

## POISEUILLE GOLD MEDAL AWARD CEREMONY PRESENTATION ADDRESS

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Past President, The International Society of Biorheology

*Mr. Chairman, Members of our Society and of this Congress, Ladies and Gentlemen*

It is a great privilege and gives me pleasure as the last recipient of the Poiseuille Gold Medal Award to give you a brief account of the scientific activities and contributions of the person whom The International Society of Biorheology has chosen to honor at this our Congress at The Weizmann Institute of Science here in Rehovot, Israel.

Syoten Oka of Tokyo, Japan, was born in that city sixty-seven years ago. In 1930 he received his Bachelor of Science degree in physics at the University of Tokyo. In 1934 he was married to Noriko Teshima, a most charming lady, who, to our great regret, could not make the journey with him. In 1938 he received his Ph.D. in physics at Osaka University where he was an assistant professor and then until 1939 an associate professor. For the next twenty years, he belonged to the Kobayasi Institute of Physical Research, where, in 1946, he became its Chief Research Member. In 1959 he became Professor of Physics at Tokyo Metropolitan University, a position he kept until his retirement in 1971. He was then Professor of Physics at Keio University School of Medicine until 1973. Since that time, he has been Visiting Professor at Kyorin University School of Medicine in Tokyo, where he resides. Last year, he was chosen as Director of the National Cardiovascular Research Institute of Japan. He will assume this post after the completion of this institute, now being built in Osaka.

Professor Oka a member of many scientific societies in Japan and elsewhere. He has played and continues to play in Japan a leading role in the organizational and intellectual activities of the physical and medical sciences. From 1952 to 1967 he was Vice-President of the Society of Polymer Science, of which he is an Honorary Member. From 1958 to the present time, he has acted as Chief Editor of "The Reports on Progress in Polymer Physics in Japan".

Since 1962, when *Biorheology, an International Journal* first appeared, Syoten Oka has been one of its Editors. He has been also one of the Vice-Presidents of our Society since its beginning, first, from 1966 to 1969, when it was the International Society of Hemorheology and thereafter, when it became the International Society of Biorheology.

Syoten Oka's scientific attainments in our science of biorheology are known to anyone who is actively engaged in biorheological studies or otherwise interested in them. These studies in theoretical biorheology concern the flow of blood in small tubes and capillaries, the flow of a viscous fluid through a tapered tube, principles of rheometry, flow behavior of non-Newtonian fluids and other fields of hemorheology. He has made seventy contributions to our science,\* most of which represent original work. They first appeared in 1960 and then became more and more his main scientific interest.

However, we would not have a complete picture of the immensity of his scientific productivity, the diversity of his interests, and the depth of his insights, if we were uninformed about his prominence in many other areas of physics, in which he is considered a master. I must confess that I was quite unaware of the extent and scope in his productivity until I received recently on twelve printed pages a record of his publications, which amounted to nearly 300. Besides biorheology, his pioneering studies have concerned the following areas: electrolytes; physics of polar liquid and gases; physics of colloids; fluid mechanics; polymer physics; rheology; physics of dielectrics; biopolymers; biophysics; heat conduction; and powder and disperse systems. Among these publications, he was a contributor to more than 40 books, some of which deal with biorheology. This year, his book, entitled *Rheology—Biorheology* was published in Tokyo[1]. It is in Japanese, and I hope that this book of 492 pages will be published

\*A list of these publications is contained in this special issue of *Biorheology*.

soon in an English translation. His list of publications gives an inkling of the active life, the *vita activa*, of this unusual and great man in the sciences of our time.

From friends in Japan, I learned recently that the pioneering spirit and enthusiasm were always with Syoten Oka, and in 1933, when the Faculty of Science of the Osaka Imperial University (now the University of Osaka) was founded, he was already entering into unexplored scientific fields. In the early 1940s when Syoten Oka became interested in polymer physics, he published a paper on the mean square end-to-end distance of a macromolecule. In this communication he took account of hindered internal rotation of bonds, about five years before W. J. Taylor (U.S.A.), H. Kuhn (Germany) and H. Benoit (France) published papers on the same subject[2–7]. The formula for the mean end-to-end distance of a macromolecule with hindered internal rotation of bonds is now generally called in polymer physics the Oka equation.

Syoten Oka's interest in biology can also be traced to the early 1940s. Polymer physics led him to biophysics. After World War II, these two sciences developed particularly in Japan, a development of which Syoten Oka was one of the main architects. His great ability in mathematics enabled him to solve many intricate problems which are encountered in explaining phenomena of blood flow.

Our young science of biorheology is particularly fortunate in that it has attracted non-biologists of the highest caliber for the study of biological phenomena and processes which are so important to the well-being of mankind. Since biorheology deals also with a number of medical problems, biorheological studies are of growing significance in their application to the practice of medicine as aids to physicians and surgeons in the art of healing and in the maintenance of health.

In Syoten Oka, our science has been provided with a person whose theoretical contributions are of great consequence to these practical aspects of biorheology. It is hardly surprising that in a great country like Japan the Ministry of Health and Welfare would have selected Professor Oka to be the Director of the National Cardiovascular Research Institute of Japan. It is of interest that for this post not a physician but a physicist was chosen.

It would be tempting to give a summary of Syoten Oka's work in theoretical hemorheology. However, as we shall be fortunate to listen to his Poiseuille Award Lecture in a little while, I trust that he will refer to at least some of the contributions which he has made.

I should like to mention an episode, because it throws a light on this man who is so open and enthusiastic to new inquiries into scientific areas with which he was previously not acquainted. This goes back to my first meeting with him in Tokyo in 1960 after I had presented a General Lecture before the 8th International Congress of the International Society of Blood Transfusion, which was entitled "An Introduction to Hemorheology"[8]. Perhaps the title of this presentation intrigued Professor Oka and his friend Professor Bun-ichi Tamamushi, the great surface chemist and rheologist, to come to this lecture, together with some younger Japanese non-biological scientists. After giving the lecture, I met this extraordinary man, whom I had not known before. At that time, when I mentioned to him the work of Professor Noburo Kamiya on the rheology of protoplasm, he was not acquainted with his name or with his work. When, a few weeks later, I met with Professor Kamiya in his laboratory at Osaka University, I learned that he also had not known about Professor Oka. It was a great surprise when, about a year later, I heard in New York that Professors Oka and Kamiya were engaged in a mutual study on the rheology of protoplasm. It concerned the determination of the dynamic properties of protoplasm from the experimental data of the damped torsional oscillation of a protoplasmic fiber suspended from a fixed point.

Recently I wrote to Professor Eiichi Fukada of Japan and asked him to let me know something about Syoten Oka's interests outside of his pursuit of science. From a letter which I received in New York last week, a few days before my departure, I cite the following: "I think that he likes animals, since his character is so gentle and warm. He is loved by everyone who knows him. He likes to travel and carries a small camera. Everytime he comes back from conferences in foreign countries, he shows the slides to us. I am looking forward to seeing his slides which he will take in Israel".

Those among us, who, like me, have had the privilege and pleasure to meet Syoten Oka, either in his country, in a European country, such as Iceland, Germany, France, or in the United States, will have been charmed by his warmth, his natural modesty, and, above all, by his feeling of wonder about the world. As any research scientist deeply feels, it is this wonder which is the source for any scientific inquiry into nature. It is in this sense that I am presenting to Syoten Oka

the highest honor of our Society, the Poiseuille Gold Medal Award.

At this point, I think the Society would like to thank the firm Dr. Thiemann of Aachen, G.F.R., as the sponsor of the Society's award.

On the frontside of the Medal, designed by the late Icelandic artist Nina Tryggvadottir, are the portrait and the signature of the first biorheologist, after whom the award is named. Surrounding the portrait, it reads: Jean-Léonard-Marie Poiseuille, 1797-1869.

On the backside of the Medal the citation reads

TO SYOTEN OKA  
FOR HIS OUTSTANDING CONTRIBUTION  
TO THEORETICAL AND  
EXPERIMENTAL BIORHEOLOGY  
SECOND INTERNATIONAL CONGRESS  
OF BIORHEOLOGY  
THE WEIZMANN INSTITUTE OF SCIENCE, REHOVOT  
29 DECEMBER 1974 TO 7 JANUARY 1975  
THE INTERNATIONAL SOCIETY  
OF BIORHEOLOGY

In placing the Poiseuille Medal on you now, Syoten, I extend on behalf of each member of our Society and of everyone here, as well as of numerous scientists and of other people everywhere our best wishes for a good, productive, and long life. Our congratulations are combined with the universal greeting of peace with which one is greeted in Israel; *Shalom* !

REFERENCES

1. Oka, S. *Biorheology—Rheology*. Shokabo, Tokyo, 1974.
2. Oka, S. *Proc. Phys. Math. Soc. Japan* **24**, 657, 1942.
3. Taylor, W. J. *J. Chem. Phys.* **15**, 412, 1947; **16**, 257, 1948.
4. Kuhn, H. *J. Chem. Phys.* **15**, 843, 1947.
5. Benoit, H. *J. Chim. Phys.* **44**, 18, 1947.
6. Flory, P. J. *Statistical Mechanics of Chain Molecules*, p. 26, 1969.
7. Vol'kenshtein, M. V. *Molecules and Life—An Introduction to Molecular Biology*, Plenum, New York, 1970.
8. Copley, A. L. and Scott Blair, G. W. *Proc. 8th Int. Soc. Blood Transfusion*, Tokyo (1960), p. 6. Karger, Basel, 1962.