A TRIBUTE TO PROFESSOR LEWIS HENRY KEYS (1922 - 2022)

A PIONEER IN THE SCHOOL OF METALLURGY

Ian Hall, Phillip J Mackey and J Bruce See

Lewis Keys circa 1968

Recently the three of us were saddened to learn of the passing on 20 January 2022 just before his 100th birthday of Associate Professor Lewis (Lew) Henry Keys, an outstanding academic from the pioneering years of the UNSW School of Metallurgy. Dr. Keys passed away in Swansea, Tasmania and had, as he wished, a simple funeral service in Launceston. He was predeceased by his wife Peggy.

All of us knew Professor Keys during our studies in the School of Metallurgy in the 1960s and 1970s. One of us (Ian) was supervised by Lew for his PhD on stress corrosion cracking whilst the other two of us were taught by Lew.

Lew was one of the many outstanding earlier members of the academic staff in the School of Metallurgy. Accordingly, the purpose of this tribute is to both honour his memory and to acknowledge his significant contributions to the early development of the teaching and research reputation of the School.

Lew was born in Parramatta on 17 March 1922 and, after relocating to Newcastle, attended Newcastle Boys High School from 1933 to 1938 graduating with the Leaving Certificate. He attended Newcastle Technical College from 1939 to 1941 whilst working as a metallurgical trainee at Commonwealth Steel Co. Ltd (Comsteel) in Waratah, a suburb of Newcastle. During this time he lived in Tighes Hill near the BHP Newcastle Steel Works and the site of Newcastle Technical College.

Commonwealth Steel was a manufacturer of special steels and railway axles and wheels and During World war II was one of many Australian companies that manufactured munitions and military products including steel helmets and bulletproof plate (successfully made for the first time in Australia in 1940).

On 18 December 1941 at age nineteen Lew enlisted in the Australian Infantry Force and was assigned to C Sqn. 2/11th Australian Armoured Car Regiment in Tamworth with Infantry Service No. NX79272. He was discharged from the Army on 6 June 1944 (D-day) with the rank of Corporal before enlisting the next day (7 June 1944) in the RAAF with Service No. A9301 with his occupation given as Metallurgical Chemist.

Lewis Keys as a RAAF Aircraftsman in 1944

In the RAAF Lew trained as a navigator, achieving a mark of 93.5% in the training course. Lew was regarded as smart, competent, calm and reliable and was assessed as "Exceptional" by the Aviation Aptitude Test. He was discharged from the RAAF on 1 August 1945 as a LAC (Leading Aircraftsman) and was still living at Tighes Hill in Newcastle.

He resumed his metallurgical career in 1945 and graduated in 1949 with a Credit Diploma and the title ASTC (Associate of Sydney Technical College).

Lew joined the Department of Supply in 1951 and was an Attached Scientist at the Royal Aircraft Establishment in Farnborough, England. At Farnborough his investigations focussed on the production of magnesium-lithium alloys and the development of titanium alloys for use as skin material in ultra-high speed aircraft. Upon returning to Australia he spent four years at the Defence Standards Laboratories, Maribyrnong, initially on investigations of service failures and subsequently on research into the embrittlement of titanium alloys.

In September 1957 he joined the School of Metallurgy as a Research Fellow sponsored by the Australian Atomic Energy Commission and in March 1960 he was appointed to the lecturing staff.

In 1960 he was awarded an MSc in metallurgy for his thesis titled "The Preparation and Properties of Silicon Carbide". He was subsequently promoted to Senior Lecturer in 1964 and to Associate Professor in 1973 having earlier gained a PhD in Metallurgy in 1968 for his thesis titled "The High Temperature Oxidation of Silicon Carbide." After retirement from the School of Metallurgy in 1982 he moved to Bicheno, Tasmania in the 1990s.

During his academic career Professor Keys made sabbatical visits to the Sorbonne University, Paris in the 1960s and 1970s and was a Member of the International Congress on Metallic Corrosion, Vice President of the Australasian Corrosion Association in 1974 and the Organiser in 1975 of the 6th International Congress on Metallic Corrosion in Sydney.

In an article in the 1967 edition of the Metallurgical Review Lew wrote about his study leave in 1966 in Paris at the Centre de Recherches, L'Ecole Nationale Superieure des Mines. He noted that "it is possible to ferret out good restaurants serving excellent food at reasonable prices and offering the added attraction of a kaleidoscopic view of "vraies (true) Parisiens." His interest in food and wine made him a keen member of the UNSW Cheese & Wine Club, along with several others of the School's academic staff.

Lew further noted that, "apart from the more obviously important aspects of a year in Paris, my study leave did involve a busy and profitable academic life". Besides carrying out high temperature oxidation studies at the Centre de Recherches he delivered a course of lectures to graduate students at the Institute Nationale des Sciences et Techniques Nucleaires at Saclay. As he comments "this was an interesting exercise for both the students and myself, as (the lectures) were given in French".

Professor Keys research speciality was in metallic corrosion and fatigue cracking, topics on which he wrote many papers and supervised several post-graduate students. He had a reputation as an international expert on corrosion and through Unisearch he undertook much consulting work, including several very high-profile engineering and corrosion failure cases. He also had a long-standing consulting job internationally with Sandvik.

He was strongly focussed on practical applications of research and, as a member of the ISO committee on surgical implants, he was very influential and practical about issues like standardisation of screws.

An example of his expertise and competence as a researcher is an article he wrote for the 1969 Metallurgical Review on the stress corrosion cracking of metals. His command of the subject and his broad and balanced overview of the topic are evidenced by the summary in the article which reads in part "a comprehensive explanation of the occurrence of stress corrosion cracking would necessarily account for the dependence of the phenomenon on the composition and structure of the material, the presence of a tensile stress, the temperature and the specificity of the environment. With all these variables to be considered and as the available data come from a variety of sources which, in many cases, do not completely specify the experimental conditions, the postulation of a single mechanism for all stress corrosion failures is virtually an impossible task. However, the preponderance of evidence currently available points to several features which are invariably applicable to stress corrosion failures and it is from such features that a generally satisfactory concept other phenomenon can be drawn, although the origin and extent of some of these may differ from case to case."

In addition to his ongoing heavy involvement in research Professor Keys led the Department of Materials in the School where his lecturing focused on materials for engineering students. These lectures were presented in the large University lecture theatres to hundreds of students who were sometimes difficult to motivate, unlike the much smaller numbers of metallurgy students.

Part of this materials course included six practical sessions in basic metallurgy conducted in the School of Metallurgy and run by the metallurgy post-graduate students as demonstrators. For the demonstrators, this involved setting up the laboratory, marking the roll, giving a 30 minute lecture, conducting the experiment safely within three hours, collecting the reports from the students, cleaning up the lab, marking the assignments and submitting the assessment at the end of the course. Due to the large numbers of engineering students and the limit of 15 students per practical class, the set of classes had to be repeated many times during the year. All this enormous amount of activity was supervised by Professor Keys and was a massive contribution to the teaching responsibilities and influence of the School of Metallurgy.

Upon retirement, he moved to Bicheno, Tasmania for a quieter life, but continued some consulting. In later years he made several overseas trips, including to Paris to visit former colleagues at the Sorbonne University, and shared his life and travels with his wife Peggy.

Professor Keys had a wide range of outside interests that are summarised in a 1961 Metallurgical Review article about the award of his MSc as “music, shootin”, huntin and fishin”, rugby union, and growing garden goodies for gourmandising.”

Lew (Dr. Lewis Henry Keys), gregarious and friendly as we remember him. Early1970s with Bruce Harris (left) and Paul McCormick (centre).

During his career in the School of Metallurgy at UNSW Lew showed himself to be a well prepared and thorough teacher. One of us (Ian) remembers Lew as "knowledgeable, approachable and friendly" with good ideas for research. As befits a dedicated teacher and researcher he was at times distracted with a wide range of professional activities and the ongoing load of the materials classes for engineering students. However, when needed, he focussed on helping and enabling his students.

The other two of us (Phillip and Bruce) remember Lew as always immaculately dressed and probably the best dressed professor in metallurgy. He was personable, well-liked by all and always had a friendly word. As one example, when we were working together on a pilot plant in the process wing of the then School of Metallurgy, we both appreciated Lew passing by and offering encouragement.

Professor Lewis Henry Keys was almost certainly the last surviving member of a group of academics who graced the School of Metallurgy in its pioneering years. He was a distinguished academic and made a positive difference to the education and training of a legion of undergraduate and post graduate members.

He will be remembered as a decent and honourable man who served our country in its time of greatest peril and as one who had the highest standards of professional and personal integrity. Lew is survived by a niece and two nephews.

We are grateful to have been able to honour Lew's memory in this manner.

May he rest in peace.

Turramurra, Montreal and Lakewood *February – March 2022*

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