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CUED WEBSITE: SUPPLEMENTARY MATERIAL (www.eng.cam.ac.uk/to/oatley)

Research at the Cambridge University Engineering Department
Post-Stereoscan (Chapter 5.6 in full)

 K. C. A. SMITH, B. C. BRETON AND N. H. M. CALDWELL

Bibliography of Scanning Electron Microscopy, CUED,
1951–2004

 K. C. A. SMITH, B. C. BRETON, N. H. M. CALDWELL
 AND D. McMULLAN

A Brief History of the Cambridge Instrument Co.
 D. J. UNWIN

V. E. COSSLITT, F.R.S (The Oxford Dictionary of National Biography)
 D. McMULLAN