THE INFLUENCE OF THE LEYDEN SCHOOL UPON SCOTTISH MEDICINE*

by

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MEDICAL knowledge, from the earliest times, has spread through the world by certain definite routes.

Any attempt, therefore, to reconstruct the story of Medical Progress should include a consideration of space as well as time, places as well as dates, and geography as well as history.

In ancient times, learning moved slowly from East to West: from China and India to Babylonia and Egypt. How much those early civilizations borrowed from each other is still a matter of uncertainty, but it seems safe to assume that Egypt did contribute to the great climax of cultural activity which coincided with the life and work of Hippocrates about 400 B.C.

After the downfall of Greece and Rome, the torch burned feebly for some centuries, enlightened to some extent by Arab learning, until at Salerno, about A.D. 1000, it again shone brightly, stimulated by the teachers at that famous seat of medical education, the first organized medical school of Europe. From that time, knowledge spread more widely, aided by the travels of wandering scholars, the discovery of new countries and increased facilities of transport. The path of progress became more easy to trace, especially after the Renaissance: it led from Salerno to Padua: thence to Leyden, and from there to Edinburgh and to Philadelphia. Those were, in succession, the leading schools of medicine, each in turn becoming the main centre.

In the present lecture we are concerned with that part of the story which involves the influence of the Leyden School upon British and American medicine.

Let us begin with Padua, the direct ancestor of Leyden. The University of Padua was founded in A.D. 1212. Even in its infancy it was an important school, and naturally, its fame increased in the days of Vesalius and of his follower Fallopius.

Many foreign students were attracted: a goodly proportion of them were from England. The Roll of the Royal College of Physicians of London in the years prior to 1671 includes the names of fifty-seven Fellows who had taken a medical degree at Padua.[1]

Perhaps the most famous of them was Thomas Linacre, who founded the College in 1518, and was the first President. The leading classical scholar of his day, he taught Greek at Oxford and was, at the same time, a skilful physician. He had taken his Doctor's degree at Padua in 1492.

Of slightly later date was John Caius, founder of Caius College, Cambridge.

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He had studied medicine at Padua in 1540 under Montanus, who was probably the first to teach medicine at the bedside, and who, as we shall see, influenced the Leyden School.[2]

Among other Englishmen who went to Padua to study was William Harvey, who graduated there in 1602, leaving his stemma or coat of arms, which may still be seen in the quadrangle: Harvey having been representative of England. It is said that from his teacher of anatomy, Fabricius, he drew the suggestions regarding the valves of the veins, which led to his great discovery.

The Reformation caused a decline in the popularity of Italian universities, from which all non-Catholics became excluded, and, although Padua attempted to evade the Papal Edict by establishing a separate university for non-Catholics, such an action did not revive the fading glory of Padua as the centre of medical education. It was under these favourable circumstances that the University of Leyden commenced her noteworthy career.

Founded in 1575 by William the Silent, as a reward to the city for a gallant defence during a state of siege, a university was chosen by the citizens in preference to the alternative offer of exemption from taxation for ten years.

The majority of the students were Dutch, but the fame of Leyden soon attracted students of all nations, more especially because the new university had opened its doors to all who came, whatever might be their race, nationality, or religion. Among those who came from abroad to study at Leyden were many English-speaking students, who far outnumbered those of other tongues.

Some came to study theology, some law, but the majority were medical students, attracted by the excellence of the teaching which has continued to the present day. Not all of them graduated: the *Album Studiosorum Lugduno Bataviae*, 1575–1875, printed in the tercentenary year, is a list of all who matriculated during the three centuries.

From the *Album Studiosorum*, Edward Peacock, in 1883, compiled his *Index to English-speaking Students who have Graduated at Leyden University* (Index Society, No. 13). All the English-speaking students are listed, not merely medical students, and there are no biographical notes, simply the name and date of graduation in each case. About 4,000 entries are given.

The manuscript volumes from which the *Album* was compiled were kept by each successive Rector of the University in his own handwriting, not always clearly legible. The *Album* formed also the basis of the excellent researches of R. W. Innes Smith,[3] which he published in 1932 in book form under the title *English-speaking Students of Medicine at the University of Leyden*. Innes Smith's list contains 2,124 entries, with biographical notes of each, and although Scottish students are not listed separately, it has been possible to ascertain that they numbered 546, or about one-fourth of the English-speaking medical students. This proportion rose to about one-third in the time of Boerhaave, 1701 to 1738.

J. D. Comrie, in an address given at Leyden in honour of Boerhaave, on the bicentenary of his death, stated that when Boerhaave was teaching, in the period 1701–38, the total number of medical students was 1,919, of whom 659

were English-speaking, including 205 Scottish students. Of the remaining English-speaking students, 340 were English, 107 were Irish, and 7 came from British Colonies. The figures were obtained by an analysis of the list in the *Album Studiosorum.*

The compilation of a complete Scottish list is not easy. The names in the original manuscript lists are arranged according to the date of matriculation, while the names of students who remained for a second or third year are recorded in a separate series of volumes, and are classified, not according to date of re-entry, nor according to their surnames, but, curiously enough, under Christian names. Thus John Monro, who matriculated in 1692, appears on one of the pages devoted to the many 'Johannes' in the volume for 1693, showing that he remained for a second year at Leyden.

The basis of the present study has been the 546 Scottish names extracted from Innes Smith's record. Many of these names have been traced in the original manuscripts at Leyden, although the difficulty of doing so was considerable. The majority, to be sure, are designated 'Scotus', but a large number are listed 'Scoto-Britannus', a few are classed under cities and appear as 'Scotus Aberdonensis', 'Scotus Edinburgensis', or 'Scotus Glasconensis'. Among other isolated titles are 'Bamfia-Scotus' (Kelk), 'Invernessus-Scotus' (Innes), 'Hadingtoni-Scotus' (Smiles), 'Scotus in Provincia Nairniae Natus' (Robertson), and even 'Wicko-Britannus' (Anderson, of Wick). A political refugee of 1687, Jacobus Milne, is entered as 'Scotus profugus'.

No attempt has been made to place on record a complete list of Scottish students. Individual names may readily be found in Innes Smith's list which is arranged alphabetically. Only a few of the more famous students are mentioned in the present paper, the main object of which has been to trace the influence of Leyden upon the Edinburgh Medical School during early times. As a background to the achievements of those Scottish students at Leyden, it may be of interest to refer briefly to some of their teachers.

Early Teachers of Medicine at Leyden

The first to be appointed Professor of Medicine at Leyden in 1575 was Pieter van Foreest (Forestus), 1522–97, the most learned Dutch physician of his time. After he graduated M.D. at Bologna in 1543, he studied at Padua and Paris and then returned to Delft, where he became the leading physician. When the University of Leyden was founded, he was invited to teach medicine there, but he did not hold his appointment for long, as he preferred to continue his practice at Delft, where he remained until his death. Although his career as a teacher was short, his influence as an author was deep and lasting. His chief work, *Observationum et curationum medicinalium,* 1584–1606, is a monument of industry which was highly esteemed and widely read in its many editions.

Associated with Forestus was Geraert de Bondt (Bontius), 1536–99. Bontius was a graduate of Padua who was originally appointed to teach physics and mathematics at Leyden University in 1575, but who, in 1581, was transferred to the Chair of Anatomy and Botany. In 1589, along with Pieter Paaw, he

organized the first botanic garden at Leyden, and thereafter confined his attention to botany, and handed over the anatomical teaching to Paaw.[4]

Pieter Paaw, 1564–1617, who had studied at Padua under Fabricius, Harvey's teacher, was Professor of Anatomy at Leyden when the first anatomical theatre was built, in 1597.

Another graduate of Padua who taught at Leyden was Johann van Heurne, 1543–1601. Like many of his colleagues of that time, he taught anatomy and surgery, as well as medicine. Castiglioni states that it was van Heurne who introduced into Leyden the clinical method of teaching which had been originated at Padua by Giovanni Battista da Monte (Montanus), 1488–1551. Johann van Heurne was professor at Leyden from 1581 until 1601, when he was succeeded by his son Otto who held the Chair for the next fifty years. Their name of van Heurne is not to be confused with that of the anatomist Johann van Horne (Hornius), 1621–70, mentioned as one of the professors at Leyden by Sibbald, in his autobiography to which reference will be made presently.[5]

Also of later date was another famous Leyden teacher, noted by Sibbald, Johannes Antonides Vander Linden, 1609–64, a remarkable scholar whose writings rank high in medical literature. He took the M.D. degree at Franeker, the second of the Dutch universities to be founded (1585), in which university his father was Professor of Theology. Leyden is still a centre of medical learning, but Franeker University came to an end in 1811.

Vander Linden was professor at Franeker in 1639, and then at Leyden from 1651 until his death. He is best known for his work as a medical bibliographer, which is discussed at length in a paper by George Sarton.[6] A keen disputant, he opposed Harvey's discovery, stating that the circulation was known to Hippocrates, and that the idea was passed on to Harvey by George Heriot (Scott's 'Jingling Geordie') when they met at Court.

The next star to appear in the Leyden firmament was the famous Franz de la Boe (Franciscus Sylvius), 1614–72, a great anatomist, a physician who taught at the bedside, and a follower of Harvey's views. Sylvius laid stress upon the value of anatomy and chemistry in medical education, and after his appointment to the Chair at Leyden in 1660, the reputation and status of the university were greatly enhanced. The number of students still further increased when Boerhaave was appointed. Sylvius was succeeded by other anatomists of distinction: Anton Nuck, 1687; Govert Bidloo, 1701; Johannes Rau, 1713; and Bernhard Albinus, 1721. Some of the anatomical preparations of Rau and Albinus may still be seen in the Anatomical Department of Leyden University.

Boerhaave and Pitcairne

By far the greatest of all the Leyden teachers in medicine was that physician of world-wide fame, Hermann Boerhaave, 1668–1738. He graduated at Harderwyck in 1693, and in 1701 commenced his distinguished career at Leyden. Boerhaave was a master not only of medicine but of botany and chemistry as well: he was, in fact, a whole faculty of medicine in himself. The University of Leyden, which in its earlier years had absorbed some of the learning of Padua,

the training ground of so many of the first teachers, was now, in turn, about to disseminate that learning, and much of its own besides, to newly established medical schools in other countries.

For this great service, Boerhaave was largely responsible. Students of many lands flocked to attend his classes, and it may be truly said that modern scientific medicine commenced with Boerhaave. Not only did he raise Leyden to the height of its fame as a medical school, but, through his students, he was responsible for the founding of the famous schools of Vienna and Edinburgh.[7]

Among his pupils were Albrecht von Haller, 1708–77, who brought fame to the new university of Göttingen, Gerhard van Swieten, 1700–72, who reconstructed the medical school of Vienna, and Alexander Monro, *primus*, 1697–1767, who with other Leyden students founded the faculty of medicine at Edinburgh.

Shortly before the time of Boerhaave, there occurred at Leyden an event which united still further the medical partnership between Holland and Scotland. This was the appointment of Archibald Pitcairne, 1653–1713, of Edinburgh, to be Professor of Medicine at Leyden in 1692. Pitcairne, one of the most brilliant physicians of his day, had been a student of divinity and of law before turning his attention to medicine. After studying at Padua, he took the M.D. of Reims in 1680, and on returning home found himself the youngest Fellow of the newly founded Royal College of Physicians of Edinburgh. The originality of his writings and, in particular, his defence of Harvey's view regarding the circulation of the blood, which remained a matter of dispute for a century after the discovery, led to the selection of Pitcairne as successor to Schacht in the Chair of Medicine at Leyden. At that time, teaching was still conducted in Latin, so that an interchange of scholarship of this nature was possible. Although, for family reasons, Pitcairne remained at Leyden for little more than a year, when he returned to Scotland, he did much during his brief tenure to promote the success of the Leyden School.

Among Pitcairne's students were Richard Mead, who became so famous in London, and also, it is said, though never conclusively proved, the great Hermann Boerhaave, who was to follow him later in the Chair.

Pitcairne was not the only Scot to become a professor at Leyden University. Almost a century earlier, Gilbert Jack, 1578–1628, of Aberdeen, was elected Professor of Philosophy in 1604, and held the position until his death. As was not unusual in these days, Jack studied theology and medicine as well as philosophy, and he took the M.D. degree at Leyden in 1611.

Some distinguished Leyden students

There were students of all nations at Leyden, and several of them attained distinction even as undergraduates.

It was the Dane, Niels Stenson (Steno), 1638–66, who, while still a student, discovered the parotid duct in a calf, in 1661, the first of his notable discoveries. A Swedish student, Olaf Rudbeck, distinguished the lymph vessels as separate from the lacteals, in 1653. There were also Dutch students who attained fame:

Jan Swammerdam for his micro-dissections of insects, and Regnier de Graaf for his discovery of the Graafian follicles in the ovary.

The matriculation album of Leyden contains the names of many English students who became well known in later years. Innes Smith states that 'the first student of all nations to be entered in the Faculty of Medicine at Leyden' was an Englishman, John James (Johannes Jacobus), who came from Cambridge and took the M.D. degree at Leyden in 1581.

Among other English medical men who studied at Leyden were John Aikin, whose *Biographical Memoirs* are well known, Sir Thomas Browne, and his son Edward Browne, Oliver Goldsmith, the extent and location of whose medical studies is still a matter of dispute, Baldwin Hamey, father and son, John Coakley Lettsom, the Quaker physician, Richard Mead, Thomas Percival, of *Medical Ethics* fame, and William Charles Wells, who wrote the famous *Essay on Dew*. In the present paper, however, we are mainly concerned with students of Scottish birth, and it is appropriate that we should commence with those who were responsible, directly or indirectly, for the foundation of the Faculty of Medicine in the University of Edinburgh.

Leyden students and the Edinburgh School of Medicine

The first name deserving of mention is that of John Monro, 1670–1740, who was at Leyden in 1692–3, when he may have been a pupil of Pitcairne. He had previously studied medicine at Padua. We have noted how Padua and Leyden were so closely linked. John Monro greatly desired that Edinburgh should have a medical school comparable to those of Padua and Leyden, and with this ideal in view he educated his son Alexander with the intention of having him eventually appointed Professor of Anatomy at Edinburgh.

This scheme proved highly successful. Alexander Monro, 1697–1767, later called *primus* to distinguish him from his son and grandson who followed him in the Chair, fully justified his father's expectations, and was duly appointed. When at Leyden in 1719 and 1720, he was a favourite pupil of Boerhaave, whom he used to assist in dealing with the many English-speaking patients who were sent to consult the professor, then at the height of his fame. On his return home, Monro *primus* was appointed to be Professor of Anatomy and Surgery, in succession to Adam Drummond and John McGill, who had succeeded the first holder of the Chair, Robert Eliot, whose appointment, in 1706, had been made, jointly, by the College of Surgeons and the University. Eliot had been a student at Leyden in 1692, when Pitcairne was teaching there. John Munro and his son Alexander each studied at Leyden for two years. The next of the three Alexander Monros, Alexander Monro, *secundus*, 1733–1817, who was even more successful in the Edinburgh Chair of Anatomy than his father, had spent one year at Leyden University in 1757. His son, the third and least eminent of the professorial trio, Alexander Monro, *tertius*, 1773–1859, was not a Leyden student.

Associated with A. Monro, *primus*, in the foundation of the Faculty of Medicine at Edinburgh were four other professors, who had just been appointed.

The first of them, John Rutherford, 1695–1779, the maternal grandfather of

Sir Walter Scott, spent a year at Leyden in 1718, took the M.D. degree at Reims in 1719, and was appointed Professor of the Practice of Medicine at Edinburgh in 1726. This post he held for forty years, and he was the first to introduce clinical teaching into the Edinburgh School.

The other three were all students at Leyden along with Monro, *primus*, in 1720. They were Andrew Plummer, 1698–1756, who graduated M.D. at Leyden in 1722, and was appointed Professor of Chemistry and Materia Medica at Edinburgh in 1726; Andrew St. Clair (or Sinclair), 1699–1760, who, though a Leyden student, graduated M.D. at Angers in 1720, and became, in 1726, the first Professor of the Institutes of Medicine, which we now call Physiology; and John Innes, 1696–1733, who had taken the M.D. at Padua in 1722, and who, on appointment to the rank of professor in Edinburgh, shared the duties of the Chair above mentioned with Plummer, though his term of office was cut short by his early death.

The five above-named professors constituted the first Faculty of Medicine at Edinburgh University in 1726. In the same year the first professor of midwifery (the first in any country) was appointed in the person of Joseph Gibson, although at first he lectured to midwives only.

Before the time of Monro, *primus*, anatomy had been taught for many years, in fact, since the year 1505, when the Incorporation of Barber-Surgeons was founded, largely in order to provide training for their apprentices. Their first accredited teacher of anatomy, James Borthwick, was appointed in 1645. His apprentice and kinsman, William Borthwick, studied at Leyden in 1667. Archibald Pitcairne himself, although a physician, joined the surgeons after a quarrel with the College of Physicians, and acted as one of the teachers of anatomy in 1702.

Eventually the surgeons, in collaboration with the university, in 1706, appointed as Professor of Anatomy, Robert Eliot, whose career has been already mentioned.

Botany and Chemistry were also taught at Edinburgh before the Faculty of Medicine was founded. In 1676, James Sutherland became the professor of botany. He was succeeded in 1706 by Charles Preston, another Leyden student (1694). His brother, George Preston, followed him in the Chair in 1711, and when George Preston retired in 1729, the candidate chosen to fill his place was Charles Alston who, for some years, had been in charge of the Royal Garden at Holyrood, and had given lectures on Botany and Materia Medica. Alston was a student at Leyden in 1718, and had graduated M.D. at Glasgow in 1719.

The sister science of Chemistry, which had been taught in a desultory fashion by the Surgeon-Apothecaries, was accorded official recognition in 1713 by the appointment of a Leyden student to be Professor of Chemistry. This was James Crauford, a native of Leith, who had become an M.D. of Leyden in 1707, when he was one of the early students under Boerhaave, whose reputation as a chemist was very high. Alexander Munro, *primus*, was a pupil of Crauford, and also attended the botanical lectures of George Preston in Edinburgh.

Thus the basic studies of botany, chemistry, and anatomy in the Edinburgh School were all founded on knowledge obtained in Leyden.[8]

Monro was not the first, however, to envisage the foundation of a complete Edinburgh Medical School.

Others, and in particular Archibald Pitcairne, deserve a share of the honour. A professor at Leyden, though never a student there, Pitcairne was associated with Sir Robert Sibbald, 1641–1722, when both were original Fellows of the Royal College of Physicians in 1681. Neither Pitcairne nor Sibbald lived to see the establishment of the Faculty of Medicine of which they had dreamed. Sibbald was a Leyden student in 1660, and M.D. of Angers in 1662. His brief autobiography, first published in 1833, gives some interesting details of his life and times, and of an earlier attempt, in 1656, to found a College of Physicians in Edinburgh, a project which was then hotly opposed by the Surgeon-Apothecaries. Sibbald's versatility is shown by his appointment in 1682 as Geographer-Royal for Scotland, and by the publication of his chief work, *Scotia Illustrata*, in 1684. Among the illustrations of plant and animal life is the first description and illustration of the Solan Goose or Gannet, the bird which so greatly interested William Harvey when he visited the Bass Rock in 1636.

Four years after the physicians founded their college, an effort was made to inaugurate organized medical teaching at the university by the appointment of three Professors of Medicine, Sibbald, Pitcairne, and Halket.

James Halket, 1655–1710, who, in point of age, came between Sibbald and Pitcairne, was an original Fellow of the college, and was President in 1704. He had been a student at Leyden in 1675, but did not graduate there.

There is no evidence of any lectures having been given by the three professors, and almost half a century was to elapse before the Faculty was inaugurated. Two years before this came about, in 1724, the Town Council, on the recommendation of the Royal College of Physicians, decided to appoint a professor 'to give regular instruction in the institutes and practice of medicine'. They chose William Porterfield (d. 1771) who, like so many of his colleagues, had studied at Leyden in 1718, after taking the M.D. of Reims in the previous year. Porterfield delivered no lectures, and, two years after his appointment, was apparently quite pleased to hand over the duties to the four professors who, with Alexander Monro, *primus*, formed the first Faculty of Medicine. Besides being famous as a physiciain, Porterfield made several valuable contributions to ophthalmology.

To complete the picture, it is necessary to refer to several other men of distinction who had studied at Leyden and who became intimately associated with the Edinburgh Medical School.

Sir Archibald Stevensone, 1629–1710, the first President of the Royal College of Physicians, 1681–4, and the father-in-law of Archibald Pitcairne, had been a student at Leyden in 1659, his name being entered in the Matriculation Album as 'Stephanides', and he became M.D. of Leyden in 1661.

Another famous Edinburgh physician was Sir Alexander Dick, Bart., 1703–85, who studied (1724) and graduated (1725) at Leyden. At that time his name

was Cunningham, which he changed to Dick when he succeeded to the baronetcy of Prestonfield. He was President of the Royal College of Physicians for the unusually long period of seven years, 1756–63, but he is remembered chiefly as a philanthropist and able administrator, and also as a friend of many other famous personages of the day, including Samuel Johnson, Benjamin Franklin, and others.

A contemporary of Dick was another medical baronet, Sir John Pringle, 1707–82, so well known as a founder of military medicine, as distinguished from military surgery. His book, *Observations on Diseases of the Army, 1752*, contains interesting details of the Jacobite Rebellion of 1745. Pringle was one of the first students at Edinburgh after the Faculty was formed, although he did not graduate M.D. there, but at Leyden in 1730.

That Pringle possessed considerable talent is shown by the fact that in 1734 he was appointed professor, not of medicine, but of moral philosophy, at the University of Edinburgh. This position he held for eight years, during which period he also practised as a physician.

A noteworthy medical graduate of Leyden (M.D. 1665) was Gilbert Rule, 1629–1701, who, after practising medicine at Berwick-upon-Tweed, became Principal of Edinburgh University in 1690 and held that office until his death.

Among the Leyden students of later date were three members of the famous family of 'Academic Gregorys', a family which included sixteen professors at Scottish universities within thirty years.[9]

The first of the three was James Gregory, 1707–55, sometimes called 'the younger' to distinguish him from his father of the same name who was one of the Aberdeen 'Mediciners', as the early professors of medicine at King's College were called. James the younger studied at Leyden in 1728, and succeeded his father as mediciner in 1732. This post he held until his death, when he was followed by his younger brother John. John Gregory, 1724–73, after studying at Leyden in 1745, became Professor of Medicine, first at Aberdeen, and then at Edinburgh. His lectures, published in book form, *On the Duties and Qualifications of a Physician*, 1772, foreshadowed the later work of Thomas Percival of Manchester, who coined the term 'Medical Ethics' by his book of that title. Percival, an Englishman, was an Edinburgh student who became M.D. at Leyden in 1765.

John Gregory had succeeded Robert Whytt in the Edinburgh Chair in 1766, and on Gregory's retirement his successor was William Cullen, with whom he had collaborated as joint-professor.

The next to assume office in the Chair, in 1790, was perhaps the most famous of all the Gregorys, James Gregory, 1753–1821. The son of the above-mentioned John Gregory, he was still a student at Leyden when the post fell vacant, but it was kept open for him until he should be ready to undertake the duties. This he did with conspicuous success for the next thirty-one years. His name is still associated with the particularly nauseous powder so frequently administered to children of Victorian days.

Before we leave the Edinburgh School, it is interesting to note that although the famous Cullen himself had no direct connection with Leyden, his assistant, John Brown, 1736–88, studied there in 1776. Brown achieved fame, or at least notoriety, by his 'Brunonian' system of medicine, so easy and simple that it appealed strongly to students, though it soon became obsolete. The majority of Brown's biographers omit to state that he studied, but did not graduate, at Leyden. He was then forty years of age.

Looking back upon the list of those who were connected with medical education at the University of Edinburgh in early times, it is quite remarkable to observe how many of them studied at Leyden, and how many were pupils of Boerhaave.

The wide river of medical learning which flowed from Padua to Leyden was in full flood when it continued its course to Edinburgh, which city, in turn, had become the leading medical school of the civilized world.

Other Scottish students at Leyden

Besides those associated with the Edinburgh School, there were many students at Leyden who came from other parts of Scotland. The influence of Leyden, though most profoundly felt at Edinburgh, was apparent throughout Scotland. The first Scottish student to study and graduate in medicine at Leyden was Peter Goldman. A native of Dundee, he had graduated M.A. at St. Andrews in 1604. His M.D. thesis, accepted at Leyden in 1610, was on the subject of Melancholia. On his return to his native Scotland, he became a minor poet of some repute, writing some good Latin verse. He died in 1628.

In the nineteenth century the number of English-speaking students at Leyden had greatly diminished, and only four Scottish names appear in the list. They are J. Kelk, 1822; R. Mayne, 1832; S. Smiles (to be noted later), 1838; and R. A. Balfour of Dunfermline, who became M.D. at Leyden in 1842, perhaps the last Scot to do so.

There were many students who attended the classes at Leyden without taking a degree, and no distinction has been drawn between the two categories in the present review.

One of the earliest of the Scottish students to arrive in Leyden was Alexander Leighton, 1568–1649. He appears in the list of M.D. graduates of 1617 as 'Anglus Londonensis', but the reason for that was, that, although his only degree was M.A. of St. Andrews, his birthplace, he had practised medicine for some years in London, and was forty-nine years of age before he decided to graduate at Leyden. Leighton is remembered, however, not for his medical achievements, but for his participation, with disastrous results to himself, in the religious controversies of his time. For his virulent attack upon episcopacy he was not only fined £10,000, but his ears were cut off and his face branded S.S. (Sower of Sedition). It is indeed strange that such an opponent of episcopacy was the father of the more famous Robert Leighton, 1611–84, Bishop of Dunblane, Archbishop of Glasgow, and, in 1653, Principal of the University of Edinburgh.

Another St. Andrews student, who was at Leyden about a century after Leighton, was George Martine, 1702–41. Martine first appears on the stage of history as the leader of a student riot at St. Andrews in 1715, when the college bells were rung to celebrate a Jacobite victory. Martine spent the year 1721 at Leyden, and graduated M.D. St. Andrews on his return. For some years he practised at St. Andrews, and published his researches on Animal Heat and on Periods and Crises of Disease, besides his important description of the operation of tracheotomy (bronchotomy) which he carried out in 1730, many years before the operation was performed elsewhere in Britain. Martine died of fever at Cartagena, while acting as surgeon to an expedition to the West Indies.[10]

The first Professor of Medicine at St. Andrews, appointed in 1722, was Thomas Simson, 1696–1764, a Leyden student of 1718, and an M.D. of Glasgow, 1720.

Turning north from St. Andrews to Aberdeen, we find that the first Professor of Medicine at Marischal College, in 1701, was Patrick Chalmers (d. 1727). Chalmers was a student at Leyden in 1679, after graduating at Padua in 1677. At Padua he represented the Scottish nation, and his 'stemma', or coat of arms, like that of William Harvey, may still be seen in the university quadrangle. Chalmers' ledger, preserved at Aberdeen, gives interesting details of the medical practice of his time.

His successor in the Chair at Aberdeen, Matthew Mackaile (d. 1734), had studied at Leyden in 1712. He was appointed in 1716, after Chalmers had been expelled on account of his Jacobite sympathies.

Of much later date was Alexander Gordon, 1752–1803, the well-known Aberdeen obstetrician whose treatise on Puerperal Fever (1789) is a medical classic. Gordon was at Leyden in 1776, and he served for some years in the Navy before he graduated M.D. at Aberdeen and commenced practice there.

The University of Glasgow can claim a number of Leyden students who became members of the staff, and two of them may be mentioned.

Thomas Brisbane (d. 1742), was an M.D. of Leyden, 1707, who, in 1720, was appointed the first Professor of Anatomy and Botany at Glasgow University, while his successor, Robert Hamilton (d. 1757), studied at Leyden in 1736. Hamilton was transferred to the Chair of Medicine at Glasgow the year before his death, but the real founder of the Glasgow Medical School was William Cullen, who began to lecture in Chemistry in 1747, and who went to Edinburgh in 1755, there to continue his career as the leading physician of his day.

Among the few Scottish students at Leyden during the nineteenth century was one who became more famous for his literary work than for any contribution he made to medicine. Samuel Smiles, 1812–1904, was a native of Haddington who graduated M.D. at Edinburgh before going to Leyden in 1838. He practised medicine in his native town, and later, in Leeds, where his organizing ability led to his appointment as Secretary to the South-Eastern Railway, a post which he held until 1866. His chief book, entitled *Self Help*, had an enormous circulation, and his other works of similar nature were almost as popular.

From Edinburgh, in the eighteenth century, the methods of medical education which had come from Leyden were to be carried across the Atlantic by the Edinburgh graduates from America who founded the first medical school at Philadelphia.

When Dr. Silas Weir Mitchell received the LL.D. degree from the University of Edinburgh in 1895, he spoke of the medical institutions of Philadelphia as 'children of Edinburgh and grandchildren of Leyden'. More than 100 Americans took the M.D. degree at Edinburgh in the second half of the eighteenth century. But there was also a direct link between Leyden and America, established before that time.

American students at Leyden University

The number of American students who graduated at Leyden is relatively small when compared with the number who studied at Edinburgh.

Nevertheless the list is an important one, as it contains some famous names. Perhaps Samuel Fuller should be regarded as the first, although it is quite uncertain whether he studied at Leyden or whether he was a qualified doctor at all.[11] Certainly he accompanied the *Mayflower* on her historic voyage, and ministered well to the medical needs of the Pilgrims in the New World for fifteen years. He had joined the company at Leyden in 1609 when they came there from Amsterdam, and he was deacon of the Rev. John Robinson's church until the *Mayflower* sailed in 1620. No one who visits Leyden today, whether he be American or not, can remain unmoved as he reads the tablet in the Pieterskirke which records the sailing of the Pilgrim Fathers. As we recall the part played by Samuel Fuller, we can hardly imagine that he spent eleven years in Leyden without attending some of the classes at the great new university of that time.

The first American of whose medical graduation at Leyden there is a definite record, in 1661, was Samuel Bellingham. He had been born in New England, of a Lincolnshire family, and is said to have studied also at Harvard. I can trace no further details of him, though it would be interesting if one could do so, as he appears to have been the only seventeenth-century student from America. The first Leyden graduate to practise medicine in America was Laurence Bohun, who became the first Physician-General of Virginia in 1602. He, however, was not American-born, like Bellingham, but is listed 'Anglo-Londinensis'. After Bellingham, the next American names do not appear until 1736, when Isaac Du Bois (New York) and Samuel Nicholson (Maryland) both graduated M.D. Of slightly later date was Johannes La Montagne, a Huguenot who had taken the M.D. degree at Leyden, and who arrived in New York, then New Amsterdam, in 1637. He practised there until his death in 1670. Between 1736 and 1780 there were seventeen American graduates, several of whom became men of high distinction.

Phineas Bond, for example, took the M.D. of Leyden in 1742 and then joined his brother Thomas in practice at Philadelphia. It was Thomas Bond who collaborated with Benjamin Franklin to found the Pennsylvania Hospital

in 1752, and both brothers were physicians on the staff. They assisted John Morgan, in 1765, to establish the first medical school of North America.

A Leyden graduate of 1747 was the famous John Redman, who graduated, first at Edinburgh, and then at Leyden, returning to America to become the first President of the American College of Physicians in 1786, a position which he held until 1805, the year before his death.

A well-known New York doctor, Jacob Smith, graduated M.D. Leyden in 1764, having previously been a student at Princeton. He was appointed Professor of Chemistry and Materia Medica at King's College, New York, in 1767. He died in 1812.

The first Professor of Surgery at King's College, New York, was John Jones, 1729–91, who studied at Paris, Leyden, and Edinburgh, and graduated M.D. at Reims. He was the author of the first surgical book to be published in North America—*Plain Remarks upon Wounds and Fractures*, 1775. He went to Philadelphia in 1785 and he attended Benjamin Franklin in his last illness.

In 1765 Arthur Lee became an M.D. of Leyden. The son of wealthy parents, born in Virginia, he was sent over to school at Eton, and from there went to Edinburgh to graduate M.D., and thence to Leyden to do the same. For a short time he practised at Williamsburg, but in 1768 he returned to London to study law and to enter upon a career as a diplomatist. He became American Ambassador to France, and was associated with Benjamin Franklin. He returned to America in 1780, ten years before his death.

Another famous American, in the Leyden Album of 1778, was Benjamin Waterhouse. He became Professor of Medicine at Harvard in 1783, but his chief claim to fame was his ardent sponsorship of vaccination which earned for him the title of 'The Jenner of North America'. He vaccinated seven of his children and exposed three of them to smallpox infection in order to prove that they would be 'ever after secure from the smallpox'. Among other children vaccinated by Waterhouse was Oliver Wendell Holmes.

Finally, there may be mentioned the name of William Charles Wells, a Leyden graduate of 1780, who, although he was born in South Carolina, of Scottish parents, spent most of his life in London and was physician to St. Thomas's Hospital. His famous *Essay on Dew* first appeared in 1814, and he was perhaps the first to demonstrate the connection between rheumatism and cardiac disease.

Leyden, Edinburgh, Philadelphia

By this time the Edinburgh degree ranked equal to that of Leyden, and many young Americans faced the long and difficult journey across the Atlantic to avail themselves of the opportunities for medical education which Edinburgh now offered. More than 100 American students took the M.D. degree there in the second half of the eighteenth century. All members of the first Faculty of Medicine at Philadelphia—Morgan, 1762; Shippen, 1761; Kuhn, 1767; Rush, 1768; Wistar, 1786; and Physick, 1792—were Edinburgh graduates, just as all those who composed the first faculty at Edinburgh had been Leyden graduates.

Also graduates of Edinburgh were the great men of New York. Samuel Bard, 1765,[12] and, later, David Hosack was an Edinburgh student, 1792–4, while, in a much more remote part of this great country, another who had studied at Edinburgh, Ephraim McDowell, made history by his bold performance of ovariotomy in 1809.

Leyden and Edinburgh should not claim all the credit for the training of those American pioneers. In London, the Quaker physicians, Fothergill and Lettsom, and that reformer of surgery, John Hunter, did much to assist many an American student who came for learning or for advice.

Nevertheless, Leyden was at one time the leading medical centre. Later the Leyden tradition was firmly transplanted to Edinburgh, and again, to Philadelphia. It is true that the great William Cullen, like John Hunter, was never at Leyden, but Cullen ever had a high regard for Boerhaave. Each was a very inspiring clinical teacher.

The influence of Leyden in Modern Medicine

I have attempted to demonstrate the significance of the Leyden School during the years of its greatest fame, and especially to indicate how important was its influence upon the younger schools in Scotland and in America. In the early part of the nineteenth century the fame of Edinburgh became less, and Paris was the centre of medical education, with Louis as one of the leading teachers, as Osler has told us so dramatically.

Then, about the middle of the century, the scene changed once more, and the German schools drew students from many lands. Vienna, until the outbreak of the First World War, was the foremost post-graduate medical school. Medicine had travelled by devious paths since the days when Padua and Leyden were in the forefront. But it must not be imagined that the glories of the ancient seats of learning have now entirely faded. Padua is still a famous medical school, and so, also, is Leyden.

It is good that we should recall the past and draw inspiration from the pioneers who achieved so much in the face of many difficulties. It is well, also, to realize that the University of Leyden still holds a position equal to that of Amsterdam, of Groningen, or of Utrecht, all universities founded early in the seventeenth century. The number of students at Leyden in 1956 was 4,344 (3,101 men and 1,243 women). Long may our venerable ancestor continue to flourish!

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