SPECIAL MINUTE

PROFESSOR DONALD MICHIE
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Donald Michie leaves Edinburgh after 26 years and a career of extra-ordinary diversity. He was born in Falkirk in 1923 into a family with strong banking connections. During his education at Rugby he demonstrated marked talents for golf, squash and chess. From Rugby he won, in 1942, an open scholarship to Balliol to read classics, but this had to be delayed because of the unfortunate state of international affairs. After setting a record for the shortest time as an infantry private, he was posted to Station X, the cypher school at Bletchley Park, where good use could be made of chess-playing open scholars. Events at Bletchley were a closely guarded secret until the thirty year rule allowed the release of a part of the story in 1975.

The details have an extraordinary fascination. All German military signals were encoded by a machine named Enigma. The output of a keyboard was transposed by a set of wheels carrying a pattern of scrambling wires which connected keys to different letters. The wheels were rotated with each character typed, which meant that a fresh transposition code was in use for every letter. With the right wheels and initial settings, de-coding was instan-taneous but without them the task appeared impossible. The Germans were confident that their signals were absolutely secure. However, a set of wheels was stolen by members of the Polish underground movement and smuggled to Britain. The cypher school at Bletchley was given the task of breaking Enigma and had priority to employ the finest minds in the country. Michie was an obvious recruit. He worked with Alan Turing on machines which tested random Enigma settings to see if intercepted messages could be turned into recognisable German text. The machine that they produced would today be called a computer. As a result of their work the supreme allied commanders were able, for most of the war, to read any German signal nearly as quickly as the intended recipient. It is difficult to imagine how the war could have been won without the results from Bletchley, and all too easy to see how it could have been lost.

Despite the dazzling success in war, when peace returned it was officially decided that there would be few industrial, commercial or scientific uses for the new technology. One of the reasons was that it was expected that a computing engine might need as many as a thousand bits of memory and that it would never be possible to achieve adequate reliability! The team was dispersed to civilian life. Michie took up his delayed scholarship at Oxford, but switched from classics to medicine.

Following the visit to St. Giles' Fair he acquired some pet mice, which he bred in the kitchen of his digs. The observation that the patterns of the fur of successive generations of Michie mice did not correspond with received views on genetics prompted discussions with eminent professors of the subject, a D.Phil., and later a D.Sc.

After a period of work as a research associate at University College and the Royal Veterinary College in London, he was offered a non-teaching Senior Lectureship in Immunology at Edinburgh in 1961. He developed statistical tests for tissue matches in kidney transplants that are the standard technique today. In 1962 he was awarded a Readership in Surgical Science. His computing interests remained at the hobby level but involved a spectacular bet. Michie was challenged to build a machine which would learn to play noughts and crosses. His apparatus consisted of an array of match boxes containing beads to represent each possible position and the options open. Successful moves were reinforced by the addition of beads so that the probability of winning (or at least not losing) steadily increased. In the early sixties the idea was revolutionary in its implications. The bet was won.

Michie's interest in machines which could learn won him an invitation as visiting Professor in Electrical Engineering to Stanford. During this visit to America his involvement with computing was rekindled while visiting a USAF project for the machine analysis of language. On his return he persuaded the Chairman of Elliot Automation to give Edinburgh a generous discount for a computer and set up the second multi-access time-sharing system in the country. (This was shortly after the time at which official estimates put for the number of computers needed in Britain at five.) Edinburgh's pre-eminence in artificial intelligence can be traced to Michie's Experimental Programming Unit, which was set up after his transfer from Surgical Science in 1965. He gathered a dedicated group of junior researchers and instilled in them the highest levels of enthusiasm for the new subject. He was closely associated with Bernard Meltzer's Meta-Mathematics unit, which did pioneering work in the computer proof of mathematical theorems. From 1966 they organised a series of Machine Intelligence Workshops which have produced a regular stream of books. Michie was awarded a Personal Chair in Machine Intelligence in 1967.

In 1968 the group set about the construction of robots with vision, touch and mobility. By 1972 the system was envied by leading laboratories in America and Japan. Indeed even today leading car producers are astonished at the date of the Edinburgh achievement. Unfortunately it was officially decided that there would be few industrial or commercial uses for the new techniques, the project was closed and the team was dispersed.

Michie moved on to the development of expert systems and in 1979, in company with John McCarthy, lost by a narrow margin a bet about computer chess. The bets had been laid in 1969 in response to comments from David Levy, the current Scottish chess champion, that computers would never be able to approach the best human players. Opinion amongst the artificial intelligentsia was fairly evenly divided. But very few people except Michie ever imagined that respectable chess could be played by a machine that would fit in your pocket and cost less than a tankful of petrol. David Levy won his bet in 1979. It would be interesting to know if he would accept a second.

A career which covers classics, code-breaking, genetics, kidney transplants, electrical engineering, computers and robots requires many midstream jumps. Donald Michie manages to make original contributions to a new field of interest in an astonishingly short time. His predictions about the progress of personal computing and robots have proved correct. Shortly to be fulfilled is one about the success of computers at medical diagnosis. His next achievement will be unpredictable as the output of an Enigma machine. The only features that can safely be excluded from its description are dullness and tranquillity.