

Dr. David M. Maurice: Fond Memories of my Teacher and Best Friend

By Saiichi Mishima

The death of Dr. David Maurice was a great sorrow to everyone working in the field of eye research. He was one of the great scientists of our time and one of the best teachers in our field. It is sad to realize that we can no longer talk to him and benefit from his inspiring ideas. On this website we can see all of David Maurice's publications and perhaps readers will associate each paper with a fond memory. Everyone recognizes that Dr. Maurice created new fields of the eye research with innovative ideas that he alone conceptualized. What can not be found in the list of his publications is the warmth of his personality, his cordial way of teaching, and above all his way of making friends and enjoying life. I was one of his early students and shared with him many fond memories over the past 45 years. Of course, I learned many scientific techniques, ways of thinking and how to write papers, etc., but more importantly, I learned from him how to make friends and how to teach young people. In this essay, I am happy if I can convey these personal aspects of David Maurice.

I started my training in Ophthalmology in 1950, when I was interested in optical instruments, such as the slit-lamp microscope and the fundus camera. From 1955 to 1958, I was working on the reflection of polarized light from the eye. At that time I came across Dr. Maurice's famous paper – “The structure and transparency of the cornea. J.

Physiol., (1957) 136:263-286” and I was very greatly impressed and excited to read the writings of such a genius. My Professor, Otsuka Jin, advised me to apply to the British Council for support. Fortunately, I succeeded and indicated that I would like to join Dr. Maurice as a student. In the summer 1959, before I departed for London, I received a letter from David. He said that he was looking forward to my arrival and wanted to work on fluorophotometry. I thought, therefore, that I needed to understand the papers of Hans Goldmann and of Friedenwald and Becker on aqueous



Figure 1: Institute of Ophthalmology on Judd Street, 1960

humor dynamics. I made a copy of these papers and put them in my baggage. My voyage to London was first by the French ship Cambodge, from Yokohama to Hong Kong, and then on the British ship, Corfu, to London. A one-month voyage meant one-month of vacation, doing nothing but playing and enjoying myself. My copies of the two papers were never taken out of my baggage. When I arrived in London, we were taken to the accommodation available to British Council students. There, to my surprise, I found David. He carried my baggage on his shoulder up the stairway to the third floor. I was surprised at his strength and, especially, his kindness on greeting me on my arrival. I came with 15 other Japanese students on this voyage, but David was the only teacher there to meet us. He told me that the Institute of Ophthalmology was having a farewell party for Maurice Langham, who was about to leave to join the Wilmer Eye Institute at the Johns Hopkins University.

I was taken to the bar in the Institute basement, where David introduced me to everybody, and where everybody was drinking beer. I was soon drunk on a single glass of beer and I remember only that there were many people in the room – but not much more. Thus my first day in London had started.

1. One year in London

After one week of orientation lectures at the British Council, I started to live in Belsize Park and to work on the fourth floor of the Institute of Ophthalmology (Figure 1). I occupied Maurice Langham's room next to David's. I was surprised to learn that we could not start animal experiments without a Home Office license. It would take at least two months to get this, and we did not wish to waste time. The fluorophotometer was still under construction in the workshops on the basement floor. The only thing we could do was to use our own eyes for our experiments. So, we started to observe each others' eyes with the slit-lamp microscope. The target was the tear film. David asked why the tears never flow down while we are upright; in other words, how is a vertical tear film maintained? Also, is there a flow of water in the tear film? These were fresh ideas for me, since I had never considered such questions before. We observed small particles in the tears or small fluorescein stains in the tear film for a long time. We saw many particles flowing in the tear meniscus along the margin of the eyelid, but we saw no movement in the film. Then he asked how thick the tear film was, and how we could measure it? I remembered how physiologists were making microelectrodes to insert into cells and pulled many glass rods on the burner to make fine glass filaments. We selected glass filaments with a diameter of 3 to 10 micrometers and immersed the filaments into the tear film. The tear film thickness was indicated by the diameter of the glass filaments that barely disappeared in the film. During the course of these preliminary experiments, David was asking questions like a machine gun. This was my first exposure to his genius and it was a wonderful education for me.



Figure 2: Maurice- Giardini Pachometer

Finally, I received a license to perform animal experiments. It was the duty of all workers to keep a record of all experiment, such as individual timing of experiments, methods of anesthesia, types of experiments and experimental details, etc... This was again a surprise for me, and it gave me the basic concept of handling experimental animals.

The first experiment was to measure corneal thickness, using the Maurice-Giardini pachometer (Figure 2). This was a simple instrument, in which the thickness of a plastic block is selected to match the optical path of the corneal thickness, so that the slits through the blue filter and the plastic block are focused on the anterior and posterior corneal surfaces at the same time. In addition, the vertical line, i.e., the normal to the cornea is always assured at the time of each measurement. With the use of this instrument, we wrote two papers (to be precise, David wrote them) on evaporation of water from the tear film. During the course of writing this paper, I did not understand some parts of

David's English and I remarked that his English was strange. This story spread around the Institute and caused Norman Ashton great amusement. Gradually, however, I began to understand English expressions that at first appeared too difficult for a young man just arriving from Japan.

Outside the Institute, life was relaxed and peaceful. Figure 3 is a picture taken one afternoon in the summer of 1960 at the home of the Maurice family in Holly Village. Professor Fred Crescitelli of Los Angeles was visiting at the time. Julia Maurice is seen as a baby in the cradle. This is one example of my peaceful life in London. The Maurices liked parties and I was invited almost every weekend to join them. Often, friends at the party would then invite me to join them for another get together. This chain of invitations was a part of life in London. I was always the only Japanese person present and everybody asked me questions. In other words, weekend parties were bombardments with the English language. It was a kind of torture in the



Figure 3: Professor F. Crescitelli of Los Angeles with Maurices at the Holy Village London, July, 1960

beginning, but after about a half year, I started to understand what everyone was saying. I am very grateful for those tortures, since my linguistic ability was built-up during this period.

David knew that I wished to travel in Europe. He became interested in a paper by Giardini, but when he tried to reproduce his experiments, it did not work well. He wrote a letter to the British Council indicating that Dr. Mishima needed to go to Como, Italy and do experiments together with Prof. Giardini, to solve an important problem. Giardini was the head of the Eye Department of Ospedale Santa Anna of Como. To my surprise, I received permission from the British Council to go to Como, and I made a two-week round-trip to Paris, Marseille, Genoa, Rome, Venice, Milano, and Como. The dinner on Lake Como was one of the most enjoyable experiences of my life. After that, I visited Franceschetti in Geneva and Goldmann in Bern and came back from Ostend to London. Without David's generosity, this trip to Europe, that left such an indelible memory, would have been impossible.



Figure 4: Excursion to Oxford with 3 Japanese Professors, From left, Fukui, Akagi and Kurachi. Celia in the middle with Prof. Akagi, August 1960

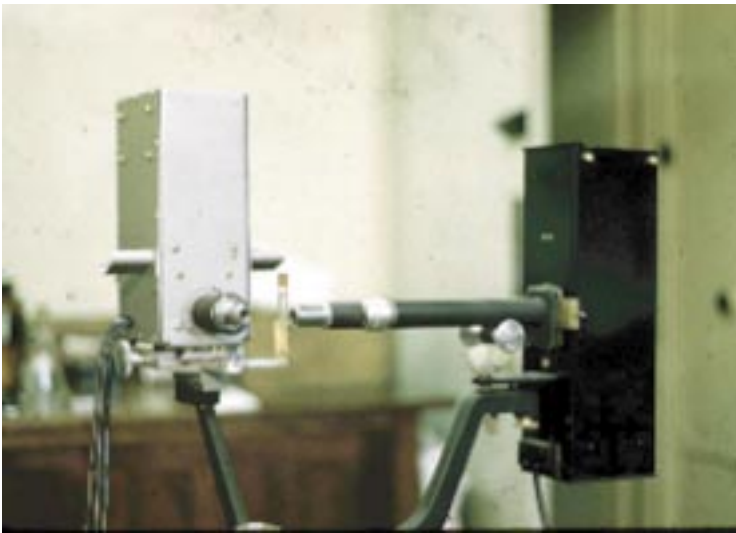


Figure 5: The fluorophotometer made at the Institute of Ophthalmology London.

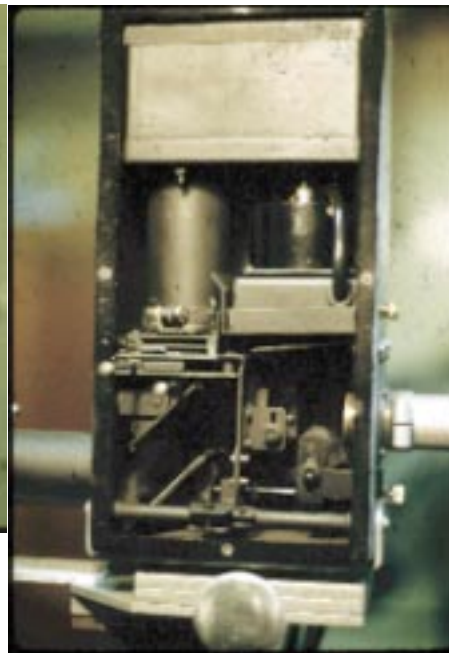


Figure 6: Inside of the Fluorophotometer.



Figure 7: Professor N. Ashton being examined by Dr. D. M. Maurice with the new fluorophotometer.

David was a man of great kindness. In the summer of 1960, three Japanese Professors visited me. David invited all of us on a one-day trip to Oxford. Figure 4 illustrates a boat ride on that day. David had a guest that evening at home, and we had to come back to London in the evening. On the way home, the car stopped suddenly. We had run out of gasoline. David had to run to a gasoline station and

bought enough to drive to the station. We, and his daughter Celia, were waiting by the car because the only nearby shelter was a pub. We arrived home late, and I still do not know how much David had to apologize to his guest.

By late spring of 1960, the fluorophotometer was completed (Figures 5 and 6). The optical system seen in Figure 6 is complicated but it worked very well. The photomultiplier used in this instrument was the latest model, and the amplifier was constructed based on a new concept of that time: it was a great education to me. The instrument was new to the Institute and everybody was interested in the new machine. Figure 7 shows David examining Norman Ashton with the instrument. My time in London was already getting very short, and we had to work day and night with the instrument. Its main purpose was to establish a method to determine the permeability of the corneal endothelium to fluorescein. The mathematical theory to analyze the curve was the “2 compartment” model, which David showed me. It turned out that I did not have to read Goldmann or Friedenwald and Becker. This work was the foundation for later pharmacokinetics studies.

In 1960, George Smelser gave the first Symposium on the Structure of Eye in New York, and David was involved in the Symposium. He talked about me to the American scientists, and on his return to London, he said "I sold you to America". Thus, I was invited to join Claes Dohlman's cornea group in 1960.

2. One year in Boston

In September 1960, I went to Boston from London by jet. Carlotta, David and the family came to see me off at Heathrow airport. This was my first experience of flying. At the Boston airport, Arvid Anseth was waiting and I was taken to his home where I met the entire Swedish colony.

Dohlman's laboratory was on the third floor of the Retina Foundation, now known as the Schepens Eye Research Institute. It was a single, small building, but sometime later one-half of the building was torn down and we had to work in the building, as shown in Figure 8. Bengt Hedbys was measuring the imbibition pressure of the corneal stroma in the living rabbit. Dohlman and Hedbys measured the swelling pressure of the corneal of stroma. These projects were based on David's ideas and he was supervising Dohlman's Group. Bengt Hedbys and I immediately became close friends and enjoyed Boston nightlife and sukiyaki in the laboratory and best of all, the project progressed very well. David came to Boston and we visited George Smelser at the Marine Biological Laboratory in Woods Hole (Figure 9). My friend, Kikkawa Yoshizo, also a cornea man, visited us on his way to Baltimore and the cornea gangs were often drunk at the home of the boss, Claes



Figure 8: The Retina Foundation, 30 Staniford Street, in 1960

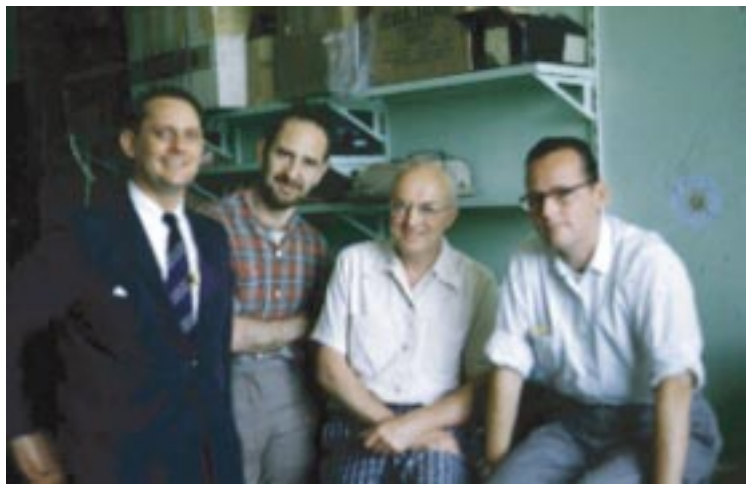


Figure 9: Visit to Dr. G. K. Smelser at Marine Biological Laboratory at Woods Hole, Massachusetts. from left, B. O. Hedbys, D.M. Maurice, G. K. Smelser, and C. Harding



Figure 10: Cornea gangs at Dohlman's in 1960. From left, D.M.Maurice, Sai Mishima, C.H. Dohlman, B.O. Hedbys and Y. Kikkawa

Dohlman (Figure 10). Everybody was young and happy.

Now I understood the whole picture of “David’s cornea”: the swelling pressure, the imbibition pressure, the permeability of the epithelium and endothelium. The numerical values for these corneal properties needed to be determined. Nobody at that time had a clear picture of the David’s cornea, and I extended my studies along the lines drawn by him. When we wrote a paper, we used to go to a pub - the “Harvard”, on Massachusetts Avenue. With beer on the table, he dictated the paper and Bengt and I wrote it down on any scrap of paper we could find. This unusual way of writing gave us a rich linguistic experience.

When I was about to leave Boston, David visited America and, together, we went to the home of David’s wife’s (Carlotta) parents in Los Angeles, where we joined his family. Then we drove through the desert to Moon Lake, Yosemite and then to San Francisco. This family trip was most enjoyable and left me with an unforgettable memory (Figures 11 and 12). I came back to Tokyo in August 1961.

3. Back to Boston and to New York

I returned home in 1961 and joined Tokyo Medical and Dental University. Then, in the spring of 1962, I moved to Tokyo University. That year, the 18th International Congress of Ophthalmology was held in New Delhi and many American visitors passed through Tokyo to the Congress and visited me. Maurice Langham came to my Department at Tokyo University and because my environment for research appeared unsatisfactory to him and he said, “You must leave here immediately”. This impression soon spread to the United States and I received many letters advising me to return there. A letter from Claes Dohlman was decisive and I decided to move to Boston with my family. We traveled through Hawaii, San Francisco and Disneyland and finally arrived in Boston. The Dohlmans accepted us very warmly and we stayed in their house for a while. Then we found an



Figure 11: Moon Lake on the way from Los Angeles to San Francisco, 1961



Figure 12: Yosemite, on the way from Los Angeles to San Francisco, 1961

apartment in Cambridge and finally moved to Arlington, next to Bengt Hedbys home. We were soon amalgamated into the Swedish colony and my family enjoyed their life in the U.S.A. The Retina Foundation was completely rebuilt and we had a very nice laboratory. Claes Dohlman, being an excellent teacher, attracted many American fellows: Peter Laibson, Jules Baum, Stuart Brown, and Miguel Refojo (Figure 13). This was the most pleasant group and we still have close friendship with each of them. The work with Bengt Hedbys continued along the line that David Maurice had laid down. After two years, Bengt Hedbys had to return home to Lund, Sweden to defend his Doctoral Thesis.



Figure 13: Cornea Group at Retina Foundation in 1964, from left Peter Laibson, Claes Dohlman, Sai Mishima, Miguel Refojo, Jules Baum and Stuart Brown.

My return to the United States was sudden, and therefore, I had only a study visit visa, which allowed us to stay for only three years; after that, we would have to leave. Columbia University in New York built a new research building, the so-called Black Building, and George Smelser occupied the 15th floor. Anthony Donn had started a Cornea Center there and needed people to work there. Both George Smelser and Anthony Donn approached me and offered help to change my visa status to that of an immigration visa, if I would move to Columbia and join the Navy project in which George Smelser was engaged. I had no other choice if I wanted to stay longer in the United States. I was sorry to leave Claes Dohlman, but we decided to move to New York in 1965. I had my own grant from the NIH and had the freedom to run whatever project I liked. With the first grant I received, I bought a small lathe and many chemicals to prepare a culture medium on the instructions of Everet Kinsey and Venkat Reddy. I constructed a plastic incubation chamber for the cornea and, with this, succeeded in maintaining corneal thickness for a long time *in vitro*. I reported this first to David and he was very happy and talked to everybody about this *in vitro* cornea. The method was later improved and simplified by David, and it became the standard technique for corneal research.

While I was in Boston, we became friendly with Irving Fatt. He was at that time Professor of Petroleum Engineering at the University of California Berkeley and was interested in movement of water in the cornea. He analyzed the work of the Boston group on swelling, imbibition pressure and water flow resistance in the corneal stroma and applied a complex mathematical treatment to these events. In addition, he carried out microelectrode, polarographic measurements of oxygen in the cornea. He finally moved to the Optometry School in Berkeley and became the Dean of the School. Thus, he had many students working on the cornea. The Cornea Center of Columbia University and the Berkeley group held a symposium in New York (Figure 14). David came to this symposium, and, following it, David, Irving and I went to Los Angeles and San Francisco together and had an enjoyable trip. The year was either 1966 or 1967. At that time David was probably looking for a

place to work in the United States and, in fact, he moved to Stanford in 1968 from London. When David was present, the Cornea Group was always very active and the atmosphere was bright.

In August 1967, Professor Mizukawa Takashi ran a Corneal Symposium in Kyoto. Mizukawa held a wonderful, small group meeting (Figure 15). Since all of the participants were close friends, the meeting was gay and affable. After the meeting, Jose Zadunaisky, David and I stayed in a Japanese inn in Kyoto; we felt happy to be in this group. Before dinner, we were to take baths. Jose went first, and when I went to bathe, I found that all of the hot water had spilled out and the bath-tab was completely empty.

4. Back to Japan again

On my way back from Kyoto to New York, I visited Tokyo University, and Professor Shikano urged me to come back to Tokyo. I could not make up my mind, since my family was enjoying American life

and I did not know what would be waiting for me in Tokyo. I discussed this with George Smelser and Gerard DeVoe for a long time, and finally decided to go back to Tokyo University in 1968. Three years later, Professor Shikano retired and I was appointed the chair and Professor of the Department. It was very fortunate for me, since I could run the department by following the principles I learned from Dr. DeVoe and Dr. Smelser in New York.

In 1970, I found a reason to invite David to Tokyo, since he had moved to Stanford and we were now closer. He came to a meeting in Tokushima, and stayed in Tokyo for several days. Hara Tsutomu worked with David in London and Hara wanted to invite him also. He has a big hospital in Utsunomiya, and David, Hara, and I went to Nikko, the foremost sightseeing beauty spot in eastern Japan. Hara took pictures of David and me (Figures 16-18). Then we went to Hakone and stayed at a beautiful Japanese inn. You can see David in a Kimono in Figure 19. He also stayed at our home



Figure 14: Cornea Symposium at the Cornea Center of the Columbia University, 1966?



Figure 15: Cornea Symposium in Kyoto, August 1967, held by Prof. T. Mizukawa



Figure 16: At Nikko, photo by Dr. Hara Tsutomu, 1970



Figure 17: at a Japanese inn , in Nikko



Figure 18: at Kegon Water Fall in Nikko, photo by Dr. Hara Tsutomu



Figure 19: at Hakone, Japanese inn.



Figure 20; Jerusalem Seminar on the Prevention of Blindness, August, 1971



Figure 21: A scene of the Seminar, Drs. D. M. Maurice and S. Brown



Figure 22: at the first Meeting of the Japanese Chapter of ISER, 1973, Osaka: Center: Prof. T. Mizukawa and Dr. Maurice is next to him.



Figure 23: The ISER Meeting in Capri, June 1974



Figure 24: the ISER Meeting in Capri, 1974

in Tokyo. Both David and I had no work to do and this trip was for pleasure only. It was wonderful.

Professor Michaelson of Jerusalem held a seminar on the Prevention of Blindness in 1971, to which I was invited. Elaine Berman told me that I could get a travel grant and this allowed me to attend the Meeting and enjoy a reunion with David (Figures 20-21).

Professor Mizukawa of Osaka University was very interested in eye research and wanted to establish a Japanese Chapter of the International Committee for Eye Research (ICER). The International Committee for Eye Research was founded in 1969, with the President, Antoinette Pirie, Vice-Presidents Nordman and Smelser, and Endre Balasz was Secretary General. Mizukawa invited the executive members of the ICER and many Japanese research workers engaged in eye research, to attend a large symposium, that included an opening ceremony for the Japanese Chapter (Figure 22). This was in October 1973. I was reunited with many old friends including David Maurice and Endre Balasz, and many others.

The first meeting of ICER was held in Capri in 1974, before the 22nd International Congress in Paris. Many Japanese research workers attended this meeting. Figures 23-24 shows participants enjoying a boat ride. Since this meeting was a great success, it was decided that the organization be named the International Society of Eye Research (ISER). This meeting, established by a gathering of scientists and close friends, will remain in their memories forever.

The Japanese Ophthalmological Society decided to invite the 23rd International Congress of Ophthalmology to Japan, and this invitation was approved at the International Congress in Paris 1974. I was elected Secretary General of the Congress and, therefore, went around in the world to invite as many people as possible to Kyoto. I would like to take this opportunity to thank all my friends, the Dohlman Group, the Columbia group, Herbert Kaufman and his group, the London group, Prof. Weigelin and the Bonn group, Prof. Pouliquen and the Paris group, and many others. Their help, guidance, and good wishes served as the basis of the success of the Kyoto Congress. The Congress began on May 14, 1978 with the Opening Ceremony in the presence of



Figure 25: at the 23rd International Congress in Kyoto, 1978, May 15 at Aoi Matsuri.

the Crown Prince and Princess of Japan (the present Emperor and Empress). The second day of the Congress was Aoi Matsuri, a traditional festival that dates back to the 12th Century, and the best seats in front of the Kyoto Royal Palace were reserved for the Congress participants. In Figure 25, David and I were talking to someone, before the beginning of the procession of the festival.

The year 1981 was very special for me: I received the Proctor Medal at ARVO and was invited to give the Jules Stein lecture in Los Angeles. I was also nominated to give the Edward Jackson Memorial lecture at the American Academy of Ophthalmology. It was indeed a great honor, and my teachers, David Maurice and Claes Dohlman were the first to send me congratulatory messages. My wife and I went to Los Angeles when I gave the Jules Stein lecture, and then Claes and Carin



Figure 26: In 1981, before ARVO Meeting at Professor and Mrs C.H.Dohlman.



Figure 27: At ARVO in Sarasota 1981



Figure 28: At the Stanford Campus in 1981



Figure 29: At the Laboratory of Stanford University, 1981



Figure 30: At the 25th ICO in Rome.



Figure 31: At the Chibret Award Dinner, 25th ICO, 1986, Rome. Prof. G. Scuderi is at the right of the picture.

Dohlman invited us, with David to their home (Figure 26). My wife and I made a grand tour from Los Angeles to Boston and then to Sarasota, New Orleans, and finally to Stanford. Before my Proctor lecture, David introduced me to the audience. My lecture was on the pharmacokinetics of drugs instilled into the eye. This was nothing but an extension for the work with fluorophotometry, which David taught me toward the end of my stay in London, in 1960. Figure 27 shows both of us relaxed after the lecture. Herb Kaufman is behind us.

On our way home, my wife and I visited Stanford and stayed with David and Carlotta: Irving Fatt joined us (Figure 28). David was asked by Marvin Sears to write a chapter on pharmacokinetics in his book and David asked me to co-author this chapter. We had time to discuss this chapter at his laboratory (Figure 29). I was very much surprised at his complete and extensive theory and his thorough exploration of the literature.

This year 1981 was a most productive year for me, and perhaps the last year of my productivity. I was elected Director of the Tokyo University Hospital in 1980 and I became completely absorbed in administrative work, for the first three years as Hospital Director and the next three years as Dean of the Medical School. Because of this, I had to leave the clinical practice of ophthalmology and, of course, eye research. The year 1986 was the year for the 25th International Congress in Rome, and my wife and I attended for pleasure. Due to the international political situation, very few Americans attended the Congress, but we were very happy to find David there (Figure 30). He studied, once upon a time, in Rome and the city held unforgettable memories for him. He must have enjoyed being in the city at that time. The Chibret Company gave an International Award for young research workers and held a big Award Dinner Party (Figure 31). Giuseppe Scuderi was the President of the Congress and he was at our table. David and Scuderi were close friends, since David's studies in Rome.



Figure 32: At the Symposium on Vitreous Fluorophotometry, in Kyoto 1984, from left David Maurice, Mike Marmor, standing from left, Shimizu Koichi, Miyake Kensaku and Tsukahara Isamu.



Figure 33: At the Symposium on Vitreous Fluorophotometry in Kyoto, 1984, from left: Miyake Kensaku, Mike Marmor, David Maurice, Ted Krupin and Honda Yoshihito.



Figure 34: At the Fisherman's Wharf of San Francisco, in 1989 .

In 1984, Tsukahara gave a Symposium in Kyoto on vitreous fluorophotometry and invited David, Michael Marmor and Ted Krupin to participate. On the Japanese side, Miyake Kensaku was on the panel. Everybody looks happy in Figures 32 and 33. I was completely absorbed in the administration of the University, and it was not possible for me to visit Kyoto.

I retired from Tokyo University 1987 and then had some time to go abroad. Claes Dohlman invited me to Boston in 1989 to give Dunphy Lecture to the Harvard Alumni. We were, of course, very happy and stopped in San Francisco on our way to Boston. The evening we spent at Fisherman's Wharf (Figure 34) left us with unforgettable memories. My wife and I stayed at the Dohlman's home in Boston and we enjoyed our visit.

In June 1996, I received a letter from Peter Gouras, informing me that David was to receive the von Sallmann Prize at the 12th ISER Congress in Yokohama. He asked me to introduce David. Obviously, I was very happy to do this and assembled various slides to introduce him. His Award lecture was on REM sleep and its role in aqueous humor circulation and nutrition of the eye. The evidence presented and his unique ideas were quite extraordinary for me to hear and were revolutionary. I believe that the entire audience felt the same. The dinner that evening was the happiest reunion of old friends that included David Maurice, Endre Balasz, Claes Dohlman, Carlos Belmonte, Jorge Fischbarg, Jin Kinoshita, Marvin Sears, Peter Gouras, Michael Riley, Michael Marmor, Araie Makoto, Tsukahara Yoko, and myself. This was indeed a most memorable evening and remains in the memory of everybody.

The Yokohama Party was the last time I saw David. Since then, I have had physical problems and I have stopped all overseas travel. David moved to New York and he, too, was unwell. Occasionally, we exchanged letters: he wrote sometimes, reminiscing about the good old days. I also wrote in a similar vein and felt that we were getting old. It is very sad that now we can no longer exchange words or letters, but we can remind ourselves of the good old happy days.

I thank Takayuki Nagasaki, David Maurice's postdoctoral associate, for giving me this opportunity to write a small essay about my teacher and best friend, David Maurice.