ARCHIBALD LIVERSIDGE (1847–1927)
PIONEER GOLD GEOLOGIST AND GEOCHEMIST

The crystal cluster featured on the cover of this issue of *Elements* is informally named the "Liversidge nugget" after Archibald Liversidge, FRS, an important early protagonist for science in Australia (Fig. 1). A woodcut of the nugget (Fig. 2) appeared on the front cover and in Figure 1 of the 1888 edition of his *The Minerals of New South Wales*. He is pictured holding the nugget in his portrait (Fig. 1). He regarded this "beautiful group of crystals [as] perhaps one of the finest in existence", describing them as "for the most part imperfect octahedral and elongated cubes; some have imperfectly developed faces of the rhombic dodecahedron, joined end to end in an arborescent form." The nugget had been acquired by the Royal Museum of Science and Art in Edinburgh (now the National Museum of Scotland), but its provenance is uncertain, though probably New South Wales.

Archibald Liversidge was born in London and educated at the Royal School of Mines and at the University of Cambridge. In 1872, he was appointed Reader in Geology at the University of Sydney and two years later was promoted to Professor in Geology and Mineralogy. He was instrumental in the establishment not only of geology but also the teaching of all sciences at the university, countering the argument of the Principal and Classics Professor, Charles Badham, who dismissed the need for teaching science (chemistry, physics and geology) as they "are ornaments of the memory which may be acquired at any time of life"! He was made Dean of the Faculty of Science when it was established in 1879, a position he held until his retirement and return to England in 1907. In 1882, Liversidge was elected a Fellow of the Royal Society of London. He was one of the first to encourage women to enroll in university courses and was prominent in popularizing science through public lectures. He helped establish the Industrial, Technological and Sanitary Museum, Sydney, now the Powerhouse Museum, and revived the ailing Royal Society of New South Wales, of which he was president three times. He played a major role in the establishment of the Australasian Association for the Advancement of Science (later ANZAAS), which held its first congress in 1888, being its honorary secretary until 1909 and president in 1898. Liversidge was in some ways a typical Victorian polymath and published on a wide range of subjects, including analytical chemistry, agriculture, astronomy and anthropology, but his principal contributions were in mineralogy, chemistry and geology.

FIGURE 1 – Archibald Liversidge, 1909. Portrait by John Collier (1850–1934). Oil on canvas (detail). Commissioned by the University of Sydney. ©Art Collection, University of Sydney

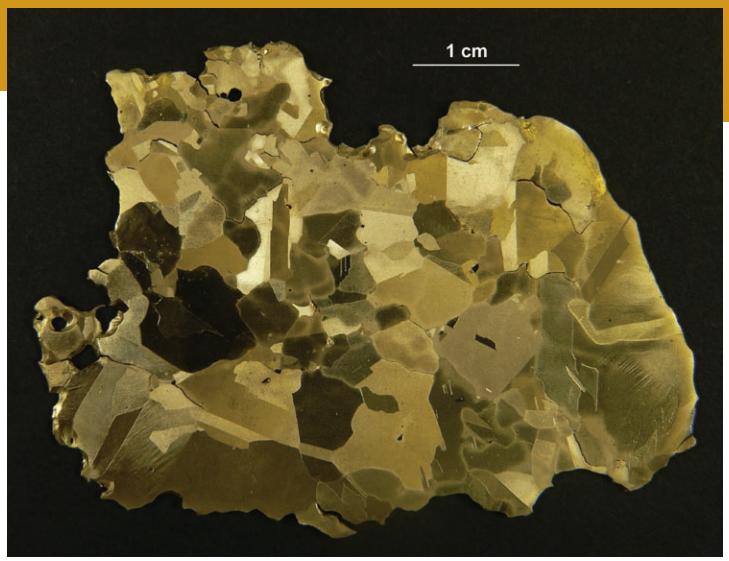

FIGURE 3 – Polished section of Liversidge's nugget from Coolgardie. Courtesy Natural History Museum, London (photograph CRM Butt, 2007)

FIGURE 2 – The Liversidge nugget, gold foil–stamped woodcut image from the front cover of *The Minerals of New South Wales*, Liversidge 1888

Liversidge's tenure at the University of Sydney corresponded with years when gold prospecting and mining were of major economic and cultural importance in Australia. He devoted considerable effort to the study of gold and, in particular, entered the debate concerning the origin of nuggets – were they formed in situ in placers or are they only detrital? He studied the composition and crystallography of numerous nuggets, many now archived in the Natural History Museum, London (Fig. 3), noting their silver content and their polycrystalline structure. He also conducted many experiments on the mobility of gold relevant to the weathering environment, finding that gold was soluble in aqueous sulphide, organic and acid halide solutions and re-precipitated, *inter alia*, as octahedral crystals and hexagonal plates. He also noted that gold may be removed from solution and suspension by "fungoid growths". He made one of the first estimates of the abundance of gold in sea water and found that gold is concentrated in some seaweeds. Nevertheless, despite showing the undoubted mobility of gold under Earth-surface conditions, Liversidge concluded that the majority of, if not all, nuggets are hypogene in origin. Over the next 100 years, his papers and conclusions were largely forgotten or ignored, and the perception that most nuggets are supergene returned to haunt another generation. Liversidge's work is echoed by three articles in this issue of *Elements* (Hough et al., Williams-Jones et al., Southam et al.), recognizing his status as a pioneer in the field.

Acknowledgments: Biographical information was obtained from Professor Roy McLeod and from published sources.

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