Meeting: 1003, Atlanta, Georgia, SS 3A, AMS-MAA Special Session on History of Mathematics, I

1003-01-900 **Anthony J. Crilly*** (t.crilly@mdx.ac.uk), Middlesex University, The Burroughs, Hendon, NW4 4BT London, England. *Matrices without numbers.*

Arthur Cayley's memoir on matrix algebra (1858), the "immortal memoir," has been the focus of attention for both historians and mathematicians on many occasions. Much has been written about it, but what more can it tell us about the early history of matrix algebra? I shall look again at this memoir, but from Cayley's frame of reference. One observation which can be made is that Cayley's matrices are not "numerical," but have symbolic entries–a fact which connects his matrices to the calculus of operations, symbolical algebra, and invariant theory.

Cayley's was prompted to write the paper by his discovery of the celebrated "Cayley-Hamilton" theorem, a theorem which has been the source of many further investigations and source of mathematical activity–it is a spectacular result. That Cayley did not prove the theorem is well known. The real mystery lies not in this, but in how he actually discovered it–to the modern reader the theorem involves an "illegal" step. I hope to explain why this was entirely legal in Cayley's time. Finally I shall note that Cayley's involvement with invariant theory lead him to a deeper result, one which he left unpublished. (Received September 30, 2004)