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BY CHARLES H. WILLIAMS JR AND DAVID P. BALLOU

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Vincent Massey—Vince to all who knew him—lived life very fully. Carol Strickland, the wife
of a former graduate student of Vince’s, captured his vitality for many of us. ‘The stop-flow
might have been Vince’s favorite research tool, but in life, he was all flow without stop. I can
still see Vince—his eyes twinkling—practically chomping the stem of his pipe in two as he
guffawed at something that struck him as funny. What a bon vivant he was! Whatever he did,
he did full-bore, “sucking all the marrow out of life”, as Thoreau put it.’

Vincent Massey gained international distinction in physical biochemistry. His pioneering
efforts to relate flavin chemistry to flavin enzymology resulted in a new understanding of
flavin charge-transfer complexes, free radicals in flavoproteins, oxygen reactivity of flavins,
the interactions of the flavin ring structure with proteins, and the classification of flavoen-
zymes. His discovery that Straub diaphorase is in fact lipoamide dehydrogenase and that it
functions in the pyruvate and 2-oxoglutarate dehydrogenase complexes was a milestone in
understanding metabolism. His development of totally innovative methodology for the deter-
mination of intermediates in enzyme catalysis through transient kinetics made flavoproteins
one of the best understood enzyme families. This allowed him to define the mechanism by
which the drug allopurinol inhibited xanthine oxidase; this was one of the first instances in
which the effects of a drug on an enzyme were understood chemically. Vince had a great
human impact on science by inspiring and training others and by his determination to main-
tain the integrity of the scientific method as well as to foster basic research.

Vince had many passions and we shall enjoy recalling them later, but his pre-eminent
passion was hard work, particularly on flavoproteins. One of Vince’s favorite stories was
about Sir Hans Krebs FRS (figure 1), who had built an excellent department at the University
of Sheffield just before Vince moved there. Some time after Krebs’s move to the chair at
Oxford, he returned to give a seminar in Sheffield. After the seminar, a student asked Sir Hans
what he owed the secret of his success to. He commented that ‘it was luck’, Vince recalled,
but when the applause at his modesty ended, he became serious and said, 'I had a certain amount of luck in my life, but I made a correlation—the harder I worked, the luckier I got'. Surely this story appealed so much to Vince because it confirmed his own predilections.

A remembrance of Vincent Massey has appeared in *Flavins and flavoproteins* 2002 (Chapman et al. 2002) and an obituary can be found in *Trends in Biochemical Sciences* (Ballou et al. 2002). Much of the material in the section on scientific achievements has been taken (with permission) from Ballou et al. (2002) and some of the personal tributes are from the remembrance.

**FAMILY BACKGROUND AND EARLY LIFE**

Vincent Massey was born on 28 November 1926 in the countryside outside the tiny village of Berkeley, near the coast of New South Wales south of Sydney, the third and youngest child of Mary Ann and Walter Massey. There were about 150 people living in the village, most of them
relatives. Vince’s father was a fisherman, as were his uncles. They lived near a freshwater lake full of fish, which they caught and sold. They also fished in the sea along the seashore. Vince helped out on quite a few fishing endeavours and found them exciting, but when asked if he ever considered becoming a fisherman, he answered, ‘Not on your life!’

Vince’s epiphany came during his teenage years. His world changed dramatically when he started high school. He had attended primary school in a one-room, one-class school in his village, having one teacher and 20 students of different ages. High school was in the town of Wollongong, about 10 miles away. Perhaps the effort of getting to the high school enhanced its value, for he had to cycle five miles to the train station, catch a train to town, and then walk to the school. The whole trip took about two hours each way. The high school, with about 2000 students from all walks of life, was where the world of ideas opened up to him. He had classes in chemistry, physics and mathematics. He read voraciously and was tremendously excited by learning and discovery. It was at that point that he realized he did not want to fish and that he would be heading in a direction away from the sea. It was also at that time that he read a biography of Louis Pasteur, which stimulated his interest in becoming a scientist.

He was fascinated by chemistry and laboratory experiments. He set up his first laboratory in his bedroom, but the sulphuric acid he used to dissolve other chemicals also dissolved the carpet and his trousers, so he had to find another site. His father had bought a large building for processing the fish and prawns he caught and sold, and he helped Vince to build a laboratory in part of this ‘depot’, as it was called. Vince spent his pocket money on setting up a workbench and apparatus, and his parents chipped in. He earned money for his experiments by collecting the mushrooms that grew in abundance in the surrounding countryside after a heavy rain, packing them in boxes and shipping them off to market.

Vince was the first person in his family to go to university. His family thought he was a bit strange but they were proud that ‘Vin was brainy’, that he had special talents that were out of the ordinary; and they helped him. Despite being poor, they penny-pinched to pay for his board at the University of Sydney. Vince worked as a camp counsellor and at an industrial laboratory to earn money during the vacations, but studied full-time during term. He majored in biochemistry, which interested him the most because it involved studying the chemistry of life. As a discipline, biochemistry had existed since the turn of the century, but it grew dramatically in the 1950s and he was in at the beginning of that expansion. He found it exciting then and continued to find it exciting until the end of his life. He earned a BSc (honours) degree from the University of Sydney in 1947.

Vince’s first professional position was as a research biochemist at a government animal health laboratory in Sydney. His first five publications date from this short period (1947–50) in which he studied the inhibition of the tricarboxylic acid cycle by fluoroacetate in nematodes (1, 2)*. It was during this time that he met and married Margot Grünewald, a German-Jewish refugee who had come to live with her aunt and uncle in Sydney and whose cousin was a college classmate of Vince’s. His employers, the Commonwealth Scientific Research Organization, gave him a two-year fellowship to study for his doctorate in biochemistry at the University of Cambridge in England. This was at a time when higher degrees were not awarded by Australian universities. He and his bride set off for England in 1950, never to live in Australia again.

* Numbers in this form refer to the bibliography at the end of the text.
POSTGRADUATE CAREER

At Cambridge Vince was a member of Emmanuel College. It was only a short bicycle ride from college to the Biochemistry Department on Tennis Court Road, and only a slightly longer ride to the house he shared with Margot on Histon Road, just off the Chesterson Road. They were soon joined by their first child, Charlotte.

The following description by Vince of biochemistry at Cambridge in the 1950s is taken from the biographical memoir of Malcolm Dixon FRS (Perham 1988). It was also presented by Vince in his ‘after dinner’ speech at the 2002 International Symposium on Flavins and Flavoproteins in Cambridge (figure 2). It has been edited slightly:

By coincidence, it is exactly 50 years ago that I got my Ph.D. degree, here at the University of Cambridge, so I thought it might be interesting for many of you to know what Cambridge and biochemistry was like in the 1950s.

I did my thesis work with Malcolm Dixon, who at that time ran the dynamic Unit of Enzymology, and who, along with Edwin Webb, was writing the classical book, called simply: ‘Enzymes’, which was for many years the standard reference work on enzymology. In Malcolm’s lab I did not work on a flavoprotein, rather on a colourless but very fascinating enzyme, fumarase. However, there were several people in the lab who were working on flavins and flavoproteins, so I did get a lot of exposure to these fascinating molecules, and Malcolm himself was of course the first person ever to purify and study xanthine oxidase. In the lab at that time was Gordon Whitby, who did his thesis work on the isolation and characterization of FAD [flavin adenine dinucleotide]. He was the first to isolate it in pure form and determine its extinction coefficient. Also there, and a great influence to me throughout my whole life, was Gregorio Weber, already an expert in fluorescence, who was at that time developing theoretical and practical aspects of fluorescence polarization. It was Gregorio who demonstrated that the ten-fold lower fluorescence intensity of FAD compared with riboflavin or FMN [flavin mononucleotide] was due to an internal complex between the flavin and adenine ring systems in FAD. Also in the lab was a young South African woman, Nerina Savage, whose project was the further purification and characterization of Straub diaphorase. Although I did not know it at the time, her work also had great relevance to later work of mine. Bob Morton, F.R.S., was working on yeast lactate dehydrogenase.

It is difficult to believe now, but at that time there were only a dozen or so known flavoproteins, and many of the ones that were known had no known physiological function. Let me list them: The Old Yellow Enzyme of Warburg and Theorell, the New Yellow Enzyme of Haas, d-amino acid oxidase, xanthine oxidase, Straub diaphorase, l-amino acid oxidase from snake venom, the three acylCoA dehydrogenases of Helmut Beinert, NADH-cytochrome c reductase, succinate dehydrogenase, lactate dehydrogenase, NADPH–cytochrome c reductase, glycollate oxidase and glucose oxidase.

In 1952 Cambridge was undoubtedly the world centre of biochemistry. Biochemistry as a discipline had been largely developed at Cambridge under the leadership of Fredrick Gowland Hopkins, F.R.S., who died shortly before I arrived. The first International Congress of Biochemistry had been held there in 1949. While I was in Cambridge, 1950–1955, there was a constant stream of visitors from overseas coming to spend Sabbatical leaves, including Frank Putnam, Al Lehninger, Chris Anfinsen, Emmanuel Margoliash, and in the flavin field, Tom Singer and Edna Kearney.

The intellectual atmosphere in Cambridge at the time was as stimulating as one could ever expect to experience. John Kendrew, F.R.S., and Max Perutz, F.R.S., just down the road in the Cavendish Laboratory, were the first people to determine the structure of proteins, and not to forget Jim Watson, For.Mem.R.S, and Francis Crick, F.R.S. Fred Sanger, F.R.S., was using the newly developed methodology of paper chromatography and his FDNB [1-fluoro-2,4-dinitrobenzene] labelling technique to determine for the first time the amino acid sequence of a protein. I saw this on a daily basis, since he did most of it on a bench directly across from mine. Then there was Peter Mitchell, F.R.S., a flamboyant character with long hair, already laying the foundations of the chemiosmotic hypothesis. In the Molteno Institute, less than 100 yards away, were David Keilin, F.R.S., and Bill Slater, F.R.S., who with the aid of Cees Veeger organized the very first Flavin Symposium in Amsterdam in 1965. Keilin and Malcolm Dixon were old friends, and when I succeeded in crystallizing fumarase, Malcolm was excited enough that he wanted to show the crystals off to Keilin.
In Australia I had been working for three years in the CSIRO [Commonwealth Scientific Industrial Research Organisation], on the metabolism of nematode parasites. In the course of this I had found that fluoroacetate was a potent inhibitor, and had tracked down its mode of action to blocking citrate utilization. I thought that this would be a good starting point for a Ph.D. project, but Malcolm, because of his friendship with Sir Rudolph Peters, F.R.S., and Peters' continued active interest in fluoroacetate toxicity, ruled that out as a suitable topic. But typically he did introduce me to Sir Rudolph at the earliest opportunity. Peters, of course, showed a very gracious interest in my work; indeed this interest was maintained through the rest of his life, and he was often of much help to me, supplying rare chemicals and being generally supportive.

So instead of working on fluoroacetate, Malcolm set me to work on fumarase. This enzyme had been partly purified from pig heart the previous year as a Part II Class exercise, and Malcolm thought that it would be an interesting enzyme to study. How right he was! Within six weeks of arrival I had pure crystals, and Malcolm was quite delighted. I suspect that he was somewhat amazed by these young Australians in the Department
(Bob Morton, Ted Thompson, Frank Hurd and me) who used to work both night and day, a most unusual thing in Cambridge at that time! Anyway, he quickly arranged a trip to Oxford, where Sandy Ogston, F.R.S., and Rupert Cecil determined both sedimentation and diffusion coefficients of the enzyme, and showed its homogeneity.

We cannot resist one more bit of history in Vince’s own words on the occasion of his presenting the American Society of Biochemistry and Molecular Biology Fritz Lipmann FRS award to Helmut Beinert in 1994:

I would like to say a few words about Fritz Lipmann, in whose memory this award is given. Lipmann was one of the great pioneers in the field of intermediary metabolism, starting his career in Germany with Otto Meyerhof on the reactions and intermediates of glycolysis, and thus an early recognizer of the importance of energy-rich phosphate linkages and the potential importance of protein-phosphorylation. At the time that I was getting my B.S. degree in Australia in 1947, he had succeeded in the isolation of coenzyme A, and by the time I had gotten my Ph.D. in England in 1953, he was awarded the Nobel Prize together with Hans Krebs.

In his spare time Vince carried out a research project in collaboration with a fellow graduate student, Brian Hartley (FRS 1971) on the active-site labelling of chymotrypsin (4, 5).

After completing his doctorate, Vince went to the USA and spent a summer in the Chemistry Department at the University of Wisconsin in Madison, continuing his work on fumarase with Bob Alberty. The 1954 paper by Alberty and Massey is a classic of enzymology, perhaps the first thorough steady-state kinetic study of an enzyme as a function of pH (3). Tom Singer and his wife Edna Kearney, whom Vince had met in Cambridge, were by this time working on flavoproteins at the nearby Enzyme Institute. They had discovered that the FAD of succinic dehydrogenase was covalently bound to the protein. Shortly afterwards, Singer was hired to head the Edsel B. Ford Institute for Medical Research at Henry Ford Hospital in Detroit, and he recruited Vince as part of his initial group. Vince worked with Tom on succinic dehydrogenase and this initiated his career in flavins and flavoproteins, an area in which Vince was to become recognized as the leading figure. Most biochemists become specialized in one area and Vince was no exception. ‘There are no renaissance men in biochemistry’, he once said.

ACADEMIC CAREER

Vince returned to England in 1957 to accept the position of lecturer at the University of Sheffield, where he established his first independent research laboratory. The Biochemistry Department was headed by Quentin Gibson (FRS 1969) His close friend Gregorio Weber had moved there a few years earlier. Having been schooled in the British tradition, Vince took teaching very seriously, and not surprisingly, the third-year honours practical work revolved around flavoproteins. He was promoted to Senior Lecturer in 1961.

In 1963 Vince made a major career change by moving to Ann Arbor as Professor of Biological Chemistry at the University of Michigan. Professor Minor J. Coon, although not yet Chair in Ann Arbor, had visited Vince several times in Sheffield (see above) and was instrumental in Vince’s recruitment. Vince was, alas, part of the ‘brain drain’ that so devastated biochemistry in Sheffield and many departments in other British universities. He was very active at the University of Michigan, in the affairs of the department, the medical school, and the graduate school. He was named the J. Lawrence Oncley Distinguished University Professor of Biological Chemistry in 1995.
He held the title of Permanent Guest Professor at the University of Konstanz from 1975. This involved a residency at the university for one term per year and a series of lectures. It has already been noted that Vince took teaching seriously and this he did, occasionally to the point of going over the students’ heads; allegedly, this was often the case in Konstanz. This guest appointment provided ample opportunity for collaboration with his close associates Peter Hemmerich and Sandro Ghisla.

Vince was the recipient of many awards and honours, including the Alexander von Humboldt Award in 1973, Fellowship of the Royal Society in 1977, Senior Fellow of the Michigan Society of Fellows from 1975 to 1980, and the University of Michigan Distinguished Faculty Achievement Award in 1983. Tokushima University awarded him an honorary DSc in 1994 in recognition of his many collaborations with Japanese scientists. He was awarded the Henry Russel Lectureship, the highest recognition given to faculty members at the University of Michigan, in 1995. He was elected to membership of the National Academy of Sciences (USA) in 1995. He was chosen by the Biochemical Society of Great Britain for the Harden Medal and for the Jubilee Lecture in London in 1999.

**SCIENTIFIC ACHIEVEMENTS**

Vince’s first major, independent discovery was that Straub diaphorase (a flavoprotein that had been known for more than a decade) was in reality dihydrolipoamide dehydrogenase, and further that this enzyme was a component of both the pyruvate and 2-oxoglutarate dehydrogenase complexes. His subsequent mechanistic studies on lipoamide dehydrogenase launched flavoprotein enzymology into its ascendancy. His notebooks from this era survive and they make a fascinating record of the history of these discoveries. Several letters were tucked into the notebooks, revealing his correspondence with others in the field including Lester Reed and I.C. Gunsalus. A letter from Vince to Paul Boyer explained, in rather colourful prose, David Green’s misunderstanding of his work. Later, Vince and David made a bet that Vince won. One dollar of the $5 payoff (at the International Biochemistry Symposium in Moscow) was framed on Vince’s office wall. In spite of all of this, they had a profound respect for each other, so much so that David’s daughter, Rowena Matthews, became Vince’s graduate student; the paper by Matthews and Massey (6) is a classic in the enzyme charge-transfer field. Rowena has gone on to a highly impressive scientific career and was recently elected to the National Academy of Sciences (USA).

Vince was skilled in the steady-state kinetics of enzymes that convert a single substrate to a single product, by virtue of his graduate education with Malcolm Dixon. However, flavoproteins use two or more substrates and produce at least two products. Fortunately, the Biochemistry Department at the University of Sheffield, in the early 1960s, was superbly qualified to guide Vince in the study of such systems. Among the faculty were two scientists who greatly influenced his strategies in the study of flavoproteins: Keith Dalziel (FRS 1975), one of the outstanding practitioners of steady-state kinetics of enzymes with multiple substrates and products, and Quentin Gibson, who developed the stopped-flow technique to study rapid reactions (6).

In his early studies on dihydrolipoamide dehydrogenase, Vince showed how these two approaches could be used synergistically to define the kinetic mechanism with remarkable precision. He showed that the overall reaction could be separated into two half reactions: first,
dihydrolipoamide reduces the enzyme, and then the reduced enzyme reduces oxidized nicotinamide adenine dinucleotide (NAD⁺) to NADH, thus completing the cycle. This is a clear case of a ping-pong enzyme mechanism by which one substrate reduces the enzyme and its product is released, while a second substrate is converted to product as the enzyme returns to the oxidized state. This mechanism applies to many flavoproteins, and because the flavin gives a clear spectroscopic signature of each catalytically important intermediate it is possible to study the individual half reactions in detail. The development of kinetic techniques continued in Vince’s studies of the flavoprotein hydroxylases, particularly 4-hydroxybenzoate hydroxylase (12), leading to some of the most detailed mechanistic studies in any area of enzymology. He and his colleagues, especially Dave Ballou and Barrie Entsch, developed methods for resolving transient spectral intermediates by stopped-flow optical techniques. These strategies are now widely used and have become paradigms for the elucidation of flavoenzyme reaction mechanisms.

Vince exploited with considerable elegance the light-absorbing characteristics of flavins in their several redox states. In particular, working with Graham Palmer, they demonstrated the participation of the half-reduced flavin (semiquinone), and the existence of charge-transfer complexes formed with exogenous reagents or with internal electron donors, by virtue of their characteristic colours. He showed that the blue flavoprotein semiquinones were neutral and the red semiquinones were anionic (7). Figure 3 shows the spectra established by Vince and Graham. This was the first demonstration that flavoproteins could be classified by their spectral properties: oxidases have red semiquinones and dehydrogenases have blue, except that, as shown, in glucose oxidase the blue semiquinone could be induced by low pH; this led Vince to further, more complex classifications (15). The study of flavin radicals led to the important realization that significant quantities of superoxide are produced when oxygen reacts with reduced flavins and flavoproteins (16). Vince and colleagues demonstrated unambiguously that the superoxide generated by reduced flavins reacts directly with cytochrome c and with erythrocuprein (9), a protein that Irwin Fridovich and Joe McCord had shown to have superoxide dismutase activity (McCord & Fridovich 1969). These findings have evolved into many
further studies. The reactions of reduced flavins and flavoproteins with oxygen were always of great interest to Vince. His seminal studies led to an understanding of how the several classes of flavoproteins react with oxygen (figure 4).

Working with Peter Hemmerich (in Konstanz) and Graham Palmer (then in Ann Arbor), Vince also found that flavins can react photochemically with ethylenediamine tetraacetate (EDTA) and other electron donors to become reduced. He showed that 5-deazaflavin in such reactions provides a gentle universal reductant for most biological redox systems; this forms the basis for a now widely used method for reducing redox proteins (13). He also pioneered the use of a wide variety of modified flavins to probe the active sites of flavoproteins, as well as to show the stereospecificity of hydride transfer from pyridine nucleotides to flavins (figure 5). These modified flavins (referred to affectionately as ‘funny flavins’) were used to characterize flavin environments, intermediates in reactions, and the accessibility of various regions of the flavin to solvent (14). In his last 15 years, a large fraction of his research employed ‘funny flavins’. His flair for collaboration was important in all his work on flavin chemistry, in which he often teamed with Peter Hemmerich, Franz Müller and Sandro Ghisla. With Gertrude Elion and Graham Palmer he demonstrated the mechanism of inhibition of xanthine oxidase by the important pharmaceutical allopurinol (10). Later, Graham Palmer, Dave Ballou, Dale Edmondson, John Olson and Vince showed by optical and electron paramagnetic resonance kinetic methods that the mechanism of this multi-centred redox protein can be described by a rapid equilibrium model (11). Electrons are believed to enter as hydride equivalents from xanthine to reduce molybdenum and very rapidly distribute to the other redox centres (FAD and two [2Fe–2S]) of the enzyme according to their redox potentials. The reaction with oxygen reverses this process by similar rapid equilibria. Many studies of other
multi-centred redox proteins have employed this method. Vince also showed how xanthine oxidase could be used as a veritable working electrode to deliver electrons slowly to a wide variety of biological systems via a low-potential dye such as methyl viologen. In the presence of an indicator redox dye, the continuously varying spectra associated with the simultaneous slow reduction of the dye and the protein permitted calculation of the redox potential.

Vince had an abiding faith in basic research—study whatever turns you on and what you think is important. This concept may be out of favour but when Vince applied two years ago for renewal of his National Institutes of Health grant, for years 40–43, one of us (C.W.) urged him to put in something trendy. ‘Why?’ ‘Well, because pure basic research is not in favour.’ ‘So what!’ The application was scored in the 96th centile and was, of course, funded.

All Vince’s colleagues knew that he would die in harness, and so he did. During his last afternoon in the lab, while one of us (C.W.) was making overheads to back up a PowerPoint presentation, Vince was, as usual, doing an experiment—this time on Old Yellow Enzyme. It is ironic that we still do not know the function of this enzyme—a problem that Vince worked hard to correct for a very long time. He made significant progress but the final solution eluded him. That Friday afternoon, Vince’s experiment was going so well that he called C.W. over to look at the computer screen. There was a beautiful array of spectra that C.W. duly admired.

It is not possible to understand Vince’s approach to research without knowing his predilection for collaboration. He knew that if you wanted to ask truly hard questions, you would probably need help in answering them. The remembrance in Flavins and flavoproteins 2002 was organized as a collection of vignettes by his major collaborators. The excerpts that follow are from the remembrance.

His work with us we mention only in passing, but for one of us (D.B.) the work has extended over almost 40 years and involved many publications. Although both of us had our own laboratories and did most of our work independently, our joint research with him was crucial to our success.

Our laboratories and several others held a joint research meeting weekly, continuing a practice he had started in Sheffield; no paper ever emerged from our labs until it had passed muster.
in Chatters (or The Chats). Chatters was where we all talked about our research without any time constraints. In the early days in Ann Arbor, we met on Monday evenings and often went past 10 p.m. Every Friday Vince would prowl around seeing who had fresh data; because he knew what everyone was doing, there was no escaping him—anyone caught had the weekend to get it together. There was always beer and soda pop until the university decided that alcohol should be banned. But Chatters went on anyway. Here, lively, critical, but constructive analysis of research was at a high level. Problems were usually solved by the presenter’s going to another lab within the group to do new experiments. When Vince got interested in the new TV show *Rowan and Martin's Laugh-In*, Chatters was rescheduled to Tuesday evening; there was never any question of having it during the day.

Vince’s first major collaboration was with Cees Veeger, who came to Sheffield as a graduate student from Bill Slater in Amsterdam. Cees recruited Vince to his ‘thesis committee’. The mechanism of lipoamide dehydrogenase was worked out in this collaboration, which included Quentin Gibson (6). Perhaps his most intense collaboration was with the pre-eminent flavin chemist Peter Hemmerich. After Peter’s untimely death in 1981, the work continued with Peter’s student Sandro Ghisla. In his contribution to the Massey remembrance, Sandro has caught the essence of the Hemmerich collaboration:

Peter described Vince, with his typical exaggeration, and with poorly concealed admiration, as an Australian playboy, continuously smoking a pipe while driving red sports cars and reading *Playboy* magazine… Vince and Peter grew personally closer, while their scientific diatribes became more and more emphatic. Peter was telling Vince he did not know anything about chemistry, while Vince was responding more diplomatically, but firmly, that the same held for Hemmerich and biochemistry. Nevertheless, they did complement each other; they were both smart enough to give in when a case was hopeless. This led to a most fruitful interaction that lasted for a decade. Each was forcing the other to do the right experiment in order to prove the counterpart wrong. Obviously, Vince was at an advantage in this respect due to his ability to design and carry out the right experiment in no time.

We know that Vince loved England and Australia dearly, but we think his favourite countries were Italy and Japan. Thus, it is not surprising that he cultivated extensive long-term research partnerships in both countries. The Italian connection began with Bruno Curti’s sabbatical year in Sheffield and extended, involving a host of Bruno’s colleagues, for the rest of Vince’s life. Bruno describes it thus:

The establishment in Ann Arbor of an ‘Italian colony’ as Vince used to call it, derived from an appreciation of the good work made by the Italian researchers, but it was also due to the personality of Vince, who born in Australia, educated in England, resided in the United States, remained in his heart a man with a great love for Europe, Shakespeare, the Italian Renaissance, and the music of Vivaldi, Bach and Mozart. In Ann Arbor, the Italians included Giuliana Zanetti, Severino Ronchi, Umberto Branzioli, Armando Negri, Gabriella Tedeschi, Loredano Pollegioni and the late Luigi Casola, and, in the laboratory of Rowena Matthews, Maria Antonietta Vanoni. They all felt at home with Vince, even living on the other side of the ocean.

We should add that because Margot was fluent in several languages, she enhanced the feeling of home by speaking to them in Italian.

The Japanese connection began as a research rivalry between Vince and Kunio Yagi; they had sharply differing views about the mechanism of ε-amino acid oxidase. Yagi called the relationship ‘friendly enemies’. Vince later took a half sabbatical in Yagi’s laboratory. At meetings in Japan, Vince got to know many younger Japanese, in particular Takeshi and Tomoko Nishino in Yokohama and Tokyo, Kazuko Yorita in Tokushima, and Youichi Niimura in Hokkaido and Tokyo. Takeshi describes an all-too-believable incident:
Vincent visited our laboratory at Yokohama City University Medical School near Tokyo several times for discussions about experimental results or to give lectures to the medical students. He was very nervous every time he gave a lecture and spent a long time in preparation of the materials. He paid no attention to the fact that some parts of his lectures were too advanced for the medical school students to understand; still, he imparted a lot of the spirit of science. He spent three months as the first guest professor from a foreign country at the Yokohama City University Medical School in 1988. During his stay Takeshi and Vince performed a number of experiments together and published papers amounting to 46 pages in the Journal of Biological Chemistry. Once Takeshi and Vince drove to the countryside in Takeshi’s sports car. Vince complained to Takeshi about his fast driving, saying ‘you drive like you were on the Autobahn’. But when Vince drove the car in Japan even faster than Takeshi, he got a speeding ticket of 10,000 yen.

Collaborations with two crystallographers were crucial to Vince’s work: Martha Ludwig in Ann Arbor and Andrew Karplus, first at Cornell and later in Seattle. Martha and Vince studied the structures of a clostridial flavodoxin and the so-called waving flavin in 4-hydroxybenzoate hydroxylase. With Andy he studied the structure of Old Yellow Enzyme.

Vince was a key organizer of all of the 14 International Symposia on Flavins and Flavoproteins, which began in 1965, including the one he hosted with Charles Williams in Ann Arbor in 1981 and the one he attended in 2002 in Cambridge, England, where he was the keynote speaker. The 15th Symposium is being organized by Takeshi Nishino and will be dedicated to Vince’s memory.

Vincent Massey was one of the outstanding biochemists of his generation. His colleagues and students found inspiration in his enthusiasm for basic research, admired his unusual skill at experimentation, and valued his investigations as models of originality and precision. His mentorship at the bench distinguished his research style from that of most other biochemists. Most of the more than 340 refereed papers that he authored included many experiments performed with his own hands. He established Ann Arbor as the Mecca for flavin research.

PRIVATE LIFE AND PERSONALITY

We said at the start that Vince was a man of many passions; having dealt with his major passion for hard work on flavoproteins, we can now take up the personal ones: cooking and consuming good food and wine, music and art, gardening, sailing, and—above all—family and friends.

It seemed remarkable that Vince, married to a superb cook like Margot, would himself enjoy cooking—except that many chemists do. After Margot’s severe stroke in 2001, Vince took over the cooking totally. It was at least a month before he relented and even allowed his children to make contributions towards a meal. The level of hospitality in the Massey household was awesome. Guests were often put up for a month at a time; that way they could discuss research around the clock. Those of us who have experienced such hospitality consider it one of the rare privileges of our lives. Massey hospitality even extended to a dinner for C.W. upon his arrival in Sheffield as a new postdoctoral researcher in 1961, at which, after coffee, Margot remarked, ‘Vince will take you home now because I am going to have a baby’. Rachel was born later that night.

Vince’s taste in music was somewhat specialized but his taste in art was catholic. The eighteenth century, encompassing Bach, Handel, Mozart and Haydn, was his musical focus, in that order; after that, he was highly selective with very little beyond Beethoven, Schubert, Brahms, Dvorak and Mahler taking his fancy. The Massey home was filled with books about art from a wide variety of artists.
Vince was an avid gardener. It is undoubtedly hyperbole, but it is said that, if he looked sternly at a plant one day, it bloomed the next. He was always keen to guide his friends through his gardens, pointing out the roses and the wide variety of lilies. Vince was a bit competitive about his gardening. His night-blooming cereus was huge. When he observed that a bloom was coming at about 8 or 9 o’clock in the evening, he would call a cadre of close friends to come and watch—and, while watching, to demolish a few bottles of excellent wine, which undoubtedly enhanced the appearance of the blooms.

Atypically, Vince was not competitive about sailing, at least in later life. He started sailing in Sydney Harbour, where sharks were not unheard of. Margot hated sailing, in part because Vince had capsized with her on their first outing. Later, in Michigan, he liked to sail with C.H. in their International 470 (an Olympic-class racing boat) around Whitmore Lake and discuss research or the philosophy of life. The only time we capsized was when we were too engrossed in chat; all sailors know that the wind does not like to be ignored.

Although science was always foremost in Vince’s life, he delighted in the role of father and grandfather. Well do C.W. and his wife-to-be, Angela, arriving to baby-sit, remember finding Vince giving the children their baths, as he did every night. Thirty years later, C.W.’s youngest grandson, who lived in Ann Arbor, played a very big part in Vince and Margot’s life. Then in recent years, both Charlotte and Andrew (sadly, in his case, only a few months before Vince’s death) and their families moved back to Michigan, making possible many grand get-togethers of the four grandchildren and their parents at the Massey house.

Vince died quietly in his sleep of an apparent heart attack at the age of 75 years, after a particularly happy weekend with family and close friends. A memorial to celebrate his life took place in Ann Arbor a few days after his death. About 200 people from as far away as Japan gathered to say goodbye to a good friend. Several of the ‘Goldberg Variations’ were interspersed through the service and as the audience departed to the reception that followed, Percy Grainger’s ‘Country Gardens’ cheered us on. Vince’s ashes were interred on a beautiful hillside in the Forest Hill Cemetery, Ann Arbor. With so many guests in town, it seemed inappropriate to part at 4 o’clock in the afternoon, so, in time-honoured Vincent Massey tradition, the group reconvened for a party that lasted into the wee hours of the next morning.

We end as we began with a quote from Carol Strickland: ‘They say life’s not supposed to be a rose garden. But in a way—with the beauty, the thorns, and finally the petals dropping—it is. I think the rose garden Vince planted will bloom in us for a long time.’

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REFERENCES TO OTHER AUTHORS


BIBLIOGRAPHY

The following publications are those referred to directly in the text. A full bibliography appears on the accompanying microfiche, numbered as in the second column. A photocopy is available from The Royal Society’s Library at cost.