# Chancery barrister and mathematician: Arthur Cayley (1821-1895)

COMMENTARY BY EMILY CAMPBELL, 16TH DECEMBER 2021

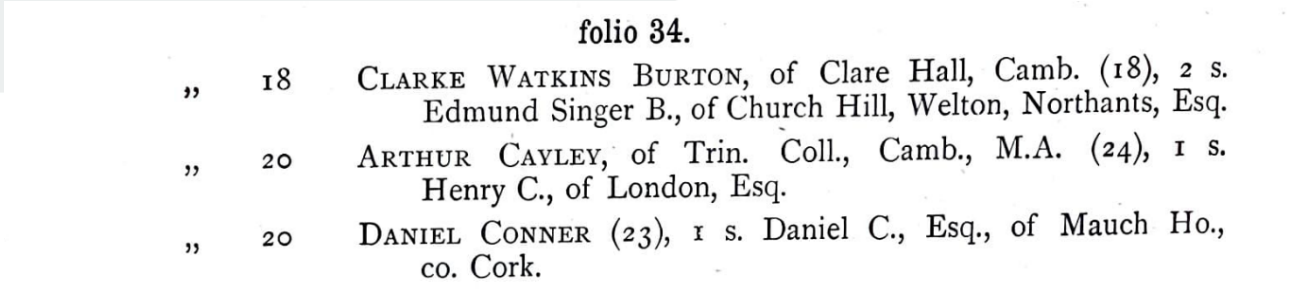
The Chancery Bar has a long history of mathematician barristers, some of them famous. For a period, there was a tradition that the "Senior Wrangler", the student[1] who had performed best in the Cambridge university mathematical tripos exams, should go on to pursue a career as a barrister in Lincoln's Inn. Moreover, the man in whose honour my Chambers is named, the late Richard Wilberforce, was a gifted mathematician, with a lifelong interest in mathematics and science.

As mathematics was my favorite subject at school, it has always interested me how the process of analysis seems to be different for those with alternative academic backgrounds. Mathematicians, for example, appear often to make significant use of visualisation when thinking about problems. How the process of analysis occurs is, however, rarely spoken about. "*Aren't companies round and aren't the trustees at the top?*", I ask a colleague. "*At the top of what?*" he answers. "*I think in words*".

The journalist Dominic Lawson recently described his "aphantasia" – an inability to form mental images[2]. However, visualisation is particularly helpful for trust and tax lawyers, as they are required to be able to understand complex abstract structures. So, it was with delight that I recently learned that perhaps the finest English mathematician of the Victorian age was also a Chancery barrister, and it is the purpose of this article to tell you a bit about him.

[1] I should really say "male student". In 1890, Philipa Fawcett was placed first in the exams, but as such was awarded the place of "*above the Senior Wrangler*", the latter accolade being reserved for a man. Of course, no woman was admitted to the Bar by Lincoln's Inn until some 30 years later.
[2] Daily Mail, 1 November 2021.

Arthur Cayley was born on 16 August 1821 in Richmond, Surrey, the son of a merchant to Russia. Spending part of his early life in Russia, the young Cayley returned to England with his family in 1829. The family settled in Blackheath, and Cayley attended a private school there, before moving to King's College School, London at the age of 14. His exceptional ability in mathematics was evident from an early age, and at his senior school he added to this a flair for chemistry, an area of interest which he maintained throughout his life. In 1838 he went up to Trinity College, Cambridge, going on to become Senior Wrangler in the mathematical tripos exams as well as winner of the prestigious Smith's Prize. A sketch of his presentation to the Vice Chancellor as Senior Wrangler survives[3]. He became a fellow of Trinity College later that year, one of the youngest of the 19th century. The fellowship was of limited duration, however, and therefore his long-term options in Cambridge were to take holy orders (for which, although a devout Christian, he felt no vocation) or to obtain a permanent position at the university, if available. In the event, he had no option but to choose a profession – and he chose the law.



folio 34.

„ 18 CLARKE WATKINS BURTON, of Clare Hall, Camb. (18), 2 s. Edmund Singer B., of Church Hill, Welton, Northants, Esq.

„ 20 ARTHUR CAYLEY, of Trin. Coll., Camb., M.A. (24), 1 s. Henry C., of London, Esq.

„ 20 DANIEL CONNER (23), 1 s. Daniel C., Esq., of Mauch Ho., co. Cork.

**Fig. Extract from Admissions Records of the Honourable Society of Lincoln's Inn, 20 April 1896**

Cayley was not the first lawyer in his family. His great-great-grandfather, Cornelius Cayley (1692-1779) had been a prominent member of the Bar and a Recorder in Kingston-upon-Hull. On 20 April 1846, Cayley was admitted as a member of Lincoln's Inn, becoming a pupil of the famous conveyancer, Jonathan Henry Christie. Christie was a colourful character, of some notoriety. In February 1821, he was one of the last men to fight a duel by pistols on English soil, for which he was tried for murder and acquitted. The duel, which took place at a popular duelling spot by Chalk Farm Tavern, near Primrose Hill, was the result of a literary spat.

[3] Victor A Huber, *The English Universities* (London, 1843).

The conveyancer M G Davidson, nephew to the pre-eminent conveyancer Charles Davidson[4], reported the following story of Cayley's first interview with Mr Christie at his Chambers based in 2 Stone Buildings:-

"*Mr Cayley arrived at Stone Buildings, sent in his card, was admitted, and asked to be taken as a pupil. Christie inquired whether he had any introduction; the reply was, No. Had he been at a University? Yes. Christie, who seldom had a vacant chair in his pupil room, used to describe himself as not having been very favourably inclined towards this monosyllabic applicant. However, he had been at the University and it might be worth while to inquire further. Christie did so, and by successive and separate questions elicited the information that Cayley's University was Cambridge; his college Trinity; that he had taken a degree; in honours; in mathematical honours; that he had been a Wrangler; that he had been Senior Wrangler. That, of course, was enough and Christie managed to find room for this applicant, whose modesty appeared to be as remarkable as his distinctions…*"[5]

A fellow pupil, T.C. Wright[6], said:-

> "*…We fellow-pupils knew that Arthur Cayley had been the Senior Wrangler of his year, and that he possessed extraordinary abilities; but they were not indicated by his personal bearing, and the retiring modesty of his disposition prevented him from ever alluding to the honours he had won at Cambridge. He had one of the most unsophisticated minds I have ever known; jokes, and the badinage of the pupil-room, seemed to be delightful novelties to him, and his face beamed with amusement as he listened to them without taking much part in the conversation, being content to devote his time assiduously to work which I suspect was not altogether congenial to his taste…*"[7]

Cayley was called to the Bar on 3 May 1849 and proceeded to act as devil for Christie, the former eschewing his own work to allow time for his substantial mathematical endeavours. Despite his lively youth, Christie was spoken of as the greatest conveyancer of his day and, with a large practice, becoming one of the first six conveyancing counsel of the Court. Cayley later spoke of work which Christie did

[4] Author of *Davidson's Precedents and Forms in Conveyancing*, mentioned in the text below.
[5] *The Institute, A Club of Conveyancing Counsel: Memoirs of Former Members (1895-1907)*, John Savill Vaizey.
[6] Also the first pupil of Charles Davidson.
[7] *The collected mathematical papers of Arthur Cayley* (1895), Cambridge University Press ed AR Forsyth.

while he was with him for clients such as the following: the Law Life Assurance Company, The Marquis of Bute, the Black Sluice Drainage, the Portarlington Estates, Settlements of the Staffordshire Estates of the Earl of Shrewsbury and the Lancashire Estates of the Earl of Crawford and Balcarres. Christie retired from practice in 1862 at the age of 70. It is unlikely to be a coincidence that Cayley left the Bar in 1863 to take up the Sadlerian Professor of Pure Mathematics at Cambridge.

Unsurprisingly, Cayley was a gifted draftsman. A precedent work praises his skill. In *Davidson's Precedents and Forms in Conveyancing* (3rd ed, 1873)[8], the author adds a footnote to a precedent calling "*attention to the remarkable skill exhibited in* [a] *settlement, the work of Arthur Cayley*". No doubt he could have been an easy rival and successor of Christie. But he never let his legal work distract from his true calling as a mathematician. Many of his friends around legal London were Cambridge-educated mathematicians. One of them, James Joseph Sylvester[9], was an actuary-turned barrister and Sylvester is himself regarded as having made fundamental contributions to mathematics. Sylvester and Cayley would walk round the squares of Lincoln's Inn discussing mathematical ideas, one area of particular interest to them being an important field of study in the late 19th century, that of invariant theory, which is related to the idea that certain points are stable under transformations such as reflections. Other friends of Cayley included Charles Hargreave (1820-1866), who also worked for Christie and won a Royal Society Gold Medal in 1844 for his work on differential equations.

In June 1848, during his pupillage, Cayley travelled to Dublin, where he attended lectures by the Irish mathematician, William Rowan Hamilton, on *quaternions*, a number system extending the complex numbers and incorporating the surprising aspect that the square of each of three of these numbers (*i, j* and *k)* is equal to -1 and that multiplication is not commutative – i.e. a different result may be obtained by the multiplication of two numbers, depending on which number is placed first. A famous story attends the discovery of quaternions by Hamilton in 1843. He was walking out along the Royal Canal in Dublin with his wife when the solution suddenly occurred to

[8] Part II, p 1067.

[9] In 1837, Sylvester came second in the Cambridge mathematics tripos exams, but was prevented from taking his degree, as he was Jewish and therefore could not fulfil the religious requirements. He worked as a barrister between 1850 and 1855, when he left to become a professor of mathematics.

him, causing him to carve the relevant equation using a penknife into the side of the nearby Broom Bridge (a plaque is now to be found there).

Cayley was fascinated by quaternions, and rightly so given his interest in abstract or structural algebra. In 1854, he published his paper *On the theory of groups*. The importance of group theory in the development of pure mathematics cannot be underestimated, nor can the role of Cayley. To this day, certain tables used in group theory are named after him ("*Cayley* tables"). A group is a set of processes, which can be combined together in certain symmetrical ways to produce other members of the set. It was discovered that groups could only take a finite number of abstract template structures. To take an example, groups with four elements either have the same structure as the group of the four rotations of the square ("*the cyclic group of order 4*") or the group of four symmetries (rotations and reflections) of the rectangle ("*the Klein group, V*"). The quaternion group can similarly be seen to define a particular group structure ("*the dicyclic group of order 8*"),

Cayley's mathematical output during his 14 years at the Bar was prodigious. He wrote between two and three hundred papers during the period 1849 to 1863, including some of his most brilliant discoveries. He was elected a member of the Royal Society on 3 June 1852.

After Cayley left the Bar, he remained as Sadlerian Professor for the rest of his life. He married in 1863, the year he went back to Cambridge, to Susan, and they had two children. Theirs is said to have been a very happy marriage. Cayley died in 1894, aged 74.

A rumour attributed to Cayley the statement that "*the object of law was to say a thing in the greatest number of words, and of mathematics to say it in the fewest*", a view and the possibility of ever having held it which he repudiated. Had he said it, he would no doubt have had scores of sympathisers.

The heirs of the skills and drafting work practised by Christie, Cayley and their contemporaries remain today at the Chancery Bar in Lincoln's Inn, albeit in modest numbers – some of them at Wilberforce Chambers. The Chancery Bar has expanded greatly, but mainly in the field of litigation, as cross-fertilised by the work of the Commercial Bar. Court-work and the fanfare of the advocacy qualification that is the appointment as Queen's Counsel dominate attention and prestige. I would, however,

argue that the heart and soul of Lincoln's Inn remains in its traditional roots. When one looks at the likes of Arthur Cayley, we can be sure that it is an honour to act as their successors.

Sources

- *The Institute, A Club of Conveyancing Counsel: Memoirs of Former Members (1895-1907),* John Savill Vaizey
- *The collected mathematical papers of Arthur Cayley* (1895), Cambridge University Press ed AR Forsyth
- *The Young Arthur Cayley* (1998) by Tony Crilly, Notes and Records of the Royal Society of London
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