Grace Chisholm Young, the first woman set theorist.

by Mirna Džamonja

The annals of set theory mention a large group of enthusiastic mathematicians working on set theory at the end of the XIXth and the beginning of the XXth century, including Cantor, Bernstein, Dedekind, Hilbert and many others. At least one of them was a woman, Grace Chisholm (1868-1944). After getting her undergraduate and Part II degree at Girton College in Cambridge (where she entered in 1889), she obtained her doctoral degree in Göttingen in 1895 under the supervision of Felix Klein, with the thesis entitled *Algebraisch-gruppentheoretische Untersuchungen zur sphärischen Trigonometrie* (*Algebraic Groups of Spherical Trigonometry*). She was the first woman to obtain a doctorate in Germany, (although Sophie Germain had an honorary doctorate from the same institution in 1831). It was not possible to study for a doctoral degree for a woman in the UK then, which is why Chisholm went to study in Germany. In fact, it was close to impossible to get any degree : at Cambridge men and women were graded on separate although related lists and women were not allowed in graduate school.

Chisholm married a fellow mathematician William Henry Young (1863-1942) in 1896. This is the same Young who finally proved Cantor's conjecture on the sets of uniqueness, showing that an arbitrary countable set is a set of uniqueness [3]. However, this did not happen overnight and, in fact, at the beginning Young was not working in research. Felix Klein invited both Chisholm and Young to Göttingen in order to allow them to pursue research and suggested that they go to Turin, where they learned set theory. Klein was a great believer in 'new mathematics' and encouraged junior colleagues to study it. Chisholm and Young stayed in Göttingen until 1908, when they moved to Geneva.

Chisholm published both under her own name, as Chisholm-Young and in joint work with her husband. In particular, they are co-authors of a book in set theory [1], indeed the first book in set theory ever published. She also did research in medicine (she finished a medical degree except for the internship) and wrote children's books. In fact, medicine is what she had wanted to study at the beginning, but her family would not allow it.

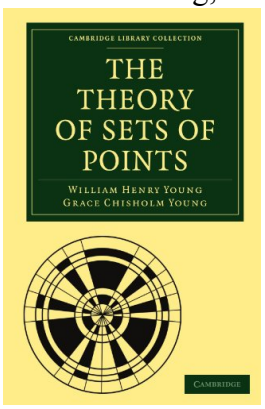
Chisholm and Young had six children, of which two became mathematicians : Rosalind Tanner (1900-1992) and Laurence Chisholm Young (1905-2000). Laurence Young worked in measure theory and gave his name to the Young measures. Of the 14 Chisholm and Young grandchildren, one is also a mathematician, Sylvia Wiegand (born in 1943, a daughter of Laurence Chisholm Young).

Cantor said of the book [1]: 'It is a pleasure for me to see with what diligence, skill and success you have worked.' Here is the first paragraph of the preface.

The present volume is an attempt at a simple presentation of one of the most recent branches of mathematical science. It has involved an amount of labour which would seem to the average reader quite out of proportion to the size of the book; yet I can scarcely hope that the mode of presentation will appeal equally to all mathematicians. There are no definitely accepted landmarks in the didactic treatment of Georg Cantor's magnificent theory, which is the subject of the present volume. A few of the most modern books on the Theory of Functions devote some pages to the establishment of certain results belonging to our subject, and required for the special purposes in hand. There is moreover in existence the first half of Schoenflies's useful Bericht über die Mengenlehre. The philosophical point of view is discussed to some extent in Russell's Principles of Mathematics. But we may fairly claim that the present work is the first attempt at a systematic exposition of the subject as a whole.

Selected Bibliography

[1] W. H. Young and Grace Chisholm Young, 'The Theory of Sets and Points' (1906),



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[2] W. H. Young and Grace Chisholm Young, 'On Derivatives and the Theorem of the Mean' (1909), Quart. J. XL pp. 1-26

[3] W. H. Young (1909) 'On the Discontinuities of a Function of One or More Real Variables',
Proc. LMS, ser. 2, volume 8, pp. 117-124.