



FRANK PHILIP BOWDEN—1903–1968

FRANK PHILIP BOWDEN died in Cambridge, after a long illness, on 3 September 1968. At the time of his death he was Professor of Surface Physics at the University and Director of the Surface Physics Laboratory, a sub-department of the Cavendish.

Bowden was born and educated in Tasmania. He came to Cambridge in 1927 as a research student and apart from the War years spent the rest of his working life there. His early researches under Sir Eric Rideal were on electrolytic processes and catalysis but, partly under the influence of Sir William Bate-Hardy, he turned his attention to the more physical and mechanical aspects of surface interactions. He had always been a keen mountaineer and skier. He tells us in one of his notes how he was once snow-bound in the Alps and began to wonder why the friction of skis on snow and ice is, or rather *usually* is, so low. This led to a series of fundamental studies on the friction of snow and ice which still remain classics. The general view was that the low friction was due to the formation of a thin lubricating film of water between the sliding surfaces. Bowden's work (with T. P. Hughes) in which he dissolved a little electrolyte in the ice showed that this was indeed so. During sliding there was a marked drop in the electrical resistance of the surface layers of the ice as the molten film formed.

The older school held the opinion that pressure-melting was responsible. Simply by using sliders of different thermal conductivities Bowden showed that, in general, this could not be true. The main cause was the heating of the surface layers of the ice by the sliding process itself. This piece of research shows all the characteristics of Bowden's science at its best—the elegant, original and direct experimental approach, the unerring choice of the relevant experiment and the uncluttered nature of the conclusions.

Bowden always maintained that it was sensible and pleasurable to choose a research field that matched one's own outside interests. Certainly he continued to remain attached to the problems of ice and snow, both as a sport (he was an excellent skier) and as a subject of laboratory research. He studied the adhesion of ice and, in 1953, published a paper on the use of P.T.F.E. as a low-friction surface for application to skis. This attracted and continues to attract very wide interest amongst ski and toboggan enthusiasts.

During 1939 he was on a visit to Australia and Tasmania when the second World War broke out. He was persuaded to start up a laboratory in Melbourne to tackle lubrication and bearing problems relevant to the Australian war effort. After his return to England the laboratory acquired the name "Tribophysics Division" of the Commonwealth Scientific and Industrial Research Organisation and it continues to a large extent to maintain the traditions established by Bowden. Back in Cambridge Bowden established his research group in the Physical Chemistry Department but later transferred his affiliations to the Physics Department. Apart from his fundamental contributions to adhesion, friction and lubrication he also carried out original basic work on the initiation and detonation of explosives which won wide recognition. During the last ten years his interests spread to include the deformation of solids at high rates of strain, the properties of matter in the finely divided state, the properties of solids at extremely high temperatures, and the range of action of surface forces. Much of this work is described in the monographs he published with D. Tabor and A. D. Yoffe as well as in scores of papers published in the *Proceedings of the Royal Society* and in other journals.

Bowden was an experimental scientist of great originality. He was elected F.R.S. in 1948 and awarded the Rumford Medal in 1956. He achieved recognition in many fields and received many awards and medals both in Britain and abroad. He also had a marked flair for understanding industrial and technological problems and was in great demand as consultant and adviser. He was wise in his judgements of people and affairs, sincere in his concern for the well-being of his staff at all levels. At his College (Gonville and Caius) he was a witty and entertaining conversationalist and, in his later years, something of an elder statesman.

All who knew him, in one capacity or another, will miss his wisdom, his charm and his humanity.

DAVID TABOR