Joseph Crabtree: The Father of the Computer

Madam President, Distinguished Elders and Scholars of the Foundation, I stand before you tonight, as have other orators, with considerable trepidation. The depth of scholarship and the sheer skill with which past orators have revealed the brilliant works of Our Hero are very hard acts to follow. Indeed if it were not for the painstaking work of previous orators, I would not, could not be here speaking to you tonight on this topic. I stand upon the shoulders of giants.

I make no apology that my oration tonight is on a serious topic. It concerns the most important technology of our time, as our Prime Minister has said quite often (and he should know; he's made a lot of money out of it.)

In addressing this seriousness, I am reminded of the opening words of the 1978 UCL Chapter Oration, *The Cleansing of Crabtree*, by the great English classicist, Arthur Tattersall:[1]

> "I have sadly concluded that, after the purity of scholarship which we have enjoyed in the first flush of Crabtree studies, we have in more recent times been subjected to a growing coarseness, a salacious crudity, a shameful degree of innuendo and double entendre, unworthy [] of our revered poet."

As you know tonight I will be revealing, with much purity of scholarship and, I hope, with a minimum of crudity and coarseness, hitherto unknown facts about Crabtree's role in the development of the computer. What I intend to do in my exposition of this most serious of fields is:

a. take you briefly through what is today accepted as the history of the development of the computer, in particular the 19th century aspects of it;

b. revisit key parts of that history and explain what *really* happened.

We generally recognize today's electronic computer as having its beginnings in the depths of World War II. As usual the Americans jumped the gun and claimed their ENIAC development as the first flowering of the technology, but it soon emerged that the early and more significant system was the Colossus development at Britain's Bletchley Park, built by a team including the great Alan Turing.

When people began to look seriously at the history of the development of the computer, it was soon discovered that the theoretical and philosophical underpinnings went back a long way, in fact to the early 19th century. The key individuals identified were:

- Charles Babbage, brilliant mathematician and inventor, who in 1822 had designed a "Difference Engine" (in effect a calculator) and then from 1833 worked on an "Analytical Engine" which included many of the essential elements of a computer: instructions, branches, loops, etc.

1 Bennett B. & Negley H. Eds, *The Crabtree Orations 1954-1994*, The Crabtree Foundation, London. P. 175

- Ada Lovelace, daughter of Byron and skilled mathematician, who worked with Babbage on the Analytical Engine, and who is claimed by many to be the world's first computer programmer.

I need to dwell on Ada for a moment as she is central to this tale.

Augusta Ada Byron was the only legitimate child of the poet Byron, who separated from his wife, Annabella Millbanke, when Ada was but one month old. Ada was largely raised by her grandmother, and we are told her mother insisted that she be kept away from poetry and instead be taught mathematics; it is said this was to avoid her father's insanity. (Her childhood was the inspiration for Tom Stoppard's great 1993 play "Arcadia".) Ada excelled at mathematics and eventually became a correspondence student of Augustus De Morgan, professor of mathematics at UCL. (She was clearly a feisty young woman, as at 17 she had an affair with her resident tutor and tried to elope with him.) At 20 she married William, Baron King, who three years later was raised to Earl of Lovelace, making Ada the Countess of Lovelace.

In 1833, at the age of 18, she was introduced to Babbage and worked with him on the Analytical Engine. Women at that time faced huge difficulties in engaging in intellectual activities: they could not go to university, join learned societies, publish papers, etc. etc. In 1842 Ada had an opportunity to get her thoughts and developments in print. In 1840 Babbage had given a talk at the University of Turin on the Analytical Engine, and a report in French on the talk was written and published by a leading army engineer Luigi Menabrea (who was later to become Prime Minister of Italy). The scientist Charles Wheatstone invited Ada to prepare a translation for publication, and Babbage suggested she add some notes of her own. And add them she did. The seven sets of notes she appended to her translation came to three times the length of the translation itself, and as well as expanding on Menabrea's description of the Engine, her notes contained detailed instructions, what we would now call an algorithm, for having the Engine carry out a very complex calculation: the generation of Bernoulli numbers. It is this, her only publication, that has led to Ada being termed the first programmer.

Ada Lovelace's role in the Analytical Engine and the birth of computer software has been a huge source of controversy, with bitter arguments about it raging to the present day. Some claim she could not have done the work attributed to her and that other hands were at work, others support her as the likely sole author of the material she published.

The team of Babbage and Lovelace has been the subject of plays, stories, and even the ultimate modern accolade, the graphic novel: Sydney Padua's "The Thrilling Adventures of Lovelace and Babbage".

So those, Elders and Scholars, are the bare bones of the generally accepted story of the birth of the computer, and the starting place for my exploration. The one advantage I have had over previous explorers is that I am part of the community of Crabtree scholarship, and I am acutely aware that at the time in question an outstanding polymath was quietly influencing all the major developments of the day. As Arthur Tattersall remarked:[2]

> "a man who, with really sublime modesty, covered his tracks so well, and allowed others [..] to take credit for his productions."

2 Op. cit. p 175

If you think I am dwelling too much on Tattersall's work you are wrong, because it is he who led me to the key fact that has enabled the true history of the computer to be unravelled. Tattersall documented Crabtree cutting a swathe through London's poetical circles in the early part of the 19th century, and in his investigations he discovered a letter from Byron in which he described Crabtree, whom he detested, as "the man who usurped my place in bed one night [] six years ago, and gave Annabella more than she bargained for."[3]

Around the same time Byron wrote a poem containing these *hitherto* enigmatic lines:

>   I've seen my bride another's bride
>   Have seen her seated by his side
>   Have seen the infant which she bore
>   Wear the sweet smile the mother wore

Here was the proof that Byron was, to quote Tattersall: "promptly cuckolded by Crabtree"[4] after his 1815 marriage, which led to Crabtree's "fathering of Augusta Ada Byron" and Byron's subsequently turning "savagely cruel to his young bride."

So there it is, in black and white. I'm not making this up, as the great Anna Russell would say. Ada Lovelace was Crabtree's daughter. That changes everything. In particular it means that the evidence we have for Ada's life and works, and indeed Babbage's works too; the correspondence and the diaries, needs to be reassessed as there is clearly another key person involved. Shadowy figures, often only referred to by their initials, suddenly come to life once we know who was *really* involved in the story.

Ada was raised by her grandmother, Lady Judith Millbanke. Annabella effectively abandoned Ada in her earlier years, but did keep up a correspondence with her mother. From this we discover that Lady Judith had a confidant, a "deare friend and counsellor" who often stayed at their estate and guided her in Ada's education. Who was he? None other than Joseph Crabtree, who was the same age as Judith and well known to her family (the Noels) having been a drinking and whoring companion of her rather dissolute brother Thomas. Crabtree quickly identified Ada's potential in mathematics and as he was well acquainted with the leading mathematicians of the day was able to arrange a series of tutors, and eventually have her accepted as a student of De Morgan. In this he was aided by Mary Somerville, the leading female mathematician, with whom Crabtree had had a fling some years before between her marriages. In the aftermath of the elopement crisis of 1833 (surely Crabtree's genes were at work there), it was Crabtree, characteristically keeping in the background, who arranged for Mary to introduce Ada to Charles Babbage.

And where was Babbage in Crabtree's grand design for his offspring? Crabtree clearly saw quite early that Babbage was an ideal person both to carry forward some of his own creative ideas and to provide an outlet for his daughter's intellectual energy. In the late 1820s, when Babbage was working on his Difference Engine, Crabtree, who was of course acquainted with him, began to sow the seeds for what became the Analytical Engine. Babbage's diary and working notes contain many references to his inspirational discussions with "JC". "JC suggested …", "JC advised me to consider …", and so on. As Babbage was something of a religious mystic subsequent writers have assumed he was receiving guidance from the

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3 Op. cit. pp 179-180
4 Op. cit. p 177

Almighty, but it is clear today that the guiding hand, although of course exalted, was somewhat closer to the earth.

Crabtree also worked behind the scenes to have Babbage unexpectedly appointed as Lucasian Professor of Mathematics at Cambridge in 1828, a post for which had been rejected three times. It is rumoured that Crabtree was able to force the resignation of the incumbent, one George Airy, by threatening to expose some of his youthful misadventures. A totally modern academic, Babbage eventually left the position in 1839, having written 3 books, but never giving a lecture.

It was in the joint work on the Analytical Engine that the triumvirate flourished: Babbage concentrating on the hardware; Ada, in Babbage's words: "that Enchantress who has thrown her magic spell around the most abstract of Sciences", on what we now call the software; and Crabtree in the background, advising here, nudging there, always insisting that his name never be mentioned. Crabtree also quietly used his influence with the Duke of Wellington to arrange a £3,000 government grant towards building the Engine.

They were heady days, which reached their peak when Crabtree got his old friend Giovanni Plana to invite Babbage to Turin to speak about the Engine, which in turn led to Menabrea's paper and Ada's pioneering publication. Was the publication all Ada's work? Her notes and correspondence show she received detailed advice during its preparation, and many writers have assumed this came from Babbage. Armed with our new knowledge we can be sure that it came from Crabtree himself. We will never know how much was done by the father and how much by the daughter, but viewed from this distance it is clearly the work of Crabtree family genius.

Sadly, as the 1840s wore on the chances that the Analytical Engine would ever actually be built receded. The brilliant conception was simply far beyond the capabilities of the technology of the day, and as we now know it took another century before the world was ready for a construction of its complexity. Crabtree was by now in his mid 90s and, dare I say it, starting to slow down a little. Babbage was turning his mind to other challenges, in particular advanced cryptography. Only Ada, ever her father's daughter, was in the full flight of creativity, drafting ideas for taking the Engine into realms where it could handle objects, music, even poetry and philosophy. (In this she drew on, and possibly inspired, the work of her friend and contemporary George Boole, whose name is also now linked to the history of computing.)

The three decided to make sure their joint creation would be well placed to influence future developments. In great secrecy they created and documented a detailed design for highly advanced successor to the Analytical Engine, which they called the "Logic Machine". Crabtree was adamant that their grand design should only be revealed to someone who matched their genius, so he had Babbage encode it using his latest and most difficult encryption system, and entrusted it to the Mathematics Department at Cambridge with instructions that it be presented once each generation to a leading graduate in mathematical logic as a challenge.

Nearly a century passed before it was successfully decoded, but it is believed that in the mid-1930s the brilliant young Alan Turing, newly graduated, and about to head off to Princeton, finally cracked the code and revealed the wonders of the design to a group of scientists who would go on to develop the world's first working computers.

And that, Elders and Scholars is the True History of the Computer, a history from which Crabtree, that master of modesty, has been excluded until now. We can at last see that he was indeed the Father of The Computer, figuratively and to a large extent literally. His role in the process was, of course, truly semenal.