BO1.1 History of Mathematics
Sheet 0   —   HT22: Reading Course

Circulation of Differential Calculus between France and Britain, c. 1800-1820

Christmas Vacation Reading

During the lecture course we looked at numerous different definitions of differentials, derived functions, and differential coefficients, all of which were identified in some way with the modern concept of differentiation (and perhaps the modern concept of a derivative). Many of these definitions emerged at the end of the eighteenth or the beginning of the nineteenth century, and were motivated by a desire to give a 'purely algebraic' treatment of the calculus, removed from infinitesimals, limits, or fluxions. At the same time, research in the calculus in Britain had diverged from that undertaken in continental Europe, with the former being described as more 'geometric' and the latter more 'algebraic'. Owing to the powerful applications of continental methods of the calculus to the physical sciences, the opinion that mathematics was in decline in Britain began to take hold. In the reading course we will look at how and why French mathematics, especially work on the differential calculus, was consciously imported into Britain in order to combat this perceived decline. We will pay particularly close attention to the variety of definitions and concepts which were used to constitute the differential calculus by mathematicians in Britain.

To do this, we will examine extracts from a variety of different sources, including: a book review by John Playfair (1748–1819); the Question & Answer section of *The New Series of the Mathematical Repository*, especially solutions by William Wallace (1768–1843) and Mary Somerville (1780–1872); and an English translation of Sylvestre-François Lacroix's 1802 *Traité élémentaire de calcul différentiel et de calcul intégral* by members of the Analytical Society of Cambridge, notably John Herschel (1792–1871), George Peacock (1791–1858), and Charles Babbage (1791–1871). Your reading for the course will start from, but will not be limited to, the texts mentioned here: as during the lecture course, the emphasis will be on the use of *original sources* (in translation where necessary). It should be noted that the recommended reading that will appear on the O1 course page will represent the bare minimum of reading needed: you will be expected to uncover further material for yourselves, which will then be the subject of discussion during our classes.

As preparation for the reading course, please read biographical material on the various figures mentioned above. A good starting point for this is the MacTutor History of Mathematics Archive, http://www-history.mcs.st-and.ac.uk/, which features short biographies of mathematicians. If you scroll down to the bottom of each biography, you will find a link to further published biographies and other relevant secondary sources, many of which are available electronically through SOLO. Other useful biographical resources that are available online are the *Oxford*

Dictionary of National Biography and the *Dictionary of Scientific Biography*, as mentioned at the beginning of the lecture course. You should go beyond the basic MacTutor biographies and explore the available material, particularly if certain parts of it grab your interest. You should be alert to the accuracy (or otherwise) of the materials that you read. We will discuss and compare the sources you have found in the first class of Hilary Term.

As further preparation, you should revise material which covered the developments of the calculus at the end of the eighteenth and beginning of the nineteenth centuries as described in the lecture course. Are there any other types of publication that would have contributed to the sharing of this mathematical knowledge at the time that you feel should receive attention during the reading course? If so, please come to the first class of Hilary Term with suggestions that you are prepared to defend!

Finally, as practice in locating online resources, in finding out what is available in your college library, and as practical preparation for the reading ahead, you should try to track down the main primary sources that we will be using throughout the reading course, namely:

- John Playfair, 'Traité de Méchanique Céleste. Par P. S. La Place', *Edinburgh Review* **11:22** (1808), 249–284.

- Thomas Leybourn (ed.), *The New Series of the Mathematical Repository*, Vol 4, London, 1819.

- Sylvestre-François Lacroix, *An Elementary Treatise on the Differential and Integral Calculus*, Cambridge, 1816.

These are all available online, via SOLO or otherwise — please see what you can find.