

THE MACLAURIN STUDENT NOTEBOOK

Glasgow University Archives and Special Collections ASC 010

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Part 1. Student Notebooks at the University of Glasgow

Scottish mathematician Colin MacLaurin (1698-1746) was only eleven years old when he matriculated at the University of Glasgow. Although young by today's standards, this was not uncommon for boys in Scotland in the early-eighteenth century. At that time, the academic program at Glasgow was modeled upon a "regent" system wherein every class of entering first-year students (bajans) was taught by a professor of Greek, Alexander Dunlop.¹ All courses after that were taught by a single regent who guided that particular class through their final three years (semis, tertians, and majistrands) (Grant and Murison, 1986). MacLaurin's regent was the renowned philosopher Gershom Carmichael, generally regarded as an important forerunner of the Scottish Enlightenment.²

During their enrollment at the University of Glasgow, certain students were tasked or volunteered to keep a record of lecture notes for specific courses that they were attending. Besides being a record of their academic instruction, the student notebooks sometimes included sketches, musical scores, and personal observations. It had been known that during 1712-1714 MacLaurin produced a notebook that contained, among other writings, notes that he took (dictates) on three of

¹ Alexander Dunlop (1684-1747) was appointed Professor of Greek at Glasgow in 1704 and resigned his chair in 1742 (Rigg and Lloyd, 2004). His 1709-1710 bejan student is identified as 'Colinus McLaurine' (University of Glasgow, 1854, p. 195).

² Gershom Carmichael (1672-1729) received masters degrees from the University of Edinburgh (1691) and the University of Glasgow (1693) before being appointed regent at Glasgow in 1694. A polymath, he taught all aspects of the philosophy curriculum including Greek, logic, metaphysics, moral philosophy and natural philosophy (Moore and Silverthorne, 2003).

Carmichael's courses on ethics and pneumatology.³ This notebook has only recently been located and transferred to the Glasgow University Archives and Special Collections. Found in very poor condition, it has now been refurbished and made available to anyone who wishes to examine it. As such, it provides unique insights into:

- MacLaurin's extraordinary mathematical background prior to writing his masters thesis
- MacLaurin's personal religious thoughts
- the academic curriculum at the University of Glasgow just preceding the Scottish Enlightenment

Relatively few Scottish student notebooks have survived: Christine Shepherd found a total of 170 for the period 1611-1723; only 47 of these were from the University of Glasgow (Shepherd, 1974, pp. 4-9, 344-357). All were written by students "whom time has forgotten" (Eddy, 2016, p.87).⁴ Thus the recent appearance of an example composed by one of Scotland's preeminent scholars represents an important discovery in Scottish historiography.

This paper will describe the provenance and journey of the MacLaurin Student Notebook for the past three centuries. It will also give a physical description of its

³ Although Carmichael's name is not specifically mentioned in the notebook, it is assumed that the dictates contained therein are his.

⁴ Only two Glasgow student notebooks survive from the period of MacLaurin's attendance: John Campbell (G.U.A. GB 247 MS Gen 12, 1713); Robert Sheddene (G.U.A. GB 247 MS Gen 71, 1714-15).

layout and condition. Finally, it will provide an overview of the contents of the notebook and suggest opportunities for further investigation.

Part 2. MacLaurin's Student Notebook

DATE	POSSESSION
1712-1746	Colin MacLaurin (1698-1746)
1746-1771	Sir Andrew Mitchell (1708-1771) British Envoy to Prussia
1771-1773	Sir Arthur Forbes (1709-1773) 4 th Baronet of Craigievar
1773-1952	Fintray House Library Hatton of Fintray (Aberdeenshire)
1952-1963	Craigievar Castle Library Lumphanan (Aberdeenshire)
1963-1970	Patrick Francis Doran (1929-2012) University of Limerick
1970-1974	Eric Gray Forbes (1933-1984) University of Edinburgh
1974-2023	Personal library of Patrick Francis Doran Castleconnell (County Limerick)
2023-present	University of Glasgow Archives and Special Collections

Colin MacLaurin received his masters degree from the University of Glasgow on 23 June 1713 for his thesis titled *De gravitate, aliisque viribus naturalibus* (*On gravity, and other natural forces*) (MacLaurin, 1713; printed and translated in Tweddle, 2007, pp. 6-43). He wrote this student notebook between 1712 (his semi year) and 1714 (the year he withdrew from postgraduate divinity studies at the university and returned to live with his uncle, Daniel MacLaurin, in Kilfinan on the Cowal peninsula of Scotland). The notebook remained with him throughout his

professional tenure at Marischal College and the University of Edinburgh. Upon his death in 1746, the notebook came into the possession of the British diplomat Sir Andrew Mitchell (1708-1771) (Scott, 2018). Mitchell was one of three of MacLaurin's protégées who assumed the task of preparing some of MacLaurin's papers to be published posthumously.⁵ However, this assignment ultimately was assumed by Patrick Murdoch, MacLaurin's former student and friend.

The notebook remained in the possession of Mitchell until his death in 1771 when his "plate furniture jewels books papers &c"⁶ were bequeathed to Sir Andrew Forbes (1709-1773), the 4th Baronet of Craigievar. Forbes was the husband of the niece of Mitchell's wife, Barbara, and lived at Fintray House, the Forbes-Sempill family estate in Aberdeenshire (Schweizer, 1989, p. 51). Forbes died only two years after Mitchell, but the notebook remained in the Fintray House Library until just prior to 1952. It was then that Fintray House was demolished, and the notebook (along with other papers of Mitchell) followed the Forbes-Sempill family when they relocated to Craigievar Castle twenty miles away. In 1974 the Mitchell papers at Craigievar were sold to the British Museum by Cecilia Alice (née Dunbar-Kilburn), Lady Forbes-Sempill (1903-1984), the second wife of the 19th Baron Sempill. However, the notebook did not appear on the inventory (B.L. Add 58283-58367).

⁵ The other two were Martin Folkes, president of the Royal Society, and the Reverend John Hill, chaplain to the Archbishop of Canterbury (Murdoch, 1748, p. xvii).

⁶ From the will of Sir Andrew Mitchell (B.L. Add Ch 75835).

The reason for this was that Lady Forbes-Sempill had loaned the notebook to Patrick Francis Doran (St. Mary's College, Twickenham) around 1963, and it was never returned.

Doran used the MacLaurin notebook in connection with his research for a Ph.D. thesis that he was writing on Andrew Mitchell's role as the British envoy to King Frederick the Great of Prussia during the Seven Years' War (Doran, 1986). Frederick had a keen interest in Isaac Newton, and Mitchell, as a colleague of MacLaurin, was able to provide the king with stories and details of his friend's early Newtonianism.

In the early-1970's, Doran loaned the notebook to Professor Eric Gray Forbes (1933-1984) of the University of Edinburgh. Forbes's graduate student, Christine Shepherd, used the notebook in connection with her 1974 Ph.D. research and translated one of the theses in it (E.U.L. CLX-A-213 folder 4 item 6). Forbes (or one of his students) made a typewritten transcription (E.U.L. CLX-A-213 folder 4 item 5) of the three theses as copied by MacLaurin, but by 1974 the notebook had been returned to Doran.

Patrick Francis Doran (1929-2012) carried the notebook with him to his new home in Ireland in 1974 where he had been appointed head of the European History Department and subsequently Dean of Arts, Humanities and Social Science at the National Institute of Higher Education (later the University of Limerick). After

Doran died the notebook remained in his personal library until it was located by his son, Hans Dermott Doran, in December 2022 (at the suggestion of this author). In June 2023, Lady Forbes-Sempill's daughter, Gabriel Sempill, donated the MacLaurin Student Notebook to the Glasgow University Archives and Special Collections where it now resides (G.U.A. ASC 010).



Glasgow University Archives & Special Collections – 28 September 2023
Left to right: Ian Tweddle, Stella Mills, David Horowitz, Isobel Falconer

Part 3. Layout of the Notebook

The MacLaurin Student Notebook is an octavo bound volume measuring 153 mm x 100 mm.⁷ It is handwritten on laid paper in black ink and contains material in Latin, English and – to a lesser extent – Greek. Its original binding is eighteenth-century brown tanned leather (probably sheepskin).

The notebook has 172 surviving folios and is written from both ends. We designate the “front” portion as the one which was missing its cover (that has now been replaced by the Glasgow University Archives and Special Collections during restoration). Its first page is titled “Praefatio” and contains the signature “Colinus M^cLaurin” at the top right-hand corner. The “rear” portion of the notebook is read by flipping the book on its spine and then rotating it 180°. On the inside rear cover (original) there is a 19th-century bookplate (pastedown) on which is printed a sketch of a cockerel along with the words “WATCH” and “FINTRAY HOUSE LIBRARY”.⁸ The press mark “J 32” also appears on the bookplate.

Part 4. Contents of the Notebook

Glasgow University Library’s numbering of the folios (inserted in pencil on each upper right-hand corner recto) begins in the front portion with “1” and runs

⁷ There was no standard size or format for such student notebooks, and some were even written “vertically” with the binding at the top/bottom of each page. MacLaurin’s page size is among the smallest of those that still exist.

⁸ These are the crest and motto of the Forbes family of Craigievar (Burke, 1884, p. 366).

consecutively throughout both portions of the notebook until concluding at “172”.

The front portion has 66 folios, and the rear portion has 106 folios. They meet between 66v and 67r. To distinguish the two portions in this table of contents, the folios delineating each section in the rear portion are given in decreasing order and identified with *italics*. REF letters (left column) are provided here only for reference; they are not part of the original notebook.

REF	Folios	Language	Description	First Words...
			FRONT PORTION	
	[i-ii]		Two paper flyleaves provided by the library during restoration	[blank]
			Evidence of two handwritten folios removed preceding the first page of this portion	
A	1r-33v	Latin	A thesis (presumably dictated by Gershom Carmichael) titled “Pars Prima Ethicae”. There is a typed transcription of this material in E.U.L. CLX-A-213 folder 4.	Colinus M ^c Laurin/Aug 16 1714/scriptsit hac/anno 1712/ Aug Sept
B	33v		Algebraic calculations involving of cubic polynomials	$py + t = 0$
C	34r			[blank]
D	34v-35r	English	A rhyming poem of ten stanzas (two lines each) praising God and His creations	To the Eternal awfull Lord
E	35v-36r			[blank]
F	36v-37r		Algebraic calculations involving of cubic polynomials	$y^3 + by^2 + x^3 + c = 0$
G	37v-47r	English	Notes on optics using geometric and Newtonian methods (with diagrams)	In the ellipse tis plain that all the reflected rays meet...
H	46v	Latin	A nonscientific observation written upside-down at the bottom of the page followed by a mathematical proportion (probably written sometime later)	sed non minor est voluptas...

I	47v-48v	English	Use of Newtonian methods to compute centers of percussion (with diagrams) These three pages are written upside down in relation to the front portion of the notebook; thus they begin on f. 48v and proceed through f. 47v.	For the centers of percussion of parabolic spaces...
J	49r-54v	English	Notes on planetary motion (with diagrams)	$= \cos = \frac{cx^4x}{2aa}$ [These first equations seem to indicate that this section is a continuation of previous writing.]
			Evidence of two handwritten folios removed preceding f. 55	
K	55r-57v	English	Notes on fluxions of logarithmic and exponential functions (with diagrams)	Hitherto we have considered Algebraic curves
L	58r-66v		Investigations of conics, exponentials, logarithms, spirals and other curves using Newtonian methods (with diagrams)	The nature of the curve line APB & the tangent PH
			REAR PORTION	
M	72v-67r	English	Worked problems on proportions, sequences, series, interest	Problem to find any number (n) of mean proportions between a & e.
N	74v-73r	English	Geometric discussion of the refraction of light (with diagram)	A geometrical construction of the progress of a ray of light
O	75r		Some arithmetic computations possibly dealing with refraction of light in the adjacent section (with diagrams)	$y:x :: S45^\circ:S20^\circ$
P	132v-75v	Latin	A thesis (presumably dictated by Gershom Carmichael) titled "Theses Ethicae" dated "1712". There is a partial typed transcription of this material in E.U.L. CLX-A-213 folder 4.	1712/Theses Ethicae
Q	83r-82v		Some mathematical computations (Newtonian) inserted in the middle of ff. 132v-75v (with diagrams)	Let $u = x$
R	133r	Latin	Faded note at top of page which contains MacLaurin's as well as another's name (Joann Welsh?). The bottom of the page contains a	Colinus M ^c Laurin haec scripsit

			(nonscientific) paragraph written in darker ink.	
<i>S</i>	<i>149v-133v</i>	Latin	A thesis (presumably dictated by Gershom Carmichael) titled “Theses Pneumatologicæ”. There is a typed transcription of this material in E.U.L. CLX-A-213 folder 4.	Theses Pneumatologicæ/Ima Inter omnes propositiones absolutas
			Evidence of one handwritten folio removed between f. 150 and f. 149	
<i>T</i>	<i>150r-149v</i>		Mathematical expressions/proportions (some written in darker ink or upside down)	$aeq - enf - bdq - \dots$
<i>U</i>	<i>162v-150v</i>	English	Notes on evolutes and other properties of curves (with diagrams). [N. B. “Mr. Huygens” is mentioned at the top of f. 158v]	O Fasion [sic] a thread to the convex part of the curve
			Evidence of two handwritten folios removed between f. 163 and f. 162	
<i>V</i>	<i>164r-163r</i>	Latin	An essay on infinity (nonmathematical)	maiora o e divisibilis in infiniti
<i>W</i>	<i>167r-164r</i>	English	Observations on Adam and Creation with Biblical citations	Adams [sic] who to Sovereignty [sic] is either from creation
<i>X</i>	<i>169v-167v</i>	Latin	Mathematical (Newtonian) and arithmetic computations with some notes [the lower portion and upper outer corner of f. 169 have been torn out]	$xd = xc$
<i>Y</i>	<i>171r-170r</i>	Latin	Notes (nonscientific) along with some mathematical expressions [the lower outer corner of f. 170 has been torn out]	Phrases Sive Eloquendi Formula Lauriores
<i>Z</i>	<i>172v-171r</i>	Greek & Latin	Notes (nonscientific) with Latin and Greek phrases interspersed	Phrases sive Loquendi formulae
			Evidence of two handwritten folios removed after f. 172	
			Two paper flyleaves provided by the library during restoration	[blank]

There are ten expository sections (A, D, H, *P*, *R*, *S*, *V*, *W*, *Y*, *Z*) which include Carmichael’s three theses, an original poem, observations on infinity, and an essay on Adam and Creation. Fourteen scientific or technical sections (B, F, G, I, J, K, L,

M, N, O, Q, T, U, X) include material on cubic polynomials, optics, centers of percussion, planetary motion, logarithmic and exponential functions, conics, spirals, sequences and series, compound interest, and evolutes. These sections seem to be far beyond the early-eighteenth century curriculum for the masters degree at Glasgow.⁹

Part 5. Possible Further Investigations

The MacLaurin Student Notebook provides many possibilities for future investigation. Among them are:

- (i) TORRICELLI AND HUYGENS In a recently uploaded manuscript (Horowitz and Falconer, 2023, pp. 35-36), Isobel Falconer and this author (with the help of Ian Tweddle) note that MacLaurin used results (unattributed) by Evangelista Torricelli and Christiaan Huygens in his handwritten paper *De Viribus Mentium Bonipetis (On Good-seeking Forces of Minds)* (MacLaurin, [1714]; Tweddle, 2018). Are these classical

⁹ The study of mathematics beyond geometry was an extracurricular option. Carmichael's description of his teaching methods and duties at Glasgow gives an idea of the standard curriculum that masters students would have studied (Carmichael, 1712; reprinted in Carmichael, 2002, p. 379):

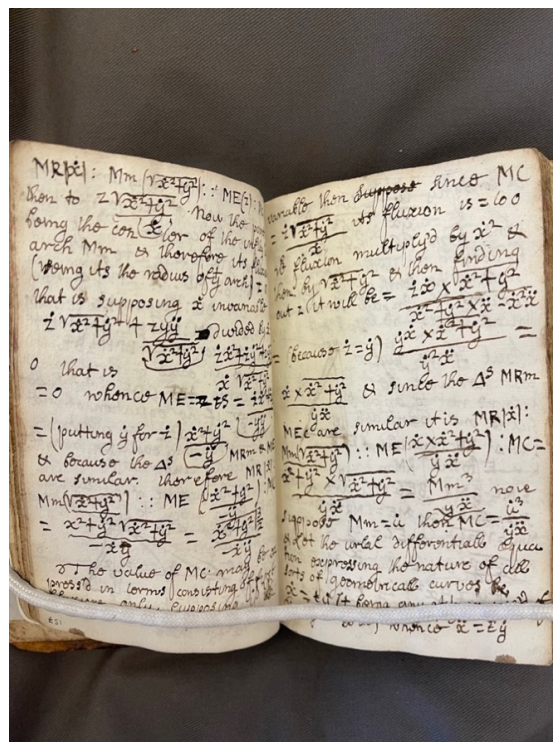
In the Magistrand [fourth] Year (if God spare them & me together), ye first work must be to compleat what yet remains undone of ye Ethicks, & then, if possible, again to glance over ye Pneumatick & Ethick Theses: tho' at the same time, I must endeavour, with all convenient Speed, to get them thro', at least, ye sixth Book of Pardies Elements, without which they can make verry few Steps to purpose in ye Physicks: I must likewise give them a touche of some other parts of Geometry, as time will allow; but for their more thorow acquaintance with them, refer them to ye Professor of Mathematicks.

- results (or others) found in the notebook? How did MacLaurin become aware of them while a student at Glasgow?
- (ii) *GEOMETRIA ORGANICA* The first book by Colin MacLaurin to be published was *Geometria Organica* in 1720 (MacLaurin, 1720). In 1748 Patrick Murdoch wrote, “Thus much is certain, that in his fifteenth year, he had already invented many of the propositions afterwards published under the title of *Geometria Organica*” (Murdoch, 1748, p. ii). Does the notebook contain any of the material that later appeared in *Geometria Organica*? Are there additional geometric results in the notebook? How many of these geometric results were original?
- (iii) ROBERT SIMSON (1687-1768) The renowned Scottish mathematician Robert Simson was appointed professor at the University of Glasgow in 1711 (Carlyle and Tweddle, 2004). He had a keen interest in the geometry of the ancient Greek mathematicians including the porisms of Euclid. While many have assumed that MacLaurin was enrolled in Simson’s classes, there is no evidence of this (Horowitz and Falconer, 2023, p.7). However, it is known that Simson personally influenced MacLaurin’s later work in geometry.¹⁰ Eric Gray Forbes suggests that some of the mathematics taught in classes at Glasgow can be traced to textbooks that

¹⁰ See 1735-1737 letters from Simson to MacLaurin (Mills, 1982, Letters [142], [143], [145], 150]).

were part of Simson's extensive personal collection (E.U.L. CLX-A-213 folder 4 items 1 & 2). Is there any mention in the notebook of Robert Simson, his work, or his library? Is there any indication of the relationship that MacLaurin had with Simson while a student at Glasgow?

(iv) NEWTONIANISM AT GLASGOW. Shepherd asserts that early eighteenth-century Glasgow regents did not adopt Newtonianism with the same enthusiasm as their Edinburgh counterparts (Shepherd, 1974, p. 240). However, entries in MacLaurin's notebook are replete with Newtonian notation and methods. From where did MacLaurin gain his knowledge of Newtonianism? On what aspects of Newtonianism did MacLaurin focus while a student at Glasgow?



Examples of Newtonian notation (pp. 156v-157r)

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Auctoritate Dignissimi Vice-cancellarii, Joannis Stirling, V. D. M. SS. Th. Professoris Primarii; necnon Amplissimi Senatus Academici consensu, & Celeberrimæ Facultatis Artium Decreto: Pro Gradu Magisterii, Summisque in Philosophia & Artibus liberalibus Privilegiis & Honoribus rite ac legitime consequendis, In Auditorio publico Academiae Glasguensis, Ad diem Junii hora post meridiem, Propugnabit Colinus McLaurin, Scotus. (Edinburgh: Apud Robertum Freebairn, Typographum Regium, 1713).

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