

## Edith Bülbring

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Edith was born on 27 December 1903 in Bonn as the youngest of four children of German-Dutch parents. Her father, Karl Daniel Bülbring, was Professor of English Language at the University of Groningen from 1893 to 1900 and then at the University of Bonn. Edith's mother was Hortense Leonore Kann, of a Dutch banking family living in The Hague.

Edith went to school at the Bonn Gymnasium, a rather old-fashioned type of German grammar school with high standards, from 1916 to 1922. Then she became a medical student, first in Bonn and subsequently in Munich and in Freiburg; she passed her qualifying examinations in Bonn in 1928.

By this time Edith had also become a remarkably good pianist. She had to make the choice between a musical career as a pianist and a scientific one in biomedical research. Her decision for the latter was probably mainly because of the influence of one of her teachers in Freiburg, the pharmacologist Professor Paul Trendelenburg who, just about then, accepted an invitation by the University of Berlin to its Professorship of Pharmacology. He suggested that Edith join him there in postgraduate research. This determined her choice of career in medical research. That her interest was not only in laboratory work is shown by her remaining active clinically for several years in pediatrics at the University of Jena and at the famous Virchow Hospital of the University of Berlin. When the political situation in Germany began to deteriorate in 1933 Edith decided to leave her native country and to go abroad. She came to England where she joined Professor J. H. Burn, who was at that time in charge of the Pharmacological Laboratories of the Pharmaceutical Society of Great Britain, at the University of London. There Edith began to work full-time in teaching and research.

In 1938 Professor Burn was elected Professor of Pharmacology at the University of Oxford. Edith, as a highly valued coworker and close friend of his, moved with Professor Burn to Oxford where, with brief interruptions, she has stayed for her remaining career and where she happily continues her extraordinarily valuable life, still devoted to her professional interests as well as to her many personal friendships.

The foregoing is an outline of Edith's biographical facts with places and dates. Dates alone mean little except in relation to memories and reflections about all the prodigious events that happened during Edith's life time and which affected her as much as her contemporaries with similar background and similar luck. Because of the Nazis, Edith changed countries and Germany's loss became England's gain.

Edith has fitted marvellously into English life because she shares its best distinguishing characteristics – the undogmatic, unpompous, unenvious, tolerant and generous way of going about one's professional and personal affairs. Like most people here, Edith has an abhorrence of

anything approaching a cult of personality; for that reason she would hate this to be eulogistic. So I shall try to let some of her qualities emerge from a few memories of the time when we worked, talked and played music together. As Edith is an extraordinarily many-sided, complex person, this will necessarily be very subjective and incomplete; for that I must ask for forgiveness and understanding from Edith herself and from her other friends and admirers. I hope that they will at least be stimulated to recall their own times with her, which will have been as important to them as mine were to me. It is, of course, quite impossible to hide my own admiring friendship.

By the time, in the mid-nineteen fifties, I had the opportunity to work with Edith she was a world-famous scientist with many original, important contributions to pharmacology to her credit. Amongst other things she had initiated modern knowledge of the physiology and pharmacology of smooth muscle which, in different preparations such as guinea pig ileum, was the tissue most used for analyzing drug effects. Edith had done this by elegant applications of electrophysiological techniques; and she had come to the point where she wanted to find out how the membrane-controlled contractile properties of smooth muscle are related to its energy metabolism. Just then I was the first person in Britain to use the firefly luminescence technique, recently introduced in America<sup>4</sup>, for quantifying ATP and indirectly also ADP; and I was just beginning to look into the fate of ATP in platelets during blood coagulation. (Then, as now, I was fascinated by the idea that all cellular energy-requiring processes make use of this one particular chemical energy-carrier.) So I joined Edith to find out about changes in ATP during smooth muscle activity.



Amongst a number of interesting new facts we established there was one which seemed important at the time, seems important still and is not yet explained: when isolated taenia coli is deprived of glucose or of oxygen the spontaneous tension and creatine phosphate concentration decrease together, ultimately by as much as 80%, while the ATP hardly decreases at all. As tension depends on the reaction of contractile proteins not with creatine phosphate but with ATP, the loss of tension in the presence of almost normal amounts of ATP is difficult to understand, unless, as we wrote at the time 'the hydrolysis of creatine phosphate alters the conditions inside a muscle in such a way that some part of the functional chain behaves abnormally'<sup>1</sup>. This discovery has recently become important in myocardium<sup>3</sup>.

It was characteristic of Edith to bring us together for the merging of different experimental skills, because her purpose was always to obtain answers to important biological questions; techniques were never more than means to that end. So because Edith wanted to elucidate the ionic basis of the membrane phenomena which she had demonstrated for smooth muscle we were also, to the best of my knowledge, the first to use radioactive isotopes, specifically potassium, to do that. It is gratifying to find a recent textbook still making use of one of our illustrations (fig. 5)<sup>2</sup>; it seems, therefore, that our results remain relevant.

I remember vividly Edith's showing me how to dissect out the guinea pig taenia coli and how to set it up for recording contractile and electrical activities. The bits of tissue were tiny and I remember the exquisite skill with which she handled them. All biologists – presumably all scientists – quickly recognize the range between slipshod and painstaking experimentation which, needless to say, makes all the difference to the trustworthiness of the results. It is said that Rutherford was at the exquisite end of this range in physics; and Edith was certainly at the exquisite end in biology. She was a seeker of experimental perfection but, just as important, she recognized that the seeking must be limited by inherent imperfections in the biological materials and experimental conditions so that her perfectionism was productive rather than, as with some others, sterilizing.

Edith asked important questions and devised or brought in techniques to answer them. As with all successful scientists, she went about research with the right mix of thought and intuition. She knew, as Einstein said, how to make everything as simple as possible, but not simpler. Very rarely did an experiment 'go down the drain', a tribute to Edith's technical abilities; and almost every experiment gave a wanted answer, a tribute to Edith's thoughtful planning.

So, the taenia coli would be set up, surrounded by the busy bubbling of 95% O<sub>2</sub> + 5% CO<sub>2</sub>. After a while the preparation relaxed and, between adding things to the bath, so did we. Then we would talk about everything imaginable. Maurois wrote of Disraeli that he was interested in hundreds of things, religion and finance among them. Edith too is interested in hundreds of things, science and music among them although, of course, both dominant interests.

Edith provided an abundance not only of her scientific skills but also, equally essential, stimulation and enthusi-

asm. To be most effective these qualities must go together because stimulation comes from throwing forth ideas, and enthusiasm through generosity in making them available. That was and is Edith's way; but I am putting it far too pedantically. In my mind's eye there is Edith leaning over the bannister upstairs in the old pharmacology building and literally showering oven-fresh results, interpretations, contradictions and all else onto the people down below who gave as good as they got. I thought then and I think now, what a wonderful way to work! No mental hoarding: in Burn's Department everything was out in the open and discussed at the top of one's voice. That happens, of course, when, as Brahms wrote, one has so many ideas that one is in danger of stepping on them. Edith, who must have done much to bring this environment about in the first place, certainly flourished in it and so did her coworkers, to many of whom it must have been an eye-opener.

Another attribute of Edith's is perseverance. Her steadiness of purpose was essential for the remarkably complete elucidation of the electrophysiological properties of smooth muscles that emerged from her laboratory, a task that required many years. I am reminded of her capacity for perseverance also by occasions when the short half-life of radioactive potassium required us to work late into the night and sometimes all night through. That happened one evening when my planchettes, small dishes on which gamma radioactivity was counted in those days, were blown away by a gust of wind as I carried them across the road to the Biochemistry Department where the counter was: after a few cross words we began the experiment again, as I remember it, there and then.

These memory snapshots may suffice to convey the sense of quality Edith displayed in her work; and everything else she did, and does, also displays this sense of quality. Thus, Edith taught me how to write in the lucid tradition of the best British biologists whose papers can be read for stylistic pleasures alone. To approach that quality meant rewriting ten times or more; and she showed me what enjoyment there is in improving and improving.

Thus again, Edith is naturally musical; but the excellence of her piano playing was, of course, acquired by long and diligent practice. Playing sonatas with her after long hours in the laboratory continued the empathy and contentment by other means.

Edith is an excellent cook: I am a gratified witness to her striving after the highest culinary quality. After each meal she teased me by saying: 'Well, at least this experiment has come off again.'

Her sense of quality comes out in these and all other aspects of her life; and this striving after excellence has set ineradicable standards for those of us who have had the privilege of working and being with her. Nothing better could have happened to us.

1 Born, G.V.R., *J. Physiol., Lond.* 131 (1956) 704.

2 Born, G.V.R., and Bülbirg, E., *J. Physiol., Lond.* 131 (1956) 690.

3 Cobbe, S.M., and Poole-Wilson, P.A., *J. gen. molec. cell. Cardiol.* 12 (1980) 761.

4 Strehler, B.L., and Totter, J.R., in: *Methods of Biochemical Analysis*, vol. 1, p. 341. Interscience, London 1954.