish I had more technical background in chemistry, process engineering and reactor design. At this point, I will probably fill in the gaps by hiring a bright young chemical engineer from MIT! Thank-you for your key role in launching me on a wonderful career path.

Sincerely,



Karen Benedek

How could we not remember our collaborative work on the RSFC burner that we licensed from MIT? I can recall first hearing about the RSFC burner at one of the Coop Program meetings and thinking what a great thing that would be for my company. As we noted back then, it truly was a classic case of an idea and concept being developed by a university and then being commercialized by a company who would sell the product. We had many challenges along the way, but eventually this idea and concept successfully made its way into the commercial world.

Dick Borio, Combustion Engineering

We have long recognized Professor Beer as one of the most knowledgeable and respected people in the field of fossil fuel combustion and emissions control. Since fossil fuel combustion has been central to our core business as a major supplier of utility and industrial boilers and related equipment, Professor Beer's consultative insights, advice and visions for the future have been invaluable.

Professor Beer helped us to stay in touch with what was happening in the world of combustion. As a frequent author and lecturer at many of the world's important combustion conferences we had the benefit of not only receiving critical information from these conferences, through timely visits by Professor Beer, but with his important interpretation of new breakthroughs in the field of combustion.

*From the nomination letter for the 2003 Homer H. Lowrey Award
by Alstom Power Inc.*

Tributes to Janos Beer from 2010 Letters

‘It seems difficult to believe that it is now over 40 years since you interviewed me for the position of Investigator at the IFRF... Now we are 43 years on. During that time, you have never ceased to make a prominent contribution to the fields of combustion and energy, while moving from the UK to the US and to MIT. In the meantime, I am still asking questions, and I hope they are still as interesting as the contributions you have made to the field of combustion.

— Neil Fricker, Deputy Superintendent of Research, IFRF

“I want to thank you for helping me to complete an undergraduate thesis with you and Peter Walsh. That hands-on experience – understanding how to structure a group of experiments. Working with equipment in the combustion lab, coordinating with members of the lab staff, analyzing data appropriately and finally distilling it down into a succinct cogent written document – aided me in my future endeavors... So you have had an impact on those of us who did not even continue in the field. Your guidance, advice and kindness will always be remembered and I hope to pass some of that on. I salute you!

— Sarah Bingman Schott ’83 MIT,
Leapfrog Marketing, Inc., Weston, MA

I still remember the day when you, as chairman of the department, called each of the students in the M.Sc. class, to inform them about the outcome of their studies. I was the first one you called in as the only lady of the class. You asked me to continue with my studies in the same department and of-

“Our joint activities on the drop tubes for droplets, coal/water slurries, and coal combustion provided us with an opportunity to use fundamentals studies to provide insights on the large scale studies that were of interest to industry. I enjoined collaborating with you on the supervision of students that led to many important publications.

“One of the greatest pleasures for me was our joint travels which were enriched by the breadth of your knowledge and your eclectic tastes. A particularly memorable trip for me was that to Toledo and the visit to the museum of Santa Cruz. I recall standing with you before the galley flag from the battle of Lepanto hanging from the high-ceiling of one of the galleries as you described the role of Don Juan of Austria and the importance of the battle in arresting the advance into Europe of the Ottomans. Another incident on that visit, one that you would expect of two MIT professors, was our looking at an unfinished picture by El Greco and noticing how he had bent the leg to anticipate the refraction that would occur with the planned but not executed painting of the water over it.

— Adel F. Sarofim ,
Presidential Professor,
University of Utah

ferred me a scholarship which would be given to a foreign student for the first time. Unfortunately, I could not take up the offer as I had to go back home. A year later, after

I sent you a Christmas card and mentioned that I started my Ph.D. in Turkey, I received your card together with the application form for the Ph.D. scholarship. This time I did not miss that opportunity. Receiving Ph.D. under your guidance was an exceptional opportunity for me and contributed to my academic performance. My Ph.D. was not the end but the beginning of your continuing support.

— **Prof. Dr. Nevin Selçuk, Middle East**

It's been more than 30 years since we saw each other last time in your office at MIT. For all these years, I have been engaged in coal-related activities in my professional life... I thank you again after all these years for teaching me everything I wanted to know about coal. I would also like to tell you that the torch you started has been carried on.

— **Yih Hong (Larry) Song, MIT grad,Nexant China, Shanghai**

I remembering travelling on the train to London with Janos and commenting that I did not understand the significance of the devaluation of the UK pound currency that was happening at the time. His vast experience in international economic theory was then revealed during the next two hours!"

— **Jim Swithenbank,
University of Sheffield, London**

My first contact with you was tangential. I was getting a PhD for research in the Mechanical Engineering. My parents and my wife hoped to attend the ceremony but only two seats were guaranteed. My Mother volunteered to chance it and somehow got a good seat. Only much later did I find out how it happened.

I could then tell you that, long after you left I discovered that my Mother had got her grandstand seat 40 years ago with the help of an "extremely kind gentleman" it was of course you!

— **John Tippetts, Former professor,
Sheffield University, Tippetts Fountains, Sheffield, UK**

After a successful interview for a post-doctoral position with Janos at Sheffield University, some 42 years later, "my subsequent career has been founded on the bedrock which you laid and I will be ever grateful for this."

— **Nick Syred, Director, Cardiff School of Engineering, Cardiff University, Wales**

When I came to MIT as a graduate student in 1979, I had no previous knowledge in the combustion field. I joined your team as an RS, and the first task you gave me was to figure out how to collect samples of organized compounds using the Environmental Protection Agency system you bought. At the time, I was perplexed by the fact that you threw me in the middle of the ocean, not knowing how to swim, and told me to swim to the shore. Now looking back on this particular experience and others during my 13 years of stay with you, I feel that I owe what I accomplished so far in my career to you. You have not only been an advisor to me, but a mentor, a second father and a dear friend.

— **Majed Toqan,
Creative Power Solutions**

Our roads crossed first time in 1991 as I was invited as a visiting engineer at MIT following your commitment as expert in the evaluation of a Swedish energy program at Chalmers. I had the true pleasure of being supervised by you and Adel Sarofin, the research quest being the chemical pathways of N₂O formation/destruction in coal conversion in fluidized beds. The work at MIT finally ended up in my PhD thesis. Since then I have been working most of the time at SP Technical Research Institute of Sweden where I have been engaged in biomass and waste combustion.

Your great contribution to go beyond the limits of knowledge in the field of combustion would therefore be of fundamental important to solve the problems of the future. But even more important is that you have contributed to stimulate research in combustion all over the world, not least by providing opportunities for foreign students and researchers to spend time in your company just as myself.

— **Claes Tullin, R&D Manager, Assistant Head of Department, SP Technical Research Institute of Sweden**

One of my most memorable professional moments was years ago as Janos and I were sitting at the head table on Monday morning waiting to open the conference. We sat there looking out at all of the attendees streaming in and greeting the distinguished speakers who were on the program.

Thank you, John for what you have done in developing the science of combustion, for mentoring many of us throughout our careers, and for being a role model that we can only aspire to.

— **Terry Wall
The University of Newcastle, Australia**

The Combustion Research Facility and research group that you created and directed at MIT was the most exciting, most challenging, most rewarding, and most enjoyable laboratory in which I have ever had the good fortune to do research.

— **Peter Walsh, University of Alabama at Birmingham.**

Perhaps you can recall the excellent scientific disputes we had on near field aerodynamics or swirling flows, pollutants mechanisms or mathematical modeling. At that time, our friendship was born.

— **Roman Weber, Managing Director, Clausthal University of Technology, Germany**

Janos reached over and put his hand on my hand and said, “Barbara, we have created something great here.” That was an incredible moment for me that I will never forget.

— **Barbara Sakkestad, President, Clearwater Clean Energy Conference**