

## SIXTH INTERNATIONAL CONGRESS ON RHEOLOGY FIRST INTERNATIONAL CONGRESS OF BIORHEOLOGY

Palais des Congrès, Lyon, France, 4 September 1972

### JOINT INAUGURAL ADDRESS BIORHEOLOGY AS AN ORGANIZED SCIENCE

ALFRED L. COPLEY

New York Medical College, New York, N.Y. 10029, U.S.A.

It is my privilege and great pleasure as President of the International Society of Biorheology and President of the First International Congress of Biorheology to give you the greetings of the membership of our Society. We are happy and proud to be here in Lyon and have our first Congress convened jointly with the VI. International Congress on Rheology. We are grateful to the members of the International Committee on Rheology for having sponsored this joint venture. We are grateful as well to the members of the Organizing Committee of the VI. International Congress on Rheology and in particular we thank its President, Professor VALLET and its Secretary, Dr. SMADJA for everything they have done to make us welcome here in Lyon and for taking over the chores in the administration of our Congress in association with that of the Congress on Rheology.

With deep sorrow, we are missing here in Lyon two eminent scientists. We are mourning the deaths of Professor A. POLICARD and of Professor AHARON KATCHALSKY. Professor POLICARD, Membre de l'Institut et de l'Académie de Médecine, Paris, who was a cytologist and experimental pathologist, kindly consented to serve as Honorary President of the First International Congress of Biorheology, but, to our great regret, he passed away last Spring at the great age of 91. Professor AHARON KATCHALSKY, Director of the Polymer Department, The Weizmann Institute of Science, Rehovot, Israel, who was a biologist, biophysicist and chemical physicist, was senselessly killed on 30 May on his return to Israel from scientific meetings in Boston and Goettingen.

Tomorrow our Congress will honor the memory of AHARON KATCHALSKY. Two weeks prior to this great tragedy, which shocked the world of science, Aharon phoned me from Boston to tell me how much he was looking forward to participating in our Congress here at Lyon. Aharon hoped to present to us his new theory on membranes as applied to biorheology.

Biorheology, as an organized science, had its beginning at the I. International Congress on Rheology at Scheveningen, Holland, in 1948, when the term biorheology was introduced [1]. Biorheology comprises the study of the deformation and flow of all living matter and of materials of biological significance derived directly from living organisms.

There have been scientific conferences devoted to biorheology or to its, at present, most vigorous branch, hemorheology [2]. The latter denotes the flow properties of blood, its components and of the vessels in which blood is contained, i.e. the structures with which the flowing blood comes into contact.

In 1958, a meeting took place at Charing Cross Hospital Medical School of the University of London on "The Flow of Blood in Relation to the Vessel Wall" [3]. As a result of the great interest of the participants in this meeting, a conference, entitled "Flow Properties of Blood and Other Biological Systems", was held the following year at the Physiology Laboratory of Oxford University. This conference was convened jointly by the Faraday Society and the British Society of Rheology [4]. Its Proceedings were published by Pergamon Press, the English publishing house which, 3 years later, in 1962, began publication of "*Biorheology. An International Journal*". Needless to say that with the publication of this journal the science of biorheology became more known. The journal *Biorheology* continues to serve as a stimulus to research in different branches of biorheology, including hemorheology.

In 1963 the "Symposium on Biorheology" was held as part of the IV. International Congress on Rheology at Brown University, Providence, Rhode Island, U.S.A. [5]. At that time, it was proposed, at a round table discussion on hemorheology, by Professor Hartert to organize an International Society of Biorheology [6]. An International Society of Hemorheology came into being 3 years later, when the First International Conference of Hemorheology was held under the auspices of the University of Iceland at Reykjavik [7].

During the Conference at Reykjavik, the Poiseuille Gold Medal was awarded to its first recipient ROBIN FÅHRAEUS, Emeritus Professor of Pathology of the University of Uppsala, Sweden. This award honors both the recipient and the French physiologist JEAN-LÉONARD-MARIE POISEUILLE [8], who may be considered as the first biorheologist. Poiseuille, who lived and worked in Paris, died there in 1869. The second person so honored was the physicist GEORGE W. SCOTT BLAIR of Oxford, England, who received this award during the Second International Conference of Hemorheology, held at Heidelberg in 1969 under the auspices of the University of Heidelberg [9].

At this Heidelberg Conference, it was decided by the membership of the International Society of Hemorheology to widen the scope of the activities of our Society to include all branches of biorheology. Accordingly, the name of the Society was changed to the International Society of Biorheology.

The decision to widen the scope of our Society has already proved advantageous. Many investigators, both from the non-biological and biological sciences, continue to be attracted to work on biorheological problems. The broader aims of our Society promise to make others aware of the growing importance of biorheology both in the biological and physical sciences. Since the beginning of this year, the journal *Biorheology*, which enters its eleventh year, has become the official journal of our Society.

Three years ago, Professor AHARON KATCHALSKY, as President of the International Union of Pure and Applied Biophysics, at the III. International Biophysics Congress in Boston, initiated measures for the International Society of Biorheology to become an Affiliated Commission of the Union. As a result of this action the Society became affiliated with the International Union of Pure and Applied Biophysics and we were fully accepted by its General Assembly last month during the IV. International Biophysics Congress at Moscow, held from 7-14 August. On 8 August, a Symposium on Biorheology was held as part of this Congress [10] with many persons in attendance. I am glad to say that this Symposium was highly successful.

The main reason for holding jointly both our Congresses here at Lyon is to acquaint the non-biologists, participating in the VI. International Congress on Rheology, with biological problems. Biorheology offers a framework to connect the sciences of biorheology with rheology. This frame, which proved to be secure, permits the application of a number of

rheological treatments to biological systems. It is my hope that the biorheological findings, which will be presented here at Lyon, will provide stimuli to rheologists.

I am convinced that biorheology, in spite of its brief history as an organized science, is of growing importance in the biological and medical sciences. I believe that new knowledge gained in biorheology will be of significance to rheology as well as to the practice of medicine and surgery, and thus serve the well-being of our species.

We participants are particularly fortunate that our two Congresses have two great institutions as our hosts: l'Université Claude-Bernard et l'Institut National des Sciences Appliquées.

The University is proudly named after a son of France, the physiologist CLAUDE BERNARD. He was born in 1813 near Villefranche, not far from Lyon. CLAUDE BERNARD [11] introduced in 1878 the concept that animals have two milieus, "an external milieu in which the organism is located and an internal milieu in which the elements of its tissues live. The real existence of a living thing does not take place in the external milieu, the atmosphere for airbreathing creatures fresh or salt water for aquatic animals, but in the liquid internal milieu, formed by the circulating organic fluid which surrounds and bathes all the anatomical elements of the tissue." He considered a complex organism as "an assembly of simple forms which are the anatomical elements living in the internal milieu".

In 1865 his "Introduction to the Study of Experimental Medicine" was published [12]. Anyone who reads this book will be struck with admiration and astonishment about CLAUDE BERNARD's insight. Let me cite the following: "I believe, in a word, that the true scientific method confines the mind without suffocating it, leaves it as far as possible face to face with itself, and guides it, while respecting the creative originality and the spontaneity which are its most precious qualities. Science goes forward only through new ideas and through creative or original power of thought." CLAUDE BERNARD concludes this remarkable book with the following words: "I have had to limit myself by forewarning biological science and experimental medicine against exaggerating the importance of erudition and against invasion and domination by systems; because sciences submitting to these would lose their fertility and would abandon the independence and freedom of mind essential to the progress of humanity."

These thoughts of CLAUDE BERNARD are bound to guide workers in all sciences, including rheology and biology. With this guidance of CLAUDE BERNARD, it gives me great pleasure to open, as President, the First International Congress of Biorheology, held here in this great city of Lyon jointly with the VI. International Congress on Rheology. My best wishes go to the participants for the scientific success of both Congresses. Thank you.

#### REFERENCES

- [1] COPLEY, A. L. Proceedings of the International Congress on Rheology, Scheveningen, Holland, 1948, Vol. 1, p. 47. North-Holland, Amsterdam, and Interscience, New York, 1949.
- [2] COPLEY, A. L. *J. Colloid Sci.* **7**, 323, 1952.
- [3] SCOTT BLAIR, G. W. *Nature, Lond.* **182**, 90, 1958.
- [4] COPLEY, A. L. and STAINSBY, G. (Editors) *Flow Properties of Blood and Other Biological Systems*. Pergamon Press, Oxford and New York, 1960.
- [5] COPLEY, A. L. (Editor) *Symposium on Biorheology*, Proceedings of the 4th International Congress on Rheology, Providence, R.I., U.S.A., 1963, Part 4. Interscience, Wiley, New York, 1965.
- [6] FRASHER, W. G., JR. and WAYLAND, H. *Biorheology* **2**, 55, 1964.
- [7] COPLEY, A. L. (Editor) *Hemorheology*. Proceedings of the 1st International Conference, University of Iceland, Reykjavik, 1966. Pergamon Press, Oxford and New York, 1968.
- [8] JOLY, M. In: *Hemorheology*. Proceedings of the 1st International Conference, University of Iceland, Reykjavik, 1966, p. 29 (Edited by COPLEY, A. L.). Pergamon Press, Oxford and New York.

- [9] HARTERT, H. H. and COPLEY, A. L. (Editors) *Theoretical and Clinical Hemorheology*. Proceedings of the 2nd International Conference, International Society of Hemorheology, University of Heidelberg, 1969, Heidelberg, German Federal Republic. Springer, Berlin-Heidelberg, New York, 1971.
- [10] COPLEY, A. L. and VOROB'EV, V. I. *Symposium XI. Biorheology*, p. 90; Program IVth International Biophysics Congress, Moscow, U.S.S.R., 1972. Proceedings, Academy of Sciences of the U.S.S.R., Moscow, in press.
- [11] BERNARD, C. *Leçons sur les phénomènes de la vie communs aux animaux et aux végétaux*, p. 113. J-B. Baillière et Fils, Paris, 1878.
- [12] BERNARD, C. *An Introduction to the Study of Experimental Medicine*, p. 226. Translated by H. Copley Green. Dover Publications, T400, New York, 1957.