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RONALD S. RIVLIN
(b. 1915, d. October, 2005)

During the period 1945–51, Ronald Rivlin developed the basic mathematical theory of large elastic deformations, which became the foundation of the mechanics of rubber elasticity. Later, with A. G. Thomas, he generalized Griffith's fracture mechanics of solids to include non-linear materials, and demonstrated its success. Other work included theories of fluid mechanics and the elastic behavior of anisotropic materials. He also mentored a generation of students in mathematical and physical science, many of whom became professors in their turn. His extraordinary contributions to mathematical physics and materials science have been recognized by numerous tributes, medals, awards, honorary degrees, etc. But I would like to give a few personal memories of Rivlin, from the perspective of a young scientist placed under his supervision at the start of a research career.

From about 1946 to 1954, Rivlin led a small physics research group, part of the British Rubber Producers' Research Association, located in Welwyn Garden City, England. A number of young physicists were recruited to join the group, including J. E. Atkins, D. W. Saunders, A. G. Thomas and myself. We had little or no experience of research. Rivlin therefore became our surrogate employer, supervisor and mentor. He was an imposing figure to a new employee, strange and pre-occupied. I could not fathom how he himself worked, or even why he was employed at all – his studies seemed rather irrelevant to the rubber industry and his attitude to work was somewhat cavalier. He would come into the

laboratory, make a few comments on the experiments in hand, and then turn to more interesting subjects – the falling value of the pound, politics, the latest injustice he had suffered, inadequacies of architects (particularly the one designing his house), and so on. I used to wonder: When are we going to do some work? And how does he produce the manuscripts that were appearing at regular intervals? Perhaps he wrote them at night – he always looked short of sleep. Indeed, although brimming with mental energy he never showed any interest in physical exercise, smoked continuously, disregarded safety warnings and was alarmed by unexpected events. He appeared to be headed for a rather short career. (This conclusion was not the only one that proved to be false.)

I recall sitting in his office as he wrote an account of our experiments. He wrote steadily, using a stubby pencil, pausing only to ask for numerical results and other details. He then put my name as co-author (in fact, lead author, following the custom of using alphabetical order). I protested that my contribution was small – the concept, strategy and exposition were entirely his. He dismissed my comment, saying: "Swings and roundabouts!" (I.e., don't expect to balance every account). It was a typically generous gesture. Although he was hardly a father figure, being only about 35 years old, and not required to be a teacher, he treated his young assistants as a real professor would have done, in fact as the best professors do, as colleagues and friends. He was invariably generous, good-tempered and helpful. It is strange now, and sad, to think that his own research assistants were not sufficiently mature to recognize the greatness of his achievement. We saw him as a somewhat odd character, not following accepted paths. Only the passage of time would teach us that that is precisely what research is.

But no one could fail to recognize that Rivlin was remarkably intelligent and witty. He was also extremely literate – for example, his papers have a classic style. Written in excellent English, they are crystal-clear and error-free. Unfortunately he was often faced with less accurate or imperfect work, which he would demolish with ease, often with a clever remark. Although entertaining to spectators, this skill did not increase the number of his professional friends. Recipients were embarrassed by being corrected, and even more by a witticism.

I should add that Rivlin himself was often depressed and morose. He complained at times that his work was not properly appreciated and that his career had been unsuccessful. But one must recall that he also received many honors and tributes. For example, when he was awarded the A.S.M.E. Timoshenko Medal, a number of former students and colleagues, most of them professors, held a special symposium and a banquet in his honor. I was curious to see how Ronald would accept the obvious evidence that he was extremely popular and highly regarded. After some complimentary remarks that were greeted with prolonged applause, he rose and said: "This is most embarrassing. I have become so famous now that when someone asks me: 'What's your name?', I have to reply: 'Modesty forbids!' "

His spontaneous wit was also shown when students at Lehigh University discovered that he was exceptionally well paid. They confronted him: "How do you justify your high salary?" He smiled and said: "Someone must think I am worth it!"

In 1971 I invited him to give a lecture in honor of Melvyn Mooney, a pioneer in rubber physics, on the occasion of Mooney's installation in the International Rubber Science Hall of Fame, at Akron. He misunderstood the request, thinking that he himself would be installed. I hastily explained that his contributions to rubber science would make him an excellent choice, but there was an unfortunate additional condition – the candidate must be deceased. After a long pause, he said: "That's too great a price to pay."

I hope these reminiscences convey the right message. Ronald Rivlin had a profound and lasting effect on many of us, teaching us what research is, why it is worthwhile, and what high standards of quality and integrity are called for. He was a giant figure in the world of mathematical physics and materials science. He was also a unique role model – we were extremely fortunate to come under his influence.

Now he has at last paid the price of admission to the Rubber Science Hall of Fame. And we are all poorer.

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