

DR JOHN BARCLAY'S TEACHING OF COMPARATIVE ANATOMY

Alastair A. Macdonald and Colin M. Warwick

INTRODUCTION

It has been clear from the various reviews made of the early years of the veterinary school in Edinburgh that one of the seminal events in its founding and development was the introduction, in May 1815, of William Dick to Dr John Barclay.^{1,2,3,4} The occasion which prompted that meeting was the inauguration by Dr Barclay of a course of lectures on Comparative Anatomy in his extra-mural school, in which he would 'dissect and demonstrate the Structures of Quadrupeds, Birds, and Fishes' and its promotion in Edinburgh newspapers.^{5,6} The Farmer's Magazine, on April 1815, specifically drew this course to the attention of farriers in Edinburgh.⁶ The course would run from Tuesday the 9th of May until about the end of July, 1815.

But what is known about that course? Throughout the preceding decade and a half it was well recognized within the medical community that Dr Barclay had a passion for Comparative Anatomy, as indicated by the contents of his books.^{7,8,9} He illustrated his annual winter-time human anatomy lectures 'in a very instructive and interesting manner by comparative anatomy, ranging through the creation, and bringing monkeys, or the quadrumana, the cetacea, the carnivora, the amphibia, the rodentia, and pachydermata alongside of man, to illustrate their comparative corporeal structure, and so to speak, mental powers also, and the perfection of their respective organizations'.¹⁰ Thus, the separate three-month long summer course of Comparative Anatomy grew out of his annual winter session of lectures on human Anatomy and Surgery. It was initiated in 1815 and was presented annually for about ten years,¹¹ and yet almost nothing has been reported about its content; 'His Comparative Anatomy course consisted of daily lectures, and was mainly occupied with osteology, illustrated by the skeletons he had collected. It was philosophical as well as practical and demonstrated that all animals are constructed on the same general outline, and only varied as to class, order, genus, and species'.^{12,13} It was this course that helped stimulate the young farrier, William Dick, to become a veterinary surgeon.

The aim of our paper is to give some insight into the format, content and philosophy underpinning Dr Barclay's Comparative Anatomy course. Although

a set of notes in William Dick's hand has not come to light, a complete set of lecture notes, taken down a few years later by another student, Dr Robert Edmund Grant (Appendix 1), has been found.^{14,15} The structure and content of these give us some insight. In addition, we present details contained within the unpublished catalogues of comparative anatomy materials belonging to Dr Barclay.^{16,17} It is clear from the lecture notes that these museum specimens were an integral part of his Comparative Anatomy course and were used to illustrate this teaching.

JOHN BARCLAY (1758-1826)

The Dr John Barclay (Fig. 1) that his students knew began teaching Anatomy in November 1797 in a small apartment he had acquired in High School Yards (Fig. 2). Initially, his classes were 'scanty'.¹¹ However, within five years his teaching skills had increased sufficiently for him to attract a big enough class to warrant the move to larger premises nearby, at 10 Surgeons' Square.

What was Dr Barclay like as a person? One former student, of 1805-06, said:

'I found Dr Barclay to be a man of vigorous mind and great enthusiasm. ... He was himself a striking example of powerful muscular organization. His figure was short and very robust, with powerful limbs; a massy figure constructed for strength and not for speed; and indeed, judging from his energetic, decisive manner, he could hardly regret that he was not made for flight, for I believe he would not have fled in battle.¹⁰ 'He discouraged a taste for frivolous, vague or useless speculation'.¹¹

'Although more than half a century has passed away since I heard his voice, I can see him now, with his iron frame and firm features, enforcing his lucubrations by the gestures of his brawny arm, and earnestly enforcing the truths he taught, with the broad Scotch dialect and intonations'.¹⁰ Another said, 'In the lecture room his language was unaffected and clear'.¹²

Dr Barclay:

'was a peaceable, modest man, full of quiet humour, genial and kindly, with a decided genius for anatomy, at which he worked enthusiastically, thoughtfully, and laboriously. The man is seen in his two favourite authors, Aristotle and Harvey ... the old classical philosopher with a side for natural history, and the modern anatomist and physiologist with a turn for the philosophical'.¹²



Fig. 1. Portrait of John Barclay Painted by John Syme in 1816
[With the Permission of the Scottish National Portrait Gallery]

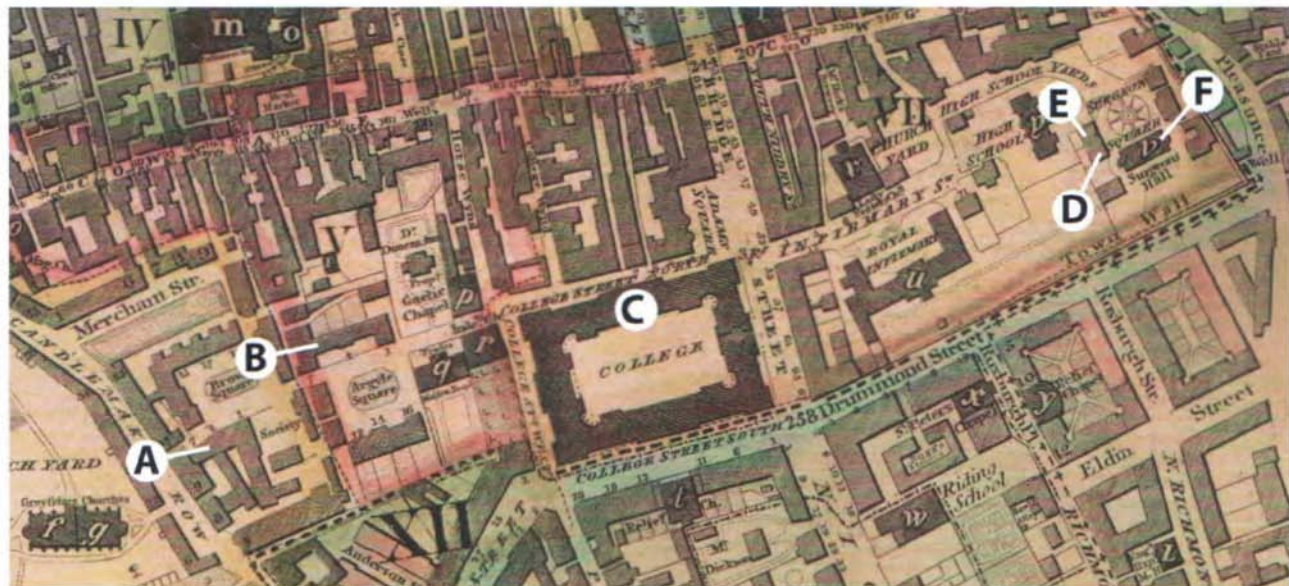


Fig. 2. Map of Edinburgh to Show the Location of: (A) Dr Barclay's Home in Brown Square; (B) Dr Barclay's Home in Argyle Square; (C) Edinburgh University; (D) Dr Barclay's Teaching Building; (E) Medical Society Hall; (F) Surgeon's Hall. *Kirkwood's New Plan of the City of Edinburgh*

[Permission to Reproduce the Detail Granted by the National Library of Scotland]

'He was a very good-natured man, almost never angry, with a great fund of humour and anecdote, and his wit, unlike that of many, had nothing offensive to others in it. ... He was a great personal favourite with his students'.¹² As a teacher 'he took great pains to resolve all the puzzles ... of anatomy'.¹²

The following example of his sense of humour is taken from lecture 10:

'I told the Craniologists that I could not distinguish the skulls of different nations and could not distinguish the character of individual skulls, but on examining the outward form of my own skull they found that I wanted [lacked] the organ of Discrimination'

Grant recorded that there was laughter from the students. Another measure of his personality was this example of his 'signing off' at the end of the last lecture of his 1821 Comparative Anatomy course; he concluded with, 'I must now thank you for the very gentlemanly manner in which you have always conducted yourselves here and for the regularity of your attendance – and I hope that though we now part as pupils and master we shall still see each other as friends – so farewell gentlemen, and God bless you all'.^{14,18} He was generous and 'gave many young men gratuitous admissions to his lectures'.¹¹ 'He was a great lover of snuff, which he took freely during lectures, without caring first to wipe his fingers'.¹² He 'often declared that he had neither the sense of taste nor of smell'.¹⁹

John Barclay was born on Sunday the 10th of December 1758 on a farm called Cairn near Drummaquhance in Perthshire.²⁰ His school education was in Muthill village, about three miles away, under the supervision of a Classical scholar, Mr Thomson. In 1776 he entered the Old College of the University of St. Andrews where he studied Arts and Divinity. Following examinations in Latin, Greek, Hebrew, Divinity and Church History, he obtained his licence as a preacher in 1781. It is at about this time that his interest in Natural History began to develop. He became tutor to the family of Charles Campbell of Loch Dochart, and then in 1789 tutored the two sons of Sir James Campbell of Aberuchill. While in this post his growing interest in anatomy was furthered by the occasional dissection of local dogs.¹¹ In the autumn of 1789 he was sent in charge of Sir James' two sons to Edinburgh where they initiated studies at the University. Barclay himself matriculated at the University of Edinburgh in 1792, and was a medical student there in each of the subsequent three sessions.²¹ As well as attending the anatomical lectures of Alexander Monro *secundus* (1733-1817), Barclay also enrolled in the extra-mural Anatomy and Surgery classes presented by John Bell (1763-1820), whose private School of Anatomy the College of Surgeons of Edinburgh had recently licensed; he acted as an Assistant to Bell for part of his time at university. John Barclay graduated

MD in 1796 and went to London for one year to learn from Dr Andrew Marshall (1742-1813) and attend his anatomy lectures in Thavies Inn.²² He returned to live as part of the Campbell household, firstly at 5 Brown's Square (Fig. 2A), Society, Edinburgh^{11,23} until 1809, and then following the household's move 450 metres east to Argyle Square,²⁴ at number 6, which lay on the north side of the square (Fig. 2B). Two years later, on Friday 25 October 1811, Dr Barclay married Miss Eleanora Campbell, the daughter of Sir James Campbell.^{11,25,26} Dr Barclay and his wife lived at that address until his death, aged 66, on Saturday 21 of August 1826.¹¹

THE COMPARATIVE ANATOMY COURSE ENVIRONMENT

Dr Barclay's teaching from 1802 was largely carried out in the house at no. 10 Surgeons' Square (Fig. 3). This three-storey building had been designed by William Milne (Architect) and constructed on land (10.17m by 18.70m) (Fig. 2D) purchased and feued (a right to the use of land in return for a fixed annual payment) on Thursday 27 March 1777 from the Incorporation of Surgeons of Edinburgh by Dr Andrew Duncan *Senior* (1744-1828).^{26,27} He used it for teaching physiology.²¹ It stood to the west of the old Surgeons' Hall (completed in 1697) which was on the south side of the Square (Figure 2F), and was built adjacent to, and to the south of the recently completed (1776) Hall of the student Medical Society, on the west side of the Square (Fig. 2E).²⁸ On Thursday 23 March 1797 Dr Duncan sold the building to Dr Alexander Ramsay (1754-1824), the anatomist.²⁶ Dr Ramsay and his colleague Dr James Latta (surgeon) seem to have taught surgery and then anatomy there from 1794-1801.²⁹ Dr Barclay purchased the building from Dr Ramsay on Thursday the 18th of February 1802 and it was recorded in the Sasines (deeds or documents recording the transfer) on Thursday 11 March 1802.²⁶

It was said that from time to time, the lecture room, on the second floor, was enlarged by Dr Barclay as his winter classes in Anatomy and Surgery increased in size.^{11,12} One of these reconstructions, in the autumn of 1815, involved the rebuilding of part of the front of the house.³⁰ This resulted in the replacement of the three windows on the second floor with four new ones, and the building of a new stairway, rising from ground level to the external entrances of both the first and second floors (Fig. 4). The effect on the interior was to increase the space on the top floor that was available for teaching to about 10.7m in length and 8.95m in width, or approximately 90 square meters of floor area. This reportedly provided seating room for about 150 students plus space for the lecturer and his anatomical demonstrations.³¹ The amount of light coming into this room was also increased. As part of this construction four low arches were

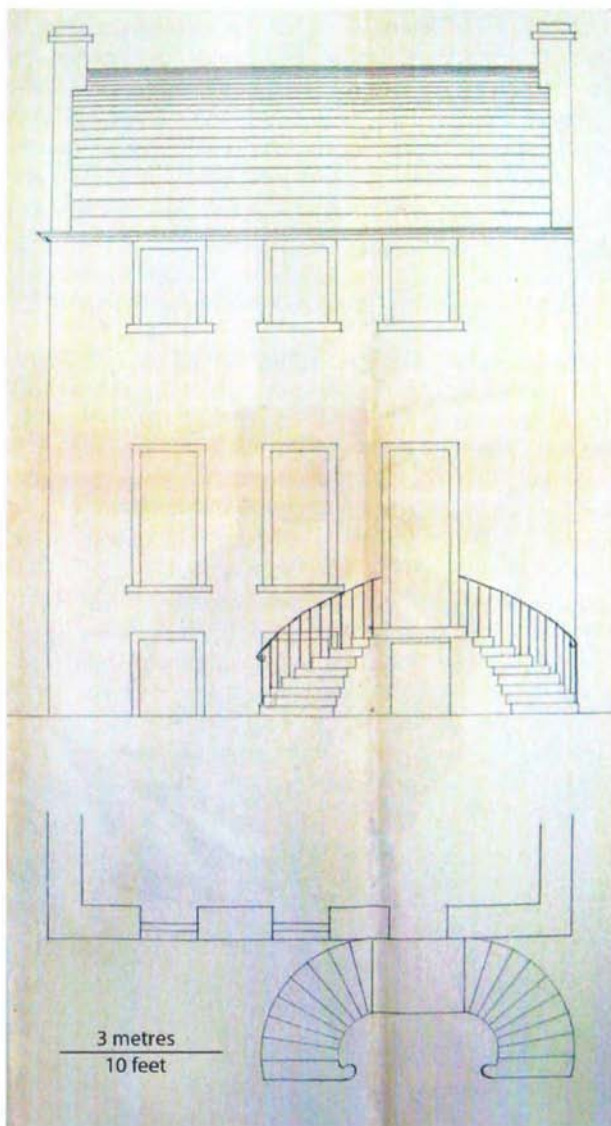


Fig. 3. (a) Front Elevation and (b) plan of the Building at 10 Surgeons' Square bought by Dr Barclay and used by him from 1802-1815.
[Courtesy of Edinburgh City Archives]

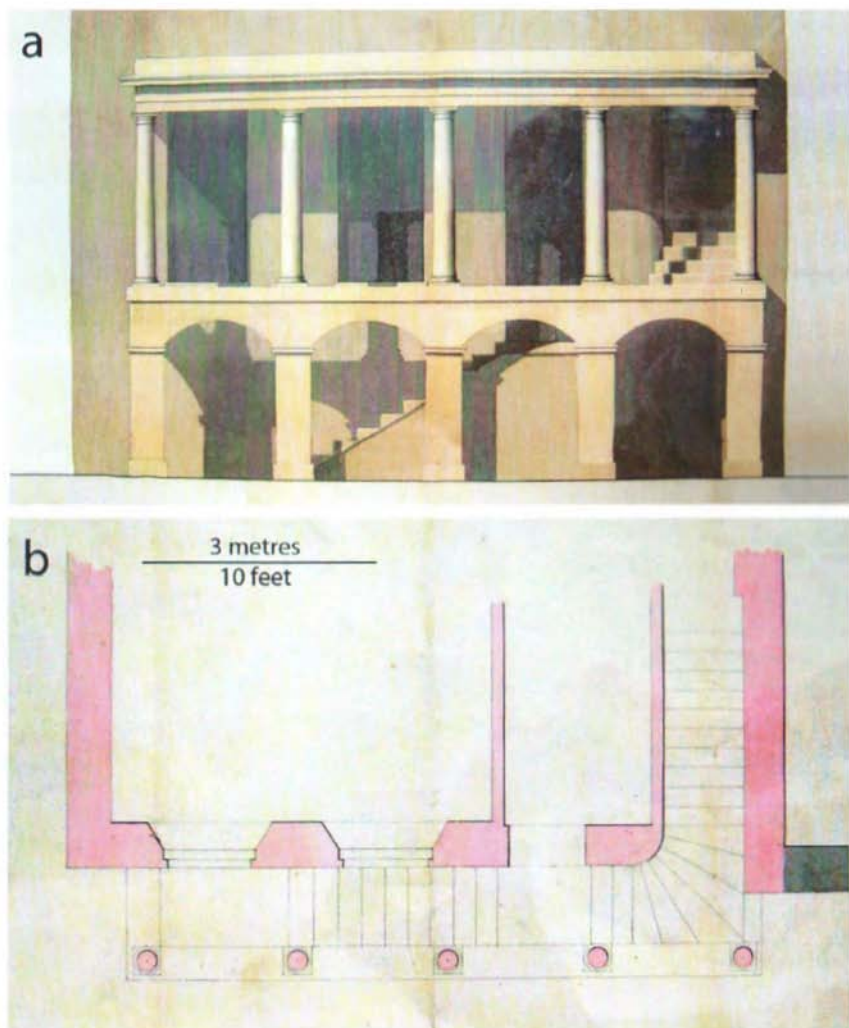


Fig. 4. (a) Front Elevation and (b) Plan of Final Proposed 1815 Modifications to Dr Barclay's Building at 10 Surgeons' Square to Show the Layout of Alterations to the Front and First Floor.
 [Courtesy of Edinburgh City Archives]

placed at the front of the house and on these arches five pillars were positioned at the first floor level to support a roof over the outside stairwell (Fig. 5).³² This design met with the approval of the owners of the neighbouring properties, the Royal College of Surgeons of Edinburgh and the Medical Society.³⁰

The larger pieces of Comparative Anatomy skeletal material were probably housed together with most of the rest of the anatomical collection in the spacious, relatively well-lit room on the second floor.³³ The anatomical dissections were apparently carried out in a room downstairs, in the semi-sunken ground floor, which was 'badly lit from the side'.^{12,34} It is likely that this floor was reached by a stair against the inside north wall of the building. It is also very likely that there was a back door from the ground floor giving access to the yard (10.17m x 6.20m in size) that lay to the west of the building. This yard must have had an outside access gate. Somewhere inside the house, 'a statue of the Venus de Medici stood elevated on a pedestal to illustrate the *beau ideal* of the human figure'.¹⁰

'In the year 1821-22, the number of students of medicine in the University [of Edinburgh] was 802, but an additional number of unregistered students usually attended classes. The attendance on the Anatomy Class [of *Monro tertius*] had declined [from 400] to only 200'.^{12,35} By contrast, attendance numbers for Dr Barclay's winter Anatomy & Surgery classes rose to reach 300 between 1806 and 1826, and he had to teach twice or three times each day in order to accommodate all the students who enrolled.¹² Sadly, data on the numbers that attended Dr Barclay's Comparative Anatomy classes do not appear to have been retained.

So, who were the students who attended the Comparative Anatomy course? In Dr Barclay's words, the course was designed:

'to cultivate, not only as an object of curious research, but of real practical utility, and a branch of liberal education of high importance to men of various professional descriptions – to all belonging to the medical profession, whether surgeons or physicians – to all naturalists, whose taste may incline them to study Zoology – to all who are concerned with the health and preservation of valuable animals – to the lawyer who attends to the nature of evidence in criminal trials – to the moralist and logician, who view the faculties of the mind in the abstract, without reflecting upon the powerful re-action of the organs by which it operates, and by which it is often operated upon – to the physico-theologist, who is anxious to witness the strongest proofs that are furnished by the works of nature of the existence and power of the



Fig. 5. An Engraving³² Showing Dr Barclay's Teaching Building (Centre) at 10 Surgeons' Square, used by him from 1815-1825, Illustrating the Four Windows on the Second Floor and the Covered Stairway.

'Surgeon's [sic] Square, Drawn, Eng^d, & Pub^d by J. & H.S. Storer, Chapel Street, Pentonville, Dec. 1, 1819.'

[With Courtesy of CRC, The University of Edinburgh]

Deity, of his omnipotence, his omnipresence, his varied operations, and his universal superintendence – and lastly, to the inquisitive geologist, who delights in tracing the great physical revolutions of the globe, by studying the fossil remains of animals, that at one time had been its inhabitants, when it presented a different aspect and had different climates from what it has now'.³⁶

Advertisements were drafted to attract a student audience from this wide variety of backgrounds, professions and interests (Fig. 6).³⁷ William Dick was among the farriers who came. He was noticed by Dr Barclay who rapidly recognised his intellectual capability; when told by one of the medical students in his class that William Dick was a common working blacksmith, Dr Barclay, retorted, 'All I can say is, that whether he be blacksmith or whitesmith, he's the cleverest chap among you'.³⁸

DR BARCLAY will begin his Course of **COMPARATIVE ANATOMY** on Tuesday the 5th of May, at three o'clock in the afternoon.

In this course he intends to demonstrate a variety of the Structures of the Lower Animals; and, keeping the Human Body in view as the Standard of Comparison, will thus give a Specimen of that broad and extended basis on which HARVEY, HALLER, HUNTER, and COVIER, have endeavoured to establish the General Principles of sound Physiology.

It may seem unnecessary almost to mention how useful such a Course may be to the LAWYER, in certain Cases of Criminal Trials; or to the DIVINE, while perusing Works upon Natural Theology. But it is still more obviously useful to those who are concerned in the Health and Preservation of Domestic Animals; to the ZOOLOGIST, who is studying the various Classes of Animals; and to those who, investigating the Physical Changes on the Surface of the Globe, may be anxious to know the Internal Characters of the Genera and Species that are now existing in a Living State, and wherein they differ from the Characters of those that have long been extinct, and whose Fossil Remains lie buried deep in successive Strata, demonstrating clearly a Succession of Periods in which they must have perished.

Fig. 6. Dr Barclay's Comparative Anatomy Course Advertisement in the *Caledonian Mercury* of 23 April 1818, p. 1; c. 3.

Surgeons, such as John Gordon (1786-1818)³⁹, David Craigie (1793-1866)⁴⁰ and Robert Liston (1794-1847) also taught human anatomy in Surgeons' Square during these years.^{12,39} It is almost certain that their anatomy classes did not extend into the late Spring and early Summer time when Dr Barclay was teaching his comparative anatomy course, although John Gordon's Physiology course was occasionally given then, and there would have been medical student and staff activity all year round at No. 11, the Medical Society's building.

The philosophy underlying Dr Barclay's Comparative Anatomy course was summarised in the introductory lectures written and largely printed shortly before his death, but published thereafter; Dr George Ballingall, his one-time assistant, saw them into press.¹¹ Dr Barclay wrote in his second Introductory Lecture to Anatomy:⁴¹

'All living bodies with which we are acquainted, are constructed on one general plan, possess similar, at least analogous, organs and functions; and being modified only as to class, order, genus, and species, contribute much to illustrate one another. In one animal, for instance, the organ is small, its structure complicated, or its use obscure; while in another, this organ is large, its structure simple, and its use obvious. So that many discoveries which are now made in human anatomy, would have still been unknown, had they not been previously made in the comparative.

Another reason for appealing to the structure of various animals, is, that by confining our researches to one species, we might be apt to ascribe too much to the form, size, structure, and situation of organs, but, by examining different animals, we soon learn that similar functions may be performed by organs of various forms, magnitudes, proportions, situations, and structures, or should the functions happen to be varied according to the organs, we are led to a very useful enquiry, not only how far the variety of function, but of genius, habits, instincts, and manners, is connected with each variation of the organs.

Thirdly, without the aid of Comparative Anatomy, we might often be induced to entertain false conceptions of the relative importance of the different organs; but when we see them imperfect in one animal, wanting in another, diseased, obliterated, or extracted, in a third, with or without any essential injury to life, we have then criteria by which we may be able to form some judgement of that rank which they hold even in the human species'.

Dr Barclay also presented to his students a large number of the names of people he considered to be anatomical authorities in some particular aspect or another. The breadth and depth of his reading indicated that he had access to some remarkably well-stocked libraries. He was very much of the opinion that careful study of their publications was an essential component of being a competent anatomist. Although very helpful, he explained that it was not enough to make use of their illustrations alone.⁴² His referenced sources included the Greek and Roman classics as well as those working in different parts of Europe who were his more recent predecessors and his contemporaries.

THE COMPARATIVE ANATOMY COURSE OF LECTURES

According to the lecture notes written down by Robert Grant^{13,18} on Tuesday 8 May 1821 Dr Barclay began his Comparative Anatomy lecture course with the following:

'Anatomy, gentlemen, which naturally signifies dissection, when applied to the lower animals is termed Comparative – we dissect the lower animals to become better acquainted with the structure of the corresponding parts of man – we dissect them at different ages to perceive changes which take place by the growth – we dissect different species to compare them and see how far they all agree – we examine the remains found in the bowels of the earth to ascertain whether they be of the same kind or species with those found living on the surface.'

Generally, Dr Barclay did not have or use any notes for his lectures.¹² However, it was reportedly his usual practice to make an exception with the introductory lectures of his courses.¹¹ The published Comparative Anatomy introductory lecture occupied 33 printed pages of text, somewhat longer than the six pages of notes taken down by Dr Grant.³⁶ Nevertheless, the general content of that first paragraph corresponds quite closely to Grant's notes.^{13,18,43} Dr Barclay's lectures, like his anatomical museum^{16,17}, drew attention to a wide range of domestic and exotic animals. His teaching method was to illustrate his lectures by the demonstration of skeletal materials or by using soft tissue dissections. He ended the second lecture by saying that:

'tomorrow I shall institute a comparison between the human skeleton and that of the lower animals and thereby show you that however diff[erent] the various species of animals may appear they are all formed after the same general scheme, they are all merely modifications of our general plan.'

However, it was not until the fourth lecture that he compared the skeletal anatomy of the human, rat, giraffe, birds, quadrupeds, fishes, the polar bear, whales and the mole, drawing particular attention to the cervical and coxylgeal vertebrae, the presence or absence of clavicles, and the structure of the pelvis.

Some more quantitative indication of the comparisons he made throughout the lecture course can be gained from Grant's noted use of the words 'animal', 'lower animal' and 'quadruped', 159, 38 and 41 times respectively; 'bird' was used 86 times and 'fish' was used 46 times. It was also not surprising, given the attention paid to the dog (and other domestic animals) in human anatomy classes at Edinburgh University during the preceding century,⁴⁴ that the dog was often mentioned (51 times), as was the horse (34 times) and the sheep (21 times). Clearly these pieces of information would have had direct relevance to farriers seeking background training in pre-veterinary anatomy. Attention was also drawn to the elephant^{45,46,47} (13 times), whale (10 times) and seal (7 times). In all, the anatomies of thirty-two mammalian species were commented upon during the lecture series.⁴⁸ Although fewer birds were mentioned by name, nevertheless they numbered thirteen⁴⁹, and the number of named fish was nine⁵⁰. Anatomical aspects of reptiles⁵¹, amphibians⁵², marine molluscs⁵³, marine crustaceans⁵⁴, insects⁵⁵ and arachnids⁵⁶ were also presented and discussed.

Skeletal (Fig. 7), skin and organ specimens of almost all of these animals were present in the building^{16,17} and many of them would seem to have been demonstrated at the appropriate time to the class. They were either brought upstairs onto the second floor, or were studied downstairs after the lecture had finished. During his second lecture Dr Barclay intimated, 'to encourage this study [of comparative anatomy] still more among you I have caused the dissecting room down stairs [ground floor] to be cleared for your use gratis and I shall attend there regularly to assist you gratis'. The listed contents of the museum indicate the breadth and depth of prepared specimens available to the students.^{16,17} As will be shown below, dissection of the dog would seem to have been the routine opportunity for mammalian dissection by the students. However, the amount and species-range of additional material for students to dissect, after the lectures, remain to be discovered.

The general plan of Dr Barclay's 60 lectures can be seen from Grant's notes.^{13,18} The content of the first thirty-one of them largely comprised the comparative anatomy of the skeleton and its musculature, the order followed being skull, teeth, vertebrae, thorax, abdomen, hind limb and forelimb. In addition to the articulated skeletons to which he referred, skulls (Fig. 8), limb bones and other incomplete skeletal materials were available for inter-species comparison on the first floor and elsewhere in the building^{16,17}, e.g. 'in the cassowary the sternum

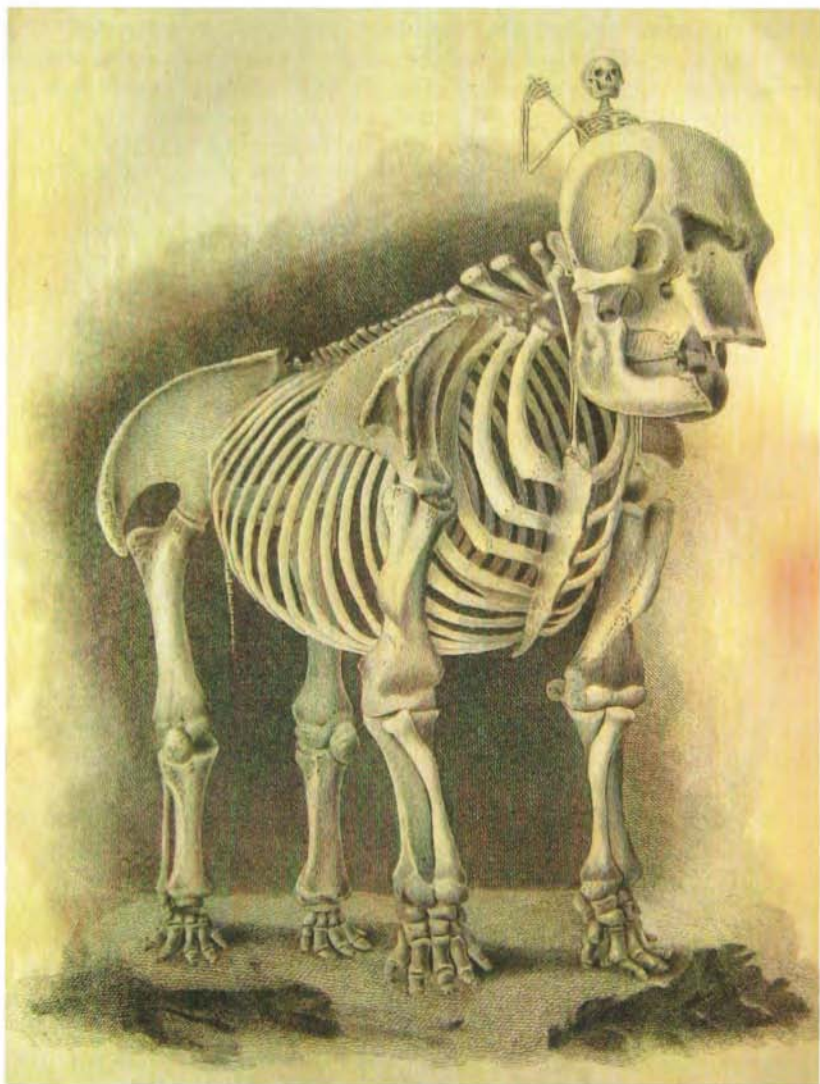


Fig. 7. Illustrations of the Skeleton of the Asian Elephant (*Elephas maximus indicus*) from Dr Barclay's Collection, Prepared by Dr Ballingall, based on Drawings by Robert Kaye Greville and Engraved by Edward Mitchell.^{45,46}
[Courtesy of CRC, The University of Edinburgh]



Fig. 8. Illustration of the Skull of the Babirusa (*Babirusa babyrussa*) from Dr Barclay's Collection, engraved by William Home Lizars.⁷ [Courtesy of CRC, The University of Edinburgh]

has no spine as in other birds, it has small pectoral muscles and consequently its wings are not well calculated for flying, they have however large sacral extremities for walking' (lecture 17); 'in this preparation we see in the case of the cat the monkey and some other animals – the varieties in the structure of the parts of animals become greater as we recede from the trunk towards the extremities' (lecture 19). Growth was dealt with in relation to tooth and limb bone structure; their blood vessels and nerve supply were also covered in a general manner. In the main, anatomy was described in relation to function; e.g. the impact that horns had on skull anatomy, and how brain size might be related to function (lecture 6); the sense of smell and the anatomy of the nose (lectures 8-10); the different functions of tails (lecture 15). The anatomy of the horse's foot was compared to that of the human finger (lecture 31). Various pathologies were also discussed where these were deemed to contribute to a better understanding of structure and function, growth and ageing.^{57,58} The next twenty-nine lectures largely dealt with brain⁵⁹ and vision⁶⁰, embryology⁶¹, glandular tissues⁶², the heart and 'systemic circulation',⁶³ the lung and 'pulmonic circulation',⁶⁴ and the viscera [stomach, liver, kidney] of the abdomen.⁶⁵ When he came to the soft parts he always had a dissection to illustrate the lecture.¹²

Naturally, the unexpected occurred every now and then, and not only added variety but probably also stimulated additional student interest in Dr Barclay's Comparative Anatomy course. Several examples may be seen in the 1821 course:

'For a course of lectures on Comp[arative] Anatomy we cannot always procure the animals at the time we would require them – and as I have procured an angler fish I shall so far interrupt the course to show you this animal which is not very common here' (lecture 3); 'I meant to have proceeded today to the thorax, the bones of the thorax but as I came down to the class [from his home in Argyle Square (Fig. 2B), along North College Street past Edinburgh University (Fig. 2C), down Infirmary Street and along High School yards to Surgeons' Square (Fig. 2D)] I happened to meet a human brain which I shall therefore demonstrate lest an opportunity should not occur when we come to treat of that part' (lecture 16); 'demonstration by a machine of the action of two muscles' (lecture 26); 'Specimen of a young seal newly calved with the umbilical cord still remaining this seal is nearly two feet long and 14 inches in circumference round the abdomen (lecture 50). Similarly with anecdotes such as, 'the same muscle which pulls upwards and backwards the angle of the mouth in the dog also pulls the ear backwards – by tying the ears of a bull together it was found to be disabled from leaping the fences, because when it

leaps the fences it always erects the ears, but when the ears are tied it could not erect them and thought that some one pulled it backwards whenever it attempted to leap' (lecture 25).

During his last (60th) lecture he summarised the course thus:

'I have avoided dwelling on my favourite hobbies the muscles and blood vessels because they require a long time to learn and because our time was very limited – we have examined more attentively which was most interesting in a comparative view, the skeleton, the brain, the eyes and the contents of the thorax and abdomen.'

DISSECTION PRACTICALS

Dr Barclay taught 'with a great variety of illustrative preparations'.¹¹ However, he clearly appreciated that for a student to gain an understanding of comparative anatomy he had to see and participate in the practical dissection of numerous species of animals: ...'those who would study it, must see it practiced. No figures or verbal descriptions can ever compensate for the want of the originals; they give not the same relish nor interest, nor afford the same correctness of ideas'.³⁶

Dr Barclay had a large number of Assistants to create his anatomical preparations, and Demonstrators to explain the anatomical features to the students; it was they who principally carried out the dissections for his classes. George Ballingall (1780–1855), Robert Knox (1791–1862) his younger brother Frederick Knox (1794–1873), Robert Nasmyth (1792–1870), and Dr Willis were some of them.¹¹ Although Dr Barclay did not give demonstrations on Human Anatomy in the summer session, when John Aitkin became his Demonstrator (in Dr Barclay's latter years), human dissections were conducted and demonstrations given by Aitkin during the summer session.¹² The Assistant who was with him from 1810 to 1815 was Robert Liston (1794–1847)⁶⁶ and he was his principal Demonstrator and Prosector in 1814–1815 at the time of William Dick's study.^{12,67} John Dickson took his place as Dr Barclay's Demonstrator in about 1815.⁶⁸

William Dick experienced this aspect of Dr Barclay's teaching method and commented upon it.¹

'During Dr Barclay's course of lectures upon comparative anatomy, and, when he was going on about dogs and cats, it occurred to William Dick that it might be a grand thing to get a horse. He mentioned it to the Professor, who was delighted with the offer.

Now, it so happened that he, shortly before, had met with a Shetland pony that had happened to have dislocated both his hind fetlocks in attempting to cover a big mare. These had been reduced; but in a fortnight afterwards the same thing had happened again. The consequence was, that there soon became compound dislocations, with sloughing. The beast was soon brought in, its throat cut, and the Doctor proceeded to lecture upon it; and thus he [William Dick] got his first lecture upon the comparative anatomy of the horse.'

During the 30th of the 1821 series of lectures, Dr Barclay mentioned 'that the viscera of the horse were dissected in the back court on Saturday [16th of June] by my friend Mr Dick the veterinary surgeon' (Fig. 9). Earlier that week,⁶⁹ Dr Barclay had made reference to William Dick's nerve-section treatment of diseased horses' feet, which was done without compromising their locomotion. It is of interest to note that earlier in 1821 William Dick, who was now developing his own teaching skills, had privately presented a four week course of eight lectures on veterinary medicine to the nine students that had attended.⁴

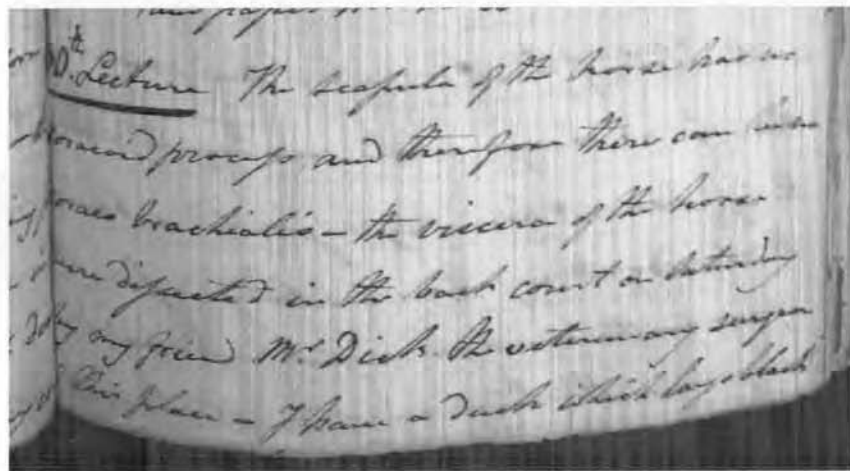


Fig. 9. Sample of Dr Barclay's Lecture Notes (Written by Robert E. Grant) Containing a Reference to 'my friend M^r [William] Dick'.
[Courtesy of Special Collections, University College London]

George Robert Waterhouse, one of Dr Barclay's students and probably a fellow student with William Dick, was present at the dissection of the male Beluga whale on, or about, Thursday 8 June 1815.

'Never shall we forget the enthusiasm of the Doctor, wading to his knees amongst the viscera of the great tenant of the deep, alternately cutting away with his large and dexterous knife, and regaling his nostrils with copious infusions of snuff, while he pointed out, in his usual felicitous manner, the various contrasts or agreements of the forms of the viscera with those of other animals and of man.'²⁰

Dr Barclay subsequently reported and published his findings.⁷⁰ However, dissection of the dog would seem to have been the standard opportunity for dissection by the students; '... the appearance of these parts in the human species can be very well learned from the disposition of them in the dog.' (lecture 27). The numbers of dogs' heads in the museum collection (43) attested both to the availability of that species and the frequency with which it was dissected during both the winter and summer courses of anatomy. During the Comparative Anatomy course the dog was dissected in order to illustrate various general aspects of its anatomy during the presentation of the lecture (lectures 25, 26, 27, 49, 52, 53) e.g.

'You see here the peristaltic motion of the viscera in this young dog killed and still quite warm – the vermicular motion is here remarkably conspicuous and seems to be much more rapid than the descent of the contained matter – the small intestine removed wholly from the animal and laid on the table still retains a little of this peristaltic motion' (lecture 53).

Further comparisons were made by dissection of a number of other species; a young goose (lecture 28); hedgehog (lecture 29); new-born seal (lecture 50); guillemot (lecture 54); skate (lecture 56); and cod (lecture 57). Several lectures focused on dissected demonstrations of the anatomy of the brain, of the human (lectures 16 & 35); sheep (lectures 32, 33, 34 & 35); dog (lecture 34); domestic cock (lectures 35 & 36); hen and fish (lecture 36); and skate (lecture 38). One of the conclusions drawn was that 'we found the brain of quadrupeds differing very little in structure from the human brain' (lecture 39). Other in-class dissections focused on the anatomy of the eye, as demonstrated by that of the bullock (lectures 40 & 41) and the cod (lecture 42). Dr Barclay also passed on methodological tips to his class, for example during the 14th lecture, 'by pouring a little hot water from a tea pot on the tail of a fish the whole flesh comes away simply by rubbing it off with the fingers, while by trying to dissect this tail without this preparation it is found to be one of the most difficult dissections

possible – this I found out by mere accident’ (Fig. 10). He pointed out fortuitous anatomical circumstances, ‘if this brain were not a little too far gone by commencing putrefaction I could not so easily tear off the pia mater’ (lecture 16). He also called on friends (and former students) to assist with dissections – ‘I know that my friend Dr Grant [the writer of these lecture notes] will have no objection to allow any gentleman to examine the interior of this [Angler] fish when he opened it, I have not asked him but I [know] from his generosity that he will readily do so’ (lecture 17), and as indicated above with respect to the dissection of the Shetland pony when William Dick was his student.

THE CONTENTS OF THE COMPARATIVE ANATOMY MUSEUM

Struthers recalled that the Barclay Museum contained the skeletons of ‘elephant, boar, camel, ox, deer, horse (including the Arabian, the great cart horse, the pony and the ass) bear, walrus, seal dolphin, narwhal, and the ostrich [sic, cassowary]’.¹² As mentioned above, William Dick had added the Shetland pony to the skeletal collection, and it is likely that he had also been the source of the other equids.¹ Very little additional information on the contents of the museum was published in the nineteenth century. Sadly, the detailed catalogue of the Barclay Collection, which William MacGillivray, the College of Surgeons’ Conservator, had been tasked with preparing in 1831, does not seem to have survived.⁷¹ MacGillivray’s ‘succinct account’ of the comparative anatomy collection reported ‘1457 preparations: viz., in spirits 60, in turpentine 10, dry 689, casts 3, engravings 8.’²⁰ However, by good fortune, an earlier manuscript catalogue does exist.⁷²

The extant ‘Barclay Collection manuscript catalogue’ is a cardboard and leather bound ledger with a red and gold label on the front bearing the inscription ‘Barcleian Museum Settlements’. The third item bound in this volume is the Deed of Trust prepared by Dr Barclay and dated 1826. The first part comprises the Barclay’s Deed of Settlement that was formally registered on Saturday 4 October 1828. It is the second part of this collection of documents that is the catalogue of the Barclay Museum specimens; it was prepared by Robert Knox (1791–1862).⁷³ On its last, 34th page, the following is written:

‘Museum Catalogue

This is the Catalogue or Numerical Inventory of the Barcleian Museum written on this and the thirty three preceding pages and extended to Eleven hundred and sixty nine [specimen] numbers referred to in a Discharge granted by me

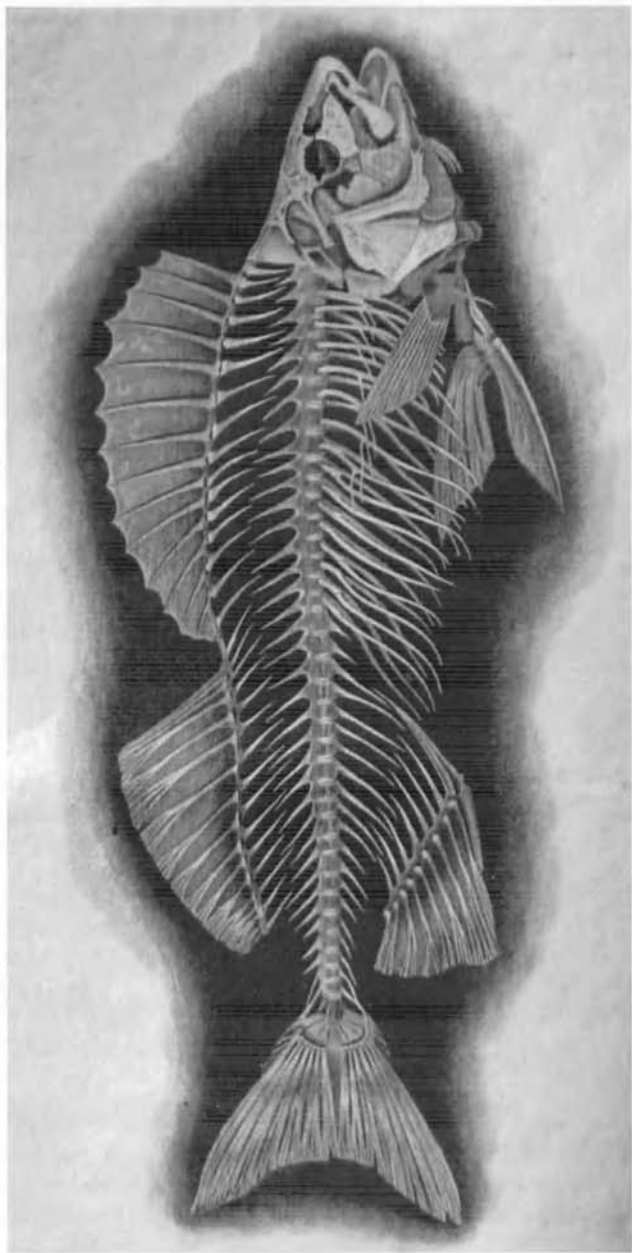


Fig. 10. Illustration of the European Perch (*Perca fluviatilis*) from Dr Barclay's Collection, Prepared by Dr Willis, Based on Drawings by Robert Kaye Greville and Engraved by Edward Mitchell.⁴⁵
[Courtesy of CRC, The University of Edinburgh]

William Wood President of the Royal College of Surgeons of Edinburgh in favour of James Ansell Esquire – and the other Trustees of the said Museum upon the delivery thereof to me on behalf of the said Royal College. Dated this Twentieth day of October in the year Eighteen hundred & twenty eight
Signed William Wood'

From an analysis of the comparative anatomical material in this Barcleian Museum catalogue¹⁶ a somewhat more comprehensive picture emerges. In addition to the human skeletons (15) of various ages that were mainly for use during the popular winter anatomy and surgery course, there was a large collection of skeletons of other mammalian species. The additional domestic species were represented by: Pig/Boar (1/1), Ox (1), Sheep (1), Goat (1), Horse (3), Ass (1), Cat (1) and Dog (7).⁷⁴ The UK land mammals were represented by: Rabbit (1), Squirrel (1), Rat (1), Mouse (1), Mole (1), Hedgehog (1), Deer (3), Bat (1), Fox (1), Polecat (1), Weasel (2), Badger (1) and Otter (1). In addition there were skeletons of exotic-land mammals; Indian Elephant (1), Monkey (2), Beaver (1), Kangaroo Rat (1), Camel (1), Reindeer (1), Polar Bear (2), Wombat (1), Kangaroo (1) and three unspecified 'Quadrupeds'. The Narwhal (2), Whale (either Beluga or Dolphin) (1), Walrus (1) and Seal (2) represented the sea mammals.⁷⁵

Reptiles skeletons were also present in the form of Turtles (5), Tortoise (4) and three 'Serpents'. Bird skeletons included Cassowary (1), Goose (1), Swan (1), Turkey (1), Crane (2), Albatross (1), Pelican (1), Heron (1), Cormorant (1), Gannet (1), Hawk (1), Eagle (1) and Parrot (1). Of the eight unspecified skeletons of 'Birds', we know from Mitchell (1820) that the Snipe and Robin were present (Fig. 11).⁴⁵ One toad skeleton represented the Amphibia, and the fish skeletons included Skate (1), Angler fish (1), Flounder (1), Pike (1) and Cod (1). Among the thirteen unspecified 'Fish' skeletons was the Perch prepared by Dr Barclay's assistant, Dr Willis (Fig. 10).⁴⁵

In addition, there were large numbers of parts of skeletons, including the heads/crania/skulls of: Small Animals (21); lower animals (2); Ape (1); Monkey (1); Wild boar (1); Musk ox (1); Ox (1); Calf (1); Sheep (1); Ram (1); Deer (1); Stag (2); Rhinoceros (1); Ass (1); Horse (8); Porpoise (2); Whale (3); Ferae [various carnivores] (13); Tiger (1); Panther (1); Dog (43); Walrus (4); Seal (1); Birds (23); Goose (1); Serpent (3); Turtle (4); Fish (1); Shark (1). Three *Babyrousa* skulls were also in the museum collection (Fig. 8).

An additional list of specimens¹⁷ was found written on eight pages of the 132 leaves of another manuscript ledger⁷⁶ that separately listed the contents of the Anatomical Museum belonging to Robert Knox (1791-1862), who in 1825

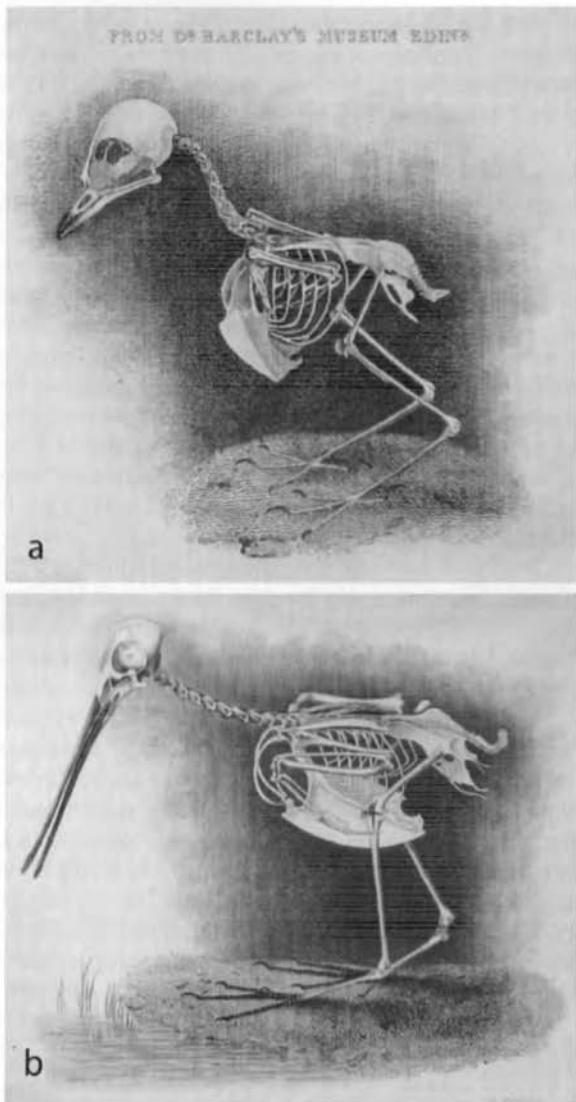


Fig. 11. Illustrations of (a) the Robin (*Erithacus rubecula*) and (b) The Common Snipe (*Scolopax gallinago*) from Dr Barclay's Collection, Prepared by Dr Willis, Based on Drawings by Robert Kaye Greville and Engraved by Edward Mitchell.⁴⁵

[Courtesy of CRC, The University of Edinburgh]

became Dr Barclay's partner and successor. These pages, written in Robert Knox's hand, were titled 'Preparations in Comparative anatomy removed from Dr Knox Premises Sept. 1828'. Ross and Taylor believed that this title referred to the transfer of the Barclay Museum teaching material, borrowed earlier by Knox, from his care back into the collection that Dr Barclay had bequeathed to the Royal College of Surgeons on his death.⁷⁷ A total of 120 anatomical preparations were listed¹⁷. The sole ground for doubt about this attribution was described as the absence from the list of the articulated skeleton of the Indian elephant presented to Dr Barclay by Dr George Ballingall.⁷⁸ Our analyses of the two lists of material suggest that they do correspond closely with one another indicating that specimens in both lists originated from Dr Barclay's museum collection. However, the dates at which some of the specimens arrived in the collection are uncertain, with the publications by Knox in 1824 suggesting that the *Ornithorynchus paradoxus* and cassowary specimens date from about that time and may have been put into the Barclay museum by Knox.⁷⁹ It is not possible to say when most of the specimens arrived in No. 10 Surgeons' Square as there is no extant dated set of records of the type shown by the detailed list of specimens in Dr Knox's collection.⁷⁶

Dr Barclay's collection should not be considered in isolation. The Medical Society⁶⁸ next door (Fig. 2E) had a general museum of human anatomy and the College of Surgeons had one of surgical specimens⁸⁰ within in its building on Surgeons' Square (Fig. 2F). Both of these appear to have contained a lot less comparative anatomy material than was present in Dr Barclay's collection. Professor Robert Jamieson (1774-1854), the Regius Professor of Natural History at Edinburgh University, was at that time in the process of stimulating the collection of a huge number of Natural History specimens for the 'Royal Museum of the University'.⁸¹ This was largely geological material but it also contained zoological specimens (including, in 1819, the Louis Dufresne collection⁸² of 1,600 bird specimens, 800 eggs, 4,000 shells, fossils, amphibians, corals and 12,000 insects). These local museums, although of potential interest, and perhaps accessible to William Dick through the mediation of classmates matriculated in the University, did not rival Dr Barclay's museum collection of comparative anatomical materials that probably more closely suited his requirements.

CONCLUSION

So in what ways would William Dick have gained from Dr Barclay's Comparative Anatomy course of lectures, dissections and museum? He is certain to have received clear instruction on the functional anatomy of the dog, cat, horse and other domestic species of animals. 'One of [Dr Barclay's] telling

illustrations of the necessity of anatomical knowledge used to be the mention of a veterinary surgeon⁸³ having written on the diseases of the gall-bladder of the horse, unaware that the horse does not possess that organ.^{12,41} Natural anxieties that William Dick may have harboured concerning the seeming complexities of anatomy and physiology represented by animals of different size and form would have been allayed; the underlying similarity of animal construction and function was at the core of Dr Barclay's teaching. He would also have found himself in an encouraging environment where it would have been quite appropriate for him to bring animals for dissection and further study; as suggested above this might explain the variety and amount of equine skeletal material in Dr Barclay's museum.

Dr Barclay's introduction to the concept of pathological similarities between humans and other mammals would also have been of considerable interest and relevance to the ambitious young farrier. His exposure to the anatomies of a range of exotic animals would have laid a good foundation for his future professional links to the animal and bird collection of the Royal Edinburgh Zoological Gardens.⁸⁴ More immediately he would have learned much from Dr Barclay about the ways to successfully present educational material to an audience of students from a wide range of previous experience. He would have seen how trained physicians and surgeons, as well as medical students, geologists and farriers responded to the anatomical material prepared for them.

It was also the appropriate study environment to have brought William Dick into, in order for him to make contact with those medical and university men who were subsequently to make contributions to his education at that time, and who would be of comparable assistance to his own students in the future.^{2,3,85} Indeed, it is likely that some of the fellows who studied with William Dick in the comparative anatomy classes may have been invited to become end of session examiners of his veterinary students after the establishment of his Veterinary School. Indeed the formation of that school would be aided by the generous donation of lecturing material on the diseases of livestock by the University's Professor of Agriculture, Dr Andrew Coventry.⁴ There was also the suggestion that Dr Barclay himself contributed in a comparable manner.⁴

ACKNOWLEDGMENTS

We would like to thank Mandy Wise and Dan Mitchell in University College London Library Services, Special Collections, for their assistance in gaining access to the John Barclay manuscript and the staff at Kew Archives where the manuscript was temporarily stored in 2013. We also acknowledge the archive and library support of the staff at Edinburgh City Archives (Brenda and

Richard), the National Library of Scotland, The National Archives of Scotland, The Royal Commission for Ancient and Historic Monuments of Scotland, and the University of Edinburgh's Centre for Research Collections and Royal (Dick) School of Veterinary Studies. We gratefully acknowledge the financial support provided in part by the Balloch Trust.

REFERENCES AND COMMENTS

1. DICK, W. (1844), 'Reply to a toast in the evening, 12th April, following the reception of the Charter.' *The Veterinarian*, 17, pp. 291-293.
2. PRINGLE, R.O. (1869), 'Memoir'. In DICK, W. *Occasional Papers on Veterinary Subjects*, Edinburgh: William Blackwood and Sons.
3. BRADLEY, O.C. (1923), *History of the Edinburgh Veterinary College*. Edinburgh: Oliver & Boyd.
4. MACDONALD, A.A. and WARWICK, C.M. (2012), 'Early teaching of the "Veterinary Art and Science" in Edinburgh.' *Veterinary History*, 16, pp. 227-273.
5. *Caledonian Mercury*, Monday, 1 May, 1815, p.1, c.1.
6. [CONDUCTOR], (1815), 'Comparative Anatomy.' *Farmer's Magazine*, 16, pp. 151-152.
7. BARCLAY, J. (1803), *A new anatomical nomenclature, relating to the terms which are expressive of position and aspect in the animal system*. Edinburgh: printed for Ross and Blackwood; and T.N. Longman and O. Rees, London.
8. BARCLAY, J. (1808), *The muscular motions of the Human Body*. Edinburgh: Printed for W. Laing, and A. Constable.
9. BARCLAY, J. (1812), *A description of the arteries of the human body*. Edinburgh: printed for Thomas Bryce & Co.; and Longman, Hurst, Rees, Orme, & Brown; J. Murray, J. Callow, S. Highley; and T. Underwood, London; and W. Duncan, Glasgow.
10. SILLIMAN, B. In FISHER, G.P. (1866), *Life of Benjamin Silliman, M.D., LL.D.: late Professor of Chemistry, Mineralogy and Geology at Yale College. Chiefly from his Manuscript Reminiscences, Diaries and Correspondence*. New York: Charles Scribner and Company, volume 1, pp. 172-173.
11. BALLINGALL, G. (1827), *Introductory lectures to a Course of Anatomy, delivered by the late John Barclay, M.D. F.R.S.E. with a Memoir of the Life of the Author, by George Ballingall, M.D.* Edinburgh: Maclachlan & Stewart; London: Baldwin, Cradock, & Joy.
12. STRUTHERS, J. (1867), 'Barclay'. In *Historical Sketch of the Edinburgh Anatomical School*. Edinburgh: Maclachlan and Stewart, pp. 56-70.
13. Dr Barclay's 'teaching [of Comparative Anatomy] was based on the new transcendental doctrine of unity underlying the diversity of forms.' LAURENCE, C. (1988), The Edinburgh Medical School and the end of the 'Old Thing' 1790-1830. *History of Universities*, 7, pp. 259-286.

- 14 GRANT, R. (1821), *Class Notes from Dr John Barclay's lectures on Comparative Anatomy, set down between 8th May 1821 and 31st July 1821 at 10 Surgeons Square, Edinburgh*. Manuscript. University College London, Special Collections, MS ADD. 28.
- 15 The UCL Library Services, Special Collections manuscript MS ADD. 28:
 The book's spine has R. and Grant, the broken crease having taken away the other initial (deduced from the layout - the letters R.E. having been above Grant). The essays, notes and titles are written in ink. The notes regarding the sessions are written in pencil under the titles.
Essays on medical subjects as the book title on the page inside, with MS ADD. 28 in modern pencil on bottom right of page as library ID. Then five blank pages. Then the title of the first essay: *An Essay on the Circulation of the Blood in the Foetus* (with pencil underneath: session of 1813-14).
 Twenty five pages of writing in English, the first three pages numbered, the rest not. The last page is signed Robert E. Grant.
 Then the title of the second essay: *An Essay on Gastritis* (with pencil underneath: session of 1813-14). Twenty eight pages of writing in English, these are not numbered, the last one is signed Robert E. Grant.
 Then the title of third essay: *An Essay on the Morbid Anatomy of the Intestines* (with pencil underneath: session of 1814-15).
 Thirty two pages of writing in English, all pages are numbered, the last one is signed R Grant. It is dated 21 Oct. 1814.
 Then the title of fourth essay: *An Essay on the Comparative Anatomy of the Brain*. (With pencil underneath: *session of 1814-15 - 28 October, 1814*).
 The first page is titled "*The Anatomy of the Brain in Mammiferous animals*" then thirty two additional pages of writing in English, all pages are numbered, the last one is signed R Grant. It is dated 28 Oct. 1814.
 Then his printed MD thesis, *Dissertatio Physiologica Inauguralis, De Circuitu Sanguinis In Foetu*: Auctore Roberto Grant. 58 pages in Latin. The last page is signed Robert E. Grant.
 Then the notes on Dr. Barclay's lectures on Comparative Anatomy, starting 8th May 1821. Titles are not given. The lectures are titled by number, until the 60th, the concluding lecture, on 31st July. [These have been transcribed, annotated and placed in the Edinburgh Research Archive for online viewing (<https://www.era.lib.ed.ac.uk/>) as: MACDONALD, A.A. and WARWICK, C.M. (2014), *Class Notes from Dr John Barclay's lectures on Comparative Anatomy, set down between 8th May 1821 and 31st July 1821, at 10 Surgeons Square, Edinburgh* by Dr Robert Edmund Grant.
 Then *Notes on the Geology of Scotland, from Jameson's Lectures on Nat. Hist. 2d April 1823*, comprising twenty one pages; these are not numbered.
<http://archives.ucl.ac.uk/Dserve/dserve.exe?dsqApp=Archive&dsqCmd=Index.tcl>
- 16 KNOX, R. (1828), *Catalogue of the Barcleian Museum*, In: *The Deeds of Settlement and Catalogue of the Barcleian Museum bequeathed to the Royal College of Surgeons of Edinburgh by John Barclay*. The Comparative Anatomy details have been transcribed, annotated and archived at: <https://www.era.lib.ed.ac.uk/handle/1842/8307>
- 17 KNOX, R. (1828), *Preparations in Comparative anatomy removed from Dr Knox Premises Sept. 1828*, pp. 8. In: Knox Old Catalogue, University of Edinburgh - Anatomy Archives - CRC DA 50 Anat [905]. These have been transcribed, annotated and archived at: <https://www.era.lib.ed.ac.uk/handle/1842/8306>

- 18 The annotated transcribed lecture notes taken down by Grant can be found at: <https://www.era.lib.ed.ac.uk/handle/1842/8305>.
- 19 CHAMBERS, R. (1835), *Barclay, John, M.D.* In: *A Biographical Dictionary of Eminent Scotsmen*. In 4 Volumes. Glasgow & Edinburgh: Blackie & Son; Dublin: W, Curry, jun & Co.; London: Simpkin & Marshall, Volume 1, 135-141.
- 20 WATERHOUSE, G.R. (1841), *The natural history of Marsupialia or pouched animals. Illustrated by thirty six coloured plates, with portrait and memoir of Barclay*. In Jardine, W. (editor). *The Naturalist's Library*, XI, pp. 17-44.
- 21 KAUFMAN, M.H. (2007), *Dr John Barclay (1758-1826): extra-mural teacher of human and comparative anatomy in Edinburgh*. Edinburgh: The Royal College of Surgeons of Edinburgh.
- 22 Dr Andrew Marshall was an eminent Scottish anatomist who followed in the tradition of the Hunter brothers, John and William, in London by encouraging his students to learn by carrying out dissections themselves; MOORE, W. (2005), *The knife man: blood, body snatching and the birth of modern surgery*. London: Bantam.
- 23 Brown's Square was subsequently demolished when the George IV Bridge was built (1829-1832).
- 24 Argyle Square was located about 900 metres west of the University of Edinburgh and was replaced in 1871 by the construction of the Museum of Scotland.
- 25 OPR marriage record 348/00 0030 0439 Dunblane reads: *Dr John Barclay and Miss Eleanora Campbell both at Kilbryde Castle booked and proclaimed thrice, and married by the Rev M Stirling on 25 Oct 1811*.
- 26 Dr John Barclay, Edin[burgh]. National Archives of Scotland, Register of Sasines, RS27/482.22; Doctor John Barclay, 30th December 1826. National Archives of Scotland, Register of Wills, SC70/1/35/833-859; In the recorded document of his will Barclay wrote '... our Contract of Marriage bearing date the 24th day of October eighteen hundred and eleven ...'
- 27 Dr Andrew Duncan *senior* (1744–1828) was a Scottish physician and professor who held the Chair of the Institutes of Medicine (or Physiology) in Edinburgh from 1789-1819.
- 28 STROUD, W. (1820), *History of the Medical Society of Edinburgh*. Edinburgh: printed for the Society by William Aitken.
- 29 According to the Post Office directories, Dr Latta may have rented the house from Dr Duncan from 1794 or perhaps one year earlier. He is recorded in the following: Post Office Directory for Edinburgh Leith Musselburgh and Dalkeith, 1794-1795, p. 111; Edinburgh directory, from July 1797 to July 1798, Edinburgh: Thomas Aitchison, p. 124; Edinburgh and Leith directory, to July 1800, Edinburgh: Thomas Aitchison, p. 174; Edinburgh and Leith directory to July 1801, Edinburgh: Thomas Aitchison, p. 131. Curiously there are no Post Office directory entries for Dr Alexander Ramsay at that address. However, Ramsay does report that he started teaching anatomy in 1796: RAMSAY, A. (1812), 'Account of some unusual conformations of muscles and vessels.' *Edinburgh Medical and Surgical Journal*, 8, pp. 281-283; RAMSAY, A. (1813), *Anatomy of the Heart, Cranium and Brain, adapted to the purposes of the Medical and Surgical Practitioner, to which is added, in notes, observations on the laws of life and sensations*. 2nd Edition, Edinburgh: George Ramsay and Company; LATTA, J. (1793), *A*

practical system of surgery: illustrated with cases on many of the subjects, and with copperplates; in three volumes, Edinburgh: Printed for G. Mudie, J. Elder, A. Guthrie, and J. & J. Fairbairn; J. Murray, and Ogilvie & Spiere [sic, Speare], London.

- 30 Edinburgh Dean of Guild Courts and Warrants 1762-1863. Dr John Barclay. Edinburgh City Archives.
- 31 The 19th century source indicating that it gave seating room for about 150 students was CATHCART, C.W. (1882), 'Some of the older schools of anatomy connected with the Royal College of Surgeons, Edinburgh.' *Edinburgh Medical Journal*, 27, pp. 769-781. This is equivalent to the modern minimum rate of 0.65 square meters per full time student equivalent, according to the Draft Universities Standards and Guidelines, 2013, Schedules.
- 32 STORER, J. and STORER, H.S. (1820), *Views in Edinburgh and its vicinity*. Edinburgh: A. Constable & Co. Vol. 2, Plate 84.
- 33 Lecture 50: Dr Barclay referred to the largest seal in the museum being below the top floor lecture room.
- 34 This observation would seem to suggest that the windows, perhaps two, on the ground floor at the back of the house might have been small. The style of architecture of that period would imply that there were probably two, possibly three larger windows on each of the other two floors at the back of the house. BELL, D. (2008), *Edinburgh old town: the forgotten nature of an urban form*. Edinburgh: Tholis Publishing.
- 35 The second Monro had retired in 1808, and the numbers attending his son's [reputedly less attractive] lectures was substantially reduced.
- 36 BARCLAY, J. (1827), 'Lecture Fifth: Comparative Anatomy.' In: BALLINGALL, G. (1827), *Introductory lectures to a Course of Anatomy, delivered by the late John Barclay, M.D. F.R.S.E. with a Memoir of the Life of the Author, by George Ballingall, M.D.* Edinburgh: Maclachlan & Stewart; London: Baldwin, Cradock, & Joy pp. 137-169.
- 37 For example: 'J'. (1815), 'On the advantages to be derived from the knowledge of Comparative Anatomy.' *Farmer's Magazine*, 16, pp. 149-151; *Caledonian Mercury*, Monday, 1 May, 1815, p.1, c.1; 19 April 1817 in *Caledonian Mercury*, p.3; c.4; 23 April 1818 in *Caledonian Mercury*, p.1; c.3; 21 April 1820 in *The Edinburgh Advertiser*, p.1; c.2.
- 38 FERGUSSON, A. (1858), 'Veterinary School' *The Canadian Agriculturist* 10 pp. 12-14.
- 39 ELLIS, D. (1823), *Memoir of the life and writings of John Gordon, M.D., F.R.S.E., late lecturer on Anatomy and Physiology in Edinburgh*. Edinburgh: A. Constable & Company; London: Hurst, Robinson & Company; John Gordon wrote a hostile article against craniology and phrenology in the influential Edinburgh Review, and ironically stimulated widespread public interest in the subject, and the supposed ability to determine character traits by examining the shape of a person's skull.
- 40 CATHCART, C.W. (1882), 'Some of the older schools of anatomy connected with the Royal College of Surgeons', Edinburgh. *Edinburgh Medical Journal*, 27, pp. 769-781.
- 41 BARCLAY, J. (1827), 'Lecture Second: Comparative Anatomy' In: BALLINGALL, G. (1827), *Introductory lectures to a Course of Anatomy, delivered by the late John Barclay, M.D. F.R.S.E. with a Memoir of the Life of the Author, by George Ballingall*.

M.D. Edinburgh; Maclachlan & Stewart; London: Baldwin, Cradock, & Joy, pp. 29-59; Dr Barclay goes on to draw attention to two additional reasons:

Fourthly, Comparative Anatomy becomes necessary in ascertaining the action of organs. All the functions have long ceased before the human body can legally be opened; and it is only in the lower animals that we can presume to make experiments, and examine the mechanism while it is in motion. It is, therefore, in this field of inquiry that we chiefly have acquired our knowledge of the functions.

Lastly, Comparative Anatomy is an object of importance; ... By it a person may readily acquire a facility in dissection, a dexterity and confidence in surgical operation, and not only preserve, but extend the knowledge which he has acquired of the human system ... it not only shews us how to examine the structures of animals with our own hands, but ... explains a great number of phenomena which otherwise we could not possibly comprehend; ... we ought to study the whole, if we wish to have just or enlarged ideas of the animal economy, or be much interested in the improvement of that science which is styled Physiology.'

- 42 'fondness for the plates, and reluctance to the labour of studying the works, which the plates were only intended to illustrate, presage nothing that is favourable to Anatomy. They indicate the decline of those energies, and of that enthusiasm, by which its boundaries were originally extended; they imply that Anatomists are beginning to dislike the *smell of the lamp*; that they feel not the pleasure, which they ought to feel, in the actual inspection of the objects themselves; that they seldom persevere until they are fatigued, or rejoice at being fatigued in such a cause; and that they are appalled at the labour and toil that is absolutely necessary for the successful prosecution of science.' BARCLAY, J. (1812), *A description of the arteries of the human body*. Edinburgh: printed for Thomas Bryce & Co.; and Longman, Hurst, Rees, Orme, & Brown; J. Murray, J. Callow; S. Highley; and T. Underwood, London; and W. Duncan, Glasgow. pp. xvii-xviii.
- 43 'Anatomy, which literally signifies Dissection, when employed as a mean to investigate the structure of inferior animals, is styled COMPARATIVE. The term has its origin from the numerous allusions that, in these investigations, are usually made to the human structure. The objects of such enquiries are various: We dissect these animals to derive, by comparison, additional information respecting the different organs and functions of the human structure; and therefore dissect them not only to be better acquainted with the species to which they belong, but to correct or confirm our observations with respect to a species which we have seen, and which, in order to be better understood, requires much collateral illustration: we dissect them, also, to learn, from analogy, the nature of a species which they resemble, but which we have not seen, nor have ever had in our power to examine; - we dissect them in different periods of life, to observe the changes in structure and form which the undergo from birth to maturity, and to mark the relations between these changes and the several changes in disposition, habit and instinct. For the same reason, and to throw an additional light upon Medicine, and Natural History, we dissect them in all the various states of health and disease, that we may know from their outward symptoms, what are the changes taking place within, and thus be able to learn from analogy, to retard, alleviate, successfully resist, or remove disease in ourselves and them.' BARCLAY, J. (1827) 'Lecture Fifth: Comparative Anatomy' In: BALLINGALL, G. (1827), *Introductory lectures to a Course of Anatomy, delivered by the late John Barclay, M.D. F.R.S.E. with a Memoir of the Life of the Author, by George*

Ballingall, M.D. Edinburgh: Maclachlan & Stewart; London: Baldwin, Cradock, & Joy, pp. 137-169.

- 44 MACDONALD, A.A., WARWICK, C. and JOHNSTON, W.T. (2011), Early contributions to the development of veterinary education in Scotland. *Veterinary History*, Vol. 16, pp. 10-40.
- 45 MITCHELL, E. (1820), *A Series of Engravings, representing the Bones of the Human Skeleton; with the Skeletons of some of the Lower Animals*. The Explanatory References by John Barclay, M.D. Part II, Edinburgh: Oliver & Boyd.
- 46 BALLINGALL, G. (1820), *Memoir of the Skeleton of an Elephant, dissected in Bangalore in 1813, and now deposited in Dr Barclay's Museum (with two plates, from Mitchell's Engravings of the Human Skeleton, &c.)*. Edinburgh: printed by George Ramsay & Co.
- 47 KAUFMAN, M.H. (1996), 'Observations on Barclay's elephant' *Journal of the Royal College of Surgeons of Edinburgh*, 41, pp. 75-81.
- 48 Tiger/tyger (1/2); Panther (1); Cat (3); Dog (51); Fox (3); Polar bear (3); Badger (1); Seal (5); Ring tailed monkey [Lemur] (1); Baboon (1); Monkey (5); Elephant (13); Mammoth (1); Mastodon (1); Horse (34); Hog (1); Sheep (21); Cow (5); Bullock (3); Goat (1); Camelopard [Giraffe] (1); Cetaceans animal (1); Whale (10); Porpoise (1); Mouse (1); Glises [Dormouse] (1); Hedgehog (3); Squirrel (2); Mole (3); Bat (1); Sloath [Sloth] (1); Kangaroo (1)
- 49 Hawk (5); Crane (1); Eagle (1); Hen/domestic fowl (4/2); Pigeon (3); Duck (3); Chick (21); Cock (2); Cassowary (2); Parrot (2); Albatross (1); Pea hen [Peacock] (1); Snipe (1); Auk or Sea duck (1); Owl (1)
- 50 Angler fish/Lopes (3/1); Haddock (3); Cod fish (14); Herring (4); Makrel [Mackerel] (4); Lamper eel [Lamprey] (1); Sea wolf [Atlantic wolfish] (1); Skate (9); Ray fish (2)
- 51 Turtle (5); Crocodile (2); Serpent (4)
- 52 Frog (2)
- 53 Mollusc (1)
- 54 Cuttlefish (1); Crab (3); Lobster (1)
- 55 Fly (1); Drone fly [hoverfly] (1); Dragon fly (1)
- 56 Spider (2)
- 57 For example: [lecture 14]- 'In old horses which have been hardly wrought during their lives the vertebrae are often united by anchelosis marking that inflammation must have existed and that these animals must have suffered much pain even when their labour was not intermitent; [lecture 19] - exhibition of a dislocated humerus where all the processes and tuberosities forming the shoulder joint have been formed anew around the head of the humerus in its new situation below the glenoid cavity'; [lecture 22] - 'specimens of the bones of birds fractured and united very awkwardly by a process of nature'.
- 58 For example: [lecture 11] - 'When the alveolar processes of the jaw bones are destroyed the teeth necessarily decay, and human dentists who used the tooth drawer with the broad fulcrum destroyed the alveolar processes of the two neighbouring teeth, and these two generally decaying soon after the extraction of the first were obliged to give up this instrument and have recourse to that which pressed on the one tooth which has to be

extracted'; [lecture 22] – 'On the importance of the suture in the foetus in easing parturition and allowing the brain to develop'.

- 59 Six lecture periods were devoted to the structural anatomies of the brains of sheep, dog, horse, human, birds and fish, much of it by means of demonstrated anatomical dissection [lectures 32-36, 38].
- 60 The anatomy of the eye and vision based on the anatomy of eyes of bullocks, human, horse, cow, spider, fly, crab, great drone fly, dragonfly, owl, as well as discussion of animals in bright light vs. animals in the dark [lectures 40 - 44].
- 61 Chick embryos were presented and discussed at the 13th and 16th days of incubation, and shortly before hatching [lectures 30, 34, 37, 38, 39].
- 62 'The thymus gland large in the dog - larger in the foetus than in the adult where it seems to have been partly absorbed - this gland is larger in hibernating animals - the functions of the thyroid, the thymus, the suprarenal glands, and of the spleen, are unknown'.
- 63 For example: [lecture 38] – 'The heart of the ray fish pulsates in my Museum for two days after being taken out of the body'; [lecture 46] – 'The valve of Eustachius seems like a continuation of the coat of the inferior cava and acts as a valve to the coronary vein - we see this valve much more distinct and more complete in the dog than in the human species the valve of Eustachius serves to direct the blood of the inferior cava as high as the foramen ovale without mixing with that of the superior cava - those whose foramen ovale remains open generally die at an early period of life of convulsions and their muscles are found prematurely relaxed - they have always a difficulty of breathing and are of a livid colour'.
- 64 For example: [lecture 49] – 'By injecting water with a syringe thro[ugh] the pulmonic arteries it was shown to issue from the trachea pleuricus it does not enter into the pulmonary veins so that the openings of the arteries into the cells of the lungs are larger than their orifices into the veins'.
- 65 For example: [lectures 45] – 'The nerves seen spreading on the Diaphragm are now called the Phrenic nerves - these nerves are affected in inflammation of the liver when the disease extends to the diaphragm'; [lecture 52] – 'Dr Thomson found that by tying ligatures round the intestines of living dogs, the ligature gradually passed from the outer to the inner surface of the intestines, and was discharged with the feces[sic]'; [lecture 56] – 'In gramminiferous animals the inner surface of the first stomach has a vile appearance - the second stomach [of the ruminant] has a honey-comb appearance on the inside there is a separate groove in the coats if oesophagus for conveying fluids from the first into the second stomach, because the fluids do not require to be detained in the first stomach for undergoing any change the many-ply leads from the second [sic third] into the rugous or third [sic fourth] stomach - the gastric juice is secreted in great abundance in this rugous or last stomach, and a small portion of this stomach put among milk very soon causes that milk to coagulate'.
- 66 In 1818 Liston went on to establish his own extra-mural school of Anatomy, also in Surgeons' Square.
- 67 COMRIE, J.D. (1932), *History of Scottish Medicine*, 2nd ed. London: Baillière, Tindall & Cox, Volume 2, pp. 496-497.
- 68 KAUFFMAN, M. H. (2003), *Medical teaching in Edinburgh during the 18th and 19th centuries*. Edinburgh: Royal College of Surgeons of Edinburgh.

- 69 Lecture 25 on Monday the 11th of June, 1821: 'My friend Mr Dick the veterinary surgeon from observing that the joints of the extremities of quadrupeds move all simultaneously, frequently cuts the nerves going to the hooves of horses when their feet are diseased, know [s] that the same muscles which move the leg will still continue to move the foot as before.'
- 70 BARCLAY, [J.] & NEILL, [P.] (1821), Account of a Beluga or White Whale, killed in the Frith [sic, Firth] of Forth. *Memoirs of the Wernerian Natural History Society*, 3, pp. 371-395; This paper was read on 7 and 21 December 1816, and contained: I. *Notice regarding the capture of the animal, and description of some of its external characters.* — by Mr Neill, pp. 371-380; II. *Account of the dissection of the Beluga* — By Dr Barclay, pp. 380-395.
- 71 Dr Barclay stipulated in his will (West Register House Edinburgh, 'Dr John Barclay, Physician in Edinburgh' SC 70/1/35 pp. 833-858; Supplement dated 2 February 1827 CC8/8/151/376-9) that his entire museum collection of comparative and physiological anatomy should be deposited in the Royal College of Surgeons of Edinburgh.
- 72 It is housed in the Museum Office of the Royal College of Surgeons
- 73 In 1825 Dr Barclay concluded a co-partnership agreement with Robert Knox with regard to Dr Barclay's teaching in his extra-mural school. One year earlier Knox had been appointed in charge of the Royal College of Surgeons' Pathological Collection.
- 74 In addition to supplying Dr Barclay with a pony [DICK, 1844], William Dick as the highly motivated local farrier was well positioned to provide the Arabian, the great cart horse and other equid material in Dr Barclay's collection.
- 75 There is a contemporary description of the walrus skeleton: 'The enigma of three phalanges, besides the "metacarpal" and "metatarsal" bones, in the internal digits, is partly explained on finding that one of the three, in both of the fore-feet, is made of wood. The scapulae are, or were, the very differently shaped scapulae of a cetacean. Dr Barclay must have been away on one of his customary autumnal tours when his articulator indulged in these variations, which may afterwards have afforded scope for the doctor's wit. I once found a skeleton being partly from a bear partly from a seal.' STRUTHERS, J. (1867), 'Barclay'. In *Historical Sketch of the Edinburgh Anatomical School*. Edinburgh: Maclachlan and Stewart, pp. 56-70.
- 76 Knox Old Catalogue, University of Edinburgh - Anatomy Archives - CRC DA 50 Anat [905].
- 77 ROSS, J.A., & TAYLOR, H.W.Y. (1955), Robert Knox's catalogue. *Journal of the History of Medicine and Allied Sciences*, 10, pp. 269-76.
- 78 KAUFMAN, M.H. (2001), 'Frederick Knox, younger brother and assistant of Dr Robert Knox: his contribution to "Knox's Catalogues"'. *Journal of the Royal College of Surgeons of Edinburgh*, 46, pp. 44-56.
- 79 KNOX, R. (1824), 'Observations on the anatomy of the Duck-billed animal from New South Wales, the *Ornithorynchus Paradoxus* of naturalists' Memoir I. 'On the organs of sense, and on the anatomy of the poison gland and spur' *Memoires of the Wernerian Natural History Society*, 5, pp. 26-41; KNOX, R. (1824), Memoir II. 'Observations on the organs of digestion and their appendages, and on the organs of respiration and circulation, in the *Ornithorynchus paradoxus*.' *Memoires of the Wernerian Natural History Society*, 5, pp. 144-150; KNOX, R. (1824), Memoir III. 'On the kidneys, urinary

- bladder and organs of generation, in the male of the *Ornithorynchus paradoxus*' *Memoires of the Wernerian Natural History Society*, 5, pp. 151-160; KNOX, R. (1824), Memoir IV. 'On the osseus, muscular, and nervous systems of the *Ornithorynchus paradoxus*' *Memoires of the Wernerian Natural History Society*, 5, pp. 161-174; KNOX, R. (1824). 'Observations on the anatomical structure of the Cassowary of New Holland (Casuarus Novae Hollandiae, Cuv.)' *Edinburgh Philosophical Journal*, 10, pp. 132-140.
- 80 TANSEY, V. and MICHIE, D.E.C. (1978), The museum of the Royal College of Surgeons of Edinburgh:
http://www.museum.rcsed.ac.uk/media/4361/museums_history.pdf
- 81 <http://www.nhc.ed.ac.uk/index.php?page=4.7> (Accessed 22 December 2013).
- 82 http://en.wikipedia.org/wiki/Louis_Dufresne (Accessed 22 December 2013).
- 83 TAPLIN, W. (1796), *The gentleman's stable directory: or, modern system of farriery. ... To which is now added, a supplement, containing practical observations upon thorn wounds, ... with ample instructions for their treatment and cure.* 13th edition. London: Printed for G.G. and J. Robinson; and G. Kearsley.
- 84 MACDONALD, A.A., WARWICK, C.W. & JOHNSTON, W.T. (2005), Locating veterinary education in Edinburgh in the nineteenth century. *Book of the Old Edinburgh Club, New Series*, 6, pp. 41-71.
- 85 ANON. (1827), 'Highland Society of Scotland', *The Scotsman*, July 14, p. 443, c.3; Dr Robert Knox gave William Dick's students free access to his lectures and classes on Comparative Anatomy.
- 86 Brown's Square was subsequently demolished when the George IV Bridge was built (1829-1832).
- 87 Argyle Square was located about 900 meters west of the University of Edinburgh and was replaced in 1871 by the construction of the Museum of Scotland.
- 88 ANON. (1850), 'Biographical sketch of Robert Edmund Grant M.D. F.R.C.S.L & E. & Professor of Comparative Anatomy and Zoology in University College, London', *The Lancet*, 56, pp. 686-694; DESMOND, A. and PARKER, S.E. (2006), 'The bibliography of Robert Edmund Grant (1793-1874): illustrated with a previously unpublished photograph', *Archives of Natural History*, 33, pp. 202-213.

APPENDIX 1: ROBERT EDMUND GRANT

From 1798 to 1809 Dr John Barclay and his wife-to-be, Eleanora Campbell, lived in the Campbell family's Edinburgh home at 5 Brown's Square, Society, Edinburgh.^{11,86} In 1809 they moved home 450 metres east to 6 Argyle Square where Dr Barclay lived until his death in 1826.^{11,87} John and Eleanora Barclay's neighbours in Argyle Square were the Grant family – Alexander Grant, a lawyer and his wife Jane Edmund. They had a large family, the seventh of whom was Robert Edmund Grant, born on Monday 11 November 1793.⁸⁸ He attended Edinburgh High School and was then educated in medicine at the University of Edinburgh where he gained his MD in 1814. As a young man he became an authority on marine life, particularly sponges, which he found in the Firth of

Forth. From Tuesday 8 May 1821 Robert attended the 60 lectures on Comparative Anatomy given by John Barclay at number 10 Surgeons' Square. In 1824 he assisted Dr Barclay by lecturing on invertebrates in his place during his Comparative Anatomy course. Charles Darwin was one of his students at the University of Edinburgh during the session 1826/1827. In 1827 Grant (who never married) was appointed as the first Professor of Zoology and Comparative Anatomy at the University of London, the post he held until his death in 1874. He installed a collection of his specimens at University College London – the Grant Museum, which still exists. Grant was also appointed as Fullerian Professor of Physiology (1837-1840) at the Royal Institution of Great Britain and Swiney Lecturer at the British Museum (1853-1857).

The attention of the reader is drawn to the three transcribed and annotated manuscripts that in effect constitute additional appendices:

<https://www.era.lib.ed.ac.uk/handle/1842/8305>

<https://www.era.lib.ed.ac.uk/handle/1842/8306>

<https://www.era.lib.ed.ac.uk/handle/1842/8307>

Authors' address: Alastair A. Macdonald, BSc, PhD, Dr, MBA, FHEA and Colin M. Warwick MBE, Veterinary Biomedical Sciences, Royal (Dick) School of Veterinary Studies, The University of Edinburgh, Easter Bush, Midlothian EH25 9RG.

FROM *The Veterinarian* 1858 p. 586

A HORSE KILLED BY WASPS

As Major-General Dalton, of the Royal Artillery, was driving with his family in an open carriage, on the afternoon of August 31st, a large swarm of wasps, darkening the air by their numbers, attacked his horse, stinging it in every part of the body in a most frightful manner. They pitched in hundreds upon the horse, a very valuable and high-spirited animal, pursuing the carriage for nearly a mile, and endangering the lives of all who were in it, who, however, fortunately escaped with only a few stings. On reaching home the horse had suffered so severely that it was found necessary to send for a veterinary surgeon, and every necessary remedy was resorted to, but the shock given to the nervous system, and the high state of the inflammation produced, caused its death in forty-eight hours.
