Article

Richard Truscoe: Biochemistry Pioneer, Science Interrupted by War

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Richard Truscoe was appointed from University College London in 1957 to establish teaching and research in Biochemistry at Victoria University of Wellington. He had extensive experience in research in England, Europe, and the United States. His scientific career had been interrupted by the Second World War, in which he served as an intelligence officer in the top-secret British Special Operations Executive (SOE). His SOE service was regarded as remarkable. During the war he consistently supported an independent future for Poland and warned of the dangers presented by the territorial ambitions of the Soviet Union. In biochemistry he had been a pioneer researcher on the metabolism of purines, and on the metabolic functions and effects of hormones and blood electrolytes including potassium and sodium. On arrival in Wellington, he predicted a future where biochemistry facilitated production of food grown in laboratories and for advances in medicine based on molecular understanding of disease. He initiated undergraduate and Honours teaching in biochemistry at Victoria University of Wellington, established infrastructure for research and supervised a cohort of a dozen MSc students. His legacy includes graduates who were stimulated to follow research careers, and interests in human health and disease that continue today.

Introduction

Richard Truscoe (1897-1988) had two stellar careers, a career in wartime intelligence operations beginning in the first World War and revived at a high level in the second, and a career in biochemistry during its formative stages. Truscoe was born Richard Truszkowski in London in 1897 and did not take up the English-sounding name, Truscoe, until later in the 1940s. Because he was known throughout his career in New Zealand as Truscoe I shall use that name throughout. Sources for his biochemical career are more accessible than those for his secret service. For biochemistry there are his publications, official records, and the memories of his students. For his intelligence career there are official records, available only since 1995, occasional reminiscences by colleagues, and the stories he told his family which were collected by his daughter Diana Hall in Truskowski and the SOE (Hall, 2015).

Truscoe was appointed Senior Lecturer in Biochemistry within the Chemistry Department at VUW in 1957. He came from the Department of Clinical Pathology at University College Hospital, London. Samantha Campbell's study (Campbell, 2009) of the origins of biochemistry in New Zealand universities describes the historical background, including the international growth in biochemistry and its relevance to New Zealand agriculture and medicine, that led the Victoria College of the University of New Zealand to begin planning, in the late 1940s, to teach in Biochemistry. The plan came to fruition a decade later on Truscoe's arrival. Further important stages of development were the arrival of J. N. Smith as the first Professor of Biochemistry in 1964, and the establishment of Biochemistry as an independent department from 1969. Graduates remember Smith and Truscoe as formative influences on their careers (for example Professor Stephen Kent, University of Chicago, who as an undergraduate "was fascinated by the ability of enzymes to catalyze chemical reactions" (Kent, 2022)). Students from that time, of which I was one, were educated and entertained by Truscoe's precise and lively manner, sense of humour, and extensive experience of biochemistry and twentieth century Europe.

Family and Education

When Richard Truscoe was born in London in 1897 his family were political refugees from Tsarist Russia. Truscoe said that his father Hieronim Wladyslaw Truszkowski, a Pole born in Kiev province Ukraine, was as a young man exiled to Siberia because of support for socialism and Polish nationalism. Truscoe's mother Zofia Wanda Bujanower was Russian and had trained in medicine as a feldsher ("physician assistant") in Moscow. Truscoe's parents married in Tomsk and later "fled to France" and then England after "being threatened with extradition to Russia by the French police." Truscoe grew up speaking Russian to his mother, Polish to his father, and English at school. During his childhood Russian was often spoken with visitors who, he later said, were probably Russian revolutionaries (Hall, 2015).

Truscoe commenced a BSc in Chemistry at University College London in 1915 but in 1916 was recruited with other science students for war work. His daughter Diana Hall recorded he enlisted in the Royal Engineers Special

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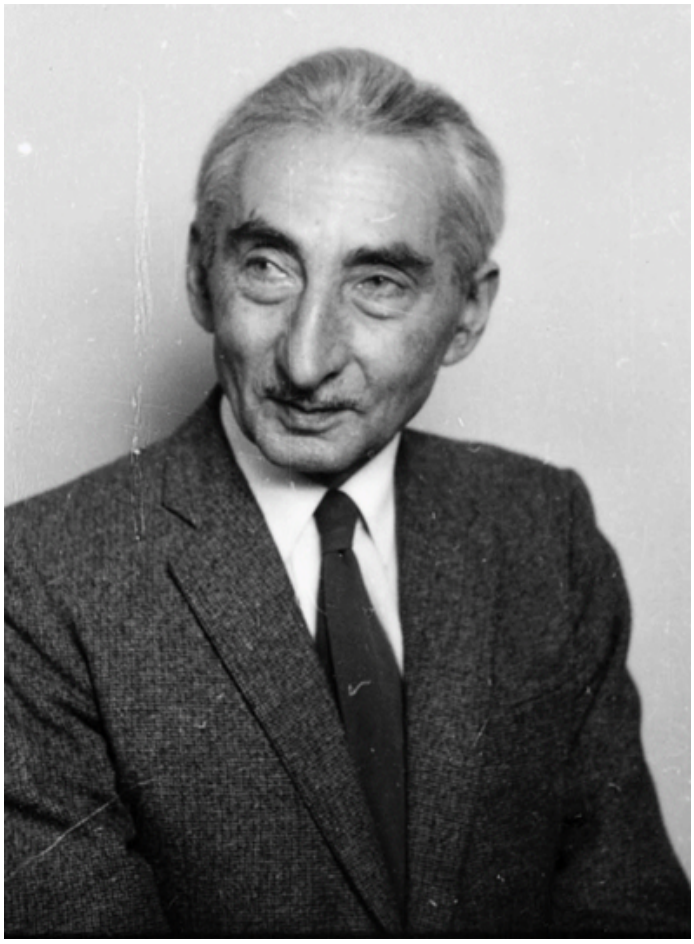

Figure 1: Richard Truscoe, circa 1970.
From "Dr. R. Truscoe, Staff Club ID photos." Copyright Victoria University of Wellington. Image courtesy of Tapuaka – Victoria University of Wellington Library.

Z Company that handled chemical weapons. He was a member of the 1918-1919 British Expeditionary Force to North Russia that landed in Archangel initially to maintain access to the ports at Murmansk and Archangel and then in support of Russian anti-Bolshevik forces during the Russian revolution and civil war. At that time the area was one of the most active battlegrounds in Russia and has been described as "hard and bitter, a grim and isolated war" (Wilkinson and Bright Astley, 1997). He acted as interpreter when his unit was captured and taken prisoner of war by anarchists (Hall, 2015).

On return to Britain in September 1919 he renewed study at UCL gaining a BSc in Chemistry in 1922 and an MSc the following year. His Master's research on oximes was published with his supervisor O. L. Brady in the Journal of the Chemical Society in 1923 and 1924. His parents had moved to Poland which was now an independent country again after 120 years of rule by surrounding nations. Truscoe followed them in 1922, becoming a Senior Lecturer in the Physiology Department of the Medical Faculty at Poznan University in 1924. He gained a PhD in Biochemistry in 1926, and subsequently qualified in medicine (Med. Dip.) at Warsaw University. His Polish wife Helen Hurda (married in 1931 at the British Embassy in Warsaw) was also qualified in Medicine. In 1935 he travelled to New York on a Rockefeller Fellowship for research at the College of Physicians and Surgeons at Columbia, in support of the growth of the State School of Hygiene in Warsaw. For the next three years, prior to the outbreak of WWII, he worked in the Department of Vitamin and Hormone Assay at the State School of Hygiene. Truscoe maintained his links to the Chemical Societies in Britain and Poland and published in Chemistry and Industry on the formation of the Chemical Research Institute in Warsaw to "enable research on chemical questions of national, economic and military importance" (Truszkowski, 1929).

Research in Poland

Truscoe's research in the 15-year period prior to WWII is represented by publications authored by Richard Truszkowski. Biochemistry at that time was a young science. The Journal of Biological Chemistry in the United States and The Biochemical Journal in the UK were launched in 1905 and 1906 respectively. The Biochemical Society UK was founded in London in 1911 as the Biochemical (Dining) Club. Little was known about the structure and mechanisms of proteins or nucleic acids, and many of the now familiar metabolic pathways had not been elucidated.

Truscoe's three preliminary publications in the French Academy of Science journal Comptes Rendus (1926-1928) and 16 publications in the Biochemical Journal from 1926-1935 investigated the metabolism of purines and properties of the enzyme urate oxidase (uricase) that is important across the animal kingdom for metabolic turnover of purines. His groundbreaking work, for example Truszkowski (1927) and Truszkowski and Chajkinówna (1935), was in the emerging field of metabolism of nitrogen containing compounds including purines and pyrimidines that were subsequently recognised as the coding components in DNA and RNA. Contemporaneously, the New Zealander Norman Edson (who became the inaugural Professor of Biochemistry at Otago University in 1949) included work on the metabolism of urate while he was a PhD student at Cambridge University (Edson et al., 1936).

Truscoe's skills in chemical analysis and his methods for purification of urate oxidase (Truszkowski and Gubermanówna, 1935) underpinned his research. Truscoe investigated the then speculative hypothesis that catalytic activity was due to absorption of substrates on the surface of proteins (Truszkowski, 1930*b*). Sumner's 1935 review Enzymes, in the Annual Review of Biochemistry, cites Truszkowski within the context of the emerging consensus that "certain, if not all, enzymes are proteins" and that the "identification of enzyme chemistry with protein chemistry promises to do much toward clearing up some of the most puzzling facts regarding the high molecular state of proteins" (Sumner, 1935). Interest in the properties of the enzyme continued thirty years later in his research in Wellington on the mechanism of action of urate oxidase. Even after retirement Truscoe told me that his dining room

table was covered with his handwritten diagrams exploring potential mechanisms for the oxidation of urate at the active site of the enzyme.

It is now known that urate oxidase is normally present in mammalian liver and kidney but is inactive in humans (Truszkowski, 1930*a*) and some other species due to mutation of the gene coding for the urate oxidase protein. Several pathologies result from the absence of functional urate oxidase in humans, the best-known being gout where unmetabolized uric acid accumulates and crystalizes in the joints.

In a change of research direction, Truscoe travelled to New York in 1935 to work on the interaction of potassium and adrenal corticosteroids with Raymund Zwemer in the College of Physicians at Columbia University. This productive collaboration blended Truscoe's expertise in medicine and biochemistry with Zwemer's interests in the functions and pathologies of the adrenal cortex. Six joint publications (1936-1937) covered methods for measurement of potassium in blood and tissues, and the role of potassium in corticoadrenal insufficiency, for example Truszkowski and Zwemer (1936) and Zwemer and Truszkowski (1936). Truscoe returned to Warsaw at the end of 1936 to work in the Department of Vitamin and Hormone Assay at the State Hygiene Institute (National Institute of Public Health). There he published with colleagues on measurement of calcium (1938) and thyroid (1938) and parathyroid hormones (1939). A final publication, in the journal Endocrinology in July 1940, updated the research on interactions between potassium and corticosteroid hormones.

Because of the threat of war, the Truscoes made plans to leave Poland in June 1939, but he was persuaded to stay longer to examine some students. Then, on 1 September 1939, Germany invaded Poland.

War

From 1939 to 1945 Truscoe's life was shaped by his biography as a British subject with Polish and Russian parents, his fluency in three languages, his commitment to and familiarity with Poland, and his former service in WW1.

The following summary draws heavily on the conversations Diana Hall recorded with her father (Hall, 2015) and is supplemented by Jeffrey Bines's PhD thesis "The Polish Country Section of the Special Operations Executive 1940-1946: A British Perspective" (Bines, 2008). Both made use of previously classified files from the British Public Record Office (The National Archives, Kew., n.d.). Diana Hall's extensive account contains her father's lucid, often humorous, recollections of individuals and events.

The Truscoes fled Warsaw on 6 September with the British Military Mission travelling through southern Poland and Romania. After returning to England Truscoe joined the British Military Mission in Paris as an intelligence officer whose role was to assess the events around the collapse of Poland. Following the occupation of France by Germany in June 1940 Truscoe was involved with plans for evacuation to Britain of Polish soldiers who had been fighting in France and was then himself evacuated from Bordeaux by sea.

After a period working as British liaison to the Polish Government in London, he joined the top-secret Special Operations Executive (SOE) (Wilkinson and Bright Astley, 1997) as an intelligence officer in the Polish Section at Headquarters in London. His duties included advising on Soviet/Polish relations and facilitating interactions with the Polish Government in exile.

In September 1941, following Germany's invasion of the Soviet Union, Truscoe was sent to the British Mission in Moscow to maintain links with the Polish and Czech missions and report back to SOE. Traveling on a minesweeper in convoy around northern Russia Truscoe landed in Archangel and then flew to Moscow where he was attached to the British Diplomatic Corps. Within days the Mission was relocated east to safety in Kuybyshev which became a centre for Soviet Government and foreign diplomatic missions during the German invasion. Diana Hall's description of that time includes Truscoe's reports, correspondence, and memories of events, for example travel "across the rear of the Russian front at the time of the Great Retreat" to Murmansk escorting a group for evacuation to Britain. One of his commanding officers in SOE Peter Wilkinson (later Sir Peter Wilkinson KCMG DSO OBE) wrote "It really was the most remarkable thing: he was very reticent about his own adventures, I've simply no idea but I can imagine it must have been absolutely horrific" (Hall, 2015). Typical of Truscoe is his description of a dinner for Soviet NKVD, now KGB, and British officers where, "after much numerous bogus expressions of mutual admiration and friendship" and where "I had myself drunk more than a few toasts to the heroic Red Army," an altercation broke out between the two senior British colonels. When asked by his NKVD counterpart "Why didn't you stop it?" Truscoe replied "I'm only a major." After six months Truscoe reported to his superiors that there was little more that could be done as the Russians "were mainly concerned with spreading Russian power and not in fighting the Germans".

In April 1942 Truscoe left Russia travelling through Baku, Tehran and Istanbul to Cairo where he was liaison to the Polish agents Countess Krystyna Skarbek (Christine Granville) and Andrzej Kowerski (Andrew Kennedy) who at that time were regarded cautiously by SOE, although Granville became legendary for her work with the resistance in Poland and France for which she was awarded an OBE, the George Medal and the Croix de Guerre (Mulley, 2012). Diana Hall wrote that Granville and Kennedy "became great friends and used to come and visit us in London both in Chelsea during the war and Hampstead after."

In August Wilkinson reported "a thrilling account by MPX of the rescue of the KOT (referring to the ex-professor of history who became an influential person in the Polish Government in exile during WWII) representative at Belgrade from the clutches of the Gestapo. MPX seems to have done incredibly well" (Hall, 2015). MPX was the code name for Truscoe.

Truscoe was based in London from September 1942 to May 1944, including reporting on the recently discovered graves in Katyn forest from the Soviet massacre in 1940

of thousands of Polish military prisoners. Ron Jeffery's account of time as a British prisoner of war in Poland, escape and life with the Polish resistance, describes Truscoe as "a man of diminutive stature but a giant personality" (Jeffery, 1989) who carried out the debriefing at SOE when Jeffery arrived in London in early 1944. Despite support from Truscoe, Jeffery encountered resistance from British officials following an impetus to hush up Soviet involvement at Katyn that could have damaged the relationship between Britain and the Soviet Union.

From May to October 1944 Truscoe was at the SOE base at Monopoli in Southern Italy to assist efforts to support resistance groups in Poland. Flights were used to supply weapons and take in and bring out agents including during the "Warsaw Uprising" when the Polish resistance (Underground Army) battled the occupying German army (Walker, 2020). An earlier flight, codename WILDHORN III, piloted by New Zealander George Culliford, on 25/26 July was used to collect parts and plans from a German V2 rocket that had been lost during test firing and after recovery by a Polish resistance group was disassembled to send information back to Britain.

Truscoe left the SOE in June 1945. During the final months he reported extensively on the Soviet Union and on the future for Poland (Bines (2008), page 150). Bines records that in March 1945 Truszkowski was a member of an SOE Mission to Poland to assess Soviet intentions in the wake of the February Yalta (Crimea) Conference where the British, Soviet and US heads of government, Churchill, Stalin and Rooseveldt, had met to plan the postwar future of Europe (Bines, pages 262-263).

A recent account "End of Anglo–Polish Cooperation in Special Operations between April and December 1945" analyses British disregard for support for Poland that would have conflicted with Soviet intentions (Tebinka, 2023). "On 24 May, Major Richard Truszkowski from SOE's Polish Section sent the high-ranking SOE officers Lt. Col. Perkins and Col. David Keswick a memorandum entitled "The Future of the SOE Polish Section." In it, he observed "now that Germany had been defeated, the main stumbling block to world peace would be the growing divergence between the political objectives of the Western powers and the Soviet Union, which meant that the West could find itself facing a dilemma whether to surrender to Moscow's demands or to embark on a new war." Tebinka concludes that Truszkowski's memorandum was disregarded as in the British Government the idea of a future war against the Soviet Union was taboo.

Post War

After leaving the SOE Truscoe apparently continued military service while reviving his scientific research. The London Gazette, 8 March 1949, lists Truscoe as a Senior Principal Scientific Officer in the War Office. Civil Service Lists from 1948-55 show related roles including in the Directorate of Military Intelligence.

In 1949 Truscoe questioned in a Letter to the British Medical Journal some statements about the relationship between purine metabolism and control of blood sugar that had been published a month earlier. By then he was using the surname Truscoe (Truscoe, 1949).

Around this time the collaboration on potassium metabolism was renewed with Zwemer, who was now associated with the US Naval Medical Research Institute in Bethesda. Zwemer had gone to Washington in 1944 to join the State Department where he had administrative leadership prior to appointment as executive secretary of the National Academy of Sciences, then chief of the Science Division of the Library of Congress from 1950 to 1955. Truscoe travelled to Bethesda three times between 1951 and 1954. US immigration documents list Truscoe as a Civil Servant employed by the British War Office. Their research was published in the American Journal of Physiology in 1953 and 1956 including on interactions between potassium and histamine in toxic shock.

Truscoe was also working with researchers led by Montague Maizels in the Department of Clinical Pathology at University College Hospital, London. Maizels was a leader in research on the biochemistry and biophysics of red blood cells including the effects of sodium and potassium ions, disturbances associated with vomiting and diarrhoea, and changes in red blood cells stored for transfusion. With Maizels and Mary Remington, Truscoe extended these studies to the use of cultured mouse tumour cells in experiments examining the effects of metabolic substrates and inhibitors on sodium transport (Maizels et al., 1958). Their three publications in the Journal of Physiology were in the vanguard of 1950s metabolic studies using cell cultures.

VUW

In 1957 the Truscoes emigrated to New Zealand for Richard to take up the appointment as Senior Lecturer in Biochemistry at the then Victoria University College. The Chemistry Department was in a growth phase including relocation to the new Easterfield Building that was completed in 1958. In an interview "Biochemistry's Advances in Medical Science" in "The Press" in July 1957 just after arrival Truscoe predicted a future in which food could be grown in the laboratory, and development of new therapies for control of disease which would be based on molecular understanding of cellular processes (Truscoe, 1957).

Four years later Truscoe reported progress in establishing biochemistry at VUW. "The Biochemistry Laboratory was the first to start work in the Easterfield Building, in 1958, in somewhat improvised quarters on the fourth floor (Figure 2). The only hours available to the first Biochemistry II laboratory class were in the evening, and the only way to reach the laboratory was to wade through the mud of the quadrangle, and to climb the unlighted back stairs. It says much for the enthusiasm of the pioneer class of 1958 that rarely was any of them missing" (Truscoe, 1961).

Stage III started in 1959, and Masters in 1960. Truscoe later commented (personal communication) that he put the Biochemistry II course together in the first year, which was a full year of three one-hour lectures and seven and

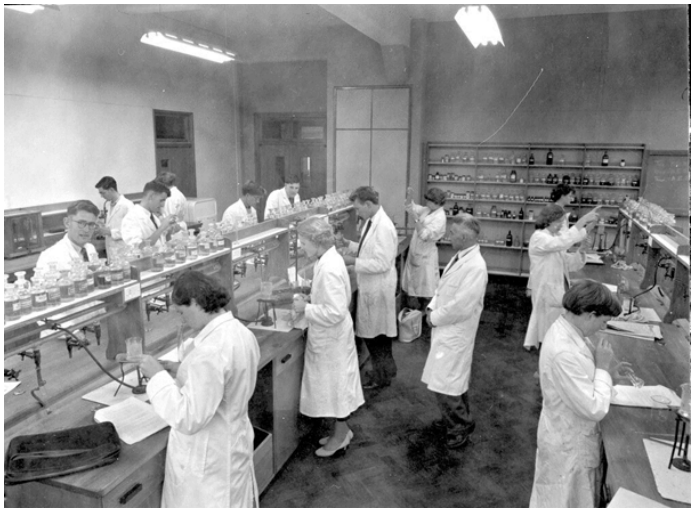

Figure 2: Truscoe supervising an evening undergraduate Biochemistry laboratory class.
From "Chemistry students, c.1958-1959". Copyright Victoria University of Wellington. Image courtesy of Tapuaka – Victoria University of Wellington Library. This appears to be the first experiment for the course, isolation of urea from the subject's urine, which introduced the students to "real-life" biochemistry. Note the pipetting by mouth which was standard practice at that time.

a half hours laboratory class each week, intending to improve it the next year, but then it was time to teach Biochemistry III lectures plus ten hours laboratory class each week. The 1960 University Calendar shows that an additional lecturer had been appointed to assist with teaching Biochemistry and that the new Honours course contained three papers covering enzymes, metabolism, and nutritional and functional biochemistry including genetics and immunology.

In 1962 Truscoe corresponded with Francis Crick including an invitation to visit New Zealand universities around the time that Crick shared the Nobel prize with Watson and Wilkinson for the structure of DNA. Truscoe wrote "Dear Crick, Many a year has passed since we battled for the Good Cause. . . .", although it is not clear whether Truscoe was referring to events during or immediately after WWII. Crick declined the invitation because of pressure setting up his own research but responded to Truscoe's suggestions about the structure of RNA (Truscoe, 1962).

Truscoe was also busy establishing facilities for research. Internal funding was from the University and routine equipment and reagents were available from the Chemistry Department. New equipment included a Beckman double beam spectrophotometer and a Sorvall refrigerated centrifuge that were essential for biochemical research. As Biochemistry expanded over the next few years Truscoe remarked that we were carrying out a "pincer movement into rooms on the second, third, fourth and sixth floors" expanding into further space in the Easterfield Building.

Truscoe continued research on urate oxidase that pursued knowledge on the mechanism of action of the enzyme. His four sole author publications from 1964-1968 established the experimental platform for supervision of a dozen MSc students whose research was state of the art protein science at that time, for example James et al. (1969). Several publications investigated enzyme inhibitors including allopurinol (Truscoe and Williams, 1965, 1968) that is used to treat gout by blocking the formation of uric acid.

Truscoe's experience, vision and experimental rigour underpinned the development of Biochemistry at VUW. He commented "While it is most rewarding to help students to gain an understanding of the fundamentals of biochemistry, and to teach them some of the techniques which have served for the elucidation of the data on which these are based, the whole process lacks vitality unless research work is being actively prosecuted, so that undergraduates can come into direct contact with post-graduate students, and can arrive at a realistic appreciation of both the thrills and the tedium and disappointment of research work" (Truscoe, 1961). He then outlined the background of his research on urate oxidase including mention of a suggestion that the mutant gene and enzyme may have conferred evolutionary advantage to humans and other hominids through positive effects of the accumulating uric acid on the central nervous system and cognitive function: as suggested by Orowan (1955) and still investigated (De Giorgi et al., 2015).

Truscoe continued at Victoria University in an Honorary capacity past retirement "possessed of quite remarkable physical and intellectual vigour" (Barrowman, 1999), and "delightful and engaging", "seen almost daily until the mid-1970s" (Halton, 2018). Truscoe's obituary published in Wellington in the Evening Post on 2nd November 1988 briefly notes his scientific and military history including controlling agents' missions into Poland, and award of the Polish Cross of Valour.

Truscoe's Impact

Richard (Dick) Truscoe's wide experience and engaging personality were well suited to the start of Biochemistry at VUW. He had first-hand experience of the growth of the modern subject and his education in chemistry provided an easy fit within the Chemistry Department. His stimulating presence and wide-ranging conversation were appreciated throughout the university. Some years after Truscoe's retirement I was told by Bob Clark (Professor of Geology and Dean of Science) that Truscoe paved the way for appointment of a Chair in Biochemistry.

Although his career was interrupted by war, Truscoe was an active laboratory scientist with a substantial publication record. The perceptive studies of urate oxidase and of potassium metabolism continued to be cited 50-60 years after publication. His publications, including 12 journal articles from research at VUW, focused clearly on major biological questions. At VUW he initiated the undergraduate and Honours Biochemistry courses with a personal teaching load that was excessive, and a focus on establishing research. Some of the students went on to do PhDs in New Zealand or overseas and then made life-long research contributions.

Truscoe's commitment to the future of Poland during and in the aftermath of WWII, and his continuing passion for biochemistry, were notable. His insights, predictions and abilities were regarded as remarkable within the SOE, as was his vision for biochemistry at VUW and the potential for biochemistry to contribute to human health and well-being. He did not emphasize his personal history or contacts with major figures in science and medicine, military intelligence, or geopolitics. Truscoe initiated research directions that have been major emphases at VUW, including enzyme and protein science, drug actions and effects, and the biochemistry of normal function and disease. It was a privilege to be taught by Truscoe. We were educated about the world as well as biochemistry and wider biology, always with a large dose of his sense of humour.

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