

## G.K. Batchelor (1920–2000)

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G.K. Batchelor at DAMPT, 1983

George Batchelor put his stamp on all aspects of fluid mechanics in the second half of the 20th Century. Born in Melbourne, he came with his wife Wilma to Cambridge UK in January 1945, a few months before the end of World War 2. His aim was to study turbulence under the guidance of Sir Geoffrey Taylor (G.I.) in the Cavendish Laboratory. G.I. was immersed in research of other subjects and gave Batchelor a free hand to do what he liked. In searching the literature George found the, now famous, Kolmogorov papers from 1941 and studied these thoroughly. Excited by these papers Batchelor set out to work on homogeneous turbulence. He wrote some very influential papers on this subject and already in 1953 he was able to publish a monograph entitled ‘The Theory of Homogeneous Turbulence’, even today a must for everybody wanting to do turbulence. It has been reprinted several times since, without changes in the text. Batchelor was also involved in the exchanges of opinion between the German scientists Heisenberg and Von Weiszäcker on one hand and G.I. on the other, when these Germans, being kept near Cambridge as sort of prisoners, derived in their seclusion much the same relations as Kolmogorov did in 1941. The veneration and love for G.I. stayed with George all his life and can be felt throughout the book ‘Life and Legacy of G.I. Taylor’ which Batchelor wrote later in life (1996). His enthusiasm for turbulence, and for G.I., brought many fellow Australians to Cambridge to

study turbulence and other subjects in fluid mechanics e.g. A.A. Townsend, J.S. Turner, O.M. Phillips. The ‘Cambridge School’ was formed.

Now that we have *Journal of Fluid Mechanics* (JFM), *Physics of Fluids*, *European Journal of Mechanics B/Fluids* and many other journals with ‘Fluids’ in the title, it is hard to believe that anno 1955 no such journal existed. Batchelor convinced the printing house Taylor & Francis and a number of his colleagues that there was a need for a journal completely devoted to fluid mechanics. In 1956 he founded the *Journal of Fluid Mechanics* and he remained Managing Editor until a few years before his death. By example he set unique standards of scientific integrity and quality. The meticulous way in which he dealt with every aspect of the editing of a scientific paper can be found in the extremely interesting paper ‘Preoccupations of a Journal Editor’ which he wrote in the 25th Anniversary Volume 106 of JFM. Apart from JFM he was Editor of a series ‘Cambridge

Monographs on Mechanics and Applied Mathematics’, in which many outstanding colleagues wrote about their subjects being persuaded by G.K.B., as he was often referred to, to do so.

The next major accomplishment by George Batchelor was the establishment of the Department of Applied Mathematics and Theoretical Physics in Cambridge. Soon it became one of the most important centres of fluid mechanics in the world. Many a fluid dynamicist who had attracted George’s attention through a lecture at a conference or otherwise was invited to give a lecture at DAMTP. They have fond recollections of their visit to George and his DAMTP. G.K.B. remained in Cambridge all his life. He was regarded by many that did not know him as very British, but liked to refer to himself as Australian. In spite of all this administrative activity, he was very prolific and one can find in JFM from the beginning many papers from his hand. After the turbulence period he wrote on various subjects in fluid mechanics before, at the end of the sixties, he turned to the motion of particles in fluids, a subject to which he made lasting contributions. He coined the word ‘Microhydrodynamics’ for the flow of suspensions of particles with size between 0.1 and 100 microns.

In 1959 ‘Fluid Mechanics’ by Landau & Lifshitz appeared in the West and G.K.B. wrote a review in JFM soon (J. Fluid Mech. 8 (1960) 315–318). It was clear that he liked the book extremely well. I quote at some length from this review because it gives a good idea of his style of writing:

“This is a refreshing change from the usual style of book, and it is a tonic to see the subject laid out in beautifully pure form and shorn of all the useful excrescences which, essential though they may be for practical ends, do conceal the fundamentals. By and large, the authors seem to have succeeded in their attempt to provide lucid analysis and physical understanding over the whole range of fluid mechanics, perhaps with different degrees of success in different parts of the subject, but with success none the less. Perhaps it reflects on the professionals of the subject that two ‘outsiders’ should have performed this service to us. Or are professionals handicapped by their knowledge of the vast *details* of the subject? At all events, putting professional pride aside, it seems to me that this book by Landau & Lifshitz ranks in importance as a comprehensive survey with Prandtl’s work ‘The Essentials of Fluid Mechanics’ which is high praise.”

Many years he had missed, while teaching courses for Cambridge students in applied mathematics, an appropriate textbook to use. The book by Landau & Lifshitz is meant for physics students and it is possible that the appearance of it made him carry out his plan to write a book for mathematics students himself. In 1967 ‘An Introduction to Fluid Dynamics’ appeared from his hand. This is a classic now only to be compared with ‘Lamb’ and – ‘Landau & Lifshitz’!

As Head of DAMTP, from its establishment in 1959 until 1986, he was extremely successful in attracting outstanding colleagues to Cambridge. Walking through the corridors (the walls often covered with weird coloured paint, acquired by the always thrifty G.K.B. at a low price) of the building in Silver Street one watched in awe famous names on many office doors. Next to his substantial duties as Head of DAMTP and the Editorship of JFM, G.K.B. was active on the international scene, in particular in the International Union of Theoretical and Applied Mechanics (IUTAM). He was for a while member and Treasurer of the Executive Congress Committee, which organizes the quadrennial congresses in all parts of mechanics. He had a clear opinion on all sort of issues and did not hesitate to express these in fierce terms. Since in all issues in which he became involved he felt very strongly how it should be done, he showed little tendency for compromise. Within IUTAM he was always suspicious of solid mechanics. Once he was asked in IUTAM to organize a mini-symposium on mechanics of heterogeneous media. This is a subject which has many aspects of a similar nature in fluids and in solids. George refused to do this unless he could do it for fluids only. At one point in time he even advocated a separation of fluid mechanics from the international body. All ended in peace. In 1988 in Grenoble he organized a mini-symposium on multi-phase flow. IUTAM made him ‘Elected Member’ of the General Assembly.

In the late sixties he directed his organizational talents to EUROMECH. Together with Dietrich Küchemann he started the EUROMECH Colloquia, which became very successful over the years. To select these and to supervise them the EUROMECH Committee was formed of which G.K.B. was Chairman until 1987. Here he could organize things just as he wanted it. He put the rules for the Colloquia and the Guidelines for Chairmen of these on paper in the usual detailed and precise way. Essential was for him that on these occasions the climate for free exchange of opinions should be optimal. No more than 45 participants, ideally seated around a big round table. The EUROMECH Committee had no money, nor Bylaws, but was very successful thanks to George. It met once a year during two full days. One item on the agenda was the discussion and selection of proposals for new colloquia. Under the chairmanship of G.K.B. this was done with such precision and attention for detail that it took more than a full day to go through all of the, usually around 25, proposals. As a member and later as IUTAM observer I participated in these meetings of the EUROMECH Committee for many years and I will always keep precious memories of them.

His scientific excellence and his skills as a leader of men found recognition all around the world. G.K.B. was elected Fellow of the Royal Society in 1957, he received the Royal Medal of the Royal Society in 1988. He was elected Foreign Member of many Academies.

One of these is the Polish Academy. He had a special relationship with Poland and Polish scientists. He was, for example, a faithful participant in the biannual ‘Symposia of Advanced Problems and Methods in Fluid Mechanics’ organized by his longstanding friend and colleague Wladek Fiszdon. These were one of the very few occasions during the Cold War time in which scientists from the West and from the East could meet. Of course, the accommodation and food were in that time not of the quality that most participants from the West were used to. When one of these felt so uncomfortable with this that he decided to leave the symposium, George was very angry with him. “If the people here live continuously in these circumstances, can’t you do this for a week?” he asked.

It is unbelievable how a man could perform all these duties and services and do scientific work at the same time. When asked once how he succeeded in doing all this, George gave the much quoted reply: “work, work, and more work”. But he liked to work and when writing in connection with G.I. Taylor “He would have known what Noel Coward meant when he said ‘Work is more fun than fun’”, he might have thought of himself as well. Thereby he exerted an enormous discipline on his use of time. Chatting away the time before our flights in an airport, after a EUROMECH Committee meeting, I mentioned an interesting paper to him. He said that he had a lot of letters to write before he could permit himself to do any reading. I admired this attitude very much, knowing that whatever the work at hand is, I can not resist laying it aside when an interesting paper catches my attention.

With the decease of George Batchelor, the world of fluid mechanics has lost a colleague of the greatest distinction, a rare organizer of men, and a true friend. What he did for the research and the education in our subject can not be overestimated and will always be remembered with love and respect.

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