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Karl Weissenberg 1893–1976



Karl Weissenberg was born in Vienna, Austria, on June 11th, 1893, and attended many different schools in Austria, Germany and France before matriculating in Frankfurt/Main at the age of sixteen and a half years.

His subsequent studies were fostered at the Universities of Vienna, Berlin and Jena, taking Mathematics as his main subject, with Physics and Chemistry as subsidiaries, touching also upon Law and Medicine. His Doctor of Philosophy degree was conferred in 1916 in Jena. He became a Privat-Dozent and later, Professor of Physics in the University of Berlin.

He had a catholic interest in the sciences and held professorships and guest professorships in a variety of subjects during his long and fruitful scientific career: Physics at the Universities of Berlin and Southampton, Physical-Chemistry at the University of Paris, Civil Engineering and Engineering Mechanics at the Columbia University of New York and Human Anatomy at the Medical School in South Carolina.

In addition to his teaching activities he was at various times a scientific consultant to a number of large scale industries in Germany, Britain and the USA and also to diverse Ministries and Health organizations.

The publications of *Karl Weissenberg* range through Mathematics, Medical X-Rays, X-Ray Crystallography and Rheology in that order, and bear witness to his significant scientific research contributions.

In 1922 he joined the research team of M. Polyani at the "Kaiser-Wilhelm-Institut für Faserstoffchemie" in Berlin-Dahlem and there for a period of about six years contributed to the X-Ray crystallography work. His acknowledged fame in this field rests on a paper published in 1924 in

Volume 23 of "Zeitschrift für Physik" describing his new X-Ray Goniometer. This allowed for the first time, a unique determination of crystallographic structure in three dimensions in space.

By 1929 his attention was turning from crystallography towards the field of rheology and during the 1930's he became associated with another person also destined to become well-known in the field of rheology, namely, *W. Philippoff*.

In 1929 he submitted his first important contribution in rheology with *R. Eisenschitz* and *B. Rabino-witsch*, it appeared in Volume 9 of "Mitteilungen des deutschen Materialprüfungsamts", and presented a general analytical method for finding the shear rate at a capillary wall, now widely used.

When *Hitler* came to power in 1933, *Karl Weissenberg* became a refugee and took up residence in Britain and there turned his attention to elastic liquids, particularly as exemplified by flame-thrower fuels. This proved to be a most productive period and his experimental observations were published somewhat later, due to war-time conditions, in 1947 in Volume 159 of "Nature". This did much to stimulate curiosity and interest in the so-called anomalous liquids, and hence in the field of liquid rheology itself. Another important publication of that period was in the "Proceedings of the International Congress on Rheology" held in 1948 in Holland, in this *Karl Weissenberg* demonstrated by means of rubber and fabric sheets, the importance of rotation of the embedded co-ordinate system in a flowing continuum. He had much earlier conjectured that certain fluids were elastic and now came the inference of the existence of a tension along the streamlines, since amply demonstrated. The earliest quantitative assessment of elasticity came from the work of a post-graduate student at Imperial College of Science and Technology, London, namely, *R. J. Russell* who worked under the supervision of *Karl Weissenberg* and submitted his Doctoral Thesis in 1946.

At this time also, the essence of the Weissenberg Rheogoniometer was established. The principal behind this second major invention was that it allowed the stresses around the full solid angle in a flowing continuum to be experimentally determined. Like the Weissenberg Goniometer, this is now commercially produced and has come into widespread use throughout the world.

The similitude of anisotropy of stress and strain in an initially isotropic medium and biorheology represent the more recent work of *Karl Weissenberg*, the latter up to the time of his death.

The fundamental ideas, of which he is the source, are pervasive and implicit in most of the published work on elastic liquids, including the considerations of thermodynamics.

Amongst his most cherished associations was that of Scientific Member of the Kaiser Wilhelm Gesellschaft and to its Institute of Physics, a special honour which he shared only with *A. Einstein* and the celebrated physicist *M. von Laue*. He was a life member of the Royal Institution, London, and was awarded in 1946 the Duddell Medal and Prize of the Physical Society of London for his invention of the Weissenberg Goniometer.

In addition to a deep and sensitive appreciation of a range of natural phenomena, *Karl Weissenberg* was an entirely engaging and unselfish person. His accord with nature was faithfully mirrored in that with his fellow human beings. He was notable in his scientific achievements and noble in personal qualities.

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Dem Schwager des Verstorbenen, Herrn Dr.-Ing. Dr. phil. *Hans-Bernhard Seebom*, Mannheim, verdankt die Schriftleitung noch folgende persönliche Mitteilung:

Mein Freund Prof. Dr. *Karl Weissenberg* ist am frühen Morgen des 6. April 1976 in den Haag gestorben. Ich habe ihn noch Ende März im Krankenhaus besucht und fand ihn schon vom Tod gezeichnet. Seine Frau, meine Schwester, hatte vorher mehrere Monate im Krankenhaus gelegen. Während dieser Zeit haben die Sorge um seine Frau und die unvermeidbare Verminderung der Pflege seiner physischen Gesundheit die Kräfte des mehr als Achtzigjährigen überstiegen. Seine Frau wurde geheilt entlassen, er selbst aber mußte mit einer Lungenentzündung ins Krankenhaus aufgenommen werden. Diese wurde zwar ausgeheilt, aber die Kräfte meines Freundes waren am Ende. Er ist nach zwei Wochen friedlich eingeschlafen.