

PATRICK COPLAND 1748--1822
ASPECTS OF HIS LIFE AND TIMES AT MARISCHAL COLLEGE

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Introduction

PATRICK Copland was Professor at Marischal College from 1775 to 1822. For all but one year he taught natural philosophy, although in title he was professor of mathematics from 1779 to 1817. Because of his teaching and related activities he became something of a celebrity in Aberdeen in the late eighteenth and early nineteenth centuries. As the nineteenth century passed, however, and with it those whom he had taught, his name declined into undeserved obscurity for he had published nothing on his course nor on his apparatus.

What particularly attracted the attention of Copland's contemporaries and still interests historians of science was his extensive use of demonstration equipment, employing the largest collection of apparatus in the country, much of it made by himself. In this use of demonstrations he was one of the pioneers of a trend that spread through all universities later in the nineteenth century to become a distinctive feature of the teaching of science in general. Copland was also a pioneer of adult education classes teaching the principles and applications of physics to artisans and other interested citizens. This venture not only predated that of his better known contemporaries in the field but was on a larger scale and continued over a period of twenty-eight years (1785-1813). Both of these topics deserve a detailed treatment that will be reserved for later articles. So too will a fuller account of his personal biography and his role as consultant physicist on matters of public concern in days before there was much conscious awareness of the need for such a specialized pursuit. What will be attempted here will be to sketch the base at Marischal College where Copland operated 200 years ago, highlighting college practices that concerned Copland's career. This was a significant time in the development of 'The Marischal College and University'. It is hoped that the forthcoming history of the University will illuminate how these developments related to the changing practices of higher education at national and international levels.

Like a great many successful academics at Aberdeen from the eighteenth century to the present day, Copland's roots were firmly planted in the North-East farming community of Aberdeenshire. His father, Samuel Copland, was minister at Fintray, where Patrick Copland was born. His grandfather was minister at the parish of Tough where the name 'Copland' was well established among local farm tenants by the early eighteenth century. Very little is known about the first third of Patrick Copland's life. Presumably educated at Fintray parish school and at home, he won a minor bursary at Marischal College at the age of fourteen in 1762.

At college he was taught mathematics for two years by John Stewart, the successor to Colin McLaurin in the chair, and natural philosophy by George Skene. Skene was a member of the Philosophical Society of Aberdeen, considered as the formative group responsible for the 'common sense' school of philosophy. So too was Copland's fourth year teacher, James

Beattie the enlightenment poet and philosopher. Copland's education would therefore have been lively and well informed but nonetheless part of an inbred academic tradition since Stewart, Skene and Beattie had themselves been students at Marischal College. This parochial tradition continued well into the nineteenth century for Copland was to teach in his own classes later occupants of the chairs that he himself filled.

In short, Patrick Copland was local by birth, upbringing, education and, in many respects, temperament. In spite of this narrow experience he was just the right man to widen the horizons of Marischal College students and the citizens of Aberdeen to the growing involvement of science in society.

A brief survey of his career - glimpses of Marischal College administration

In 1774 George Skene, the professor of natural philosophy who had taught Copland as an undergraduate, made the unusual step of deciding that he needed an assistant. Assistants usually appeared at Marischal College when a professor's teaching duties were becoming a little onerous for an incumbent approaching old age. Skene was only thirty-three.¹ He chose Patrick Copland to help him, no doubt from personal knowledge though nothing is noted in the faculty minutes. Upon the death of Skene's father (Francis) early in the following year. Skene was able to translate himself to the less demanding professorship of Civil and Natural History that his father had occupied, thereby freeing himself to carry on his father's medical practice.² Strictly speaking this involved no change of post for Skene because Marischal College had four 'Regents and Professors of Philosophy' who were each assigned specific teaching roles. However, as a result of this move the College now needed a Professor of Natural Philosophy. They looked no further than their new assistant. Copland received a royal appointment and presentation warrant (dated 25 February 1775) to the position of Regent and Professor of Philosophy left vacant by the death of Francis Skene.³ As usual, he had to subscribe to confessions of faith and the formula of the Church of Scotland, and swear allegiance to the King and to the laws and statutes of the College. In return for this fealty, the appointment lasted 'all the days of his natural Life, with hail powers'. Conditions of tenure were quite clear in those days.

A singular occurrence took place in the first year of Copland's teaching which is worth re-telling in the local context. By good fortune the instigator of it has left a little known autobiographical account of life at Marischal College around the year 1776. The author is James Stephen, grandfather of Leslie Stephen, the founder of the Dictionary of National Biography, and great-grandfather of Virginia Woolf.⁴ Stephen had been sent from London to Aberdeen in 1775 for two years, to improve his general education by taking the third and fourth year classes at Marischal College. He entered the natural philosophy class in the first year that Copland was professor. To cut his account short, he became a favourite of Copland and 'had the gratification of often receiving his public praises'. As the year drew on, Stephen realized that at the end of the year he would be examined in natural philosophy in Latin, a working knowledge of which was assumed without question but which in fact Stephen was quite without on account of his different education. Although this examination would not have debarred any student from proceeding to next year's course, some effort was put into the preparation by all students. Stephen continues the story⁵:

It became therefore a question among us how we should find Latin for tile many technical English terms that were necessary to make this branch of our studies Natural

Philosophy and, particularly, mechanics and its applic^ation intelligible. It was understood among us that the Professor felt the same difficulty, tho' he did not choose to avow it publickly to the other Professors and Principal of the University, so as to obtain any alteration of the established practice. It was surmised even by some that he was deficient in classical knowledge, tho' I dare say without reason. and perhaps his knowledge of this suspicion made him unwilling to propose an innovation of which, as the event shewed, he felt the expediency. I saw the opportunity which these circumstances afforded, and seized on it with avidity. After sounding many of my class fellows, and finding them as well inclined as myself to my object, I convened a meeting at which we unanimously agreed to a petition, drawn up by myself to the Heads of the University (the Principal and Professors) praying that we might, on account of the special circumstances, be examined in English. After full deliberation, our request was acceded to, and I had the gratification of hearing that the arguments and stile of the petition had been highly commended.

Thus in 1776, by an early application of democracy and student representation, Marischal College was brought out of its eighteenth-century custom with twenty-four years in hand.⁶ As a bonus to Copland, he was relieved of the tedium of working in a language in which by all accounts he was not particularly skilled. Stephen went on to organize a subscription from the class to raise enough money for a gift to Copland of a solar microscope as thanks for his support of the proposal and ‘as a respectful tribute of . . . our grateful sense of his talents and assiduity as a Teacher’. The solar microscope was that of Dollond, purchased at a cost of sixteen guineas, engraved with a Latin inscription⁷ and thirty-three student names. It is now lost.

After an auspicious and successful start to his career teaching natural philosophy, Copland applied for the professorship of mathematics in 1779, for reasons that we can only conjecture were mainly financial. The patronage of the mathematical chair was vested with the town council, unlike the chair

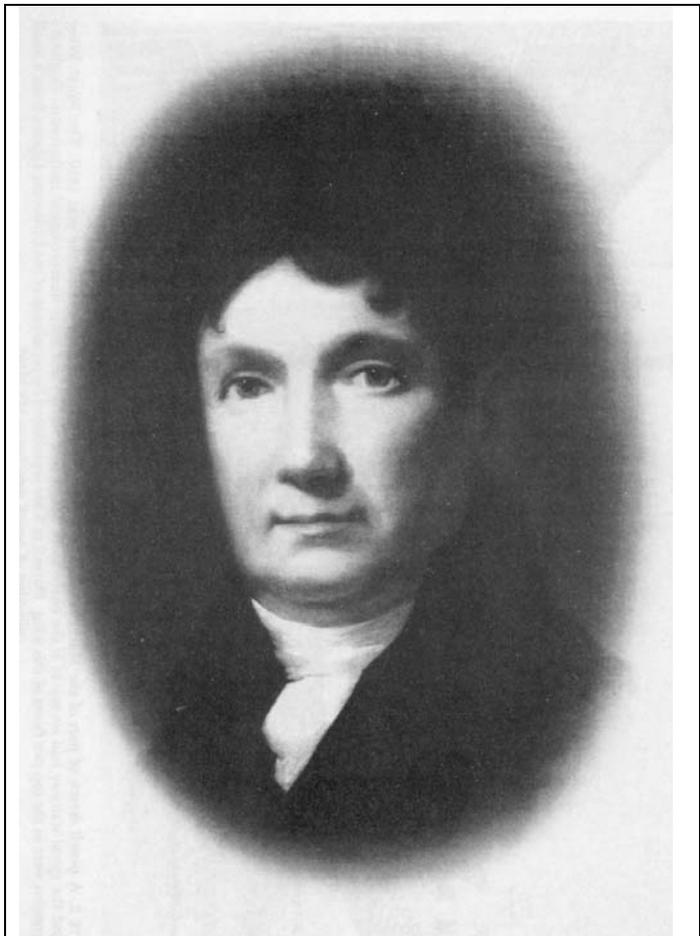


PLATE 1. Professor Patrick Copland, from a portrait in possession of his descendant Patrick A. Copland

of natural philosophy which was a Crown appointment. The previous incumbent William Traill had resigned on 6 April 1779, having obtained a preferment in the Church of Ireland. An assistant and successor, Dr John Garioch, had been appointed in September 1776 but died only six months later. The Town Council approved of Copland's application for he had not

only acted as one of Garioch's examiners but had taught the mathematics class the previous year 'with approbation' in Traill's absence. He was appointed forthwith, at a salary of £50 per annum, a greater figure than that received by the professor of natural philosophy.

On 18 June 1779, Robert Hamilton (1743-1829) was appointed to the vacant chair of natural philosophy. Hamilton's arrival at Marischal College marked the beginning of what was to be a most successful career with Town and Gown. Indeed, upon his death in 1829, there was erected in the town's principal cemetery (St Nicholas Churchyard) the largest mausoleum to any citizen of Aberdeen before or after. He certainly did not deserve this honour for teaching natural philosophy since in his first year '*he broke much of the apparatus of glass*'⁸ and was considered something of a disaster. It was obvious that it would be to everyone's benefit if Copland could get his old job back but how was this to be accomplished when by misfortune the endowment of the natural philosophy chair was not so generous as that of the mathematical chair? The problem was solved by the simple expedient of exchanging classes, but not titles, with the mutual agreement of University and Town Council. It thus came about that Hamilton lost no face by his incompetence and the effective founder of our modern natural philosophy department came to have the title of Professor of Mathematics for most of his University career. Copland retained the larger salary accompanying his post, in spite of some harassment by George Skene.

Hamilton and Copland appear to have worked together quite well, though their interests and demeanours were poles apart. In the lecture room Copland had a commanding presence, caught the attention of his hearers and interested them. Hamilton provoked ridicule amongst his students, failed to convey an understanding of his subject and had to contend with such a disorder in his class that on occasions he was reduced to sending for a disciplinarian. He partly retrieved his reputation as a teacher by publishing a synopsis of the course for students to digest in the quiet of their lodgings. An earlier *Review* article by Betty Ponting⁹ has outlined the teaching of mathematics at Marischal and King's Colleges.

In 1781 Copland raised money for the Castlehill observatory and had it built, as has been described elsewhere.¹⁰ Early in 1782 he was elected a corresponding member of the Society of Antiquaries of Scotland and later that year spent a considerable time in London supervising the making of instruments for the observatory. In 1783 he obtained a grant for employing the artisan John King to make models of industrial machinery and was one of the founding non-resident members of the Royal Society of Edinburgh (along with much of the professoriate of Marischal and King's Colleges). In 1784 he began his ballooning experiments and in 1785 his lengthy course of evening classes. These were innovative times for Copland and Marischal College. In the early 1780s the Marischal College professoriate was relatively young, able and forward looking. The contrast with neighbouring King's College was quite stark. At King's there was a preponderance of mid-eighteenth century figures. They certainly had their wits about them, but some contemporaries and posterity have tended to judge that they were more likely to be employed in the maintenance of a comfortable way of life than in keeping up with academic developments. Yet another example of Marischal's forward-looking attitude was their support at the founding of the Aberdeen Medical Society in 1789; an institution for which the King's professoriate saw no need but which in fact greatly assisted the development of good medical teaching at Aberdeen in the nineteenth century.

In this atmosphere a renewed attempt was made by Marischal College to unite the two colleges into one University. It is surprising that Copland appears to have been responsible for laying some of the kindling if not, indeed, bringing up the lighted taper to the scene, for

he seems generally to have eschewed political matters. He kept a sufficiently low profile when the flames roared during lively public debate in 1786 that his role has usually been overlooked. It would be timely to hear retold the story of the proposed union of the colleges in 1786 and the lessons that might be learned from it exactly two hundred years later. However the story is long and involved. It was significant in the history of the Colleges but throws little light on Copland the natural philosopher. In passing it is worth mentioning that Copland seems to have brought the suggestion for a new union from the Chancellor of Marischal College, Lord Bute, and his friends, whose acquaintance Copland made and whose personal support he enlisted for the Castlehill observatory in 1782. In the end, the proposals failed due to the effective deployment of King's College and its allies.

A curious incident occurred in 1800. In that year died John Chalmers who had held the office of Principal of King's College for fifty-four years, during which time he had successfully fought off many attempts to revise the practices of King's. Hence in 1800, long after all other Scottish Universities, King's College at last decided to dispense with the system of Regenting and to allocate professors to a single subject. At a meeting of 12 June, the nine members of the college briefly discussed the new arrangements and promptly voted for a 'Regent and Professor of Natural Philosophy'. Gilbert Gerard proposed Andrew Mackay (an Aberdonian well known for his work at the Castlehill observatory and for his navigational school and textbook) and Eden Scott proposed Copland.¹¹ If there was any discussion of the merits of the two candidates, it was not minuted. With four votes each from the body of the meeting, the new Principal Roderick McLeod cast his vote in favour of Copland, whereupon a wrangle began that took about three years to subside.

In a letter of the following day¹² Copland thanked the College for the honour they had conferred upon him and asked for some time to decide the matter. He then wrote to his friend the Duke of Gordon who was Chancellor of King's College, asking for advice. This hints that Copland may not have actually applied for the post. The Duke, who was in Edinburgh at the time, congratulated him adding¹³:

But I have not perspicuity enough to find out any benefit that can result from it, without you intend to get yourself dubbed D.D. and get into Rory's shoes, after he is carried feet foremost to his narrow house

Gordon suggests that Copland await his return. We do not know whether Copland had designs on the principalship but it seems unlikely. In the same letter, King's own chancellor says later (with reference to an unspecified matter):

I never entre nous heard of such low underhand work as has been practised by some of the Gentlemen of King's College.

Perhaps not surprisingly Copland wrote to the college on 5 July 1800 renouncing all claims to the chair of natural philosophy.¹⁴ The wrangle at King's, which began because Mackay's faction were incensed by the Principal's use of his vote, continued because Copland's supporters produced another candidate (William Duncan, by chance a contemporary of Copland's in his undergraduate class at Marischal College). Mackay, who would have been a credit to the college, went to litigation to secure a verdict in his favour but eventually failed.

In 1803, Dr James Beattie, who had retained his post at Marischal College as Professor of Philosophy though hardly being in possession of his 'hail powers', finally succumbed to ill

health and old age. His teaching in the last years had been done by George Glennie. Half of his royal pension of £200 was procured for Copland by the Duke of Gordon and Lord Sidmouth,¹⁵ apparently as recognition of the value to Aberdeen of Copland's evening classes and his other public activities. The other half of the pension went to John Playfair (1748-1819), at that time Professor of Mathematics at Edinburgh.

Upon Beattie's death, Copland became the senior professor at Marischal College in terms of length of appointment, at the age of fifty-five. With his finances moderately secure, a young wife and family, his newly purchased villa in its own grounds and much reputation and respect in Aberdeen, he had little more to aim for. He lost none of his enthusiasm for carrying on the business of his class but, hardly surprisingly, the innovative drive of the 1780s had gone.

In 1815, he played a leading role in promoting George Gordon, Marquis of Huntly, as Marischal College's new chancellor. As a break from recent practice there was a formal installation ceremony with accompanying pageantry. The installation took place on 22 December 1815 and a description of the ceremony, which was one of the events of the year in the town, can be found in Kennedy's *Annals of Aberdeen*.¹⁶ Huntly appears to have been a more popular person in Aberdeen than his father, no doubt mainly because of his years spent commanding the Gordon Highlanders. His full length statue, twenty feet of solid granite, is one of the few statues in Aberdeen, and his bust and portrait are in possession of the College. (King's College have not even a portrait of his father the Duke of Gordon, their chancellor for over thirty years.)

1817 was a year of uncommon activity for Copland. Almost seventy by now, he must have decided with Hamilton (who was several years older) that it would be appropriate for them to see out their final years in their rightful chairs. Although the power of appointment to both chairs lay outwith the University, with the Crown and with the town council, the exchange was arranged and both men admitted to the college in their new positions on 9 July 1817. Two weeks earlier Copland had been awarded an honorary degree of Doctor of Laws by the College, for services rendered. 1817 was also the year that Thomas Colby of the ordnance survey came to measure the Belhelvie baseline and Biot paused at Aberdeen on his ill-fated Shetland expedition. It was a year in which Marischal College was unusually lavish with its honorary Doctorates of Law, awarding them not only to Copland, Colby and Biot but also to William Knight.

Copland's term of office at Marischal College came to a close in the autumn of 1822. On 9 September he wrote to the college¹⁷ intimating that he could not undertake the teaching of his class in the following session owing to 'the very infirm state of his health'. He recommended Dr William Knight as his successor and with a slight twist of the college's arm offered to resign at once if his recommendation was favourably received. The added incentive of a smooth transition of responsibilities was probably not necessary since the college were well aware of Knight's proficiency.¹⁸ Copland officially resigned on 5 October 1822,¹⁹ little more than a month before his death. The purchase of his large collection of apparatus by the college had been negotiated in September 1822. Knight began lecturing on 2 November at the beginning of the academic session.

MARISCHAL COLLEGE PROFESSORS IN POST FROM 1775-1822

Divinity

1771 George Campbell
1795 William Laurence Brown

Civil and Natural History

1788 James Beattie (junior; of Dr James Beattie)
(1810 William Knight taught)
1811 James Davidson

Logic and Moral Philosophy

1760 James Beattie (Dr)
1796 George Glennie as assistant
1803 Beattie dies

Chemistry

1793 George French
1819 taught by William Henderson not appointed professor

Oriental Languages

1754 Alexander Donaldson (also professor of Medicine)
1794 James Kidd

Greek

1758 William Kennedy
1782 John Stuart-with assistants from 1818

Mathematics

1766 William Traill
1779 Patrick Copland
1817 Robert Hamilton, asst. John Cruickshank

Natural Philosophy

1775 Patrick Copland
1779 Robert Hamilton

Medicine

1755 Alexander Donaldson
1793 William Livingston

The preceding table is a guide to Copland's contemporaries at Marischal College, showing their dates of appointment. It has been compiled mainly from P. J. Anderson's extracts from the records of Marischal College.²⁰

In addition there were lecturers associated with the medical school, notably Charles Skene (anatomy-1802); William Dyce (midwifery 1811) and from 1818, lecturers in surgery, in materia medica and in physiology. In 1819 a lecturer in Scots law was appointed. Other officials were the Principal (who was also the Professor of Divinity in Copland's time), the Chancellor, the Rector, the Dean of the Faculty and the Sacrist.

The context of Copland's lectures in the College curriculum

The practice of Regenting, alluded to in the last section, whereby one professor taught a class through all four years, was dropped at Marischal College twenty years before Copland took office. At the same time the entire curriculum was revised and re-ordered following a plan put forward by the young professor Alexander Gerard²¹ and favourably approved both within and without the college. Gerard's plan of the course was operated essentially unchanged for the whole of Copland's tenure.

The main degree awarded by Marischal College was the A.M. (Artium Magister), to qualify for which a student took a four year course, entering about the age of thirteen or fourteen and leaving about the age of seventeen. Divinity students aiming for the ministry or for a school-master's job took a second degree; many intending a medical career went on to medical school at Edinburgh; some, particularly in the nineteenth century, intent on higher learning went to Cambridge or Oxford. For many the value of the course lay in the instruction received and not in the prestige of attaching initials to one's name. Thus it was no stigma to attend classes for only one or two years or even to attend for all four years but opt not to graduate in order to save the fee. The final oral examination was merely a formality designed to raise some money, for both the questions and answers were dictated beforehand and if the student was so overcome with nervousness that he forgot his lines, the professor gave assistance. As a system of examination it was a mockery but as an educational scheme whereby attendance at the course and performance of the course work were recognized by students and society alike as time valuably spent, it was an ideal that many modern educationalists would say we fall well short of today. Was it a coincidence that in the 1820s when doubts were raised on whether Marischal College's plan of education laid out in the 1750s was still appropriate, the heart of the problem was not tackled but some respectability was restored by the expedient of introducing both entrance and degree examinations to limit numbers?

Although there were no entrance examinations in Copland's time, it was generally considered a prerequisite of entry into first year that the student should have a reasonable knowledge of Latin. To achieve this, town schools, country schools and private tutors devoted considerable attention to Latin lessons in the two years prior to a boy's coming to College, usually to the detriment of elementary instruction in Arithmetic and English. One reason for this attention to Latin was that it formed the basis of the Bursary Competition, the result of which governed the allocation of a rather large number of bursaries. There were sufficiently many that something like half of the students might expect to obtain one. Generally they had a monetary value of between £5 and £10 though in reality a larger value for there was a reduction in class fees roughly dependent on the value of the bursary obtained. In practice these contributed an appreciable fraction of the remarkably low cost of the education. £20 per annum for fees, board and lodging, etc., was a reasonable expenditure. In a biography of one of Copland's pupils of 1818 (James Robertson) it is described²² how even as late as that date a student from a poor Aberdeenshire farming background had expenses in fees, lodgings, travel and pocket money that did not amount to £8 per annum. His food was sent from home:

That was a great day in the poor student's week when his box came with the carrier; a letter on the top of its contents, telling what they were doing at Ardlaw [home]; potatoes in the bottom; every corner filled with [a] careful mixture of provisions and clothes; eggs stuffed safely into stockings; oatcakes and scones dexterously arranged so as to give least chance of being crushed; occasional supplies of money folded in the letter or spread on the breast of a shirt; - all telling him of a love and thoughtfulness and anxiety for his comfort, that cheered his heart amid its loneliness.

Robertson's example was typical of many - as his biographer put it: "Where is the family among our Scottish peasantry that would not cheerfully bear privations to keep a son of such promise at the University?" It must be added that not all students at Marischal were the sons of poverty-stricken farmers; many were sons of the emerging professional classes; some were sons of gentry and others sons of English squires or gentlemen who considered a Scottish education highly desirable (if not entirely for academic reasons then certainly in terms of the

distance necessarily interposed between them and their offspring - perhaps as a preparation for life in the colonies). About ten percent of the students came from England and the West Indies, few from other foreign countries.

Once a student heard his name cried out by the town sergeant from the Town House on the day after the bursary competition as one of the successful candidates he had not much time to prepare himself before the start of the academic year. The teaching ran from early November until early April, twenty-three weeks in all, with only one day off at Christmas and one day off at New Year. There was no accommodation for students within the college and hence he would have to arrange lodgings in one of the boarding houses in town.²³ He was also to take note of the edict²⁴ issued by Marischal (and King's) College that students:

shall for the future pay their Fees at entry and previously to their being admitted and rated as students. Their reason for this resolution is, their having observed, that Students neglecting to pay their Fees at Entry, have sometimes misspent the Money allotted them by their Parents, in a Way prejudicial to their Morals, and inconsistent with their Proficiency.

All this attended to, equipped with long scarlet gown, the odd book, plenty of paper, some grey goose quills, ink and a penknife, he was ready to take his seat with all other arts students in one classroom.

The Marischal College building itself has been described recently in the *Review* by John Smith.²⁵ In a superb literary vignette of the college and the customs of its students, John Hill Burton²⁶ invites the traveller:

to behold a building, which rustics, who cannot read the dignified inscription 'College Court' generally mistake for the Town jail, so much does it possess of that majestic awe which sobers the student's mind to reflection.

The accompanying views of the interior of the College do little to dispel the general impression of austerity (see plates 2-5). It is interesting to reflect that in this environment the teaching of natural philosophy flourished while in the relatively opulent and civilized surroundings of the Oxford and Cambridge colleges it stagnated.

PLATE 2. *A pencil sketch of part of the Marischal College building in its surroundings around the year 1830. The North Wing behind the spiral stairway had on top of it the observatory domes (not visible) and some meteorological instruments. Copland's apartments were in the top two floors of this wing. Plates 2 to 5 are reproduced by permission of the University Library from a small collection of pencil sketches in MS M363 (see next page)*

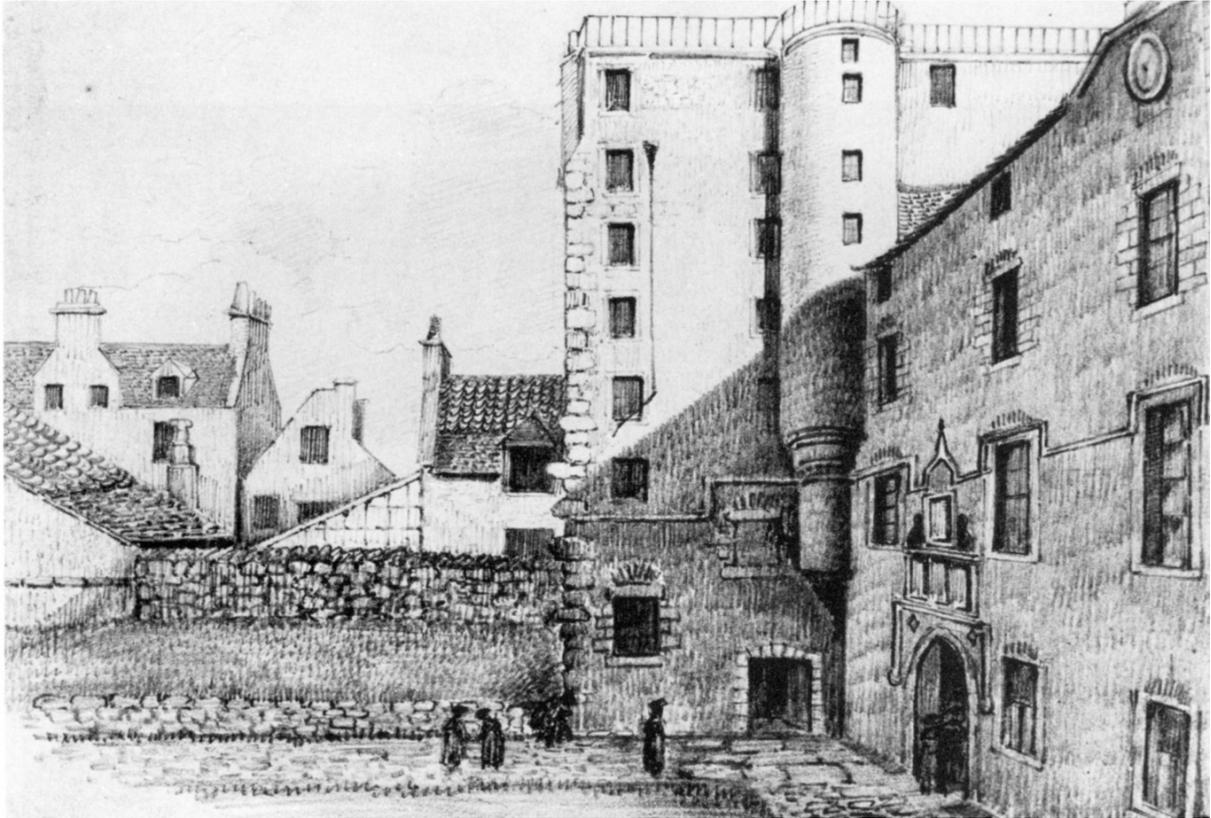


PLATE 3. Probably the spiral stairway leading up to Copland's quarters and the observatory

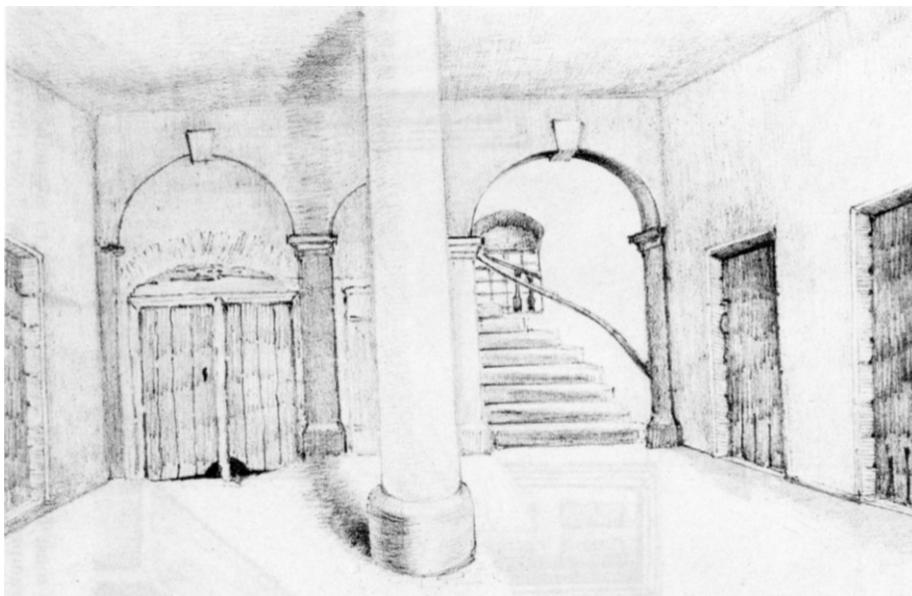


PLATE 4. The mathematical class room (next page)

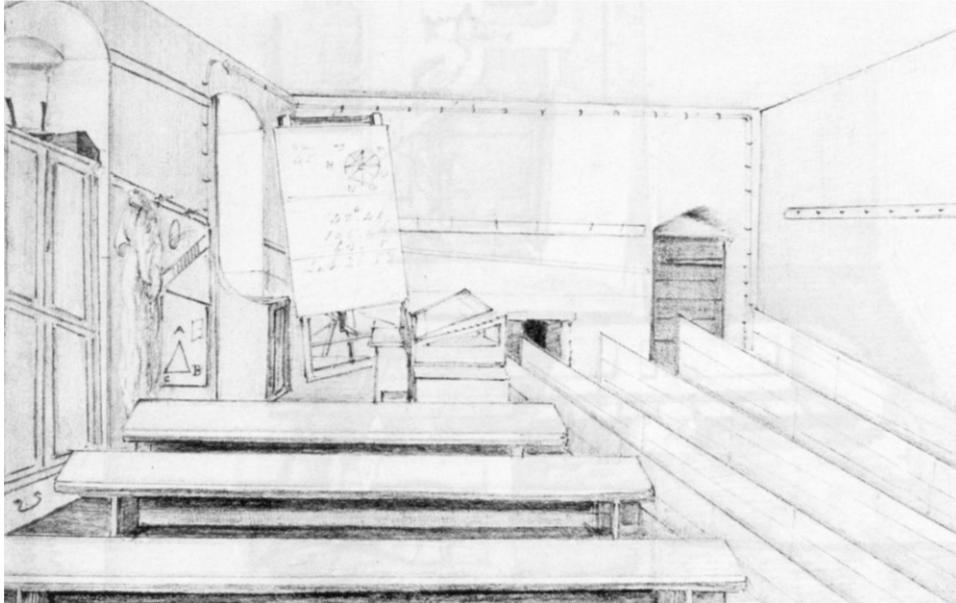
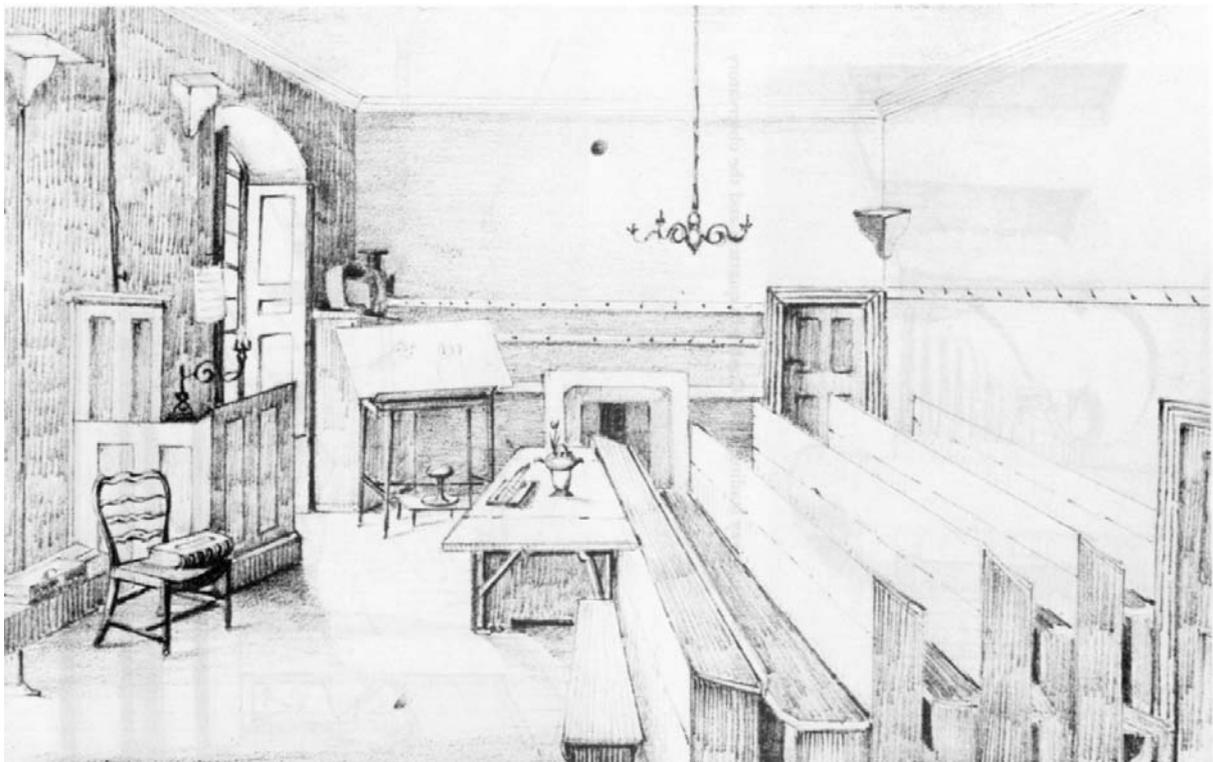


PLATE 5. Most likely the natural history classroom. The natural philosophy classroom must have been at least this size to accommodate Copland's demonstrations and exhibits. Nonetheless accommodation would have been cramped as student numbers rose to well over fifty in Copland's class in the early nineteenth century.



As a background to Copland's teaching, the content of Marischal College's arts course will be briefly summarized, following the contemporary outline given by John Stuart.²⁷

The first year was entirely spent learning the Greek language and something of Greek literature, mythology and the customs of its people. Since a familiarity with Latin was

assumed, translations of easy passages were made into English or Latin. With the typical age of a student of this class being fourteen, no great proficiency was achieved by the end of the year. By contrast the second year was a miscellany. The students were mainly under the charge of the Professor of Civil and Natural History who also gave advanced Latin lectures aimed at promoting a knowledge of Latin literature and some experience of Latin verse, and who sometimes gave an advanced Greek class. The civil history lectures emphasized the culture of the ancients and were preceded by a discourse on geography. According to Stuart, natural history included 'meteorology, hydrology, geology, mineralogy, vegetation and zoology' but what was taught seemed to depend on the interests of the professor. In addition to all this, the professor of mathematics gave elementary mathematics lectures for one hour a day, increasing the students' knowledge from naught to simple algebraic equations, the first six books of Euclid and plane trigonometry.²⁸

In the third year (called the tertian year) the main business was Copland's course, whose content will be touched on later. As with the other main courses, students attended his class at eight, eleven and three o'clock, five days a week and at eight and eleven on Saturdays. William Knight mentions to the first Royal Visitation in evidence on his own teaching that²⁹:

The lectures are accompanied with daily examinations, with a weekly examination of one hour, in which are put the principal questions of the week preceeding, with exercises or essays prescribed weekly to the students, and which are strictly required from them, besides occasional questions which require answers in writing, and which are frequently put, on many subjects, daily.

He remarks a little later:

I may add, that the class has always been taught, as far as I know, for the last half century, in the manner to which I have adhered, with such alterations as have been suggested by the progress of science and other circumstances.

Unfortunately there is no corroboration from other sources that Copland employed the same interrogative procedure, although he may well have done. What he certainly did in earlier years, according to James Stephen,³⁰ was to ask for students to hand in once a week their note taking, which was then commented on in the public class the following day. The public class took place every Friday in the 'public school', a long room on the ground floor below the college hall, where all the professors and the principal assembled and, amongst other things, public reprimands were dispensed for unseemly behaviour that had occurred within or without the College. In matters of delinquent behaviour, the students were not subject to the normal legal jurisdiction of the town but were governed by the college itself.

Even if Copland used the practice apparently followed by Knight of devoting the eight o'clock lecture hour to tutorial work on five days a week, that still left twelve hours a week to present new material, or a total of up to 270 hours during the term (in natural philosophy alone). If perhaps only one or two hours were devoted to examining his class per week, then well in excess of 300 hours could have been devoted to lecturing. One suspects that the former regime was operated, not only for educational reasons but for the fairly practical reason that at 8 a.m. (local time) in the middle of winter it is not very light outside in Aberdeen and even darker within a building like old Marischal College. We are told by a student in the early 1830s that the classrooms were even then lit by tallow candles, the wicks tipped with turpentine by the college janitor before being lighted.³¹ Candles were placed in a

frame hung from the ceiling and two candles attached to the desk or rostrum. Clearly this was the least satisfactory time of the day to conduct demonstrations or expect students to take much in the way of notes.

About three weeks before the end of the term, the students underwent the blackstone or public examination³² in the college hall. This was a more serious affair than the notional degree examination prior to graduating. It was conducted by the principal and professors and technically was open to the public. Failure entailed loss of face but it has not been found out if it debarred a student from retaining his bursary, or collecting his A.M. at the end of the course.

In addition to Copland's class, third year students spent one hour a day in the higher branches of mathematics, the class being conducted during most of Copland's professorship by Robert Hamilton.³³

The subject matter in the fourth year fell under the broad title of 'Logic and Moral Philosophy'. It was divided into psychology, natural theology, ethics, jurisprudence, politics, logic, metaphysics and rhetoric. In either the third year or fourth year, students could attend French's chemistry lectures (free of charge to bursars after 1793). For the most able mathematicians an additional higher mathematics class was run on a voluntary basis and for the Gray mathematical bursar (whose bursary of £25 was the highest in the college) there was a fourth mathematical course, usually run on an *ad hoc* basis with the professor of mathematics.

This, then, was the educational system in which Copland had to operate. There was plenty of opportunity to attend private classes in Aberdeen in music, dancing, modern languages and other social accomplishments but little opportunity for private academic tuition to supplement the college teaching.

Comments on Copland's course by his former students

The society which students of Copland's time were projected into left very few with the luxury of time to contemplate autobiographical recollections. Besides, it was not fashionable. Most reminiscences are written decades after their authors' student days which may well be quickly passed over. Such summary treatment is found, for example, in the autobiography of Sir James M'Grigor who attended Copland's class in 1786-7, was twice Rector of Marischal College and greatly honoured by the college. Hence it is perhaps not surprising that rather few comments have come to light so far from the 2000 students who passed through Copland's hands.

The earliest comments must be those by James Stephen because he was a student in Copland's first class in 1775. Stephen recalls³⁴:

Professor Copland was then at Aberdeen what my dear friend brother-in-law Farrish has since been at Cambridge. He was very expert in mechanical philosophy, strictly so called, and added to the ordinary lectures an exposition illustrated by models and experiments on various engines and machines in use for manufacturing and other purposes. This improvement was introduced in the same session in which I became his pupil, and it formed no small part of the business of the Class.

The reference to the use of demonstration models as early as 1775 is surprising because none are in the college records. They must have been brought in by Copland from his private possession. William Farish (1759-1837) was at first professor of Chemistry at Cambridge from 1793. In spite of his title he lectured on industrial machinery.³⁵

A correspondent to *Scottish Notes and Querie*³⁶ remarks:

On what occasion did Edward Ellice speak of him [Copland] in such-like terms as ‘the man who more fully opened the eyes of the student to this world than any teacher he had ever met?’ Such at least is the view all along held of Dr. Copland by one who, exactly seventy years ago [1817], was in his class, of sixty-six Dr. Copland's tall handsome figure and military gait failed not to be observed abroad, while, combined with the great powers of his mind, they secured attention and respect in the class-room.

Edward Ellice attended Copland's class in 1798-9 and became an MP of some importance, being Secretary of War in 1832.

Donald Sage, the gaelic minister who has left us with one of the few first hand accounts of old Marischal College, attended the class in 1806-7. He comments³⁷:

Patrick Copland, the professor of natural philosophy, under whom I chiefly studied this year, was the most efficient of the public teachers of Marischal College. He was a very handsome man both as to face and figure; his wife was a neat, demure, pretty little woman. They had three sons and one daughter. His knowledge of the beautiful and extensive science which he taught was rather superficial. He was, however, both an elegant lecturer and an expert mechanic, and thus made the study most interesting to us. . . . He did not dictate a syllabus of his lectures as the other professors did; but I took very full notes whilst he spoke on each of these branches, as well as copies of his drawings, diagrams, mathematical figures, machine models, etc., all of which I digested, when at leisure, into a very full manuscript of three large 8vo. volumes, with plates of my own drawing.

Where are these volumes now?

John Cruickshank, who was later to succeed Robert Hamilton as professor of mathematics, attended Copland's course a year after Donald Sage. His biographer upon mentioning the lectures of Copland adds³⁸:

This gentleman, he used to remark was the best teacher he ever had, the substance of his lectures being valuable and interesting, while the style of his instruction exercised to the full the mental powers of the students. We may here remark in passing that the simple and thorough method of teaching pursued by Dr. Copland must have unconsciously become the model for the future Professor of Mathematics.

Finally it is worth mentioning Neil Arnott. Although he made his living as one of London's physicians he is best remembered now for his *Elements of Physics*, first published in 1827. It rapidly ran to five editions, was translated into several languages and eventually ran to a seventh posthumous and updated edition in 1876, edited by Alexander Bain and A. S. Taylor. Arnott did not leave any reminiscences of his undergraduate days attending Copland's course

in 1803-4, but it is well known that he looked back on that time as being a particularly formative one for him. In a letter to Marischal College accompanying a gift to the college he remarks³⁹:

I have the conviction that any public usefulness I may have shewn, as well as my success in life, I owe in a great degree to the advantages afforded me in the Study of Natural Philosophy in Marischal College, Aberdeen, under professor Copland a most able teacher, using admirable apparatus for illustration. It had consequently long been my wish to testify in some way my gratitude towards my Alma Mater, and at the same time, if I could, to awaken in future students a just appreciation of the general study of Natural Science.

Arnott's tribute to Copland was not entirely monetary. His *Elements of Physics* is the nearest one will find to a published version of Copland's lecture course. It is entirely in Arnott's own words but in the material covered, the order of the topics, the examples used and the level of the explanations given it is easy to believe that Arnott modeled himself on Copland. Arnott was an unsuccessful applicant in 1827 for the chair of Natural Philosophy in the newly formed London University⁴⁰ and it may be no coincidence that the only copy of the inventory of Copland's apparatus known outside Aberdeen was transmitted to London University in 1828 by the Rector of Marischal College (Joseph Hume). Arnott later became a member of the Senate of London University.

Few quotations though there are on the previous pages, they serve to establish that Copland was highly thought of as a lecturer. Nothing to the contrary has been found. Various opinions of his demonstration apparatus (not cited here) confirm that he was outstandingly well equipped. What is noticeable in the comments quoted is that he did not make a permanent impression merely on those who were predisposed to follow a scientific or mathematical career. His aim was to change the practice of society for the better by introducing a greater element of applied science (to use the modern phrase). The seeds he sowed did not need the special environment of the college courtyard to flourish. Whether he consciously saw himself as part of an intellectual movement is a moot point, for movements are often more in the eyes of historians than contemporary society. Be that as it may, he was certainly successful in disseminating his ideas to large numbers who later became ministers, advocates, surgeons, army officers or teachers, to name the most common professions. Some 2000 of his pupils spread to many walks of life; they emigrated to Canada, America and the West Indies and approaching one hundred joined the East India Company's Service. What did Copland disseminate? That, in detail, is quite a long story (about 300 lecturers worth!).

Copland's course

We know a substantial amount about Copland's course both from extant students' notes and from some of his original notes that have very recently come to light and been purchased by the University from private possession. There are seven sets of students' notes in the University archives of which four are complete. On the whole these complement Copland's own notes with many additional details because Copland followed the unusual practice of speaking freely to his class and not dictating his lecture notes.

The real business of the course was to describe the behaviour of nature and to introduce just sufficient in the way of appropriate concepts as would bring a coherence to the description. It

consisted in the broadest generality of one third on mechanics, one third on gases and liquids and one third on the more subtle matters of electricity, magnetism, optics and astronomy. Copland opened with a preamble giving some account of his intentions and the reasons why students should apply themselves, soon confirming that he was not going to dictate his notes⁴¹:

In this science lectures given viva voce have a great advantage over the knowledge derived from reading alone. A Professor who speaks to his students, who can put himself in their situation, and remember the difficulties he himself experienced when at their age; who can make use of the properest, and most familiar expressions--repeat and vary them until he thinks himself understood: possesses advantages which the greatest application to books alone cannot compensate. If however after all there be any part of our subject which you do not thoroughly understand, I strongly recommend it to you all to call upon me in the intervals between the Lectures, in order to mention your difficulties, that I may endeavour to remove them.

After warning students that they would regret in later life if they failed to take advantage of seeing or making use of the very expensive apparatus of instruments, he expanded on his intention to emphasize the role of demonstrations⁴²:

There are two methods of evincing most of the truths of Natural Philosophy one of them by reasoning, and Geometrical demonstrations the other by Experiments---and as I have seen from my own Experience, since I was first in this Office, that tho' one may be convinced of the truth of an assertion by Geometrical reasoning, yet at the time of Life you generally attend this class, it neither strikes so strongly - draws the attention so much - nor leaves so lasting an impression, as when confirmed by Experiments - I have therefore been endeavouring for some years past to render our apparatus of Instruments as complete as possible, consistent with the narrowness of our Funds for this purpose - and by the great additions lately made we are now possessed of almost all the essential instruments necessary for illustrating the principles of the science and we only want a collection of models which I have great hope may be soon supplied.

This must have been said very early on in his career, for in the 1780s he did equip the college with a most splendid collection of models. The University historian Bulloch labels Copland with the journalistic tag 'a red hot enthusiast'⁴³ and that is what he was when it came to demonstrating physics. The inventory of his equipment, made at his death, runs to 530 items of the highest quality. These were not glass case exhibits but mainly working demonstrations, operated or displayed every year at the appropriate time in the course. In this respect Copland's course could not be bettered anywhere in Britain or, probably, elsewhere. How he built up his collection requires an account on its own but there is no doubt that he followed his own precept⁴⁴:

Observations and Experiment are the only sure means a man can employ to increase Discoveries in Natural Philosophy.

Copland's long course was broken into digestible fragments by a system of classification. Each field was divided into topics, each topic frequently divided into several heads, which, in complicated cases could each have several species. The sub-division of topics was prevalent in the mechanics lectures where, once the subject had been isolated and the underlying

principles given, numerous examples were adduced to bring these home. Consider just one case, namely his treatment of ‘the wedge’ as recorded in William Corbet’s notes⁴⁵.

Having discussed at some length the different geometrical conditions implied if the wedge moved perpendicular to the narrow edge or almost parallel to it, he went on to give examples of the wedge in action. Lest anyone should think that wedges were simply for splitting logs, Copland’s list is as follows:

Examples of the Wedge

- 1st *In Husbandry, Plough, Harrows, Spade. Pick axe &c.*
- 2nd *Carpenters, Axe, Adze, Saw, Chisel, Plane*
- 3rd *Metallists tools, File*
- 4th *Military weapons, Spears, Darts, Arrows, Lances, Bayonets, Swords, of all kinds, Small swords beginning at a point, Broad swords at an edge and Sabres from both*
- 5th *In Surgery, Lances, knives, needles, Surgeons and Glovers instruments have edges as well as points*
- 6th *Razors, nails, Scissors*
- 7th *Bills and Claws of Birds, Teeth, Horns*

Velocity adds to the power of the Wedge, hence in cutting we draw a knife along, because a knife is a fine saw as will be seen through a Microscope.

Of course many of these examples are essentially the same but by variant repetition the point was driven home. Long after the geometrical discussion on the resolution of forces which preceded this list had faded from the student’s memory enough of this list would surely remain for him to remember that the *modus operandi* of a diverse collection of natural and manufactured tools could all be referred to a single concept embodied in ‘the wedge’. The wedge was one example of the controlled use of force and the controlled use of force was, when all was said and done, much of what the application of science to the design of machines was about.

The topic of the wedge was illustrated by diagrams and one demonstration piece. For other topics there were a profusion of demonstrations, numbering hundreds in total. One or two illuminating comments on his demonstrations can be found in local archives. One student (James Dickson who attended the course in 1785-6) mentions in a letter home to his father on 14 January 1787⁴⁶:

On Thursday last Professor Copland tried some experiments in projectiles and Gunnery in the Old Town links with a Mortar and shell of about 81b weight. The greatest distance it carried to with a charge of half an ounce or 280 gr[ains] of Powder was 1962 and a half feet, and the shell when fired perpendicularly upwards was 16 and a half seconds in the air, with the same charge.

Another student, David Shirreffs who attended in 1807-8, was sufficiently stimulated to make his own electrostatic generator. The unfortunate lad died at the age of eighteen (not from his generator) and his father in a published tribute to his son,⁴⁷ commented:

I shall not soon forget with what pleasure he came and informed me, when he had brought it to give a shock, nor how much he was gratified by making us all, one after another, experience its effects.

Finally, Alexander MacDonald, a student in 1818-19, gives us a lively account of Copland in his old age⁴⁸:

Professor Copland was long unapproachable in his wide and interesting field of Natural Philosophy. Steam was then in its infancy, electricity little better, and his experiments in both were conducted in such a style as to carry the sensation to us students that we were constantly "under fire". When we seemed to want enlivening he made us join hands, and sent a shock through the class. When we threatened to get too lively, he added a few extra peats to the steam engine boiler, which hissed and sputtered on the table before us, and shut down the valve with the grim remark that this 'beautiful contrivance' was all that protected us from. Here he gave a shudder, and tried to raise the valve, almost immediately exclaiming, 'William must have been tampering with this'; but seeing that a general rush to the doors had all but commenced, he promptly added, 'Oh, here it comes, now the danger ceases'. With the sigh of relief that followed, all larking ceased for the remainder of the day. It was always kept by the boys in wholesome remembrance, that a former college porter had, in the performance of kindred experiments, been, as the Yankees express it, 'used up'. In pumping into the barrel of an air gun, he had put in 'the atmosphere' too much, which, as the extra strain did to the barrel, broke his back. Consequently volunteers for service of this sort were nowhere in our time.

MacDonald's reminiscences were published seventy-five years after he had left the class by which time a few events had clearly merged together. However one cannot ask for better evidence that Copland's lectures made a lasting impression!

With regard to highly controversial topics which exercised the minds of his more philosophic countrymen in other chairs, such as the nature of heat, of electricity and to some extent, of light and chemical energy, Copland's outlook was basically simple and his approach pragmatic. He was happy to say what nature was like, not what it was. If everyone had adopted this attitude then clearly science would not have advanced particularly quickly. The notable aspect of this conservatism is that when one reads Copland's lecture notes one is impressed by how much of them are still true-irrelevant for modern youth, perhaps, but still true. This surely arises because Copland played down the difficulties of conceptual interpretation with which some of his colleagues were struggling.

It is certainly unfair to accuse Copland of description without explanation. It is not unfair, though, to say that the mathematically deductive content of the course was small. This was necessitated by the level of competence of the audience at whom it was aimed, whose age group corresponded to our present fourth year at school. Unlike our present fourth year, Copland's students had received no prior physics and only the most elementary mathematics. A course festooned with 'algebraic drapery' would have been a complete waste of time.

Finally, as one might expect from a man whose father and grandfather before him had been ministers of the church, never minding his exposure in undergraduate days to the teaching of some members of the Aberdeen Philosophical Society, Copland did not support the religious

skepticism of Hume which was gaining ground elsewhere. In his introductory remarks he comments⁴⁹:

But Natural Philosophy is also subservient to Purposes of a higher nature as it lays the surest foundation for Natural Religion and Moral Philosophy, by leading us to the knowledge of the Author and Governor of the Universe. To study Nature is to enquire into his works, every new discovery we make, serves more and more to increase our Admiration of His wisdom and Goodness.....

Leaving matters of metaphysics aside, his contemporaries believed he had something original to offer at a more practical level. His simple approach, quietly optimistic philosophy and above all his effective delivery of information that people wanted to hear ensured that he was understood and appreciated in his own times.

Acknowledgements

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Notes

1. George Skene, John Stewart and Colin McLaurin all share the distinction of having been appointed professors at Marischal College at the age of nineteen
2. A short sketch of George Skene is given by William Knight in Aberdeen University Library (AUL) MS M107, pages unnumbered, in which he is described as ‘*a genuine scholar, of good ability, great shrewdness and sense, and witty of a coarse and violent temper and expression; in his classes a very strict disciplinarian, and a huge scolder of bad scholars*’. Another sketch in Alexander Bower *An Account of the Life of James Beattie L.L. D.*, pp. 148-50 (London, 1804) emphasizes that his favourite study was classical literature. Bower also mentions (pp. 146--8) that both James Beattie and Skene wished the chair of moral philosophy in 1760 and that James Beattie was almost appointed professor of natural philosophy. George Skene went on to become the principal physician in the North East of Scotland. It is possible, but unproven, that Skene and his father realized that Francis Skene could not carry on in 1775 and planned George Skene's translation to the Natural History chair, effectively selecting Copland as a possible successor in 1774
3. Aberdeen University Library (AUL) MS M93 ‘Register of Presentations 1678-1857’ contains a transcript of Copland's Royal presentation and other details of his appointment as entries dated 20 March 1775 and 28 March 1775
4. Merle M. Bevington (ed.), *The Memoirs of James Stephen Written by Himself for the Use of His Children*, pp. 176-94 (Hogarth Press, London, 1954)
5. *Ibid.* p. 189
6. AUL MS M392, ‘Letter to Professor Copland from his first class 1775-76’ with thirty-six signatories. James Stephen *op. cit.* (4) p. 189 says that his letter was addressed to the Principal and Professors but the petition quoted below was clearly addressed to Copland. It reads:

Hon:d Sir

Uncertain whether at the ensuing public examination you purpose to examine the students of this class in the Latin language, or deviate from a custom which we apprehend has not many cogent reasons to support it; we beg leave respectfully to lay before you our sentiments on this subject - hoping you will condescend to consider and (should it appear reasonable) comply with the subsequent request:

We beg leave to observe that speaking Latin is not commonly considered as a necessary branch of education; we are indeed instructed to read and write that language with propriety; but to speak it, and fluently would be a very difficult attainment, a faculty of no material use, and what we may venture to assert very few are possessed of.

The public examination we apprehend is intended to prove what proficiency we have made in Natural Philosophy, not in the Latin Tongue; would it not then be unjust that by reason of an inferior degree of knowledge in that language, or probably from an accidental want of expression anyone of us should incur the reproach of ignorance and inattention, when possibly that very person may have applied himself most diligently to the subject we have been studying?

In fine, that the possibility of this and other disagreeable consequences may be removed, and that this class not labour under a disadvantage from which every other is now exempt; With due deference to your superior judgement, we make this unanimous request that we may be examined in no other than our native language: And in return for this condescension we hope to evince, that the care and attention you have bestowed in instructing us has not been ineffectual.

7. AUL Knight MS M111, p. 1201 quotes the inscription but not the names
8. AUL Knight MS M111, p. 1200
9. Betty Ponting, 'Mathematics at Aberdeen: Developments, Characters and Events, 1717-1860', *Aberdeen University Review*, no. 162 (1979), pp. 162-75
10. John S. Reid, 'The Castlehill Observatory, Aberdeen', *Journal for the History of Astronomy*, xiii (1982), pp. 84-95
11. AUL MS K49, 'King's College Minutes XIV 1800-1818', 12 June 1800 12. *Ibid.* letter copied in minutes of 27 July 1800
13. Letter from Duke of Gordon, Edinburgh, to Patrick Copland, dated 19 June 1800, no. 26 in private collection of P. A. Copland (Richmond)
14. Transcribed in King's College minutes, *op. cit.* (11), 5 July 1800
15. P. J. Anderson, 'Professor Patrick Copland' in *Scottish Notes and Queries*, first series vol. I (1887), pp. 124-25. See also a note in the MS collection of P. A. Copland (Richmond)
16. William Kennedy, *Annals of Aberdeen, from the Reign of King William the Lion, to the end of the year 1818; &c.* vol. 2, pp. 90-2 (London, 1818) 17. AUL MS M43, 'Minutes III 1818-1834', 16 September 1822
18. He had taken the class of civil and natural history in 1810-11 during an interregnum in the professorial duties caused by an unfortunate new appointment. Upon a re-appointment being necessary in 1811, he had failed by the casting vote of the principal to take the chair, but since that time had given most successful private courses in natural history and chemistry in Aberdeen. These had terminated in 1816 upon his appointment as Professor of Natural Philosophy at the Belfast Institution but he seems to have lost no time in returning to Aberdeen when asked

19. The resignation letter, or a copy of it, is in AUL MS 2886
20. P. J. Anderson, *Fasti Academiae Mariscallanae Aberdonensis*, vol. II p. 46 (New Spalding Club, Aberdeen 1908) has sections listing all the college appointments
21. Alexander Gerard, 'Plan of Education in the Marischal College and University of Aberdeen, with the Reasons of it, Drawn up by Order of the Faculty', 33 pp. (Aberdeen, 1755). A copy is in AUL MS M387/11/3/20. Through the work of William Smith, founder of the University of Pennsylvania, the Marischal College plan of education did much to mould the shape of university education in America
22. A. H. Charteris, *Life of the Rev. James Robertson D. D., F.R.S.E. Professor of Divinity and Ecclesiastical History in the University of Edinburgh* (William Blackwood and Sons, Edinburgh, 1863), pp. 4-17 describes quite well a poor student's progress through Marischal College, though it is not clear to what extent the author is paraphrasing Robertson's own description since the book is written in the third person
23. James Stephen, op. cit. (4), pp. 177, 181-4 gives an account of his boarding house in 1776
24. *Aberdeen journal*, 2 October 1775
25. John Smith, 'The Marischal College Story', *Aberdeen University Review*, no. 171 (1984), pp. 288-92, plates
26. John Hill Burton, 'The Two Great Northern Universities', Tait's *Edinburgh Magazine*, vol. XIV (1833), pp. 182-91. Burton's pen brings Marischal College to life as no other writer has managed
27. John Stuart, 'Historical Account and Present State of the Marischal College and University of Aberdeen. Anno 1798', being pp. 5-40 in *Essays, chiefly on Scottish Antiquities by the late John Stuart, Esquire of Inchbreck, &c.* (Aberdeen, 1846). The same account formed part of Appendix 3 in Volume 21 of John Sinclair (ed.), *The Statistical Account of Scotland* (Edinburgh, 1799) but is set in larger and clearer type in the *Essays*
28. For fuller details, see Betty Ponting, op. cit. (9) pp. 162-76
29. 'Evidence, Oral and Documentary, taken and received by The Commissioners Appointed by His Majesty George IV. . . for visiting the Universities of Scotland' vol. IV, pp. 97-8 (HMSO, London, 1837)
30. James Stephen, op. cit. (4) p. 186
31. Anon. (James Riddell), *Aberdeen and its Folk* (Dawson Bros, Montreal, 1868)
32. According to James Stephen, op. cit. (4), p. 188, it was called the Blackstone examination from the old custom of each student sitting on a large black stone while being examined. It was alternatively called the public examination.
33. For a summary of the higher mathematics syllabus, see Betty Ponting, op. cit. (9)
34. James Stephen, op. cit. (4), pp. 188-9
35. R. T. Gunter, *Early Science in Cambridge* (Oxford, 1937). Pages 230-2 discuss Farish's lectures as professor of chemistry, which were oriented towards natural philosophy while the professor of natural and experimental philosophy F. J. H. Wollaston (1762-1828) gave very chemically oriented lectures. Farish was elected professor of natural philosophy in 1813 (*ibid.* p. 81). There is no evidence presented by R. T. Gunter that he had as large a collection of demonstration pieces as Copland came to use
36. G. (sic), 'Professor Patrick Copland', *Scottish Notes and Queries*, first series vol. 1 (1887), p. 108
37. Donald Sage, *Memorabilia Domestica; or Parish Life in the North of Scotland*, pp. 201-2 (Edinburgh, 1889)
38. Joseph Ogilvie, *John Cruickshank Professor in the Marischal College and University of Aberdeen*, p. 13 (Aberdeen, 1896)
39. Quoted by P. J. Anderson, *Fasti Academiae Mariscallanae Aberdonensis*, vol. I, pp. 538-9 (New Spalding Club, Aberdeen, 1889)

40. Robert A. Bayliss and C. William Ellis, 'Neil Arnott, F.R.S., Reformer, Innovator and Populariser of Science, 1788-1874', *Notes and Records of the Royal Society of London*, vol. 36 (1981), pp. 103-23. See also Alexander Bain, 'Biographical Memoir of Dr. Neil Arnott', *Transactions of the Aberdeen Philosophical Society*, vol. I (1881), pp. 133-64
41. Patrick Copland, AUL MS 3123/2, 'Manuscript Notes of Lectures on Natural Philosophy. . .', fo. 16`
42. *Ibid.* fo. 25'
43. John Malcolm Bulloch, *A History of the University of Aberdeen 1495 1895*, p. 145 (Hodder and Stoughton, London 1895)
44. Patrick Copland, op. *cit.* (41), fo. 4'
45. AUL MS M174, 'Natural Philosophy Mar: College Session 1814-15, William Corbet Taught by P. Copland'. P. J. Anderson, op. *cit.* (20), p. 414 records him as the son of William Corbet of Bielside, Aberdeen, later becoming an assistant surgeon in the East India Company
46. Alexander Allan *Cormack*, *James Dickson, M.A.*, p. 21 (private publication, Peterculter, 1968). Upon entering Copland's class in November 1785, Dickson wrote home: "My new Master, Professor Coupland I like very well, and shall endeavour to give all my assiduity to his science that he requires." 47. [James Shirreffs], *A Family Record; or Memoirs of the Life and Character of David Shirreffs, A.M.* (D. Chalmers & Co., Aberdeen, 1811)
48. [Alexander Macdonald], *A Jumble of Jottings from the Memories of a Quiet Life*, pp. 24-5 (A. Brown and Co., Aberdeen, 1894)
49. Patrick Copland, op. *cit.* (41), fo. 32'

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