EARLY SCIENCE IN OXFORD

III

THE DODO

From Mrs. Louisa Gunther's copy of the blackened original painting in the British Museum. (Sloane Collection.)

EARLY SCIENCE IN OXFORD

BY

R. T. GUNTHER

VOL. III

PART I. THE BIOLOGICAL SCIENCES

PART II. THE BIOLOGICAL COLLECTIONS

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PREFACE

This volume continues the process of stock-taking the scientific resources of the University of Oxford since the earliest times. Having begun with a survey of such experimental methods as require special chemical, physical, or mathematical apparatus for their successful application, we now proceed to the biological or more purely observational sciences in which success depends largely upon the special training of the observer and on his judicious selection of the material for study. It will have been seen that many of the inventions described in our earlier volumes attain the noblest and completest application in the hands of the physician and the biologist, and therefore deserve a fuller treatment here, but owing to considerations of space, detailed descriptions of instruments, and even of methods, have been omitted to leave more room for biographical notes, and for details concerning the University Collections. These details have not been printed before; and we may state that it was our idea of publishing illustrations of all extant zoölogical specimens once forming part of the historic Tradescant Collection, that first suggested the compilation of this History. The photographs now produced were the first to be taken, and we gratefully record our indebtedness to Mr. Robinson, who during the stress of war time photographed these rarities which stood unheeded in the University Museum.

The names of the great investigators Boyle, Hooke, Wren, Locke, Mayow, Recorde, and many another, figure in our pages again, but often in a new light. On resifting the evidence, we believe that we have found the real incentive of their scientific labours, and the source of their enthusiasm: this lay not in the love of mere abstract learning, but in the attraction of biological research—research on the forms and the properties of *Life*.

That they were one and all Biologists is a truth to which the writers of chemical and physical text-books never draw attention. Yet the 'Father of Chemistry' must be known as the founder of Museums of Spirit Preparations; the 'Discoverer of Oxygen' as the best Physiologist of his day; the great English Philosopher and the Father of English Algebra alike, as accomplished physicians; the inventor of the Wheel Barometer and of Balance-wheels of watches as a leading Palaeontologist and founder of the 'Cell Theory'; the great architect of St. Paul's as expert anatomist, microscopist, and pioneer of methods of Injection. It is not unreasonable to suggest that the success of these men in other spheres was due in no small degree to their early biological training. Every one of them had received an education in anatomy, a course which more than others emphasizes the importance of the cult of form, or *Morphology*.

We, who live surrounded by beautiful buildings at home, and who have enjoyed the study of masterpieces of architecture abroad, have unusual opportunities of criticizing the work of modern architects in Oxford. In almost every case it is easy to detect in their work blunders of which no morphologist would be capable. The conclusion is inevitable that a training in the detailed arrangement of bones, nerves, and blood-vessels is far superior to that given in a drawing-office. Nor is it difficult to support our thesis by reference to the lives of great men of all nations. Was not Aristotle a Naturalist whose observations on marine zoology were unquestioned for a thousand years? Was not Leonardo da Vinci a rarely gifted anatomist? Few were better acquainted with the dissecting room than Rembrandt. To Goethe we owe the theory of the metamorphosis of plants and the vertebral theory of the skull. Michelangelo, 'the divine' interpreter of the human form, was successful as an architect and as an engineer. Descartes is often referred to as 'the first physiologist'. Galileo undoubtedly derived great benefit from a medical training. Cuvier and Darwin had scarcely any other. With such examples one can but deplore what my friend Sir Ray Lankester has criticized as the Neglect of Morphological Science.

We gladly own our obligations, as in the previous volumes, for the extra-illustration of the text. The authorities of the University Presses both at Oxford and at Cambridge have kindly permitted a repetition of the portraits in their possession. Oxford has contributed Digby, Tomlin, Ashmole, Radcliffe, and Tradescant; Cambridge has lent blocks of Harvey and Sir T. Browne. Magdalen College and the Delegates of the Clarendon Press have again helped to lighten the cost of the volume. To the Boyle Lecturer of this year, Sir Robert Hadfield, we appropriately owe our statuesque portrait of Boyle. Professors Bourne and Sollas kindly permitted the examination of the collections in their charge, several College Librarians have been most helpful by exhibiting their zoological and other 'rarities' to their former colleague, and Messrs. Hinton and Norman have helped in the naming of the species. And for blocks, and permission to use them, we are indebted to Mr. John Murray, Dr. Singer, Mr. C. Thompson, Messrs. Bale and Danielson, Mr. Charles Parker, and Mr. Warner.

The proofs of parts of the book have been read by Sir D'Arcy Power, Mr. J. Fulton, Mr. A. Douglas, Mr. Craster, and by my wife, to all of whom I tender my warmest thanks.

R. T. GUNTHER.

MAGDALEN COLLEGE, OXFORD
June, 1925.

CONTENTS

ILLUSTRATIONS

PLATES

THE OLDEST MUSEUM SPECIMENS

TEXT FIGURES

I

EARLY MEDICINE

The science of Medicine in Britain owes its origin to sources that are not less diverse than are the races from which its practitioners have sprung. By a scholarly investigation of the few old Leech Books, that are preserved on the shelves of Bodley and of the British Museum, the learned Dr. Payne has given to British Medicine the glamour of an Anglo-Saxon descent. And, as supporters of the recent feminist movement in the University will doubtless note, the first historical examples of medical practice in Oxford are associated with a lady doctor. St. Frideswide (d. 735) used water (traditionally drawn from Binsey well) in which she had previously washed her hands, to restore the sight of a blind girl of seven years of age. She treated cases of sudden blindness by prayer. Kissing was her remedy for leprosy. And she was equally successful in the cases of Alward, the Sabbath-breaker, who, while cutting wood with an axe on the Lord's day, found his hand fixed so tightly to the handle that he could not let go; and of the Thames fisherman who was seized with a violent fit and had to be bound.[1] To her credit, too, is the cure of the earliest known case of an undergraduate requiring a doctor. Stephen of York, a comely youth, was sore stricken with incurable fever: his means were being squandered in paying fees to the leeches (*inanibus se sumptibus eviscerans*); and, as a last resort, he implored the help of Frideswide. She gave him some of her holy water in a cup, and he was restored to health.[2]

After the Norman Conquest there was a break, during

[1] Parker, *Early History of Oxford*, Oxf. Hist. Soc. 1884.
[2] *Acta Sanctorum* Octobr. viii, p. 579.

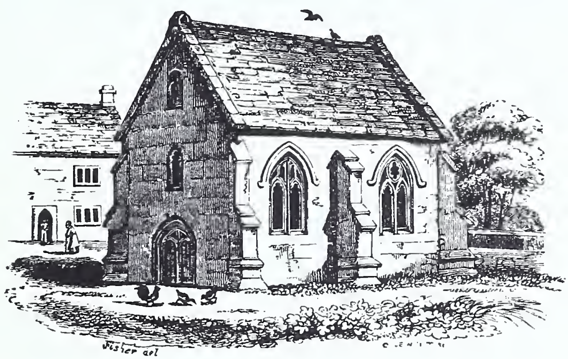
which science slept until its disciples were reinspired by contact with the great School and Sanatorium of Salerno and by the Hellenic lore hoarded by the Arabian savants and translated into Latin during the eleventh and twelfth centuries. The first man in Oxford to utter the long-hidden secrets of the old Greek Masters of Medicine was doubtless our admirable ROGER BACON. One of his last writings, 'Of the Cure of Old Age and the Preservation of Youth', was printed at Oxford in 1590 and translated in 1683. When a copy of this book was displayed as an exhibit on the occasion of the Bacon Celebration in Oxford in 1914, many who read the opening sentence for the first time agreed that its reference to the existence of microbes is a remarkable example of fore-knowledge even from so prescient an author as Bacon.

'As the world waxeth old, Men grow old with it: not by reason of the age of the World, but because of the great Increase of living Creatures; which infect the very Air, that every way encompasseth us, and Through our Negligence in ordering our Lives, and that great Ignorance of the Properties which are in things conducing to Health, which might help a disordered way of Living, and supply the defect of due Government.'

It has been held by some historians that there was a Jewish, or other school of Medicine established in Oxford in the twelfth century, but Dr. H. P. Cholmeley, who has investigated the opportunities given in our city in the Middle Ages for the study of medicine, has come to the conclusion that there is no evidence for such belief. There were, however, Leeches (*Medici*), but the earliest mention of them does not suggest great efficiency, for, in the case of Stephen of York, their treatment was less efficacious than that of St. Frideswide in the eighth century. The Oxford Franciscan, ROBERT GROSSETESTE, (1175-1253), was one of those who acquired sufficient medical knowledge to be appointed physician to a bishop: this implies that medical teaching was obtainable at Oxford before 1200, which is a traditionally accepted date for the foundation of the University. Grosseteste was an ardent advocate of temperance. In 1236 he urged that strong drink should be avoided, since it 'deprives a man made in the image of God of the use of his reason, brings on the worst diseases, shortens his life, is the stepping stone to apostacy and engenders other innumerable evils'. Food, sleep, and good humour are in his opinion the best means to temporal salvation.[1]

Another early name on the roll of Oxford physicians was Reginald de Stokes, who became a 'Master of Physick' in attendance on the Bishop of Lincoln *c.* 1250.[2]

Clinical experience was doubtless to be obtained at one or other of the charitable foundations established



St. Bartholomew's Hospital Chapel.
From Parker, Antiquities of Oxfordshire.
Block lent by Mr. Parker.

in the twelfth and thirteenth centuries. A hospital for lepers, founded by Henry I, 1100-35, and dedicated to St. Bartholomew, was situated a quarter of a mile beyond St. Clement's, but is stated by Wood to have been allowed to fall into decay when a rumour was spread that leprous folk overseas had, at the instance of the Saracens, 'poisoned the fountain of sweet gliding streams'[3].

'In 1329, Edward III to gratifie his scollers of Oriel Hall, conferred on them the hospital, which was then

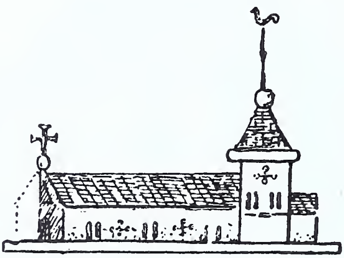
[1] Stevenson, *Life of Grosseteste.* The first Franciscans landed in England in 1224, just seven hundred years ago, under the leadership of Agnellus of Pisa. Their Oxford house was built on land obtained from Richard the Miller in what is now Church St., St. Ebbe's, near which Agnellus himself is said to be buried.

[2] *Mon. Franciscana* i. 113; Rolls Series.

[3] Wood, *City*, ii, 509.

much decayed, so that they might have the use of wholesome air in times of pestilential sickness.'

The master of the hospital, who was in priest's orders, had at his command a valuable assortment of amuletic medicines with which to cure his patients. It boasted St. Edmund the Confessor's comb,[1] one of the ribs of St. Andrew the Apostle, the bones of St. Stephen, and the skin of the patron saint of the hospital. 'Those who were troubled with continuall headaches, frenzies or light-headed, were by kembing their heads with St. Edmund's combe, restored to their former healthe; or



THE HOSPITAL OF ST. JOHN, *c.* 1250
After Matthew Paris. Brit. Mus. Roy. MS. 14 C vii, f. 221.

those troubled with a weaknesse of joynts or halting, were by the handling and applying those bones to the places affected, restored to their pristine state.' The equipment may have been worth as much as is an ounce of radium to a modern hospital, and with the recrudescence of superstition after the great war of 1914 might have had a modern value had it survived.

The second 'infirmarie for ye sicke', or St. John's Hospital, appears to have been founded in or before the reign of King John, who gave it lands. It was refounded in 1233 by Henry III, who gave it a new site and buildings, a mill, and Statutes. The care of the infirmary and its inmates was vested in a 'sacrist', who, as one of the brethren, wore a gown of brown stuff with a cross on the left breast, and over this a cloak marked with a double cross in front. Considerable portions of the old buildings

[1] Edmund the martyr was born at Abingdon, which accounts for his comb being preserved in the neighbourhood. Edward the Confessor was also born near Oxford, at Islip.

of the old hospital may still be traced in and under the later buildings of Magdalen College.[1] Patients treated in this hospital were narrowly limited by statutes which expressly forbade the admission of any sick persons who could not confess, or who might be suffering from leprosy, paralysis, dropsy, mania, epilepsy, fistula, pregnancy, or incurable diseases. This would practically ban all cases except the specific fevers, ague, and such complaints as pneumonia and bronchitis. This rule appears to have been common at a time when it was desired to prevent a hospital becoming an infirmary. Sir D'Arcy Power informs me that it still holds good at St. Bartholomew's Hospital in London founded in 1123. Surgical patients and accidents, of course, were always admitted.

In Edward II's reign, according to Miss R. M. Clay,[2] several brethren who had caused dissensions elsewhere were transferred to St. John's hospital in Oxford. Small wonder that a subsequent visitation of St. John's should reveal misrule, dissolute living, disobedient and quarrelsome brothers, sisters, and ministers. An Order to admit the King's Chaplain, 'finding him and his clerk food, drink, robes, shoe-leather, wood, litter and a fitting dwelling place' in the hospital, reads very like a forerunner of the ordinances of Royal Commissions of our own times.

The following list of medieval hospitals has been extracted from the same authority.

The Medieval Hospitals of Oxfordshire.

Leper houses are marked with asterisks.

Date.		Founder.	Patron.
1126	*St. Bartholomew, Oxford	Henry I	Oriel Coll.
1142	*St. Mary Magdalene, Crowmarsh	—	Osney Abbey
? 1158	St. Giles, Cold Norton	—	Priory
1166	*St. Leonard, Clattercote	—	Bishop, Priory
1180	St. John Baptist, Oxford	re-f. Henry III	Crown
1219	'Bethlem', Oxford	—	—
1226	St. John Ev., Burford	—	Private
1228	— Eynsham	—	Abbey

[1] Appendix to Salter, *Cartulary of St. John's Hospital.* Oxf. Hist. Soc. lxix.

[2] R. M. Clay, *Medieval hospitals of England.*

Date.		Founder.	Patron.
1231	*St. Cross, Woodstock	—	—
1234	Domus Conversorum, Oxford	Henry III	—
1241	St. John B., Banbury	R. Whiting	Bp. of Lincoln
1307	*St. Leonard, Banbury	—	—
1330	St. Giles, Oxford	—	—
1338	St. Peter, Oxford	—	—
1339	St. Mary V. & S.M.M., Woodstock	—	—
1345	St. Clement, Oxford	—	—
1355	St. Mary V. & S.J.B., Bicester	N. Jurdan	—
1437	God's House, Ewelme	De la Pole	Private
1457	Great Almshouse, Burford	—	—
1460	St. Christopher, Thame	R. Quartermayne	—
1501	New Almshouse, Banbury	—	—

Then there were the infirmaries of the great religious houses such as Osney Abbey and St. Frideswide's Priory, where, according to Wood, 'there was the infirmary where the monks that were sick retired, and had the benefit of physicians and their medicines'. But, as Cholmeley points out, the monastic physicians were a kind of lay brother, or at least could take fees as did Walter of Brakelond.

Opportunities for gaining clinical experience must therefore have been very limited, 'but as no clinical study was necessary for a degree, probably no student, unless unusually enthusiastic, would trouble about it'. The medieval physician was not uncommonly an ecclesiastic who undertook the cure of the body as well as that of the soul, and licence to practice in both faculties was granted by bishops.[1] Among others, we may mention Albert, afterwards a Cardinal, who accompanied Lanfranc on his visit to Egleward; John of St. Giles, the friend and physician of Robert Grosseteste; and Ranulphus Besace, physician to Richard I.

We have already alluded to the apothecaries' quarter in the High Street in the first part of this work,[2] but the earliest record of apothecaries in Oxford is even older than is there indicated. As early as 1230 a Roger Spicer lived in Grope Lane, now known as Grove Street, and from 1240 to 1285 the name of William le Spicer de Winton, sometimes associated with that of his brother

[1] It was necessary, at any rate in later years, for a candidate to show that he had cured a certain number of poor people. (D'A. P.)
[2] *Early Science in Oxford*, vol. i, p. 3.

Alfred le Spicer, 1246–57, frequently appears as a witness in the deeds of St. John's Hospital; his daughter Maria figures in 1263, and his son Richard le Spicer had a house on the site of 80 High Street in 1308, being probably the individual of the same name who paid 4*s.* for a shop near Carfax in 1297. The name written RICHARD LE ESPECER appears frequently from 1289 to 1312 and written RIC. 'IPOTECARIUS' in a rental of 1293-4 of St. Martin's parish for his holding 'apud Karefouk', 'in Quarefuc', 'in quadreuio'. Meanwhile the name of a Thomas le Spicer appears in 1248, 1250, 1253, 1257, 1263, and he is followed by Tho: Apotecarius in 1280, and in 1293-4 as renting land in All Saints parish, and 'against the town walls opposite Kybaldestreet'. In 1277 a district called the 'Spicery' was specially allotted to apothecaries and spicers for their trade. This in 1293–4 was localized as 'In vico Cattestrete' and xii *d.* was paid for it. John le Especer rented a messuage in 1283 and Iwo Ipotecarius in 1293–4 occupied two shops 'sub magna camera de Borouwaldescote' which is Broadgates or Burwoldscot Hall. It is of course obvious that some of these 'Ypotecarii' may only have been private persons, but it is also probable that a fair proportion were really engaged in the trade of Oxford in the thirteenth century.[1]

Two early deeds, quoted on the occasion of the British Medical Association meeting at Oxford in 1904, are worth repeating. The earliest is a Release by John Sencer of Oxford to John, son of William Espicer, of Oxford,

'of all his lands, tenements and rents which he has by extent under a writ of elegit (seizure of property of a party legally declared unable to pay a debt), viz., A messuage in the parish of St. Mary the Virgin, three shops adjoining it, two shops in the Apothecaria in All Saints parish, and one shop in the tannery (*peletria*) in St. Martin's parish. Dated, Oxford, Monday next before the Ann[n]. of our Lady, 1315'.

Another deed, dated 1341, relates to a taper-maker and an apothecary:

'1341 (15 Edw. III). In the King's Court. William the Tapermaker delivered to John of Denton his Ypotecary-stall with all its utensils, and 20 lb. of wax and spices existing in

[1] Salter, *loc. cit.*

the stall to keep a merchandize for him, and to give account of the same at the four seasons of the year. He now complains he cannot get the account from John of Denton.'

The power of electing and admitting apothecaries came to be vested in the Chancellor, who usually appointed a commissary to act on his behalf. An instance of this is recorded in 1526, when our first Wolsey lecturer heard one David Styles take the following oath.

'I swear that I will always have in my shop all medicines, species of medicines and confections which concern the art and mystery of an Apothecary, and are necessary for the health of man.

'That I shall be contented once a year (at least) that certain physicians practising in the University shall visit my shop upon the account of good and bad medicines, in the month of November, or any other time if occasion shall require it, to be adjudged of by the Vice Chancellor, one of the Proctors and the practising physicians here; and these searchers and tryers of medicines being of the Vice Chancellor's and Proctors' appointment, shall have power to destroy and throw away all bad and unprofitable medicines and drugs.

'That I will sell all things appertaining to my trade at a low and reasonable price, and as sold in other places in England.

'That I will not make up any compound medicines without the presence and advice of some physician admitted to practice, who shall judge those samples fit to be made up into compositions.

'That I will observe these things without fraud or deceit.'

The Pharmacy pots in which the old apothecaries kept their drugs have been found in excavations in many parts of central Oxford and a selection has been figured in the plate facing page 6 of volume i. In the 13th century the Arabs glazed pots with a waterproof glaze of tin dioxide, which circ. 1299 was made at Faenza (Ravenna), where Luca della Robbia learnt the method.[1] The mark of the apothecary was the mortar, and it is remarkable that no very early Oxford specimens of Apothecaries' Mortars should be known. The elaboration to which this necessary utensil afterwards attained is noted on page 44.

It is curious that Shakespeare should not have alluded

[1] Feldhaus, *Die Technik der Vorzeit.* Leipzig 1914.

to this *alter ego* of the needy apothecary of Mantua, whose shop Romeo described in such detail.

I do remember an apothecary,
. . . meager were his looks,
Sharp misery had worn him to the bones,
And in his needy shop a tortoise hung,
An alligator stuff'd, and other skins
Of ill-shap'd fishes; and about his shelves
A beggarly account of empty boxes,
Green earthen pots, bladders, and musty seeds.

The first lecturer on medicine whose name is preserved to us is NICHOLAS TYNCHEWYKE or TINGEWICK, M.D., Fellow of Balliol College, who was gratefully remembered by Edward I as the physician 'to whom, after God we owe thanks for our recovery from the illness which lately oppressed us'.[1] The list of drugs used by Tingewick included distilled oil of turpentine, aromatic flowers for baths, carminative electuaries, plasters and ointments of various kinds, the oils of wheat, ash, and bay, water of the roses of Damascus, wine of pomegranates, remedies prepared from pearls, jacinths, and coral, and many other drugs. The king was taken ill at Carlisle, and the cost of conveying these remedies from London to that city amounted to £159 11*s.* 10*d.*, the apothecary's bill for the medicines being £134 16*s.* 4*d.*[2]

In Oxford Nicholas Tingewick read physick lectures in the Physic School[3] adjoining his Inn on the east side of Cat Street on the site of the Cloisters of All Souls College. It is reported that, having read in Mirfield's medical MS. *Breviarium Bartholomei* that 'lice (*pediculi*) of sheep, bruised and compounded with honey and water (*hydromel*) can cure jaundice (ycteridia), . . . he rode 40 miles to an old woman who had by this remedy cured an infinite number, so to speak, of persons, and that he gave her a sum of money for instructing him in the cure'.[4] Tingewick died in 1324.

[1] On Oct. 7, 1306. Rymer, *Foedera*, ii, 1077–8, quoted by Norman Moore, *Linacre Lecture*, 1913.

[2] Thompson, *Alchemy and Pharmacy*, 1897.

[3] Maclean, *History of Pembroke College*. See the plan on p. 21.

[4] Herburwe hall on E. of Cat St. was given to St. John's Hospital in 1265: it lay between Corbets Hall, afterwards known as Tingewick's Inn on the N. and Goodgame Hall on the S., and must have

There is no evidence that our predecessors in Oxford may lay claim to so much perspicacity as to have spontaneously realized the need of studying anatomy. That insight into the craft came to them from abroad, where Mondinus had already practised dissection about 1309, and the Emperor Frederick II had ordered that all surgeons should undergo a course of human anatomy before being allowed to practise; and gruesome stories of vivisection are told.

The study of physick was, however, accorded an honourable place among the courses of early Oxford. In the original statutes of the University, set out *c.* 1325, those skilled in medicine are reckoned more learned than others, since to their discretion are committed the cure of the sick, the perils of death, and the ordering of life. Great care must therefore be exercised that only competent persons are allowed to practise or incept in that faculty.

For inception in Medicine, a candidate was to have read one book of the *Tegni* (= τέχνη) of Galen, or one book of the *Aphorisms* of Hippocrates, *pro majori parte.* These sufficed for Theory. For the practice of medicine the candidate must have read one book of the *Regimentum Acutorum* of Hippocrates, or the *Liber Febrium* of Isaac, or the *Antidotarium* of Nicolaus. A candidate must also have responded to the Masters Regent in the faculty for two years. Graduates in Arts were let off with a two years medical course, but from others eight years study were required. For licence, candidates had to have heard 'Medicinalia' for six years, to have read *cursorie* one medical book *de practica* and another *de theoretica*, and to have responded and opposed in all the medical schools for two years. Apparently no other book-learning was required and no mention is made of clinical experience or of anatomical knowledge.

In some colleges the study of medicine was not encouraged, indeed in Merton it was expressly forbidden by Statute, but such was the spirit of contrariness among the members of Merton College that they early began to

been where the great gates of All Souls quadrangle stand. The name dates from about 1200. By the end of the thirteenth century it was known as the Magna Scola, and in the fifteenth century as Physick Hall. Salter, *Cartulary of St. John's Hosp.*

seek medical knowledge and degrees. In 1284, only ten years after the foundation of the College, when a visitation was held by Archbishop Peckham, among the abuses which had to be corrected was that of the admission of medical students, who came in on the plea that medicine is a branch of physics. This innovation the Visitor absolutely prohibited. Happily, remarks a recent Warden, his injunction was neglected: medical science continued at Merton as a part of 'philosophy'; and it is remarkable how many of its Fellows devoted themselves to Physics, as they were then understood.

One of the first of the Merton doctors was John of Gaddesden who graduated D.M. about 1309 and wrote a treatise on Medicine, the *Rosa Medicinae*, in the seventh year of his 'lecture'.

The 'Rosa Anglica', as John's book is more usually called, though largely a compilation from the works of earlier physicians, also contains many personal observations which show that Gaddesden must have had a large practice. Some of his clinical pictures, e.g. of ascites with obstructive jaundice, are said to be wonderfully vivid, and many of his remedies anticipate modern practice. Incision for dropsy, urea as a diuretic for cure of a hydropic child, red-light treatment for smallpox, treatment for phthisis, are all noted. His list of signs of leprosy is most detailed, and he mentions a rapid clotting of the blood which is confirmed by the observation of Boeck and Danielssen that the fibrin ferments largely increase in the blood of lepers. His surgical operations did not go far beyond tapping for dropsy, an operation for hernia, and the reduction of dislocations; that of the lower jaw being well described. His contemporaries looked upon him as an authority in the diseases of women. He also includes directions on diet, cookery, and the lucrative business of a beauty specialist.[1] With Bernard of Gordon[2] and Gilbert the Englishman,[2] Gaddesden is mentioned by Chaucer in the *Canterbury Tales*.

[1] Cholmeley, *John of Gaddesden*.

[2] Bernard was the author of the *Lilium Medicina* and Gilbert of the *Compendium*.

Blood Letting.

A surgical operation of everyday occurrence was that of blood letting. This practice has a long and complicated history, and many were the treatises and rules which guided the practitioner. The general utility of bleeding was well known to the ancients. The Rules of Health of the School of Salerno (*c.* 1100) governed its details in the Middle Ages, and would have regulated venesection in Oxford.

The choice of the vein from which blood was drawn was considered to be of great importance. In the *Treatise on Bleeding* it is stated that 'There is also a vein in the fore-finger which anatomists call the Salvatella. This must be opened on the right hand in congestion of the liver, but on the left in congestion of the spleen'. Many physicians held that a complete cure was only possible if the bleeding took place between certain hours, and when certain planets or signs of the zodiac were in the ascendant. Their belief was inherited from antiquity, as the following extract from an Anglo-Saxon Leech-book shows:

> The old leeches laid it down in Latin books that in every month there are ever two days which are very dangerous for drinking any medical potion, or for blood letting; because there is one hour on each of those days, on which if any vein is opened, it is loss of life or long disease. A leech tested this doctrine, and let his horse bleed on that hour, and it soon lay dead.[1]

And this in spite of the warning of the Venerable Bede that 'No Christian man shall do anything of witchery by the moon: if he doth, his belief is naught'.

The powers of the greater lights, the sun and the moon, were evident to all. The belief in the influence of the stars on human life received authority from the mistranslation of a passage in Hippocrates, τι θεῖον in disease being rendered by *coeleste* instead of *divinum*.[2] And the old Greek doctrine of the influence of particular planets on particular organs became the physician's guide, and

[1] *Leechdoms of Early England*—illustrating the History of Science before the Norman Conquest, p. 153.

[2] E. Withington in Little's *Roger Bacon Essays*, 1914.

helped him to shelve many of his responsibilities on to the stars. An interesting survival of the ancient bond between astronomy[1] and medicine is the sign of Jupiter, ♃, with which every modern prescription begins.

The phlebotomist was greatly helped in his practice by diagrams which were based upon an original scheme worked out by an early Christian bishop, Priscillian, to indicate the particular organs over which the twelve signs of the zodiac preside. The scheme was doubtless of service to innumerable physicians and their patients, but Priscillian was executed in A.D. 385, a martyr for his special form of science.[2] The Priscillian scheme was much used in the fourteenth century and appears in several of the Ashmolean manuscripts, and on the Oxford instrument which we have already figured and described as no. 68.[3] The latter example is engraved upon the side of a Physician's Quadrant. The twelve signs of the zodiac are distributed over the various members of the body according to the accepted scheme. The following pictures of Zodiac Men occur in manuscripts in Oxford:

The Zodiac Man in Manuscripts

1. **Zodiac Man.** **xiv cent.**
Coloured. f. 363 MS. Ash. 789.
Reproduced in vol. ii, p. 238.

2. **Zodiac Man.** **xiv cent.**
f. 7 MS. Savile. 39.
Another copy similar to the last. On the same page as a Volvelle.

3. **Zodiac Man.** **xiv cent.**
f. 34^b MS. Lib. Mus. Ash. A 5.
Reproduced in vol. ii, p. 170.

[1] At the time of which we are writing 'Astronomy' and 'Astrology' were so intermingled that, as in our previous volume, we use the term Astronomy whenever the practice of that science is involved, even though it be exercised by astrologers.

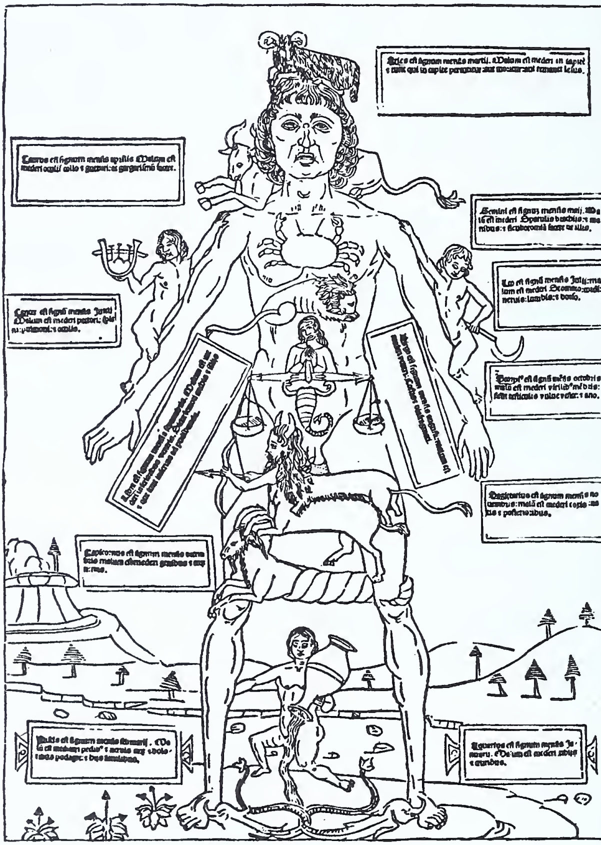
[2] 'Ad hanc insaniam pertinet prodigiosa illa totius humani corporis per duodecim signa coeli distinctio, ut diversis partibus diversae praesideant potestates', Leo, *Epistola* xv.

[3] *Early Science in Oxford*, ii, p. 170.

4. Zodiac Man. **xiv cent.**

MS. Ash. 8.

Less carefully drawn than the last.



KETHAM'S ZODIAC MAN.
Fasciculus Medicinae, 1491

5. Zodiac Man. **1424.**

MS. Ash. 370.

Brightly coloured.

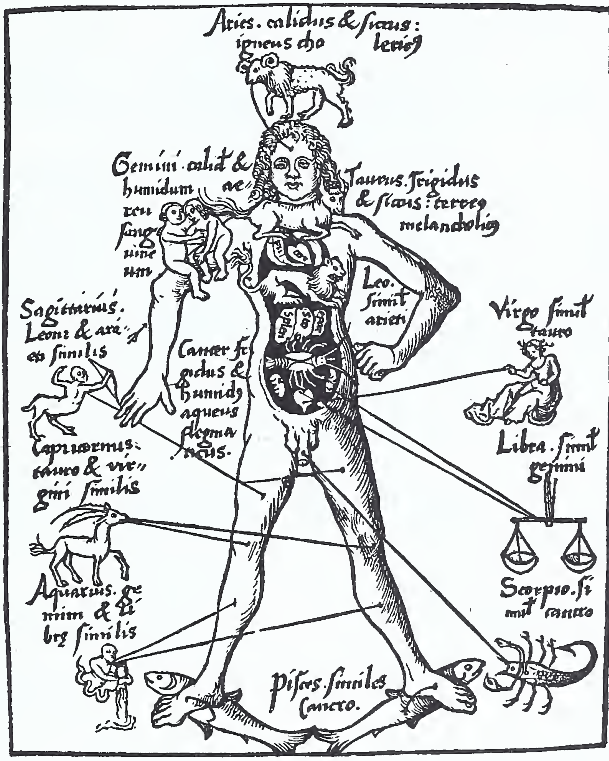
6. Zodiac Man.

MS. Ash. 210.

7. Zodiac Man. **xv cent.**

MS. Ash. 391.

Finely coloured and protected by a veil of silk gauze.



REISCH'S ZODIAC MAN.
Margarita philosophica, 1504.

Later the Zodiac Man diagram appeared in printed books. One of the earliest of these diagrams to be printed from wood blocks appeared in 1475 in the Calendar of Regiomontanus. It was a crude production, but the art of block cutting improved so rapidly that by 1491 craftsmen were producing work as fine as that used to illustrate the fine work by Ketham. The somewhat later drawing of the Zodiac Man of 1504, printed by Reisch, has a special charm.

Special calendars were prepared for the use of medical men and were soon multiplied by the printing press; indeed the Purgation Calendar of 1457 is believed to be the first printed medical publication. It was followed by a Blood-letting Calendar in 1462.

A popular account of the traditional and approved procedure is contained in the later work of a member of University College, who has already been mentioned in connexion with the invention of the telescope:

LEONARD DIGGES. *A Prognostication*: imprynted at London, within the blacke Fryars, by Thomas Gemini. 1555.

First ye have many pleasant chosen rules for ever, ⟨including⟩ 'No. 9 a conducible note of all the *euel daies* in euery *moneth*: with other necessaries: for letting bloudde also, with the dominion of the *Moone* in mans bodye: for pourging, and bathing, more largely then by the Table tofore sayde.

The Table on fol. D iii v declareth for ever the daies that are good or bad 'to let bludde, to purge and bathe'.

This table is engraved on page 4 of a pocket dial in the Bodleian Library, already described in vol. ii, p. 282. On sig. E. is

A conducible note for letting bludde.

LEt bludde at no tyme, without great cause: for it bryngeth wekeness and many infirmities. If ye do, see it be after good digestion, and fastinge, in a fayre temperate daye. Beware before all maner *exercise, bathinges, watchinges,* and *c. c.* &c. After, vse fine meates, of light digestion: abstayninge from all the aforesayd, vntill the fourth daye. These signes are mooste daungerous for bludde letting, the *Moone* beyinge in them, *Taurus, gemini, Leo, Virgo,* and *Capricorne,* with the laste half of *Libra* and *Scorpius.* The rest are all good, so the *Moone* beare no dominion in that member whiche ye cut: as followeth.

The dominion of the Moone in mans bodye.

FRom the *chaunge,* to the *firste quarter,* a mete tyme to let yonge men bludde.

From the *firste quarter,* to the *ful,* good for middle age.
From the *ful* to the *laste quarter,* apt for aged folke.
From the *laste quarter,* to the *change,* best for olde men.

Beholde the figure.

Aries.

Gemini. — Taurus.

Leo. — Cancer.

Libra. — Virgo.

Sagittarius. — Scorpius

Aquarius. — Capricorn

Pisces.

DIGGES'S ZODIAC MAN 1555.[1]
Prognostication.

Signes mete for the complexions.

ARIES, *Sagittarius* — for the *fleumaticke*: the head, and thyes excepted.

Libra, *Aquarius* — for *melancholike*: buttockes, and legges excepted.

Cancer, *Scorpius*, *Pisces* — for *cholerike*: brest, membres, and fete excepted.

For the *sanguine*, all be apt that tofore are named good.

In the *springe tyme* let bludde at the right side.
In *Haruest time* at the left syde.

The learned Phisician will consider, beside all that is sayde, the *Coniunctions*, *Oppositions*, and *quadrate aspectes* of the Planetes: with many other thinges *Astronomical*, most necessarie, both in bludletting, purging, bathinge, &c.

For to take purgations, and to bathe.

THe metest time to take purgations &c. is neither in hote, nor colde dayes: that is, from the tenthe of *Marche*, to the twelfthe of *Iune*.

[1] Engraved by C. I.

Further, by rules Astronomical, it muste be perfourmed when the *Moone* is in cold moyst, and watry signes, as *Cācer, Scorpius* and *Pisces*: conforted by aspectes, and radiations, of planetes fortifienge the vertue of the bodye expulsive.

The *Moone* in *Aries, Taurus* and *Capricornus,* naughte. One cause of vomiting the purgation, is the *Moone* having aspect to any planet *retrograde.*

The *Moone* in these signes folowinge, very good to bathe: *Aries,* Leo, Sagittari, *Cancer, Scorpius* & *Pisces.*

These ensuyng are euel to bathe: *Taurus, Virgo,* and *Capricorne.*

Of .... hear clipping: shaving: and geldinge.

Heare cutte groweth well, the *Moone* encreacing. beynge in *Tauro, Virgine,* or *Libra.*

Cuttinge, shaving, clipping, in the wane, causeth baldnes: what is then cut, groweth litel. *Calamitium prohibet, oleum Tartari.*

The best tyme of Gelding is in *Cancer, Scorpio,* or *Pisces* in the wane.

It is scarcely surprising that some medical Pegasus should also have found an inspiration in the theme of 'what veins to bleed in':

Ye that wyll lette gude men blode
And vaynes wyth all yowre liues fode
Some vaynes vse ye
And mony other lette ye be.[1]

The practice may not have been less thorough in Oxford than it was in the East, and at the right hour on the right day the High Street by St. Mary's may, like the streets of Bagdad, have been seen running with blood from the barbers' shops.[2] And bleedings continued through the centuries: indeed as late as the beginning of the nineteenth century the practice of many Oxford physicians did not differ greatly from that of the celebrated Dr. Lettsom (*d.* 1815):

[1] Egerton MS. 2572.

[2] My friend Sir D'Arcy Power has, however, pointed out that this could not have happened if the Master and Wardens did their duty, for the by-law always ran as in London that 'No barber shall be so bold or so daring as to put blood in their windows openly or in view of folks, but let them have it carried privily into the Thames'.

When any sick to me apply,
  I physicks, bleeds and sweats 'em;
If after that they choose to die,
  What 's that to me,

I. Lettsom.

Once a belief in horoscopes was firmly rooted, it followed that the conscientious physician must be skilful in the use of mathematical instruments, for it was the position of the stars, and tables and computation, that helped him to secure a correct diagnosis. Indeed, if he knew enough Astronomy, he need hardly know any medicine at all, for the relations of the planets, and later of the zodiac, to the parts of the body, were reduced to diagram form. Several of these diagrams, beautifully coloured, occur in Bodleian codices of the fourteenth and fifteenth centuries.

It may be here noted that in the sixteenth century the connexion between medicine and astronomy led on to a weird connexion between medicine and mathematics; for instance, there was a belief in the potency of certain numbers, particularly three and seven, and in geometric squares and figures such as mystic trigrams, pentacles, &c., the use of which was often closely intermingled with calendrical or astronomical factors. Drugs also, physicians believed, should be compounded so as to bring out their *dynamidiae*. This no doubt led thoughtful men like Arnaldo de Villanova (1235–*c.* 1313) to the study of mathematics. Again, a profound belief in the influence of comets upon human health made it needful that physicians of the sixteenth century should have enough mathematics to fix the position of comets in the heavens,[1] which they did by the help of astrolabes and armillary spheres.

Among the medico-mathematical scholars of the sixteenth century was Leonardo da Vinci (1452–1519), one of the world's greatest anatomists. And the advantage of an early training, both in medicine and in mathematics, is exemplified in the cases of Galileo, Copernicus, and Cardano, and also later on in the case of our own Robert Recorde. Oxford in this followed the trend of thought of the time. Astronomy was certainly considered

[1] A work that was much consulted was that of Fernandez Raxo y Gomez (d. 1595) *De Cometis*, Madrid, 1578.

a necessary part of the medical curriculum, for it has been noticed that almost all the early astronomers of Oxford were also medical men; especially was this the case in Merton College, to which most of them belonged. Indeed, a course of preliminary horoscopy was probably of far greater utility to the fifteenth-century physician than preliminary botany is to his twentieth-century successor. John of Burgundy in his treatise *de Pestilentia* emphasizes the point:

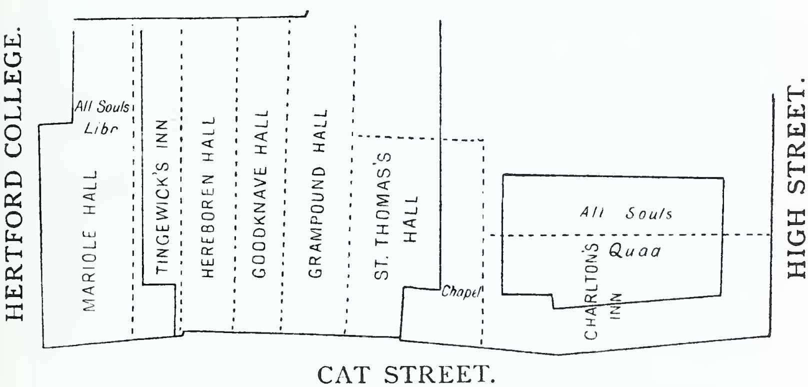
'And by cause that ther have bene many grete maistirs and ferre lernyd in theoric or speculacion and groundly in sight of medecyne but they bene but litill proued inpractik and thereto allefully ignorant in the sience of Astronomy the whiche science is in phisik wonder nedefull as wittenessith ypocras in epidemia sua seying what phisician that ever he be and kan not astronomy no wyse man owt to putte hym in in his handis for why astronomye and phisik rectifien yche other in effect and also that one science sheweth forthe the many thinges hidde in the other alle thynges in thynge may not be declared. And I 40 yere and more have oftyn tymes proved in practice that a medecyn given contrary to the constellacion all though hit were both wele compownyd or medled and ordunatly wroght after the science of phisik yit wroght nowther aftur the purpose of the worcher nor to the profite of the pacient.' [1]

John goes on to explain that heavenly or firmamental bodies are the first and primitive cause of sickness, and that those who know not the causes, who have not 'dronkyn of that swete drynke of Astronomye', can put to sores 'no perfite remedie'. It would be hard to give a more cogent reason for the close study of the heavenly bodies. The wonder to us is not that medical Fellows of Merton should have attained to eminence as astronomers, but that one of the most eminent of them all, John of Gaddesden, should have practically omitted all mention of astronomical matters in his *Rosa Anglica*.

But obviously astronomy had its uses, for did not Eschenden foretell the Black Death from the consideration of an eclipse of the moon in 1345? The medical practice of a surgeon of the first class who lived in the Midlands through the time of the Black Death is illus-

[1] Sloane MS. 3449, f. 6, quoted from Cholmeley.

trated by the works of John Ardern, of which copies are preserved in the Ashmole and Digby collections.[1] Ardern, 1307–77, wrote an interesting account of his operation for Fistula, which gives us an excellent idea of the methods in use in the times that followed the period of the School of Salerno and terminated with the fatal year 1349. He is, moreover, the only contemporary authority for the story of the way in which Edward the Black Prince obtained the ostrich feather, an anecdote which immediately follows a discussion on internal piles.



PLAN OF OLD HALLS ON THE SITE OF ALL SOULS COLLEGE ALONG THE EAST SIDE OF CAT STREET.

THE PHYSICK SCHOOL ADJOINED TINGEWICK'S INN.

From a sketch by H. E. Salter. Cf. p. 9 note.

THE PHYSICK SCHOOL.

For the better training of members of the profession it was ordained in 1357 that the Vespers of Physicians should be kept in 'scoliis propriis' belonging to the faculty.[2]

The Physick School was a 'great Hall in the Street of Cats in the Parish of St. Mary', which according to

[1] MSS. Ashmole 1434, ff. 11–107; 829, ff. 76–115; Digby 161, f. 23. For the work of a nearly contemporary surgeon, see Lanfrank Science of Cirurgerie, *c.* 1380, in MS. Ashmole 1396.

[2] Wood, *Hist.* 1796, p. 765.

Wood was 'knowne by the name of Physicke Scoole and Hall and perhaps before Herberowe Hall'. 'There was a very fair school therein, which with the Hall itself (inhabited by physicians) belonged to St. John's Hospital. All I can find material of this school, is that it with others of the same faculty were repaired by one John Major, an inceptor in the same faculty in 1426. After the divinity school now standing was finished, the students in physic did their exercises therein.'[1] The last contemporary allusion to the Hall is perhaps contained in a charter dated 1484–5, when for a certain garden in Cat Street 'where was the school and Hall called Phisick Hall', 20*s*. per annum was received from the College of All Souls. For generations Cat Street remained the physicians quarter of old Oxford, and as such we shall refer to it again in the seventeenth century (p. 44). Moreover, when the great pit for the underground extension of the Bodleian Library was being dug on the west side of Cat Street, old pharmacy pots were exhumed (and, we trust, saved) in such large numbers as to make it clear that Radcliffe's Physick Library has appropriately taken the place of at least one Physick Shop.

Merton College became the leading medical college of the time. One of the first to witness the keeping of the Vespers may have been the elder JOHN KYLLINGWORTH of Merton, who flourished *c*. 1360. About 1386 JOHN CHYLMARK, also of Merton and remembered as the author of the *De accidentibus Planetarum*, was lecturing 'in Scholis Oxoniae in plateâ Scholarum positis'. To these two succeeded a band of eminent doctors. Among them were NICHOLAS COLNET, 1398, who accompanied Henry V to France as his physician, and was present at the battle of Agincourt. JOHN SOMERSET, Inceptor in medicine and physician to the Household of Humphrey Duke of Gloucester, was sworn a supervisor of the London physicians on 27th June 1424. JOHN KYLLINGWORTH the younger, proctor in 1441. WALTER HART, a worthy disciple of the elder Kyllingworth, and like him an astronomer. So high was his reputation that Chichele nominated him as one of the first twenty Fellows of All Souls. He acquired two medical treatises by Simon

[1] Gutch.

Bredon, which his brother, acting as his executor in 1484, gave to Merton. JOHN CURTEYS or CURTEIS, M.D.,[1] noted as a physician and astronomer, was elected a Fellow in 1442. THOMAS BLOXHAM, M.D., admitted B.Med. 1455, was celebrated as a practitioner; on one occasion 20*d.* was due to him for attendance and medicines supplied to a scholar who died.[2] To him succeeded the astronomer physicians HENRY SUTTON, M.D., elected 1458, and JOHN STACY, elected 1462, the last of whom was accused of treason and was hanged at Tyburn (Leland). And more eminent than all, JOHN CHAMBERS or CHAMBYR, M.D., elected Fellow 1492, who will be mentioned again as Court Physician to Henry VIII, co-operated with Linacre and De Victoria in obtaining a charter for the Royal College of Physicians in 1518. He had studied in Paris 1502–6, taking his M.D. there, and again in Oxford in 1531. PHILIP DENSE elected Fellow 1500, and JOHN BLYSSE, M.D., elected 1509, have already been mentioned as astronomers of repute. We think of them now as physicians. Neither lived long. Dense was cut off 'morbo pestilenti' in 1507; Blysse practised in London, and died at Blackfriars in 1530; he had been selected by the University in 1510 to dispute with a Spaniard of the University of Montpellier. Contemporary with him was WILLIAM LORYMER, elected 1509, who resigned his fellowship in 1511, being 'medicus et uxoratus'. At a later date All Souls College also became a leading medical college. Among their early alumni were Walter Hart of Merton, NICHOLAS HALSEWELL, fellow 1468, whose arms were formerly in the cloister windows; RICHARD BARTLOT M.B. 1503 'very famous for his great knowledge of physic' (Caius), and THOMAS GWYN M.D. 1528. To New College belonged THOMAS BENTLEY M.D. 1518. JOHN CLEMENT, the friend of Sir Thomas More, and WILLIAM FREEMAN were also Oxford men, but their college, if they had one, is uncertain.

About 1400 there appear to have been so many townsmen and illiterates advertising themselves as medical

[1] There is no evidence that the degree of doctor of medicine was conferred at Oxford before 1449 when THOMAS EDMONDS received it. In 1451 it was conferred on JOHN FACEBY, physician to Henry VI. The Register from 1455 to 1505 is missing.

[2] Anstey, *Mun. Acad.* ii, p. 664.

men, that the University passed a statute against unlicensed persons and resolved to proceed against them in future as disturbers of the public peace.[1]

About the middle of the fifteenth century several Englishmen were pursuing their studies in Italy.

The more eager students either mistrusting the depth of their instructors' knowledge, or finding no prospect of advancement in their own country, elected to study abroad. Of interest to us is a small party of Oxford scholars, mostly Balliol men, who worked with Guarino Veronese at Ferrara. The party consisted of Grey, Free, Gunthorpe and Tiptoft of Balliol, and Fleming of Lincoln. John Phreas or Free (d. 1465) of Bristol, the best known of them, went to Italy to study Greek and Medicine, and is said to have made money by teaching medicine at Padua, Ferrara, and Florence. Ten of his letters, probably written at Ferrara in the autumn of 1457 and in 1458, are in the Bodleian Library and have been recently described.[2] Free translated the *Phalakras egkomion* of Synesius. His *de Laudae Calvitiae* was printed posthumously with the *Praise of Folly* at Basel 1510-20, 1521, and in an English version by Fleming in 1579. It was a paradox proving that baldness is more desirable than a thick crop of hair.

Few of our worthies deserve more to be had in remembrance in Oxford than Dr. Gilbert Kymer, d. 1463, the cleric-physician attached to the house of Humphrey, Duke of Gloucester. Kymer was Chancellor of the University 1431–33 and was M. B., B. C. L., M. D. before 1420; Proctor 1412–13; Principal of Hart Hall 1412–13; presented to the living of Lutterworth, Leicestershire, 16 Dec. 1420 whilst yet a layman. Dean of Wimborne Minster and Treasurer of Salisbury Cathedral; ordained subdeacon 28 Feb. 1427-8; presented to St. Martin's Vintry 1434; Dean of Salisbury 1449; sworn Rector of the medical men in London 27 Sept. 1424. He was called to attend Henry VI at Windsor in June 1455. Physician with Dr. Somerset to the Household of Duke Humphrey, whom he induced to leave his library to the

[1] *Mun. Acad.* 236. Note by Gibson, O.

[2] Spingarn, *Unpublished Letters of an English Humanist.* 'Journ. Comp. Literature', i, 1903. The originals are in MS. Bodley 2359.

University. He was the author of a treatise addressed to Humphrey, *Diaetarium de Sanitatis Custodia*.[1]

The first surgeon known to have been admitted and licensed to practise his art in Oxford was PETER DE ALCOMLOWE, who is mentioned in a statute dated Nov. 7, 1462, as having been examined. Another fifteenth-century medical man was WILLIAM GODDARD, a Grey Friar of Oxford, whose recipe for making Aqua vitae is among the Sloane MSS.[2]

UROSCOPY.

To determine the nature of a malady the physicians of the fifteenth century, having inherited the methods of their predecessors in the Middle Ages, placed an exaggerated reliance on conclusions drawn from the pulse and the urine of their patients. So universal was the latter method of diagnosis, that the glass flask of peculiar shape, termed a urinal, that was used for this inspection became the adopted sign of the physician. Our drawing of a urinal, taken from the book of an Oxford physician of the sixteenth century, and reprinted in 1651, shows us that the shape of the flask remained practically unaltered from its appearance at least five hundred years previously.

As early as 1181 the statutes of the hospital of St. John of Jerusalem prescribed that there should be a uroscopist on the staff of the hospital. One of the earliest Oxford manuscripts on the subject dates from the thirteenth century (MS. Digby 79) and includes a *Tractatus de urinarum sciencia*, f. 18. About 1220 MICHAEL SCOT compiled certain Medical Receipts paying especial attention to the urine of the patient. (*D. N. B.* and J. Wood Brown, *Life of M. Scot*, 1175-1232.)

Uroscopists with their glass flasks are depicted in medical writings as early as the eleventh century.[3] They became a customary illustration in the first printed medical books, where they may be studied in a great

[1] Two chapters have been published by Hearne in *Liber Niger Scaccarii*, pp. 550-9 (Bodl. Douce h.h. 152). The MS. is in the British Museum. Information from Sir D'Arcy Power.

[2] *Aqua vite secundum doctrinam magistri Godard per Johannem Grene medicum scriptum*: a short recipe in English, *c.* 1468. MS. Sloane 4, p. 77.

[3] Cf. the eleventh-century Anglo-Saxon MS. in Brit. Mus. figured in *Anglo-Saxon Leechcraft*, 1912, p. 32, and the thirteenth-century miniature in MS. Ashmole 399, Dr. Singer, *Proc. R. Soc. Med.* ix, 1915.

variety of woodcuts.[1] But there are not many examples in sculpture which can compare with the fine figure of the Doctor of Medicine on a buttress on the west side of the cloisters of Magdalen College.[2] It dates from 1506, and therefore represents a physician of the fifteenth century. In his gown, with the hood thrown across the shoulder, he is in the act of performing a uroscopy, and perhaps thus earning a fee to put into the somewhat empty purse carried in the left hand. The limpness of the purse may indicate that uroscopy, in spite of the high esteem in which it was held, was not a very paying business. At Frankfurt the customary fee was 12 pfennigs.[3]

Recorde's Improved Urinal, *c.* 1550.
Urinal of Physick, London 1651.

All the possible appearances of urines were tabulated

[1] Megenberg, *Buch der Natur*, 1478.
Rodericus Zamorensis, *Speculum*, Augsburg, 1479.
J. de Cuba, *Hortus Sanitatis*, 1485, 1492, 1498.
Tallat, 1502.
Eyn nyge kalender recht hollende, Lubeck, 1519.
Brunschwig, *Buch der Kunst zu destillieren*, 1512.

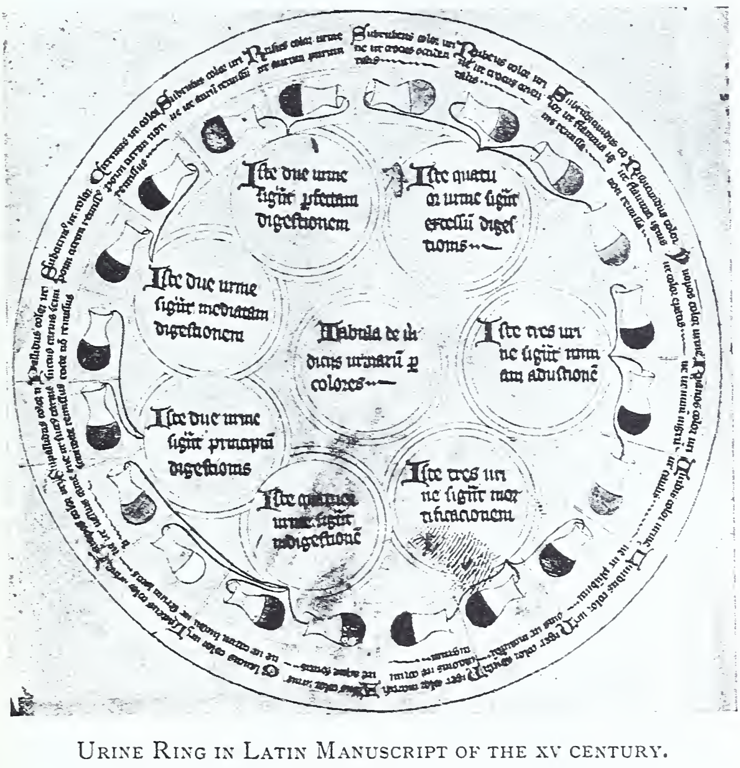
[2] A description of the Magdalen uroscopist was written about 1696–8 during Hough's presidency and was included in the curious dialogue between the three interlocutors, A, B, and C. It was entitled *Collegium Magdalense* and may be consulted in MS. Rawl. D. 912, f. 332.

A. Haud procul hinc medicus fixis explorat ocellis
Urinam vase inclusam. (B) Medicus ne explorat ocellis
Urinam vase inclusam? bene multus in hisce
Sal video latitat; tamen et puto, saxeus aequè
Aegroti morbum cyatho deprendat opaco;
Ac qui conclusas in vascula limpida guttas
Concutit humoremque vitro conspectat amarum.

[3] Baas, p. 334.

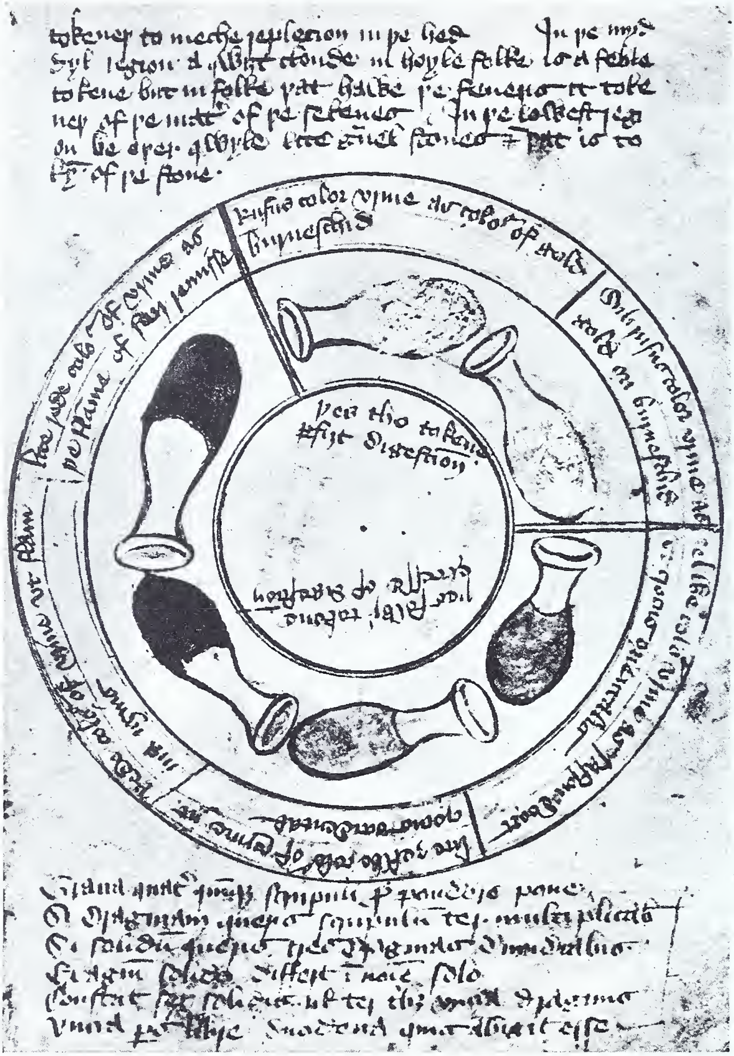
THE MAGDALEN PHYSICIAN OF 1506 PERFORMING A UROSCOPY

and co-ordinated with the supposed corresponding states of the patient. Rules for this systematizing occur in many medical manuscripts, some going back to the thirteenth century. They were also rendered in the form of a circular diagram, known as the Urine-Ring, of which there were several examples in the Ashmolean Museum.



URINE RING IN LATIN MANUSCRIPT OF THE XV CENTURY.
MS. Savile 39, f. 7v.

In MSS. Ashmole 391 (xiv cent.), 789 (xv cent.), and in MS. Savile 39, twenty urinals with coloured contents are arranged circumferentially in two symmetrical groups of ten, with mouths upwards. They are described as 'albus' to 'rufus' in the left-hand group, and as 'niger mortificationis' to 'subrubeus' in the right-hand group. The indications of the various



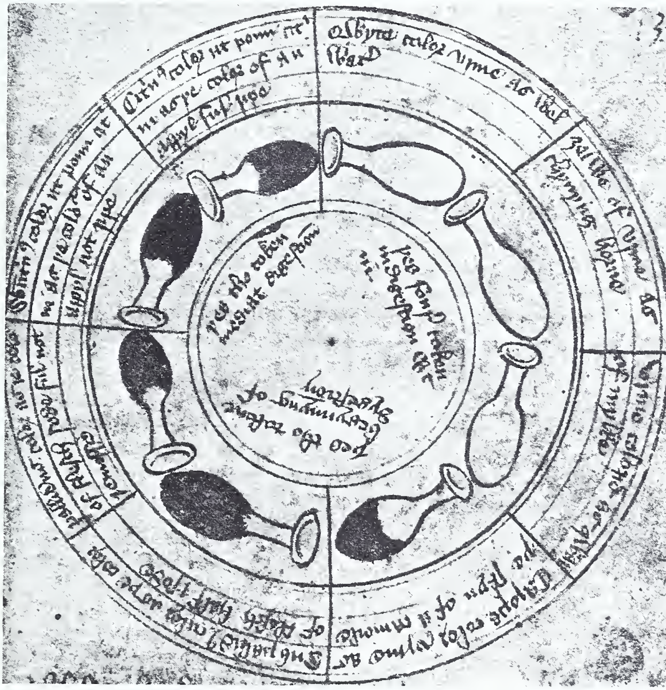
URINE RING IN ENGLISH XV CENTURY MANUSCRIPT.
MS. Digby 29, f. 129.

Inscriptions in outer ring:

Rufus color urine as color of gold burneschid.
Subrufus color urine as gold on burneschid.
Thes tho tokene perfeyt digestion.

Yelwe color urine as safron Cooxt ut crocus orientalis.
lite yelwe color of urine ut crocus occidental.
Rede color of urine ut flamina ignis.
lite rede color of urine as the flame of fuir remisse.
Thes fowre tokene excesse of digestion.

urines are defined in seven interior circular labels which are connected with the various urinals by coloured lines.[1] In MS. Ashmole 1481 there is also a fourteenth-century figure of a urine-ring, but it is apparently unfinished for the flasks have not been painted in it.



URINE RING. XV CENTURY.
MS. Digby 29, f. 130.

Inscription on Urine ring:

Subcitrinus color ut pomi citrini as ye color of an appyl not ripe.
Citrinus color ut pomi citrini as ye color of an appyl su ripe.
Thes tho token mediate digestion.

Wyte color urine as Wel Water.
Yelwe of urine as chynyng horne.
urine colorid as way of mylke.
Carops color urine as the skyn of a camoile.
Thes fowre token indigestion.

Sub-pallidus color as ye color of flesch half i-sode
pallidus color as ye color of flesch sode ful not remisse.
Thes tho tokene begynnyng of dygestion.

[1] A similar device is carried out in a French MS., *Codex Brux. No.* 5876, f. 154 v, described by Pergens in *Archiv. Gesch. Med.* for April 1908.

In a rather later example, the twenty urinals may be arranged radially, mouths outward (MS. Leipzig, 1192), and there are eight (instead of seven) indication labels within the circle of urinals.[1]

A special arrangement in three circular diagrams is found in an English Treatise, *To knaw the state of man and woman be thare water*, of the fifteenth century. MS. Digby 29, f. 125 et seq. This treatise is followed by a *Judicia urinarum secundum Egidium*.

In several of the fifteenth-century manuscripts the urinals with variously coloured contents are drawn upright, one or more on a page. They may be drawn in the margin as in MS. Digby 29 (xv cent.) f. 76, &c., or in the text, as in the *Book of Urinals and Medicines*, fifteenth-century MS. Ashmole 1447, pp. 165–85, or in groups of four, as in the fifteenth-century English manuscript, MS. Ashmole 1393, f. 62v, which begins 'A leche yt schalle see waters ye first tyme he most loke yt ye urynal be clene'. MS. Ashmole 1413 (xv cent.) contains *An exposition of the urines in order*, with roughly scribbled and coloured urinals. MS. Ashmole 1498 is nicely rubricated, but contains no figures.

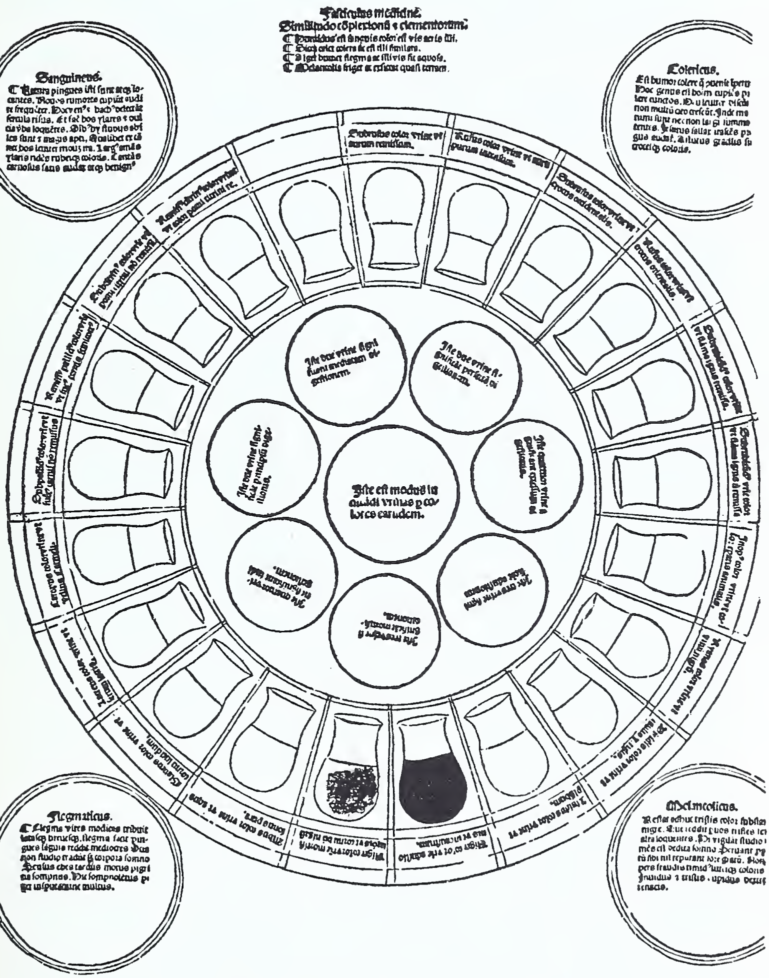
We are not aware of any English printed book in which the Urine-ring appeared, but it figured in the first edition of Dr. John de Ketham's *Fasciculus Medicinae*, printed at Venice in 1491. This book contains a diagram of twenty-one urinals grouped radially in a ring with mouths to the centre. Their purpose is explained by the central inscription, *Iste est modus indicandi urinas per colores earundem*. At the four corners are defined the characteristics of the four temperaments.

One of the first works on the subject by an Englishman was the *Urocrisiae* by Henry Daniel, a Dominican, written in 1379 (MS. Ashmole 1404). And this was followed in Oxford by *The speculation of urynns*, by H. HARE of Christ Church (MS. Ashmole 1405). Richard Napier (1608–76) (MS. Ashmole 1414), Simon Forman, and all the astro-physicians dabbled in Uroscopy.

After following the direction given above as to cleanliness, the uroscopist would hold the glass up to the light and carefully scrutinize the contents. 'If you want to know what is the matter with a man the colour of his urine will tell you. If it be red and thick, it means that he is a *sanguinicus*, that his blood is strong and that his body has a good colour. If the urine be thin and red, it

[1] Sudhoff, *Tradition und Natur beobachtung*. Leipzig, 1907.

means that the man is a *cholericus*; and that he has too much blood and too little moisture. He must necessarily



KETHAM'S URINE RING, 1491.

be in a state of chronic anger, for the gall burns so strongly inside him that the moisture cannot withstand it.' According to Recorde, urines might vary greatly in colour from claret red and crimson to purple, green, popinjay green, blew, ash-colour, and black.

It not unfrequently came to pass that a whole course of treatment was based on this one symptom alone, which opened a very wide door to the fraudulent practitioner. Arnold de Villanova, who taught medicine at Montpellier about 1300, gave his students the following advice. 'If on examining the urine you cannot find anything wrong, say that there is an "Obstruction" of the liver. If the patient complains of headaches, tell him that they come from the liver. But take care to use the word "obstruction", because people don't understand it, and a great deal depends on their not being able to understand what one says.'

The chief works on uroscopy were of foreign authorship. One of them, Vassaeus, *De Judiciis Urinarum Tractatus*, Paris, 1548, was translated by Humphrey Lloyd (1527–68), of Brasenose College, 1551, under the title of *The Ivgemēt of Oryne*, London, 1553. He was also the author of a *Treasury of Health*, translated from the *Thesaurus Pauperum Petri Hispani*. Another early printed treatise in English is contained in the anonymously printed *The Key to Unknown Knowledge, or a Shop of Five Windows*, 1599. One of the last works was by Dr. Robert Recorde of All Souls,[1] '*The Urinal of Physick*: Whereunto is added an ingenious Treatise concerning *Physicians*, *Apothecaries* and *Chyrurgians* set forth by a Dr. in Queen Elizabeth's dayes. With a Translation of Papius Ahalsossa concerning Apothecaries confecting their Medicines'. London 1651.

Henry VIII appears to have had an attentive eye for all that concerned the well-being of the medical man. He promulgated Statutes relating to surgeons during five of his regnal years and he is said to have devised some elaborate medical recipes, which, with the not less complicated plaster, ointment and 'pultes' prescribed for him by his physician John Chambre, of Merton College, are still preserved.[2] I do not know what fees John Chambre received, but his servant was given 13*s.* 4*d.* regularly every New Year's Day from 1529 to 1541.[3]

[1] See vol. i. facing p. 189 and vol. ii. p. 70. [2] MS. Sloane, 1047.
[3] Account for Payments by Henry VIII to Physicians, etc., in the Record Office.

The Statutes of Henry VIII relating to surgeons are:

3 H. VIII. 11 requiring examination and licensing and forbidding unlicenst folk to practise.

5 H. VIII. 6 discharging surgeons from duty as Constables, etc.

22 H. VIII. 13 alien surgeons not to be handicraftsmen.

32 H. VIII. 40 empowering physicians to practise surgery.

32 H. VIII. 42 An acte concernyng Barbours and Surgeons to be of one company.

34 and 5 H. VIII. 8 unlicensed folk empowered to treat simple diseases without penalty under 3 H. VIII.

The last act but one was the most important, for it united the fraternity of Surgeons with the Company of Barbers and so formed the United Company of Barbers and Surgeons which lasted until it was dissolved in 1745. Holbein's picture in the Barbers Hall commemorates the event.

The first two names of the six physicians specially mentioned in the letters patent of Henry VIII dated 23 September 1518 for the foundation of the Royal College of Physicians were those of the King's Physicians, John Chambre, M.D., Fellow of Merton and Warden 1525, and Thomas Linacre, M.D., Fellow of All Souls 1484. Both had studied and had graduated at Padua: both held positions in the Church.

Thomas Linacre (1460–1524), Fellow of All Souls, must be regarded as the principal transmitter of the spirit of the Italian renaissance into England. He had the good fortune to accompany an embassy sent by Henry VII to the court of Rome. At Florence he attracted the attention of the illustrious patron of Italian literature, Lorenzo the Magnificent, who permitted him to attend the lessons of Politian, the teacher of Lorenzo's own children. Linacre also began the study of Greek under Demetrius Chalcondyles, the editor of the great edition of Homer, published in 1488. At Rome he put his newly acquired learning to immediate use by reading Aristotle and Galen in the originals—he is said to have been the first Englishman to do so. He studied medicine and natural philosophy under Hermolaus Barbarus, who had found him in the Vatican reading Plato's *Phaedo* in the original Greek and introduced him to the work of

Dioscorides. He also visited Venice and Padua, where he graduated M.D.

On returning to Oxford Linacre gave temporary, or 'Shaggling', lectures on physic, and taught the Greek language, Sir Thomas More of Canterbury College being one of his pupils. But his reputation stood too high to permit of a continuance at Oxford. He was called to court by Henry VII, and was entrusted with the care both of the health and of the education of Prince Arthur (1501); and in the next reign he succeeded to the position, even more responsible and honourable, of guardian of the King's (Henry VIII) health, with a salary of £50 a year.

But the greatest public service of all those rendered by Linacre to medicine and to the cause of suffering humanity, was the use of his influence to secure the foundation of the Royal College of Physicians in London. He had beheld with concern the great evils which resulted from the treatment meted out to patients by quacks and empirics, who were often illiterate monks, licensed by bishops, themselves without medical experience. Through his interest with Cardinal Wolsey, Linacre obtained a charter from Henry VIII, dated 1518, constituting a corporate body of approved physicians, in whom should reside the sole privilege of admitting persons to practise as physicians within the city and a circuit of seven miles round it.

The need was rehearsed in the charter.

> Before this period, a great multitude of ignorant persons, of whom the greater part had no insight into physic, nor in any other kind of learning; some could not even read the letter on the book, so far forth, that common artificers, as smiths, weavers and women, boldly and accustomably took upon them great cures, to the high displeasure of God, great infamy of the faculty, and the grievous hurt, damage and destruction of many of the King's liege people.

Linacre was elected the first president, and continued in that office during the seven remaining years of his life. The meetings were held in his private house in Knight Rider Street, which he bequeathed to the College at his death. He carefully supervised the granting of licences to practise medicine. Among his learned friends were

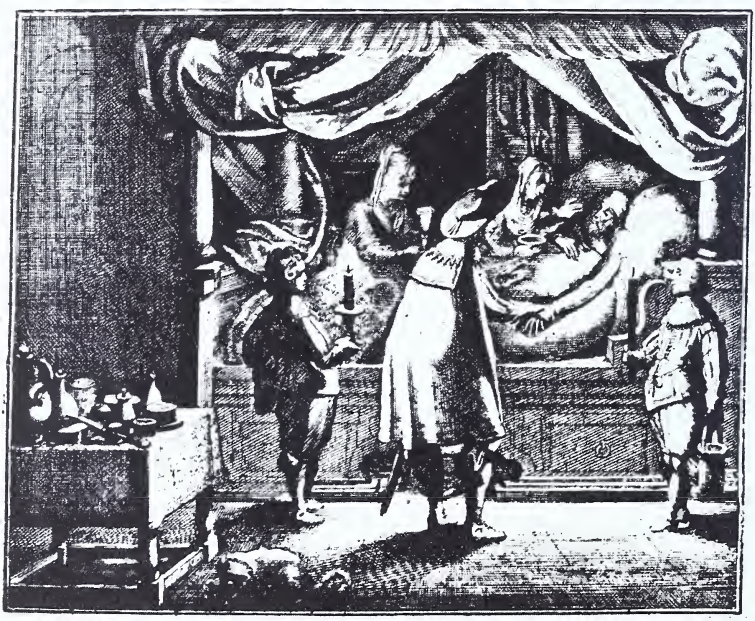
THOMAS LINACRE

All Souls College

THOMAS SYDENHAM

Magdalen Hall

ROBERTO FLVDD, aliâs DE FLVCTIBVS
Armigero, & in Medicina Doctore Oxoniensi.



A BEDSIDE SCENE: DR. FLUDD VISITING A PATIENT, 1631 numbered Latimer, Melancthon, Tunstal, Lily, Sir Thomas More, and Erasmus. With the last-named he was on intimate terms, and some of their correspondence is still extant. In a letter written in 1506 from Paris, after a chill caught whilst crossing the Channel, Erasmus, having enumerated his troubles, laments: 'No Linacre is at hand, who might free me by his art.' Linacre's most notable contribution to literature was a translation of Galen's *Methodus Medendi*. Erasmus, sending a copy to a friend, wrote, 'I present you with the works of Galen, now, by the help of Linacre, speaking better Latin than they ever before spoke Greek.'

His last act was the founding of the three lectureships that bear his name, two at Oxford and one at Cambridge. In assigning the two Oxford medical lectureships to Merton College, Bishop Tunstal, Linacre's executor, was influenced by the belief that 'there were more physicians in that house than in any other in the University'.[1] The lecturers were obliged to expound Hippocrates and Galen. The Cambridge lecturer had to explain the treatises of Galen *De Sanitate Tuenda* and the *Methodus Medendi*, as translated by Linacre. No doubt the lecturers kept to the strict letter of their obligation: certainly at the end of the seventeenth century their instruction was still limited to the exposition of the teaching of the two great masters, and to lectures every Tuesday and Friday morning during Term. The first person to benefit by the Linacre endowment was THOMAS MOSCROFFE or MUSGRAVE, who was officially styled the first Wolsey lecturer. One of Moscroff's official duties was to act on occasion as commissary for the Chancellor, in whom was vested the power of electing and admitting all apothecaries. The case of one David Styles in 1526 has been quoted on page 8.

A few years later we find two persons delivering Shagglyng lectures on medicine, and finally, in 1536,[2] Henry VIII appointed JOHN WARNER, Warden of All Souls, to be the first of a long line of distinguished Regius Professors of Physic. It does not appear, however, that any royal endowment was attached to the regius chair of medicine until the reign of James I, who gave it the mastership of the Ewelme Almshouse, and

[1] Wood, *Annals*, i, p. 863. [2] *D.N.B.* gives 1544.

thus became the real and substantial founder of the Regius Professorship of Medicine. But the Regius Professor was granted special powers of examination, and for an exceedingly good reason:

'because divers Scholars upon a foresight of the ruin of the Clergy, had and did now betake themselves to Physick, who as yet raw and inexpert would adventure to practise, to the utter undoing of many, they the said visitors ordered therefore, that none should practise or exercise that faculty unless he had been examined by the Physick professor concerning his knowledge therein.
Which order being of great moment, was the year following confirmed by the King, and power by him granted to the Professor and successors to examine those who were to practise according to the Visitor's order.' 1535.[1]

In the meantime the Linacre endowment was used to pay a Superior and an Inferior Lecturer in Merton College. Their instruction was given in the refectory, and was open to members of the University. The roll of Lecturers, commencing in 1558 with Robert Barnes, is printed as Appendix F. When we remember the high distinction of the Founders, of whom Erasmus wrote, 'If it happened that I had Linacre or Tonstall for a teacher, I should not long for Italy', or the pious hopes with which these Lectureships were founded, it is sad to think of their subsequent history. The pristine dignity of the Lectureships was not destined to be maintained. There was serious misapplication and abuse of the funds, the appropriation of which had been so specifically prescribed. And the appointments gradually sank to the position of college lectureships, and ultimately sinecures held by Fellows, till the splendid revival of the foundation in the present Linacre Professorship of Human and Comparative Anatomy.[2]

Among Oxford physicians who rose to eminence during the first half of the sixteenth century special note must be taken of three eminent educationalists:

Edward Wotton (1492–1555), Fellow of Magdalen, famous as the author of the first Zoology for medical students, will be again noticed below, p. 157.

Thomas Phaer (1510–60), of Oxford and Lincoln's Inn, was the first Englishman to help his countrymen to under-

[1] Wood, *Hist.* 1796, ii, p. 62; Reg. 1, fol. 1.
[2] Payne, quoted by Osler.

DR. ROBERT FLUDD OF ST. JOHN'S COLLEGE

stand medical science, as well as Virgil's works, in their own language. His medical treatise, *The Regiment of Life*, a version of the classical textbook of Salerno, became very popular: an enlarged edition was printed in 1596.

The achievements of Robert Recorde, of All Souls College, *c.* 1530-50, have already been described (vol. i, p. 99, vol. ii, p. 175). His *Urinal of Physick* had a great influence in the sixteenth and seventeenth centuries.

The following Oxford men are mentioned in Munk's *Roll of the Royal College of Physicians* in the sixteenth century:

Robert Huicke, Merton, M.D. 1538.
George Owen, Merton, M.D. 1527.
Thomas Huys, Merton, 1548.
Alban Hyll, M.D., F.R.C.P. 1552.
Richard Master, All Souls, M.D. 1554.
John Howell, All Souls, M.D. 1555.
John Symings, M.D. 1554.
Giles Wale, M.B. 1555.
James Good, New Coll., M.D. 1560.
Richard Caldwell, B.N.C., M.D. 1554.
Thomas Francis, Ch. Ch., M.D. 1554.
John Geynes, M.D. 1535.
John Warner, All Souls, M.D. 1535.
Simon Ludford, London apothecary, M.D. 1560.
Edward Atslowe, New Coll., M.D. 1554.
Richard Smith, M.D.
Roger Giffard, Merton and All S., M.D. 1566.
Henry Wotton, Ch. Ch., M.D. 1567.
Richard Forster, All Souls, M.D. 1573.
Ephemerides Meteorologicae ad annum 1575 *secundum positum Finitoris Londoni.* 8vo. London, 1575.
Thomas Jeesop, Merton, M.D. 1569.
Roger Marbeck, Ch. Ch. and Oriel, M.D. 1573.
MS.—*Brief and true Discourse of the late honorable Voyage into Spaine; and of the wynning, sacking and burning of the famous Towne of Cadiz there*—In the British Museum.
Christopher Johnson, New Coll. 1571.
Counsel against the Plague, or any other infectious disease. 8vo. Lond. 1577.
Richard Dew, Oxoniensis, *c.* 1582.
Thomas Hall, Broadgates, M.D. 1581.
Christopher Atkinson, M.D. 1585.
Henry Atkins, M.D. 1586.
Thos. D'Oylie, Fellow of Magdalen, M.D. 1571.
J. Osbourne, M.D. 1588.
Hippocrates D'Otthen, *c.* 1589.
John Nowell.
Sir W. Paddy, St. John's, 1591.
William Dunne, Exeter, M.D. 1582.
William Clarkson, Broadgates and St. John's, M.D. 1590.

JOHN BANISTER, M.B. 1573.
A needful, new, and necessary Treatise of Chirurgerie . . . cure of Ulcers. 8vo. Lond. 1575.
The History of Man, sucked from the Sap of the most approved Anatomists. fol. Lond. 1578.
Compendious Chirurgery. 12mo. Lond. 1585.
Antidotary Chirurgical. 8vo. Lond. 1589 and 4to 1633.
STEPHEN BREDWELL, 1594.
Helps for Suddain Accidents endangering Life. 8vo. Lond. 1633.
Physick for the Sicknesse commonly called the Plague. 4to. Lond. 1636.
THOMAS TWINE, C.C.C., M.B. 1598.
New Counsel against the Plague. Translated from P. Drouet.
Physick against Fortune. Translated from F. Petrark. 8vo. Lond. 1579.
RAPHAEL THORIUS.
EDWARD JORDAN, Hart Hall, M.D. 1591.
A briefe Discourse of . . . the Suffocation of the Mother . . . 4to. Lond. 1603.
A Discourse of Natural Baths and Mineral Waters. 4to. Lond. 1631.
JOHN GIFFARD, New, M.D. 1598.
MATTHEW GWINNE, St. John's, M.D. 1593.
Vertumnus. 1607.
A Book of Travels, and other works.
THOMAS HEARNE, B.N.C., *c.* 1600.
SIR MATTHEW LISTER, Oriel, *c.* 1605.

In the thirty years from 1571 to 1600 less than fifty medical degrees are recorded, thirty-five licenses in medicine and only one in surgery.[1]

An otherwise unknown physician, NICHOLAS GIBBARDE (*c.* 1541–1608) of Magdalen College, has again been recalled to memory through his library of carefully chosen books, which he bequeathed to his college in these terms, 'all the rewe of bookes begininge from Hippocrates and Goollen to the ende of the shelfe in my upper studie against St. Maries, my notebooks and writings excepted, to Magdalen Colledge conditionallie that they be good unto my wif and childe in performinge of the coppiehould over against Magdalen Colledge.' After being scattered for many years, his row of books has once more been brought together on the shelves of the Magdalen library, and it represents to us, more nearly than any other, the working library of an Oxford physician of the days of Queen Elizabeth. Gibbarde's medical practice does not seem to have been very lucrative—perhaps it was based too much on book-learning—but, being also of a practical turn, he was

[1] Clark *Reg.* ii. 411, quoted from Mallet *Oxford* ii. 133.

able to eke it out by 'wasching honestlie all linnine as perteyneth to the church of the College' and to act as master of the Almshouse. From this he derived an income of £4 13*s.* 4*d.* a year.[1]

Better known was Thomas Cogan, M.B. 1574, of Oriel College, who wrote about the Plague, and provided several generations of Oxford men with a text-book on Health.[2]

John Warner was followed in the Physick Chair by Thomas Francis in 1554, Walter Bayley in 1561, Anthony Ayleworth in 1582, Bartholomew Warner in 1597, and Thomas Clayton in 1611. Of these the first three were all physicians to Queen Elizabeth, Dr. Bayley, of Winchester and New College, being the best known. He was the author of three small works, privately printed, which he appears to have given away as presents to his friends. *A briefe Treatise touching the preseruation of the eie sight*, 1586, begins with a consideration of things affecting the sight: 'Southerne wyndes doe hurt the sight; so do low rooms, places full of dust and smokie are noysome. Meates are best which are easie to be digested and which do not stay long in the stomache; amongest such a young henne is greatly commended; so is partridge and pheasant.' He advocates the use of a drink made with *eiebright* or *euphragia* used in beere, in ale or meade or wine rather than in water. In some cases fenill seeds may be added with advantage. When distilled water is prescribed, Bayley wishes 'the same to be artificially done in stillatories of glasse, that the qualities of the herbes may remain in the distilled waters; and therefore I do not allow of the common manner of distilling in stillatories of leade, by the which the waterie parts onlie are drawne'.

In the next year appeared *A Briefe Discours of certain Bathes of medicinall waters in the Countie of Warwicke neer unto a village called Newnam Regis*, 1587; and in 1588 *A Short Discourse of the Three Kindes of Peppers in common Use.* The three medicines made from the three peppers were: *Diatrion pipereon*, which 'hath facultie to

[1] *The Row of Books of Nicholas Gibbard of Oxford.* Annals of Medical History, 1921, iii, p. 324.

[2] *A Preservation from the Pestilence with a short censure of the late sickness at Oxford*, 1575. *The Haven of Health*, 1586, 2nd edit. 1596, repr. 1605, 1636. Smout, the carrier, was indebted to him for 13*s.* in 1594. Clark, *Reg. Univ. Oxon.* i. 317.

warm the stomach', *Diaspoliticon*, which 'keepeth the belly loose', and *Diacalaminthe*, which 'having more subtletie in substance doth penetrate further'. He adds a note that 'although he has never seen a pepper tree living, yet, 'I have often seene at Poole in Dorsetshire and also in London, the whole clusters of pepper preserved in brine and in salt: these clusters are long and thin and not so thicke together as the cluster of grapes'.[1]

During Bayley's tenure of the Professorship a further important statute was enacted in 1565. Under it 'a student in physick was not obliged to proceed to Master of Arts in order to acquire the degree of batchelor of physick, but he was to attend the publick lectures in that faculty for six or seven years for the said degree'. At a later period, after the student had taken a bachelor's degree, 'he is to wait four years for a doctor's degree, and to read either six solemn lectures from one o'clock till two each day, on any part of Galen's works at pleasure, or three cursory lectures, by expounding some one of Galen's books'.

'Every doctor of physick after his admission is allowed to practice in all kinds of physick, but no other is suffered to practice thus in Oxford unless he be a Master of Arts and taken a batchelor's degree and be admitted by the congregation to practice.'

'No one is allowed to practice surgery within the university without the Chancellor or Vice Chancellor's licence first obtained, and if anyone shall presume contrary he shall be punished as a disturber of the peace. A student in surgery is admitted to practice throughout England, if he has been exercent therein for seven years, and has gone through two operations in Anatomy, and performed three cures at the least, and be also approved of under the hand-writing of the King's professor of physick and of one doctor in the same faculty, or of any three doctors of physick residing within the university, and then his grace on supplication is granted with a condition, that he cures gratis four poor persons (at least) when required thereunto.'

Medical discussions were a part of the ordinary exercises of the faculty, and even served as entertainments on great occasions. For the delectation of Queen Eliza-

[1] D'Arcy Power, *Dr. W. Bayley and his works*, Medico-Chirurgical Trans. XC. pp. 415-49.

beth such a disputation in Physick was arranged in St. Mary's on Thursday, September 5, 1566. The performance lasted 'from two of the clock or thereabouts untill seaven, before the Queen's Majesty; who gave very attent care unto them and tarryed till the full end thereof'.

The questions in physick were:

1. Vita potest prorogari arte medica.
2. Cibi tardæ concoctionis præferendi sunt cibis facilioris concoctionis.

In the which questions

Dr. Huicke	Dr. Barnes	were ready to oppose but for lacke of time only the three first opposed.
Dr. Baylie, Senr.	Dr. Slethurst	
,, ,, Jun.	Dr. Gifford	
Dr. Atslo.		

Dr. Francisce was Respondent. Mr. Masters was Determiner.'

On a later visit to the University city in 1592, Her Majesty was again entertained by a 'medical disputation' in St. Mary's. The record reads: 'Sept. 26th, 1592. Presently succeeded a Disputation in Physicke which was answered by one Dr. Thomas Dochin; who (after his congés as afore and a short preface concerning himself) greatly magnified Hir Majestie "for hir gratious favor in vouchsafing hir presence at this exercise, being so excellent a prince, and so singularly well seene even in this very faculty, among many other hir virtues and great excellency of knowledge and learning which he wished she might have in use of hirself." And so entered into a short exposition of one of the questions, viz.: "Quod Aere magis mutantur Corpora humana quam cibo et potu", wherein he was soon cut off by the Proctors and the Replyers called for, who were six in number, viz.: Drs. Ailesworth, Dalliber, Bust, Ratcliff, Bently, and Case.'

Bayley bequeathed a part of his library to New College, and is buried in the Chapel there. To his son-in-law, Dr. Ailworth, he left his 'skeliton of bones in Oxford' and 20 physicke books.

At Corpus the Statutes gave opportunity for a physician in residence who was probably expected to attend to the medical needs of his fellow inmates of the College. By Poynet's interpretation of the Statutes in 1551, such *medicinae deputati* were exempted from the obligation of taking Holy Orders.

List of Medicinae Deputati of Corpus Christi College.[1]

Hieronymus Raynolds	1559	John Shepheard	1673
James Tonge	1566	Phineas Ellwood	1675
John Pottle	1576	Arthur Parsons	
John Norton	1579	William Creed	1696
George Sellar	1589	Thomas Healy	1723
John Chennell[2]		John Hardress	1736
Stephen Bridges	1630	Thomas Crawley	1740
James Hyde		William Vivian	1754
Josiah Lane		George Williams	1788
Norton Bold	1661	Frederick Holme	1837
William Drury	1671		

The writings of SIMON FORMAN (1552–1611), of Magdalen College, show that he practised freely on himself as well as on others. His encyclopaedic notebooks in the Ashmolean Museum collections, MSS. Ashmole 1491 and 1494, with additions made near the end of his life, contain many recipes for the ailments, for the cure of 'wondes', for purginge, for poisons, with notes on various 'appoticarie druges' in use at the time. His graduated urine-still is figured on p. 1275 v. Perhaps the most sensational of his remedies was 'the medison I mad for my self 1610 the 12 of October, ad renovandum juventutem'.

'And it is manifest that a snake eaten the head and taille cut of and ye bowells taken outt and so boiled and eaten doth make a man yong and lustie again, for yt was seen in Sir Michaell Sandes foole. . . . And this was about Anno 1590 and he was lyvinge 1606 and Sr Michell Sands told me this alle himselfe.

And myselfe did boill 2 snakes in my strong water when I distilled it and after I drank of that water and yt made me to be fresh and take away all my gray hairs when I was 56 yers old & many toke me not to be above 40 or 42.'[3]

[1] Fowler, *Hist. of C.C.C.*

[2] JOHN CHENNELL M.B. (1562–1613) dwelt in a house backing on Cat Street, and acquired a garden in School Street from Philippa, widow of the apothecary John Williams.

[3] MS. Ash. 1491, f. 938. Simon Forman's treatise on the Plague is contained in MS. Ashmole 1403. *A Particular Treatise of the manner of purging the body and his partes by stoole and vomitt, and by Cutting, Cauterizing giving of Chysters and boxing. Collected and written by Simon Forman, gent., student in Astronomy and Physick,* is in MS. C.C.C. 169. It contains receipts dated 1607–21. On f. 41 v. is Sir Arthur Throckmorton's Course of Physick and on

The Hon. Robert Dudley, of Christ Church (1587), is credited by Plot as the first inventor of the Pulvis Cornachinus, a mixture of Diagridium, Tartar and Diaphoretic Antimony with Cream of Tartar, the proportions varying *pro re nata*[1], a medicine of such general and excellent use, that Marcellus Cornachinus (from whom it has its name) wrote a whole treatise concerning it, commending it to the world as highly useful in all diseases whatever requiring Purgation.[2] His senior contemporary, Th. Allen (1542–1632), Fellow of Trinity 1565, was noted for his skill in mathematics and astrology; and the great number of instruments and glasses in his room made the vulgar look upon him as a magician; his servitor would tell them 'that he met the spirits coming up the stairs like bees'.

It was an age of humbug. Even a Fellow of New College, one Richard Haydock, was not above endeavouring to increase his daytime reputation as a physician by pretending to have the power of preaching in his sleep. So widespread was his reputation, that at last he was invited to 'sleep' and preach before the King. Although for some time he kept up a pretence of being asleep, his deception was eventually discovered by James I, and Haydock confessed to the error of his act. He said that having discovered in himself of a greater ability and freedom of invention, memory and speech in that mild, quiet, and silent repose of the night, than in the day, his ambition to attract public attention had led him to pretend to preach in his sleep by Revelation. He left New College in 1605 and settled in Salisbury as a successful physician. We of the twentieth century have however little cause to criticize the impostors of the sixteenth. Is not ours also an age of all manner of quack remedies? of electric belts, iron finger-rings to charm away rheumatism, mascots for man, beast, and even for machine? Instead of Christian Astrology: we have Christian Science. As Lord Bacon truly remarked, 'the weakness and credulity of men is such

f. 169 a *Letter* from J. M. of Gaiton ((?) near King's Lynn) to the noted empirick D. Francis Anthony, requesting some of his 'Aurum potabile'.

[1] Jo. Schroderi, *Pharmacop. Medico-Chym.* ii, c. 77.

[2] Plot, *The Natural History of Oxfordshire*, 1677, p. 300.

that they will often prefer a mountebank or witch before a learned physician'. And the great advances made in scientific discovery, only give the greater opportunity to the skilful quack.

Yet if we translate his flies into 'microbes', we shall find that the ideas of health and disease of ROBERT FLUDD (1547–1637) of St. John's come very near to the truth.

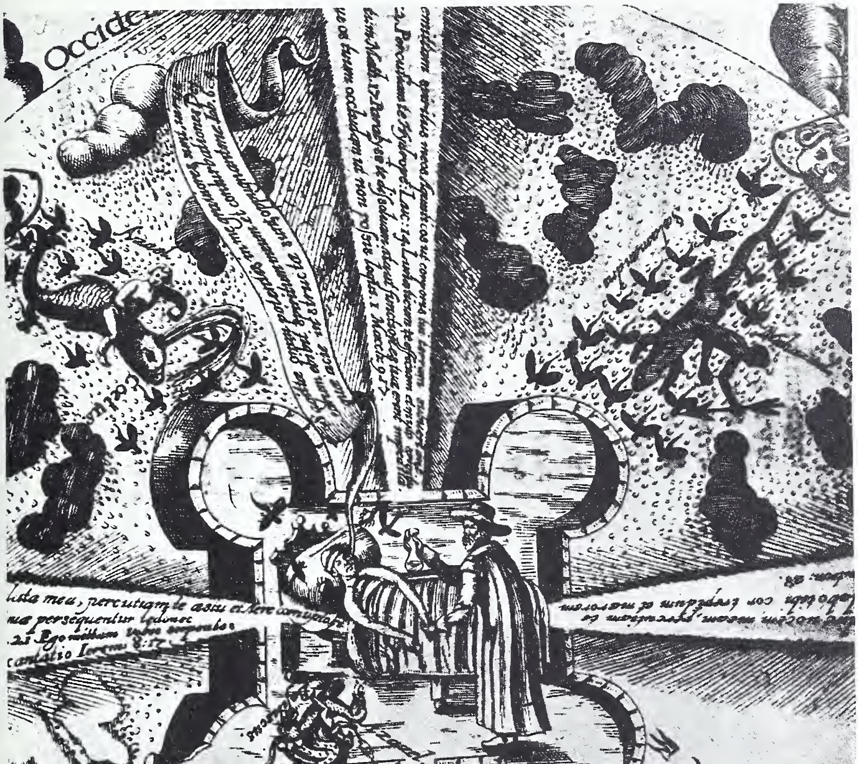
As an example of the curious blending of ignorance and knowledge of the time we may quote the following directions as to the use of mortars of various kinds. It shows the care that was often taken over unessentials. It is quoted from *A Doctor of Physick in Queen Elizabeth's days. A detection of some Faults in Unskilful Physitians, Ignorant & Careless Apothecaries.* London 1651.

> Of Morters likewise they ought to have divers sorts for all precious Stones, (that enter into Electuaries) and Corall, ought not to be beaten in a brasen morter, but Pearls and Corall ought to be beaten in a morter of white marble; precious stones must be made or grinded into pouder upon a stone called in Latine, *Lapis Porphirius,* which is a kind of red marble. Also Purgations, or Electuaries, Pills or powders mingled with any Syrrups ought not to be dissolved in brazen morters, but in morters of glasse, of stone, or of some fine wood; yea, and if they were of silver for great men of high degree, it were best. Also some Ointments ought to be made in morters of lead. (p. 161.)

A schedule of the cost of drugs in 1608 is contained in MS. Ashmole 1432.

The 'Harley Street' of sixteenth- and seventeenth-century Oxford lay round about All Souls. There Dr. TH. DOCHEN had the lease of a house 'abutting to the back syde of All Soulen College and the highe streete' in 1602, and he was succeeded by Dr. EDWARD LAPWORTH in 1610. Both were Linacre Lecturers.

With the end of the sixteenth century and of Elizabethan England we reach the close of the great period of preparation, the period of the Renaissance, which, beginning with the infusion of Greek culture, with an acquaintance with the world of science as known by the ancients, ended with the popularization of practical science that was the necessary prelude to the successful cult of pure science for its own sake which characterized the Carolinian Period that we are about to enter.



A CASTLE OF HEALTH BEING INVADED BY MICROBES IN THE FORM OF FLYING CREATURES COMING FROM THE FOUR POINTS OF THE COMPASS

R. Fludd, Integrum morborum mysterium 1631

II

MEDICINE IN THE SEVENTEENTH CENTURY AND AFTER

Oxford owes the effective foundation of her principal Medical Professorship to James I. The two lectureships which Linacre had endowed in 1524 were consolidated into one by Edward VI. It remained for James I to add a royal endowment. On March 9, 1611, Thomas Clayton was appointed Regius Professor of Medicine, and the King added to the emoluments of the chair in 1617 by annexing thereto the Mastership of the Hospital of Ewelme, for the Professor's better sustentation, even though he be a mere layman and have not taken orders. Also, the King allocated the Canonry of Shipton in the cathedral church of Salisbury for the maintenance of the stipend. Clayton married a daughter of Dr. Bartholomew Warner, his predecessor in the medical lectureship, and in 1623 he received a further augmentation from the Tomlins fund.

It had become generally recognized that anatomy was of sufficient importance as part of the medical curriculum to merit a separate course of instruction, and so R. Tomlins of Westminster endowed an anatomical lecture; directing that a readership in anatomy should be established, tenable by the Regius Professor of Medicine, who, out of the funds left for the endowment, should employ a skilful surgeon or dissector to make public demonstrations of the human subject at certain stated times. See page 87.

An insight into the nature of the Lectures by the Regius Professor, as presented by the notes of a first year student, may be gained from the diary of John Ward who was in Oxford from 1649 until 1660, when he took orders and moved to London. In Ward's notes there is no suggestion of Harvey's discovery of the circulation. The professor's views on the 'causes of purgatives are represented as (1) Extreme bitter as in Aloes and Colloquinta. (2) Loathsome and horrible taste as Agarick and black hellebore. (3) By secret malignity many times not appearing in the taste as Scammony and Antimony: and if anything purge which hath not one of these 2 former virtues in it, it is to be suspected for poison.

If we drink a great quantity of new milk it purgeth; that a mordication or vellitation of the orifice of the veins especially of the Mesentery veins: that almost all purges cause a kind of twitching etc.'[1]

Clayton was Regius Professor until 1665, but resigned the Anatomy Chair to his deputy, Sir Wm. Petty, in 1650. Two of his pupils rose to great distinction: Sir THOMAS BROWNE, and Dr. GEORGE JOLIFFE, M.A. Oxon., M.D. Camb., the reputed discoverer of the Lymphatics, and lecturer at the College of Physicians in 1653. Another who became a physician of note in his own line was PERCIVALL WILLUGHBY (1596-1685) of Magdalen College in 1620-21, the uncle of the eminent naturalist Francis Willughby, the friend of Ray (p. 168). He was widely known, especially in London and Derby, for his success in obstetric practice. He wrote several works but did not publish them.[2]

A less reputable personage was Sir KENELM DIGBY (1603-65), of Gloucester Hall. He advertised the miraculous healing powers of a 'powder of sympathy', a preparation made of vitriol and applied to a bandage, not to the wound itself. But as he was 'the very Pliny of our age for lying' (Stubbes) and 'an arrant mountebank' (Evelyn) his assertions were not taken very seriously. He was a Roman Catholic. His methods as a beauty specialist were also open to criticism. In order to preserve her beauty, he fed his wife, Dame Venetia Stanley, a lady of 'perfect healthy constitution', on

[1] D'Arcy Power, *An address on the Rev. John Ward and his Diary*. Trans. Med. Soc., London 1917, vol. 40, p. 11.

[2] According to the *D.N.B.* a quarto, *De Puerperio Tractatus*, by him is in the British Museum. Sloane MS. 529 and other works are in private hands. One, *The Countrey Midwife's Opusculum, or Vademecum*, was privately printed in 1863.

SIR KENELM DIGBY

DR. RICHARD TOMLINS

capons fattened with the flesh of vipers. She died suddenly, and some suspected poison. 'When her head was opened there was found but little braine, which her husband imputed to her drinking of viper-wine.' He found it expedient, however, to retire to study chemistry in the seclusion of Gresham College, for 'spitefull woemen would say 'twas a viper-husband'.[1]

The general trend of medicine at this time was towards the acquisition of a habit of exact observation. As an example we may cite one of Clayton's contemporaries, who practised in London. Sir Theodore Turquet de Mayerne was a Court physician, who made use of his opportunities to leave detailed notes on the cases of his royal patients. He recorded observations of the fatal illness of Prince Henry, and made a complete study of the state of health of James I in 1623.[2] His 'Notes' have compelled the admiration even of the specialists of the present day.

But in the judgement of posterity the chief light of his age was WILLIAM HARVEY.

Harvey, born at Folkestone on April 1, 1578, was educated at Canterbury, and at Caius College, Cambridge, to which he was admitted on May 31, 1593, and under Fabricius at Padua where he graduated at the age of twenty-four years in 1602. In 1615 he was appointed Lumleian Lecturer in anatomy and surgery at the College of Physicians, and delivered those lectures in which he first promulgated his demonstration of the circulation of the blood, a doctrine that was not published before 1628, in a work[3] which he dedicated to Charles I.

It was his attachment to Charles I that brought Harvey to Oxford. On October 23, 1642, the Prince (afterwards Charles II) and the Duke of York were left in the charge of the doctor at Edgehill. During the fighting, Harvey withdrew with the young princes under a hedge, and began reading a book, when a cannon-ball came near enough to suggest a prudent withdrawal.

At Oxford, in spite of the distractions of the Court and the overcrowding of the city by Royalists, Harvey made opportunities for scientific work. He was still

[1] See vol. i, p. 38.
[2] Moore, *Medicine in the British Islands.*
[3] Harvey, *Treatise on the Motion of the Heart and Blood.*

fretting over the loss of valuable notes on his experiments, destroyed when his lodgings at Whitehall were plundered, and wished to continue his researches. He was incorporated Doctor of Physic on December 7, 1642, and in 1645 was made, by the king's mandate, Warden of Merton College, in the room of Dr. Nathaniel Brent, who had temporarily left the University. Harvey would thus have been one of the importations from Cambridge whom Wood described, with Wallis, Seth Ward, and Dr. Wilkins, as 'the dregs of the neighbour University', commonly called 'Seekers'. He makes fun of their mortified countenances, puling voices, and eyes lifted up; their short hair, commonly called 'the committee cut', and shabby attire, making them look more like antiquated schoolboys than academicians. Harvey's friends included George Bathurst of Trinity, whose collaboration in embryological studies on the chick are mentioned elsewhere, Dr. Charles Scarborough, and Dr. George Ent.[1] Scarborough was a young physician who was inclined to neglect his medical studies for the more seductive profession of arms, a training which did not commend itself to Harvey. To check this military enthusiasm, Harvey advised the young doctor to come and share his lodgings, saying, 'Prithee, leave off thy gunning, and stay here; I will bring thee into practice'. And sure enough he did. Scarborough attained sufficient distinction in his after career to be knighted by Charles II.

In 1646, after the king's escape from Oxford, Harvey returned to London and lived at Cockaine House in Broad St. with his brother Eliab, probably until 1649, when he is believed to have visited Italy with his Cambridge friend Dr. George Ent, to whom two years later we owe the publication of Harvey's *Exercitations on the Generation of Animals.*

Harvey was becoming a recluse. As do some anchorites he would retire into a cave and meditate. The political struggles had affected him profoundly. 'When the state is so agitated with storm . . . were not my mind solaced by my studies and the recollection of the observations I have formerly made, there is nothing which should

[1] Sir George Ent, 1604-89, was the author of *Opera omnia Medico-Physica.* Leyden, 1687.

make me desirous of a longer continuance.' In the course of conversation Dr. Ent, finding that Harvey had still some unpublished papers, asked to see them, and after 'some modest altercations' obtained permission either to publish them immediately or to suppress them till some future time. 'I went from him', says Dr. Ent, 'like another Jason, in possession of the golden fleece, and when I came home, and perused the pieces singly, I was amazed that so vast a treasure should have been so long hidden.' Thus came about the publication of the work on Generation, part of which was connected with Harvey's Oxford period.

At Oxford 'Under Dr. Clayton were fostered, in an inquiring age of faery and imaginative Baconianism, the medical studies of that last of the great nurslings of Broadgates and first of the eminent sons of Pembroke, Sir THOMAS BROWNE . . . "the cardinal example of the thought and manner of the time", uniting in an extraordinary degree fantastic speculation with scientific research. . . .'

The celebrated author of the *Religio Medici,* Sir T. Browne (1605–82), received his early education at Winchester, and came up to Oxford as a gentleman commoner to Broadgates Hall (Pembroke College) in 1623. After taking his M.A. in 1629 he read medicine as a pupil of Clayton, and also began to practise his profession for a short time in Oxfordshire. His 'wander-jahre' were spent in Ireland, France, Italy, and Holland. He attended the medical courses at Montpellier and Padua, and was created a Doctor of Physic at Leyden, returning to London about the year 1634. He is supposed to have written the *Religio Medici* in the following year.

In 1636 he settled at Norwich, where he soon acquired a large general practice and threw himself into those literary labours and that assiduous pursuit of knowledge which, rather than any great contribution to the advancement of his science, have made his name famous all over the world. He was proud of the standing of his profession which in a quaint literary conceit he describes as of the highest antiquity, since its first operation was performed in that far distant dawn of history when, by the physician's art, Adam was thrown into a deep sleep and surgery attained its first triumph in the extraction of his rib.[1]

He was incorporated M.D. from Padua in 1637, received the honour of knighthood from Charles II on the occasion of a royal visit to Norwich in 1671, and died October 19, 1682.

The work of NATHANAEL HIGHMORE, 1613-84, will be appropriately entered in the section on anatomy, p. 93, but as a successful physician educated at Trinity College, he must be mentioned here as the author in 1651 of a somewhat slight work on the cure of wounds by sympathy, and of a more important work on Hysteria,[2] which was thoughtfully studied by John Ward of Christ Church. Ward having read that sneezing brings a paroxysm to an end asks 'whether itt is not very proper to cause histerical women to sneeze by putting up Orange pill [= peel] into their noses or some other way'. Highmore's work led to a controversy with Dr. Willis, who 'used with histerical women this method:—first vomited ym; next gaue ym pills and cured several'.[3]

Dr. CHRISTOPHER MERRET, 1614-95, of Gloucester Hall, was nominated by his friend Harvey to be first librarian of the College of Physicians. After the great fire he was retired from his appointment as it was felt that he had not done all in his power to save the books, and also that he had gone away into the country during the plague leaving the treasure chest of the College to be looted. His chief interests seem to have been botanical, but he also left writings which enable one to form a good idea of the status of medical men in his day.[4]

[1] 'For though physick may plead high, from that medical act of God, in casting so deep a sleep upon our first parent, and chirurgery find its whole art in that one passage concerning the rib of Adam.' *Garden of Cyrus.*

[2] Highmore, *Exercitationes duae: quarum prior de Passione Hysterica; altera de Affectione Hypochondriaca.* 12mo., Oxford, 1660.

[3] D'Arcy Power, *The Rev. John Ward and Medicine.* Trans. Med. Soc., London 1920. Vol. 43, p. 256.

[4] C. Merret, *Short View of Frauds and Abuses committed by Apothecaries and of the only Remedy thereof by Physicians making their own Medicine.* 1699.

The accomplisht Physician, the Honest Apothecary and the Skilful Chyrurgeon detecting their necessary connexion and dependence on each other. 1670.

Some observations concerning the Ordering of Urines. 1682.

Several speculative works on the causes of disease issued from the pen of WALTER CHARLETON, 1619-1707, a young doctor of Magdalen Hall, who published a general physiology entitled *Oeconomia animalis* in 1659. Charleton believed that calculi were formed by a definite stone-forming spirit,[1] and held other equally weird theories.[2] He became physician in ordinary to the king.

A contemporary Oxford practitioner of note was HENRY SAYER or SAWYER, M.B. 1642, Clerk of Magdalen College, who is mentioned both by Ward and by Plot.

Ward records that it was Sayer's practise 'to give vomits with admirable success to his patients; so he did in a young dropsie, and severall others and yn a sweat; in ye plague and yn malignant disease which reigned here in ye king's time and he judges itt best now in this straunge kind of feavour'. [Nov. ?, 1660.]

'The famous physician Mr. Henry Sayer of Magdalene College Oxon, who commonly made use of a cinereous Earth, somewhat tending to yellow, and finely *chamletted*, that he found at the Quarries, in the gullies of the Rocks in the Parish of Heddington: with which, as I am informed by my worthy Friend Mr. *Cross* once his Apothecary, and still living, he did as frequently, and as well procure Sweats, as with any of the Foreign earths whatever.'[3]

No physician has exerted so beneficial an influence over the actual treatment of disease as THOMAS SYDENHAM (1624-89) of Magdalen Hall. He effected a real revolution in the practical application of medical knowledge by recommending physicians to follow the footsteps of nature and of experience that is gained by observation at the bedside of the patient, rather than trust in the quack-remedies of herbalists or prognostications of astrologers and mathematical physicians, whose vagaries were still the vogue. Travelling quacks occasionally got as far as Oxford. In 1626-7 J. B. de Succa set up in Allhallows churchyard; in 1639-40 Dr. John Pundeen erected his stage in St. Mary's churchyard by the dial, and in 1652 over against Bodicote's Tavern; in 1661 Dr. Vincent Lancelles, a Venetian, set up over

[1] *Spiritus Gorgonicus*, 1650.
[2] *Exercitationes pathologicae*, Lond. 1661.
[3] Plot, p. 61.

against Cobb's. 'Stupendous cures' were done by their nostrums. One of the worst of the brotherhood issued and circulated in Oxford in 1661 a printed handbill, purporting that he was a 'High Dutch Physitian' able to cure all sorts of diseases 'through God's mercy.' It ended 'The professor hereof, James Themut, is a native of Vienna in Austria, and now lodgeth at', after which is put in writing 'the S⟨ar⟩rasin in Oxford'. Wood's notes on it are, 'The vulgar apt to admire strangers. They flocked to this man and left the Universitie phisitians'.—'Feb. 1660⟨–1⟩ within a mounth after this man's comming, he rann away and cozenned his patients of grat quantity of money that he had taken of them beforehand'.[1]

Sydenham's undergraduate studies were interrupted by the war. He matriculated at Oxford on May 20, 1642. At that time his college, Magdalen Hall, had become one of the most successful societies in Oxford, chiefly owing to the high reputation of the Principal, John Wilkinson, Fellow and afterwards President of Magdalen College. Sydenham's sympathies were all with the Puritans and the Parliamentary party, and led to his leaving the University as soon as it became a garrison for Charles I, which happened after the battle of Edgehill. It is in the highest degree improbable that Sydenham could have become acquainted with the great discoverer of the circulation of the blood, then in attendance on the unfortunate monarch, for while Harvey was a Royalist, Sydenham served as a Parliamentarian, ultimately becoming a captain.[2] Moreover there is no evidence that young Sydenham had shown any interest in medicine at that stage. Not before he had had some conversation with a physician who had been called in to attend on his brother, was Sydenham persuaded to return to Oxford, for the purpose of enjoying 'leisure and opportunity to pursue medical studies'. Here he set to work in real earnest. He entered as a Fellow Commoner at Wadham in 1647, and was created Bachelor of Physic on April 14, 1648, at the visitation of the University by the Earl of Pembroke.

On October 3, 1648, he was elected to a Fellowship[3] at

[1] Wood, *Life*. edit. Clark, vol. i, p. 377. [2] Cf. Payne, *Sydenham*.
[3] At All Souls Sydenham is believed to have been chamber-

All Souls College, where he became Senior Bursar, and began to suffer from the gout, on which he wrote the classic work. He pursued a post-graduate course at Montpellier and finally settled as a practitioner in Westminster. In the year 1660, when he was only thirty-six, he was seized with an exceedingly violent attack of gout, which kept him in bed for two months and by extending his personal experience conduced to the assistance of other sufferers.

'Without doubt men will suppose that either the nature of the disease I now treat of is in a manner incomprehensible, or that I, who have been troubled with it thirty-four years, am a very dull fellow, seeing my observations about it and the cure of it little answer their expectations.' With the graphic pen of one who has suffered the terrible martyrdom of this disease in his own person, he describes—'How the patient goes to bed and sleeps well till about two o'clock in the morning, when he awakes with a pain seizing his great toe, heel, calf of his leg, or ankle; it is at first gentle, increases by degrees, and resembles that of dislocated bones: towards the following night it reaches its height, accommodates itself nicely to the various forms of the bones of the instep, whose ligaments it seizes, resembling the gnawing of a dog, and becomes, at length, so exquisite, that the part affected cannot bear the weight of the clothes upon it, nor the patient suffer any one to walk hastily across the chamber. The severity of this first attack continues for twenty-four hours, when the sufferer enjoys a little ease, begins to perspire, falls asleep, and when he awakes finds the pain much abated, but the part swollen. The next day, and, perhaps, for the two or three following days, towards evening, the torture returns, but remits towards the time of cock-crow. In a few days, the other foot is destined to endure the same excruciating agony.' Sydenham goes on to enumerate the catalogue of complaints that afflict the gouty person,—'till at last he is worn out by the joint attacks of age and of the disease, and the miserable wretch is so happy as to die.'

Sydenham was admitted a Licentiate of the Royal College of Physicians on June 25, 1663, but he was never elected a Fellow.

His great chance came in 1665. Towards the close of the preceding year two or three persons had died

fellow with Dr. Thomas Millington, afterwards Sedleian Professor of Natural Philosophy and President of the College of Physicians. Sydenham resigned on marriage in 1665.

suddenly of symptoms that were soon recognized by those who remembered a former visitation to be those of the plague, but no efficient steps were taken to isolate the infected areas until the contagion had extended into several parishes and was beyond control. Sydenham treated his plague patients by copious and frequently repeated bleeding, and in a particular case where he was not successful, attributed failure to the bleeding having been insufficient. He thus repeated a treatment that had been previously found to be beneficial in cases of smallpox in Oxford. 'At New Coll. in Oxon in the yeare 1662 the small pox raged with much malignity and proved mortal to many, but it was apparent that few (if any) died who were let blood; wheras on the contrary those that were not phlebotomised, did all (or generally) decease.'[1] He remained on duty till about the middle of June 1665, when the weather had become very hot and the death roll had increased to an appalling extent, reaching 7,000 a week in September. The Court left London on June 24 and moved to Hampton Court, Salisbury, and finally to Oxford on September 25. Sydenham returned to London while the plague still continued violent and, as he modestly put it, 'by reason of scarcity of better physicians'.

In 1666 he took the opportunity of a printer[2] being still at work to bring out his *Methodus Curandi Febres.* It was published by J. Crook 'sub Signo *Navis* in Coemeterio D. Pauli', and was dedicated to Robert Boyle. It is noteworthy both on account of the description therein contained of the treatment of smallpox, and also because it contains no hint that he thought that smallpox could be transmitted by contagion. A chapter upon the great plague was added to the second edition which appeared two years later, prefaced by a Latin poem by John Locke.

Sydenham's greatest work was built up on his study of Hippocrates, but especially on his observations of

[1] H. Stubb, *Epist. discourse concerning phlebotomie*, 1671, as emended by Wood, Clark's edit. of his *Life*, i. 461. The treatment may have dated from the time of Rhazes, A.D. 923, for the Anglo-Saxon Leeches ordered, 'Against pockes; very much shall one let blood, and drink a bowlful of melted butter'.

[2] Perhaps John Bill and Christopher Barker who printed the official *Directions . . . for Cure of the Plague* in 1665.

epidemic diseases in London from 1661 to 1675, with considerations on pleurisy, pneumonia, rheumatism, and other diseases. It was the outcome of his first small work on Fevers, published under a new title in 1676, *Observationes medicae circa morborum acutorum Historiam et Curationem.* In spite of many shortcomings, the admirable descriptions of diseases and their symptoms are so complete that it will always remain one of the greatest of medical classics.

It would take too much space to summarize all Sydenham's treatments. Peruvian bark, already used by Brady and Prujean, though distrusted by him in 1666, was commonly prescribed by him ten years later, in fact he seems to have been the first to give it as a tonic, considering it 'as wholesome and innocent as the Bread that you dayly eat'.[1] Steel he used to give literally as steel filings, rather than in the form of chalybeates to 'restore the blood'. Mercury he banned even in Syphilis, but Opium was such a favourite drug with him that he was called 'Opiophilos', and his invention of liquid Laudanum was sold for a couple of centuries, and especially on the continent, as *Laudanum Sydenhami.* It replaced the solid preparation of Laudanum previously sold. Plain Water as a beverage, pure and unboiled, he regarded as dangerous, and doubtless in his day in London there was good cause for condemnation. He himself used to drink small beer from a silver tankard. He lived on the north side of Pall Mall, next door to an apothecary's shop, the 'Pestle and Mortar' kept by an ancestor of Malthus, the economist, near the bottom of the Haymarket. The rural surroundings of this quarter had their drawbacks, as appears from a story told by Charles James Fox, that as Sydenham was sitting at his open window looking on to the Mall, a thief once made off with his tankard, and escaped 'among the bushes in Bond Street'.

Here he took pupils. One, Hans Sloane, arrived with an introduction as 'a ripe scholar, a good botanist, a skilful anatomist'. Sydenham having read the letter, looked hard at the young man, and said, 'This is all very fine, but it won't do. Anatomy—Botany—Non-

[1] Letter to Major Hale, 1687. The first authenticated cure of fever by Peruvian bark was in 1638, in Peru.

sense! Sir, I know an old woman in Covent Garden who understands botany better, and as for anatomy, my butcher can dissect a joint full as well; no, young man, all this is stuff: you must go to the bedside, it is there alone you can learn disease'.[1]

Another house pupil, the notorious buccaneer and physician Dr. Dovar, did indeed 'learn disease' by the bedside. He caught the small-pox and was treated by Dr. Sydenham. But these educational methods succeeded. Dr. Dovar's name is now known all over the world as the inventor of Dover's Powder, and that of Sloane as the virtual founder of the British Museum.

The following note of Sydenham's treatment is preserved in John Ward's *Diary*.

> There was a great phlogosis in ye Duke of Cambridge his bowels. Dr. Sydenham kept ye Duke alive 3 weeks and the Dutchess thought he would really have cured him. Hee did it by some cooling water or other wch hath got him some credit. Hee was allso with Sir Richard Bishop for his gout but did little except pultisse him with milk and crumb of bread. He advised Mr. Bishop to fast one day in a week for his rheumatismus so as yt humour would spend ittself.[2]

Nevertheless, among the less well-instructed practitioners a firm belief in the power of the stars still held ground. The Astrological methods of the preceding century were too securely founded upon the truths of astronomical science to be readily overthrown, and indeed it is one of the remarkable facts of history that *pari passu* with great advances in the realm of pure science, made by the only true method of substituting facts for appearances and demonstrations for impressions (Ruskin), the doctrines of the wizards were more seriously accepted than at any other time (except perhaps at the present day in America). The work of Simon Forman, Archbishop Laud, Kenelm Digby, and Allen of the last century, was continued by Sir Jonas Moore, William Lilly, and John Booker. Of Oxford men, the 'venerable Rosicrucian', WILLIAM BACKHOUSE (1593–1662), of Christ Church 1610, became 'a great encourager

[1] J. F. Payne, *Thomas Sydenham*, 1900, p. 190.

[2] *John Ward and his Diary*, Trans. Med. Soc. London, 1917, vol. xl, p. 18.

of those that studied Chemistry and Astrology, especially Elias Ashmole, whom he adopted as his son and opened himself very freely to him the *secret* which he afterwards told him in syllables, and bequeathed it to him as a legacy'.[1] Ashmole became a Fellow of the Royal Society in 1661, the very year in which he recorded in his *Diary*, 'I took early in the morning a good dose of elixir and hung three spiders about my neck, and they drove my ague away'.

For those medical men who might distrust their skill to use astronomical instruments in reading the stars, there were books of *Tables* computed for long series of years which provided them with the positions of stars, the times of their rising and setting throughout the year. An important example of this indispensable adjunct to the equipment of a wise physician were the Astronomical Tables 'reduced to this our age' by John and Timothy Gadbury and published in 1656. The work was blessed by the astrological confraternity who described themselves as Philo-Medicus, Astro-philosopho-medicus and *ἰατρόφιλος*, and was dedicated 'To the Truly Noble and Most Accomplished Enciclopaedian Elias Ashmole Esquire', by the 'Reall Honourers of You and Your Incomparable Vertues John Timothy Gadbury.'

John Gadbury, 1627–1704, was born at Wheatley, near Oxford, and educated at Oxford, and recalculated the tables of 1594 of Hartgill for the period 1670–1700, and for the latitude of Oxford.

In his *POSTSCRIPT to the* Reader he remarks

READER, Thou maist wonder at our Referring the Tables foregoing to the Elevation of the University and City of *Oxford*, and not to *London*, being the Metropolis and Mother City of *England*, &c. To this we answer; first, the matter of difference is not above ten Minutes in Latitude and not above five minutes in their Meridians, which can breed no sensible variation, and againe we may tell you, that the City of *Oxford* is neerer the middle of *England* then *London* is; therefore that which is fitted for *Oxford* will better serve all *England*, then that which is fitted to the Elevation of *London*.

Secondly, *Oxford* is the *Muses* seat, and one of *Englands*

[1] Wood, *Athenae*, iii, p. 576.

Stayes; the *Sun*, the Eye, and the Soul thereof, the very source and most clear spring of good Literature and wisedome; from whence Religion, Civility, and Learning are spread most plenteously into all parts of the *Realm*. Many places in divers Coasts and Climates of the World, we read to have flourished at sundry times in the Study of divers Sciences; but the University of Oxford is found to be (for foundation) more ancient; for plurality of Sciences more generall; in profession of the Catholique truth more constant; and in the multiplicity of priviledges more excellent, then all other Schooles.

To the sounder science of ROBERT BOYLE medicine owes more than can be readily defined, so wide was his influence in securing a proper physical and chemical basis for the study of the human body in health and disease. In details we are always coming across his work in unexpected directions: for example, we wonder how many of the thousands, who have taken ammoniated quinine for influenza, have realized that they owe the ammoniacal part to Boyle? He tells us that Volatile Alkalies have been 'so prosperously made use of in Physick since the year 1656 (about "which time" as he moderately puts it) I had the good fortune to contribute so to introduce them, as to bring them by degrees into request, by divulging easy ways of making them as well as by declaring their Vertues'.[1]

Boyle rendered a real service to the more scientific study of medicine by his advocacy of the extended use of Simple medicines in lieu of the elaborate mixtures then in vogue. He truly says that if, in one Receipt 'a multitude of Ingredients are mingl'd, if not confounded, 'tis almost impossible to know with any certainty, to which of the Simples the good or bad Effect of the Remedy is to be attributed, or whether it be not produc'd by a Power, resulting from the particular Quality's of all of Them, united into one Temperament, and by its means acting conjointly, and, as the School men speak *per modum unius*.'[2]

[1] Boyle, *Nat. History of Humane Blood*, 1683, p. 206.

[2] Boyle, *Of the Reconcileableness of Specifick Medicines to the Corpuscular Philosophy. To which is annexed A Discourse about the Advantages of the Use of Simple Medicines*. Lond. 1685, p. 169: To Boyle is also attributed three little posthumously printed volumes

Among the minor medical lights of the time we may mention THOMAS TRAPHAM of Magdalen College, who published *A Discourse of the State of Health in the Island of Jamaica*, 8vo, London 1679, which was noticed in No. 141 of the *Philosophical Transactions*; DANIEL CAPELL, also of Magdalen, author of a *Tentamen medicum de Variolis*, *c.* 1660; WILLIAM COLE, 1635–1716, of Gloucester Hall, M.D. 1666, practised at Worcester, and was highly respected by Sydenham. His *De secretione Animali cogitata*, 1674, is a conjectural explanation of secretion on mechanical principles without any experimental basis. Apoplexies he attributed to the effect of cold, and dates the supposed increase in the number of such attacks to the severe winter of 1683.[1]

The praises of Dr. THOMAS WILLIS as a physician have been sung by Plot. 'The Pharmacea', he says, 'has been enriched by Willis's invention of his Spiritus Salis Armoniaci succinatus, Syrup of Sulphur, Preparation of Steel without acids, and from thence of his artificial Acidulae. In general he greatly advanced this part of Physic, that what was formerly empirical, and but lucky hits, is now become most rational, by his making the operation of Cathartic, Emetic, Diaphoretic, Cardiac, and Opiat Medicines, intelligible by Mechanical Explications; having subjoined to each most neat and artificial formulas, as well chymical as others. . . And where nature is exorbitant in any of these evacuations, he has likewise taught us how to check and reduce her; adding for the better illustration of the whole, a new Anatomy of the Stomach, Intestines, Gula, Veins and Arteries. Which he has seconded with a further discovery and rational account of Thoracic and Epatic Medicines, and of the Diseases belonging to those parts; discoursing also of Venesection, stopping of Hemorrhagies, of Issues and Cutaneous Distempers. In all which it may be observed, what is almost peculiar to him; that there is nothing trivial, most new, and all most ingenious.'

Willis was the son of Oxfordshire parents. His

of *Medicinal Experiments: or, a Collection of Choice and Safe Remedies, for the most part Simple and easily prepared: Very useful in Families and fitted for the Service of Country People.* 3rd edit., 1696–8.

[1] W. Cole, *Physico-medical Essay concerning the late Frequency of Apoplexies*, 1689.

father was a farmer who lived at Handborough, 'a retainer of St. John's College', retired to North Hinksey, and was killed in the siege of Oxford in 1646. Thomas Willis was educated at the private school of Edward Sylvester, and being connected with the family of a Canon of Christ Church, matriculated there in 1636–7. Ten years later he graduated in Medicine and set up in practice in a house opposite Merton College. His first contributions to medical learning were *Diatribae duae medico-philosophicae*, one on Fermentation, the other on Fevers, which he followed up with a *Dissertatio Epistolaris de Urinis*, 1659. His diatribes led to a reply by Meara and a defence, *Vindicatio Diatribae Willisii*, by Dr. Richard Lower and dedicated to Robert Boyle. The Willisian controversy was followed with such interest on the continent that Gerbrand Schagen, one of the enterprising publishers of Amsterdam, brought out in 1663 and 1667 an edition of all the papers which he stated on the title-page to be 'the latest, far more correct and enlarged than the others'. It is embellished with a delightful frontispiece and title, and to it is appended Sydenham's *Methodus curandi febres* 1666, and a most interesting treatise on the inheritance of diseases by Meara, entitled *Pathologia Haereditaria*.

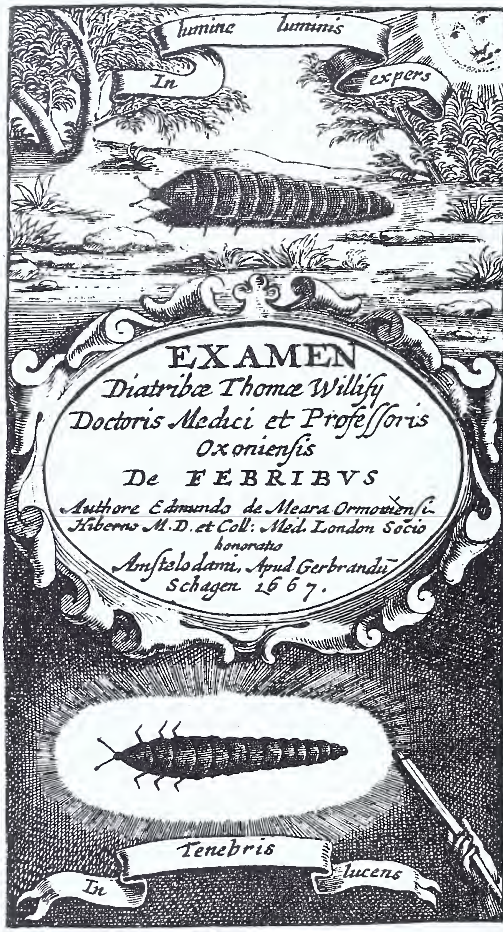
In the *de Fermentatione*, edition of 1659, Willis adopted Vibration as the keynote to his natural philosophy. According to his view Fermentation is a decomposition brought about by communication of a vibratory motion to the particles of must, and the consequent shaking apart of their loosely combined components. When disunited these components can enter into new combinations, of which one is alcohol. Forty years later Stahl developed the theory further, and it was resuscitated by Liebig only to be finally abolished by the genius of Pasteur.

Fevers, classified as intermittent, putrid, and malignant, were supposed to be due to Fermentations in the juices. His great *Anatomy of the Brain*, appearing in 1664, was followed in three years by a *Pathology of the Brain* in which he gave an account of several mental and nervous cases, and later by a work *Affectionum quae dicuntur hystericae et hypochondriacae pathologia spasmodica*, 1670, a lengthy discussion of hysterical cases and their treatment. He was a great worker and especially to be remembered as the discoverer of saccharine diabetes.

WILLIS *De Fermentatione.*
Frontispiece, 1663.

Willis's collected works were printed at Geneva in 1680, at Amsterdam in 1682, and in English form in 1681.

At this time the leading apothecaries in Oxford were Hazlewood and Crosse who made up prescriptions for



Edmund de Meara's *Examen* of Willis's *Diatribae de Febribus*. Frontispiece, 1667.

Dr. Willis, and Stephen Toone. Robert Boyle lodged with Crosse, and John Ward with Toone.

Willis was said to have made much use of a syrup of sulphur in his practice. 'Itt is his owne composition and no Apothecarie hath itt or knowes itt but ye two forementioned. Itt may be taken and is so usually with a Liquorish stick. It is a compound not above 4*d*. an ounce, but it is most used in Colds and distempers of the Lungs.' 'Dr. Willis uses to give more [than 2½ oz. of quicksilver]: ye more you give ye less is ye danger. Itt does by its own weight passe quickly. Doe but mix itt with a plaister and heat itt a little and presently itt flies away, but boyling hurts itt not at all.'[1] Dr. CONYERS, 1622–66, of St. John's College, gave 2½ oz. of quicksilver to a patient with the 'Iliack passion'. 'Hee uses nothing else almost but his emetick powders.'[1] According to Munk he was one of the few doctors who remained in London during the Great Plague, and fell a sacrifice to it.

After long concentration on the brain it was natural that Willis should not lose the opportunity presented by an autopsy. He 'hath got a new way of opening ye Brains, as to cut them on all parts from what holds them and so to turn them upside down'. 'My Lady Windsor is dead: her brain was good as Dr. Willis said, but her liver was rotten and corrupt much. Dr. Willis lays much store uppon ye brain nowadays'.[1]

Among the Oxford practitioners were Dr. BATE of New College,[2] EDMUND DICKENSON[2] of Merton, physicians, and SMITH, surgeon. We learn many details about them from the pages of the diary of the Rev. John Ward of Christ Church, himself a competent physician, and, as his biographer Sir D'Arcy Power has pointed out, a man of unusual versatility at a time when the prevailing type of mind was versatile. 'In many respects he was a true disciple of the Honourable Robert Boyle; interested in medicine, he would have made a good practitioner; as a physiologist, he would have advanced the science as a friend of Lower; Willis could have utilized him, and, had he stayed a little longer at Oxford, he might have come under the spell of Mayow, the most gifted of the band.'[3]

The prescriptions they made up indicate the increas-

[1] Sir D'Arcy Power, *The Rev. John Ward and his Diary*, Trans. Med. Soc. London, 1917, vol. xl, pp. 17, 18.

[2] GEORGE BATE, 1608–69, physician both to Cromwell and to Charles II, was the author of the posthumously printed *Pharmacopoeia Bateana* 1688. DICKENSON, see note on p. 122.

[3] Sir D'Arcy Power, xliii, p. 283.

ing use of the metallic salts employed by the new school of chemical physic as opposed to the older herbalist physicians, who relied rather on plants for their remedies. Chymical Medicines were officially recommended for the Plague in 1665.

THOSE that are delighted with Chymical Medicines onely, may make use of some of these following, being honestly prepared according to the Description of the Authours, and cautiously administered.

Fourteen of these medicines, one of which was *Aurum vitae*, were enumerated in *Certain necessary Directions as well for the Cure of the Plague as for preventing the Infection with many easie Medicines of small Charge, very profitable to his Majesties Subjects.*[1] Salt of Tartar, Antimony, filings of iron and metallic mercury were all ordinarily prescribed by Dr. Willis. The iron filings were taken in *aq. Limacum composita* and *aq. Lumbricorum* (= slimy liquor of slugs and worms). His patients were duly appreciative, and Willis had 'rich peeces of plate presented him as well as great ffees'.

Several of Willis's pupils attained to high distinction, and in addition to Wren and Lower and others to be mentioned we must add JOHN LOCKE, who took a medical degree at the age of 42, and like Sydenham, continued his studies at Montpellier.

Locke's great reputation as a philosophical writer has made many people forget that he was a doctor. As my friend Dr. Payne has pointed out, he was, however, a regular physician by education and by practice, having taken the degree of M.B. on Feb. 6, 1674-5. Born in 1632, he entered Christ Church at the age of 20, and was therefore eight years junior to Sydenham. After a course at Montpellier he obtained a post as domestic physician to Lord Ashley, the first Earl of Shaftesbury, whose life he saved in 1666 when suffering from empyema.[2] Locke kept the wound open by a silver tube. Several of his prescriptions found among the Shaftesbury papers have been published,[3] and a medical item of even

[1] London, 1665.

[2] The circumstances were described by Sir W. Osler in an article in the *Oxford Magazine*, March 12, 1914.

[3] Withington, *Locke as a Medical Practitioner*, *Janus*, 1899 and 1909. There are manuscript notes on his cases in the British Museum.

greater interest is his 'Extracts of Sydenham's Physick Books, and some good letters on various Subjects' in the Bodleian Library.[1] As an example of a letter from one Oxford doctor to another, the following from Sydenham to Locke may be quoted:

'For Mr Locke,—Your age, ill habit of body, and approach of winter concurring, it comes to pass that the distemper you complaine of yields not so soone to remedies as it would doe under contrary circumstances. However you may not in the least doubt but that a steady persisting in the use of the following directions (grounded not on opinion but uninterrupted experience) will at least effect your desired cure. First therefore in order to the diverting and subduing also the ichorose matter, it will be requisitt to take your pills twice a weeke as for example every Thursday and Sunday about 4 o'clocke in the morning, constantly till you are well. In the next place for as much as there is wanting in bodyes broken with business and dispirited upon the before mentioned accounts, that stock of naturall heat which should bring the matter quickly to digestion 'twill be highly necessary that you cherish yourselfe as much as possibly you can by going to bed very early at night, even at 8 o'clocke, which next to keeping bed, that is unpracticable, will contribute more to your reliefe than can be imagined. As to diett, all meats of easy digestion and that nourish well may be allowed, provided they be not salt, sweet or spiced, and also excepting fruits, roots and such like. For wine a totall forbearance thereof if it could possibly be, and in its stead the use of very mild small beer such as our lesser houses doe afford, would as neare as I can guess be most expedient, for thereby your body would be kept coole and consequently all accidents proceeding from hott and sharpe humors grating upon the part kept off.

'This is all that I have to offer you and I have thought of it, and all circumstances relating to your case, with the same intention of mind as if my life and my son's were concerned therein. 'T. S.'

Presumed date: Autumn of 1674.

[1] MS. Rawlinson, C. 406, printed in 1845 under the title, 'Anecdota Sydenhamiana,' by Dr. Greenhill.

In his practice Locke had more respect for research in pure science, but less respect for tradition than had Sydenham. In a letter to Molyneux he wrote:

'You cannot imagine how far a little observation, carefully made by a man not tied up to *the four humours*[1]; or *sal, sulphur*, and *mercury*[2]; or to *acid* and *alcali*,[3] which has of late prevailed, will carry a man in the curing of diseases, though very stubborn and dangerous, and that with very little and common things, and almost no medicine at all.'

In conclusion we feel inclined to ask, Is the world any the better for Locke's Philosophical writings? It is certainly the poorer for his defection from the study of Medicine.

Dr. Richard Lower, who 'was esteemed the most noted Physician in London', had previously a distinguished career in Oxford as an anatomist and physiologist, and owing to his friendship with a patient, we are intimately acquainted with one side of his Oxford life. He was a Christ Church man who was in Anthony Wood's set of tavern companions. Readers of the *Life and Times* will remember that after Wood had 'bought me a perewige of my barber 6*s*' in Michaelmas Term 1656, he consorted with masters of music and dancing and began to spend money on sack and 'at Mr. Ellis'es'; and thereafter such entries as 'at Earles', 'at Elleses', with occasional entries 'for phisick' appear ordinarily in his weekly accounts. By July 1657 he had begun to enter the names of his associates, the first of whom was Arthur Crew, soon to be followed by Cresset of Magdalen, John Curteyne the physician, and Richard Lower of Christ Church. Sept 18, 1658, 'spent at the Taverne with Mr. Lower 1*s*' is the first entry. They rang the changes on the Castle Inn, Joneses, Harper's, Jeanses, Mat. Leeches, Webs, the Crown and others; the Meremaid, where you could get half a pint of sack for 4½*d.* was a favourite. The dates given in the footnote[4] and the

[1] The four humours = the dogma of Hippocrates and Galen.

[2] The sal, sulphur, and mercury = the practice of Paracelsus and Van Helmont.

[3] The acid and alcali = the chemical system of Sylvius and Willis.

[4] Lower visited some named tavern or coffee house in Oxford with Wood and other friends on the following dates: 1658 Sept 18;

following notes may appear trivial, but at least they illustrate the relations between an Oxford physician and one of his patients.

On July 26, 1660, Lower is addressed by his christian name of Dick by Wood, and *1s.* is spent on him at the Mermaid. On Jan 8, 1662, he prescribed pills, six of which were made up by John Fulke, apothecary, and taken by Wood, who two days after 'had an issue made in his left legg under his knee, by the advice of Richard Lower, a physitian of Ch. Ch. This he kept open for several yeares after. And tho it did his stomach good, yet by his continual standing at his study, and much walking withall, too much of the humour issued out, which alwaies after made his left legg and thigh cold, especially in the winter-time. And he now thinks that when age comes upon him it will turne to the dead palsie and be his death'.

On April 23, 1663, Lower and Wood began a course of Chemistry with Stahl at Tilliard's the apothecary, and for the next three years were constantly in one another's company. He was the chief guest at a supper given by Wood on Jan 9, 1664: for this two bullock's cheeks were baked and Mary had 6*d.* for ordering the cheeks and baking. In April of 1664 'or the mounth of May Mr. R. Lower discovered the healing well at Eastrope in Northamptonshire near King's Sutton. Who shewing it to Dr. Willis afterwards, who commended the water to divers men there, it is now reported that the said Dr. Willis was the first finder therof'. Vide Dr. Lower *inter Scriptores* L. 33.

On Sundays Wood and Curteyn seemed to have made a practice of visiting Lower in his room at Christ Church, and on one occasion, on Sunday night May 15 at seven o'clock the former was detained there by 'a terrible shore of hail—some as larg as walnutes, others

1659 Feb 2, May 16, June 24, Oct 17, 28; 1660 May 1, June 30, July 26, Aug 10; 1661 July 13, Sept 5, 7; 1662 Jan 13, July 9, Aug 8, 15; 1663 Apr 13, 29, May 4, July 11, Aug 11, Sept 14, 22, Oct 9, 16, 19, 31, Nov 6, 11, 21, Dec 4, 24, 26; 1664 Jan 2, 7, 23, Feb 3, 9, 20, 27, March 3, 10, 14, 19, 26, 28, Apr 2, 12, 14, 16, 25, May 12, June 7, 15, 18, 23, Oct 9, 16, 22, 29, Nov 14, 17, 25, 26; 1665 Jan 3, 26, 30, March 12, Apr 1, 7, 10, 18, 20, 21, May 3, 12, 19, 20, 28, June 8, 11, 21, July 9, 15, 28, 29, Aug 4, 7, 8, 15, 29; 1666 Feb 24, March 1, 7, 9, 19, May 2, 27; 1667 Feb 20, 23, 25. Wood's *Life* (edit. Clark).

flat and rough like fritters as broad as half a crowne'.[1] In 1665 in Feb, Lower 'practized the transfusion of blood at Oxford'; on July 18 and August 8 Wood was mixed up in a private affair of L.'s at Garsington, and on Aug 29 the entry is 'at the Castle where we parted with Dr. Lower, 1*s*'. Obviously he went up to London at that time, but was back in Oxford in March 1666, being present on the 9th, 'when we club'd for an entertainment for Dr. L., 3*s* 1*d*.' On May 27 he sold his coat to Wood for 8*s* and thereafter but little more is heard of him in Oxford except in Feb. 1667, when again there was a farewell gathering at the Mermaid 'at Dr. L.'s departure, 1*s*', and his place as doctor to Wood was taken by John Curteyn.

1691. Letter dated Jan 15, Th., the famous Dr. Lower is at the point of death; his physitians have given him over. Jan 17, S., this morning died the famous Dr. Richard Lower (the 15th, saith Mr. Aubrey; fals). Dr. Lower hath bequeathed 1000 *li.* to St. Bartholomew's Hospitall London; 500 *li.* to the French refugees; and 500 *li.* to the Irish protestants.

He was buried in the church of St. Tudy near Bodmin. So great was his reputation as a successful physician that his name was 'impudently affixed to many nostrums sold in the shops. The print of him is suspected to be counterfeit'.[2] His original transfusion experiment (p. 131) has become a recognized operation of very great utility at the present day. He showed dropsy to be an exudation from the blood, producible by ligaturing veins, and the defluxion of a catarrhal cold to be something of the same nature and not an excretion of the brain.

Among the new methods of treatment that were invented by Oxford men in the seventeenth century, we may mention the injection of medicines into veins, due to Sir Christopher Wren in 1679, and to the same fertile brain we owe suggestions for the better study of diseases. 'The Physicians of our ⟨Royal⟩ Society should be desir'd to give us a good account of all the epidemical diseases

[1] *An Account of the Rise and Attempts, of a Way to conveigh Liquors immediatly into the Mass of Blood.* Phil. Trans. Dec. 4, 1665.

[2] W. Huddesford quoted in Clark's *Wood*, i, p. 428.

of the year; Histories of any new disease that shall happen; Changes of the old; Difference of operations in medicine according to the weather and seasons, both inwardly, and in wounds: and to this should be added, a due consideration of the weekly and annual Bills of Mortality in *London*.'[1] Dr. Lowdham of Exeter, a surgeon living in Oxford in 1679, is said to have been one of the first who amputated limbs by means of flaps instead of by the circular method as was then usual. The operation is thus described by James Yonge in his *Currus Triumphalis e Terebintho*:

> Ligatures and gripe being made as usual, with catling or some long incision knife raise (suppose it the leg) a flap of membraneous flesh, covering the muscles of the calf, beginning below place where incision is to be made and raising it that way, of length enough to cover stump. Then, having done this, turn it back under the hand of the one griping, and as soon as member severed, bring this flap of cutaneous flesh over stump, and fasten it to the edges by 4 or 5 strong stitches. Then put a dossil into inferior part, that one passage may be open, for any blood, or matter may lodg between, but this seldom occurs.[2]

The Clinical Thermometer was first described in England in the Ashmolean School of Natural History at a meeting of the Oxford Philosophical Society held on May 13, 1684. It was only 3 inches long; 4 or 5 lines in diameter; and the tube containing refined mercury, was only half a line in diameter. It had been recently invented by M. du Val of Paris for showing the duration, increase, and diminution of fevers. Other medical observations which were brought to the notice of the Philosophical Society between 1683 and 1697, will be described in full in the fourth volume of this work.

But although the leading spirits of the medical profession were making unprecedented advances, they were still far from achieving unanimity in diagnosis.

In no case was this more clearly shown than in 1685,

[1] Wren, *Parentalia*, p. 223.

[2] A letter on Lowdham's flap operation, signed 'James Young' and dated from Plymouth Aug. 3, 1678, appeared in an article by Dr. W. Blair in the *London Medical Review* v, Feb. 1801. I am indebted to my friend Mr. J. F. Fulton for this reference.

when around the death-bed of Charles II, the founder of the Royal Society, fourteen Doctors consulted and confuted each other. Some, thinking they were dealing with an epilepsy, bled him freely and ordered that he should be left undisturbed, others affirmed his fit to be apoplectic, and tortured him for hours 'like an Indian at a stake', a hot iron was applied to his head and a loathesome volatile salt, extracted from human skulls, was forced into his mouth. Then, since neither treatment was effective, and even the 'arcanum Goddardianum' failed, it was settled that he was in a fever, for which he must take bark.[1] Dr. Thomas Short alone held aloof, and told the Queen that so many physicians would kill the King. But if the doctors could be in such great disagreement in the sick-room, it is not surprising that the wildest stories should have been believed by the world outside. The tales are worth reciting as evidence of the intellectual development of the general public. 'His Majesty's tongue had swelled to the size of a neat's tongue. A cake of deleterious powder had been found in his brain. There were blue spots on his breast. There were black spots on his shoulder. Something had been put into his snuff-box. Something had been put into his broth. Something had been put into his favourite dish of eggs and ambergrease. The Queen had poisoned him in a jar of dried pears.'[2]

Dr. John Radcliffe (1650–1714) was the ideal Oxford man. He came to Oxford to prepare for a professional career, he made a fortune in London in the exercise of his profession, and then left it for the lasting benefit of the University. Entering University College at the early age of 15, he took his Bachelor's degree in 1669: accepting a Fellowship at Lincoln College, he pursued the study of medicine and took the degree of M.A. 'with uncommon applause' in 1672.

While still a student it was his boast that he prepared himself for the practice of the art of healing on the recent

[1] 1695. 29 Nov. Evelyn was told by the Marquis of Normandy that the physician would not prescribe Quinquina for the King. On being asked why, 'Dr. Lover said it would spoil their practice or some such expression, and at last confessed it was a remedy fit only for kings'.

[2] Macaulay, *History of England*, i. chap. 4. See also Dr. Raymond Crawford, *The last days of Charles II*, Oxford 1909.

JOHN RADCLIFFE

works of Sydenham and other modern writers to the exclusion of the 'rubbish of antiquity contained in musty volumes'. It was by independence of mind and character, by skill and conversation, rather than by book-learning, that he achieved his rapid success. Indeed the story is told of him that when Dr. Bathurst, the President of Trinity, called at his lodgings and asked to see his library, Radcliffe replied, pointing to a few phials, a skeleton, and a herbal, 'There, sir, is Radcliffe's library'. Yet, so long as exists the noble Physic Library that bears his name he will be held in grateful remembrance in Oxford.

Radcliffe's procedure when he first began to practise in the city of Oxford was so different from that adopted by Dr. Lydal, the most popular doctor in the University, that the leading apothecaries, Foulks and Adams, decried his methods. But nothing succeeds like success, and the apothecaries were soon obliged to make interest with him 'to have his prescriptions on their files'. He did not spare abuse of his antagonists, whom he loaded with opprobrious names, and derided, because of the slops, caudles, and diet drinks with which they drenched their patients. The position was finally won by his adoption of Sydenham's judicious method of treating the small-pox—employing cooling in lieu of the heating and stimulating treatment which was then in vogue. 'Luckily', he observes, 'it occurs occasionally, that from the preposterous application of external heat and inward cordials, the patient becomes delirious, and in a fit of frenzy, escaping from the cruel attentions of his nurse, leaps out of bed, lies exposed for many hours to the cool night air, and thus haply recovers.'

While these pages were passing through the press, we came across a good instance of such a recovery noted in a recipe book containing Forman manuscripts, now in the library of Corpus Christi College. The date of the story seems to have been about 1604, and therefore Radcliffe may have heard of it, or of similar cases.

There was a parson in Oxfordshire that was sick of a hott ague, the physicians charged them that were about him that they should keepe him from cold drinke, he lying very hot in his bed, when he sawe that he could gett no drinke, and looking up perceived the woman that attended him was a sleepe, he rose out of his bed in his shirt and ranne into the yard where was a great deepe poole, he lept into it and swame round about it. His friends came running and crying that he had spoyled himself. They gatt him into his bed agayne, where he did sweat exceedingly and so mended very shortly after.[1]

The *new method*, as it was called, had the sanction of the illustrious Locke, but the generality of doctors continued to trudge in the ancient course. An epidemic of small-pox in Oxford[2] gave Radcliffe his opportunity. Instead of stoving up his patients, he employed the 'new method', exposed the sick to the free access of the air, gave them cooling emulsions, and thereby rescued more than one hundred cases from the jaws of death.

His method also proved successful in the case of Lady Spencer at Yarnton, who had been under Dr. Lydal and Mr. Musgrave without benefit. In a short time Radcliffe restored the lady to health, to the great increase of his reputation and of his practice among the county families round Oxford.

After some unpleasantness at Lincoln College he resigned his Fellowship, but continued to reside in Oxford, and in the year 1682 took the degree of Doctor of Medicine, going out Grand Compounder. His openness and straightforwardness with patients not only enhanced the dignity of the profession, but dealt a blow to the empty pretensions of the numerous quacks and impostors who battened on credulous humanity. He specially ridiculed the art of the Uroscopists, a medical legacy of the fourteenth century and still in fashion with quacks who claimed to diagnose and prescribe for any disease from a mere inspection of the patient's urine.

In London, too, his success was immediate. He had not been settled there more than a twelvemonth before he was at the head of the profession, and in 1686 he was appointed by King James II physician to the princess (afterwards Queen) Anne. In the fateful year of the Restoration, 1688, he was sorely beset to change his religion and turn papist. He was attacked both from

[1] MS. C.C.C. 169.

[2] 1675 and 1683 were both small-pox years.

within and without the Court and from his old College at Oxford. The following is the beginning of his reply to a letter from Obadiah Walker, who had written that 'he should be incessant in his prayers to the blessed Virgin' that Radcliffe might be 'enlightened, and see the things that belonged to the peace of his immortal soul'.

Bow Street, Covent Garden,
May 25, 1688.

SIR,

I should be in as unhappy a condition in this life, as you fear I shall be in the next, were I to be treated as a turn-coat; and must tell you, that I can be serious no longer, while you endeavour to make me believe that, I am apt to think, you give no credit to yourself. Fathers, and councils, and antique authorities, may have their influence in their proper places: but should any of them all, though covered with dust 1400 years ago tell me, that the bottle I am now drinking with some of your acquaintance is a wheel-barrow, and the glass in my hand is a salamander, I should ask leave to dissent from them all. . . .

JOHN RADCLIFFE.

After 1688 and the enthronement of King William and Mary, Radcliffe's successes are a matter of history. He restored the king to health sufficiently to enable him to join the army in Ireland and gain the victory of the Boyne. He cured the young Duke of Gloucester of fainting fits, attended the Earl of Albermarle during the campaign before Namur, and was so secure of his position that he could behave with greater rudeness, not to say brutality, to his royal and noble patients than any other physician before or since.

During the last decade of his life Oxford was evidently much in his thoughts. In 1706 he gave a considerable sum of money for public buildings. In 1708 he purchased the advowson of the living of Headborne-Worthy in Hampshire, and bestowed it upon Mr. Bingham, a Fellow of University College.

Towards the end of his life Radcliffe relinquished his practice to his friend Dr. Mead, and, had he been content to live simply in retirement, might have attained old age, but he consented to be elected Member of Parliament for Buckingham in 1713, and doubtless the strain of politics contributed to bring on the fit of gout that kept him from attending Queen Anne in her last sickness, and hastened his own end. He died on November 1, 1714, falling 'a victim to the ingratitude of a thankless world, and the fury of the gout'.

By his will he left his Yorkshire estate to University College in trust for the foundation of two travelling fellowships; the overplus to be paid to them for the purpose of buying perpetual advowsons for the members of the College. Also £5,000 for new buildings. To St. Bartholomew's Hospital he gave £500 a year for 'mending their diet', and £100 a year for buying of linen. For the building of a library at Oxford he left £40,000 with endowments of £150 and £100 a year for librarian and books respectively. The bulk of the residue of his property he gave to trustees to be applied to such charitable purposes as they, in their discretion, should think best.

The Radcliffe Library was finished and opened in 1749, and the 'faithful and enlightened guardians' of his funds made the following contributions to various institutions selected solely by themselves.

The Radcliffe Observatory.
The Radcliffe Infirmary.
Building the College of Physicians (1825), £2,000.
Building the Oxford Lunatic Asylum (1827), £2,700.

There are three portraits of Radcliffe in Oxford, based on the original by Sir Godfrey Kneller in the Radcliffe Camera which was considered 'extraordinarily well done', and also a full-length statue by Rysbrack. There is also a caricature of him in Mr. Scriblerus 'Map of Diseases'.

Small-pox was so prevalent in Oxford, being spread by *engrafting*, as it was called by Addison's friend, Lady Mary Montagu, when she introduced that eastern practice from Adrianople in 1717, that engrafting or inoculation was forbidden by the Vice-Chancellor in 1753. He thus anticipated the final veto by the law of 1840.

The medical writings of Dr. John Freind (1675–1728), of Westminster School and Christ Church, enjoyed a wide European reputation owing to their being printed in several centres of learning. In his first work he applied the laws of hydraulics and the methods of statistics to the discussion of menstrual phenomena,[1] and with such success that he was elected to the professorship of chemistry in the following year.

After delivering a course of *Praelectiones chymicae*,[2] he went off to Spain to serve as an army doctor in two campaigns under the Earl of Peterborough. And again, in 1712, in the same year in which he received the honour of the Fellowship of the Royal Society, he took service in the Low Countries under the Duke of Ormond. His varied experiences appear to have resulted in the growth of great independence of spirit, for which he was rewarded by election to Parliament as member for Launceston, followed by a temporary residence in the Tower of London on a charge of high treason, and finally in 1727 by appointment as physician to the Queen of George II. He is best remembered now by his valuable *History of Physick from the time of Galen to the beginning of the sixteenth century*, a work that was compiled during his confinement in the Tower, and was for a few years the subject of several controversial writings.[3] In conjunction with Dr. Broxholme of Oxford he attended Bishop Newton, and witnessed the latter's cure after his self-prescribed draught of four quarts of small beer. The two physicians received five hundred guineas for their journey.

When Radcliffe fell, afflicted Physic cried,
'How vain my powers!' and languished at his side.
When Freind expired, deep struck, her hair she tore,
And, speechless, fainted, and reviv'd no more.
Her flowing grief no further could extend;
She mourns with Radcliffe, but she dies with Freind.

Samuel Wesley.

[1] Freind, *Emmenologia, in qua fluxus muliebris menstrui phenomena, periodi, vitia, cum medendi methodo, ad rationes mechanicas exiguntur*. Oxonii 1703. Editions also appeared at Rotterdam 1711, Amsterdam 1726, Paris 1727, and, translated into French, at Paris in 1730.

[2] Printed in 1709 and reissued from the presses of Amsterdam 1710, Paris 1727, and London 1729 (in English).

[3] Freind's other writings include *Hippocratis de morbis popularibus liber primus et tertius; his accomodavit novem de febribus commentarios J. Freind M.D.* London 1716, Amsterdam 1717. *De purgantibus in secunda variolarum confluentium febre adhibendis.* London and Rotterdam 1720. *De quibusdam variolarum generibus.* London 1723. *History of physick.* Lond. 1725–6, 1751. In Latin,

The Catalogue of Materia Medica drawn up by John Pointer of Merton College is an example of the great interest that was taken in medical matters by many laymen at this time, when the practice of compiling volumes of medical recipes was very prevalent. Pointer's MS. notes on *Waters*, on *Hot and Cold Baths*, and on *Cautions before Bathing* now in the Library of St. John's College, are printed as an Appendix on page 503.

Robert James of St. John's College (1705-76) wrote on fevers, and treated his cases with a patent antimonial powder, which was believed to have proved fatal in the case of Goldsmith. (*Morning Post*, 7 April 1774, *D.N.B.*)

Francis Willis (1718-1807) of Lincoln College, St. Alban Hall, and Brasenose College, was a pupil of Nathan Alcock. In 1769 he was appointed physician to a hospital in Lincoln, where he treated mental cases with such success that although considered by his enemies as 'not much better than a mountebank' he was called in to attend on George III during his first attack of madness in 1788. His treatment was completely successful, as it was in the difficult case of the Queen of Portugal. Willis was also in orders and was rector of St. John's, Wapping, and vicar of Ashby de la Laund, co. Lincolnshire.

One of the few medical preparations associated with Oxford is due to Samuel Glass, a surgeon, who in 1764 made 'prepared magnesia' in a laboratory he had contrived in St. Bartholomew's Hospital by Cowley Marsh, where it remained until about 1833. His *magnesia alba* was not cheap: it was sold by him in Oxford in Guinea, Half-Guinea, and Six-shilling Boxes.[1]

The uses of calomel were studied by Daniel Lysons, commoner at Magdalen 1744, and described by him in two essays, the first *Upon the effects of camphire and calomel in continual fevers*, Lond. 1771, and the second *Upon intermitting Fevers, Dropsies, Diseases of the Liver, the Epilepsy etc. and the operation of calomel*, Bath 1772.

Thomas Hunt, a Burford surgeon, was a correspondent of John Hunter who communicated an exceptional case

Leyden 1734, Paris 1735. In French, Leyden 1727-8. And his Collected Works in Latin appeared at Naples in 1730, London 1733, Venice 1733, Paris 1735.

[1] *Early Science in Oxford*, vol. i, p. 60.

which was described in the first of the latter's *Observations on certain parts of the Animal Oeconomy*, 1786.

The temporalities of the Regius Professor of Medicine were somewhat improved under the will of Dr. Richard Frewin, who on September 6, 1757, gave two messuages and tenements in Oxford, which he held by two beneficial leases from Brasenose College, to the Chancellor on trust for Mr. Gilpin for life, then on trust for the Regius Professor of Medicine, on condition that every such Regius Professor should personally occupy the same and not let it, and should keep the buildings in repair and pay £9 yearly to the Chancellor. And on June 12, 1817, the University of Oxford granted to Dr. Kidd, a lease for three years of Dr. Frewin's house.[1]

A more important endowment came in 1780 from the Rt. Hon. George Henry, Earl of Lichfield, Chancellor of the University of Oxford. He appointed by his will the Chancellor, the Bishop of Oxford, and the President of St. John's College as Trustees for a Professorship for the reading of Clinical Lectures in Physic in the Hospital or Infirmary, to the Students in Physic. The following Rules, Orders, and Directions were made by the Trustees in 1780:

1. Professor to reside in the University.
2. In November, December, January, February, March in presence of auditors, to visit and prescribe for Radcliffe Infirmary patients. Treatment to be entered in a book to be kept open for the inspection of students.
3. On 2 days to read a lecture—on cases.
4. To give a month's notice of course of lectures.
5. Auditors to be medical students of University of Oxford; 3 of them to be an audience.
6. Professor may admit anyone who has been sober for 2 years past.
7. Fees: £3. 3. first course, £2. 2. second course.
8. Failure to enter up notice of lectures punishable with loss of year's stipend.
9. For Failure to lecture,—£5 to be forfeited to Radcliffe Infirmary.
10. Deputy allowed in case of illness.

[1] Bodl. Univ. Arch. W.P. y. 2. The house, Frewin Hall, was occupied by King Edward VII, when he was an undergraduate at Oxford, and then by Edward Chapman of Magdalen. Its garden is still *rus in urbe* near the Cornmarket.

11. A grave offence to be punishable by removal from office.
12. Trustees reserve to themselves the power of making further rules.

N.B. A 'Student of Physic' is a person who has completed 2 years at Oxford and shall have signified intention of studying physic by entering his name in the Vice-Chancellor's Book.

Bodl. Archives. W.P.B. 2.

May 30th, 1780.

Matthew Baillie (1761–1823) of Balliol College achieved distinction as a pathologist. His was undoubtedly a case of inherited genius nurtured in the most favourable environment. Through his mother, the sister of Drs. John and William Hunter, he inherited the family genius and the interest of the two foremost anatomists of the age. While residing at Balliol during term time, he passed his vacations in London under the roof of his uncle William, who spared no pains to cultivate in his young pupil that habit of ready and exact explanation of every subject he treated, for which Baillie was in after life so remarkable. The manner he adopted, it is related, was as follows:

'Matthew, do you know anything of to-day's lecture?' demanded Dr. Hunter of his nephew. 'Yes, sir, I hope I do.' 'Well then, demonstrate to me.' 'I will go and fetch the preparation, sir.' 'Oh no, Matthew, if you know the subject really, you will know it whether the preparation be absent or present.' After this short dialogue, Dr. Hunter would stand with his back to the fire, while the young Baillie demonstrated the subject of the lecture which had just been delivered; and then the student was encouraged by approbation and assistance, or immediately upon the spot convicted of having carried away with him nothing but loose and inaccurate information.

It was science tuition at its most effective and best! His uncle William bequeathed to him the use of the museum (the contents of which are now piously preserved in Glasgow) and of his theatre and house in Windmill Street. To this Baillie added a well-selected collection of specimens of diseased organs, now in the College of Physicians of which he became a Fellow in 1789. In 1810 he was commanded by the king to attend, in conjunction with Sir H. Halford, on the Princess Amelia, and shortly afterwards was appointed physician extraordinary to the king.

Baillie's best-known work is *The Morbid Anatomy of some of the most important parts of the Human Body*, 1795. Styled 'superior to any eulogium in his power to bestow' by Professor Soemmering, and perpetually cited by Meckel, the most distinguished anatomist in Europe, it passed through many editions and was translated and re-translated into French, German, and Italian.

It was characteristic of his singular honesty of mind, that he remained to the end modest as to his powers: he used to say to his own family, 'I know better, perhaps, than another man, from my knowledge of anatomy, how to discover a disease, but when I have done so, *I do not know better how to cure it*'.

Another Oxford physician who attained to fame in Court circles was Sir HENRY HALFORD (1766–1844) of Christ Church, the son of Dr. James Vaughan of Leicester. He wrote convincingly on the influence which diseases of the body have on the powers of the mind. *Tic douloureux* was the subject of another essay, and his pamphlets *On the Education and Conduct of a Physician*, and on the *Effects of Cold* were very widely appreciated.

The teaching of Medicine was greatly advanced by the lectures endowed by Dr. GEORGE ALDRICH under his Will dated April 27, 1795. He founded praelectorships in Medicine, Anatomy, and Chemistry. His three trustees, the Vice-Chancellor, the Dean of Christ Church, and the Warden of Merton, were to pay a third of the interest of moneys at their disposal to the Praelector of Anatomy, on condition that he shall constantly in every winter or spring give or read one entire course of Physiology, accompanied with the completed dissection that may be of a dead human body, explaining at the same time, or in subsequent lectures, the figure, situation, connection, nature, function, and uses of the several parts and organs thereof and illustrating them by such anatomical preparations of the said parts and organs as he may be provided with, or may in future make or become possessed of; and upon this further condition that the said Praelector of Anatomy shall twice in every of the last eight weeks of that Michaelmas or Lent Term in which he shall not give or read the entire course of Physiology aforesaid, read or deliver it to the students of Medicine, in the School of Anatomy, or other more convenient place, one public lecture on some detached subject of Anatomy or Physiology at his own choice or the request of the majority of the said students. And also upon this further trust that they the trustees are to pay a third of interest to the Professor of Chemistry . . . on condition that at some convenient season of every year when the Univ. is generally fullest, he shall perform or cause to be performed under his inspection, by some well qualified person, whom he shall provide and pay for that purpose, one course of Processes in Medicinal and Philosophical Chemistry in illustration of doctrinal tendency of such series or course of Processes and pointing out the conclusion fairly deducible from the facts they exhibit . . . the remaining third to Regius Prof. of Physic, his allowed deputy or any other Doctor of Physic of the University, in pure regard to his general sufficiency and experience, first duly elected for this purpose, for it is not my intention that the Regius Professor shall claim preference by virtue of his office; he shall read a complete course of lectures on the Practice of Physic, to be annually begun at the commencement of the latter half of Lent Term, and be uninterruptedly continued till the same be finished. . . . Professors Intermitting shall be liable to docking of salary at discretion of trustees. (Will dated April 27, 1795.)[1]

	Profs. Medicine		*Anatomy*		*Chemistry*
1803	Ro. Bourne		Sir Chr. Pegge		J. Kidd
1824	J. A. Ogle	1822	John Kidd	1822	C. Daubeny

In November 182– it was proposed in Convocation that £50 be granted to Professor Ogle for the purpose of forming a small collection of such books, plates, and materials of medicine as may 'efficiently elucidate its modern practice'.

Several of the Oxford doctors and pharmacists of the early nineteenth century who attended Dr. Daubeny's Lectures are mentioned in W. Tuckwell's chapter on

[1] Bodl. Arch., W. P. y. 25.

Aesculapius in Oxford in his *Reminiscences*. Firstly there was JOHN IRELAND, a *chirurgus privilegiatus* and apothecary who lived at Headington, whence he descended with a 'stately stride', according to Lockhart. But Tuckwell described him as a man who, like the elder Pendennis in his lowly days, made up his own medicines, attended ladies at the most interesting period of their lives, sold Epsom salts, blisters, hair powder, across the counter of his shop, which he called his 'surgery'. Some men of this kind remained humble to the end; not so Ireland, who somehow obtained a Scotch degree, discarded the surgery, and set up a brass plate as Dr. Ireland on his house in Pennyfarthing Street. His servant-lad ABRAM ROBERTSON was an example of the way in which many of the humbler citizens of Oxford have and always have had the chance of rising. He became Professor of Astronomy.

On the whole in the early and mid-Victorian periods medical science can hardly be said to have flourished in the 'home for lost causes' till Sir H. ACLAND, who in 1857 found it in a state of suspended animation nigh to death, made it re-live. There were not forty men on the books of all the colleges who could write M.D. or M.B. after their name; candidates for the M.D. were allowed such latitude in the choice of subjects that it was said at one time that that distinction was conferred for knowledge of volcanoes, or of the atomic theory, or of the botany of Virgil. Dr. Edw. Fox of Balliol told the story that when he got his first class in the Oxford Science School, he wrote confidently and lightheartedly to his old head master of Shrewsbury to ask a half for the boys. Kennedy replied that he rejoiced in Classical triumphs, was gratified by mathematical honours, pleased with athletic success, congratulated Fox on achieving such success as he had deliberately limited himself to, but to ask for a half for science was—well, a most unwarranted proposal.

Darwin, too, at Shrewsbury, was chid by Dr. Butler for wasting on Chemistry time that should have been given to Classics.[1]

[1] *Brit. Med. J.* art.

III

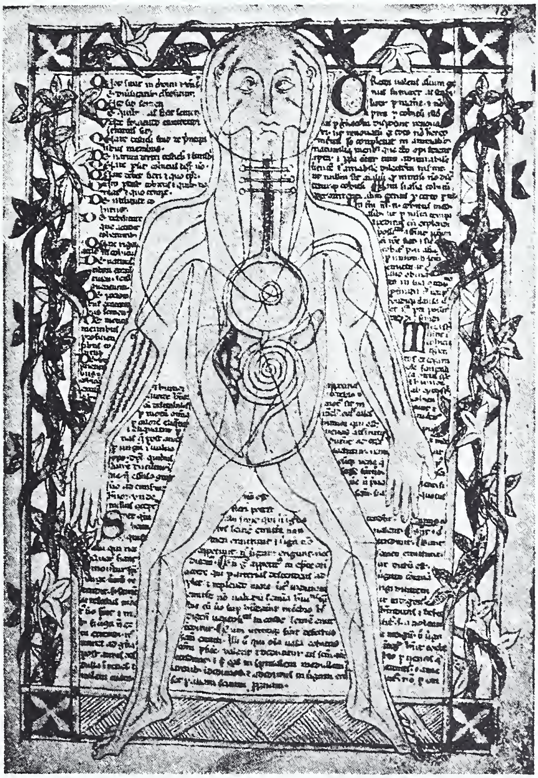
ANATOMY

DURING the Middle Ages the principal sources of advanced anatomical knowledge were copies or Latin translations of the works of Aristotle, Hippocrates, Galen, and Pliny, together with various compilations and extracts based upon those works. In the more attractive manuscripts the meaning of the author was made clearer by the introduction of explanatory pictures or diagrams. An excellent example now on exhibition in a show case in the Bodleian Library, is entitled *De corporis fabrica*[1] with five fine coloured diagrams respectively showing the veins, arteries, nerves, bones, and muscles, but their anatomy does not err on the side of truth to nature.

The study of Anatomy, as a Natural Science in the modern sense, dates from the first half of the sixteenth century. At that time it dawned on active minds that the facts revealed by dissections, which are capable of being demonstrated over and over again by other dissectors, were not always in accordance with a written word whose authority had been unquestioned throughout the Middle Ages. From time to time investigators would have the startling experience that the Book ot Nature and the statements of the most learned of the ancient Greeks and Romans were in contradiction. But it was only the greatest of the modern masters who had self-reliance enough to distrust authority, when he found it in conflict with actuality.

[1] This treatise, MS. Ashmole 399, has been variously dated as 'about 1292' and 'about 1298' by Singer, and as 'fourteenth century' by Osler, both of whom have reproduced the diagrams. Singer, *Studies*, 1917; Osler, *Evolution o Mod. Medicine*, 1921.

In Oxford, Roger Bacon had already laid stress on the importance of obtaining knowledge by experiment, but his doctrine was unheeded. It was not until 1523 that another member of our University taught that

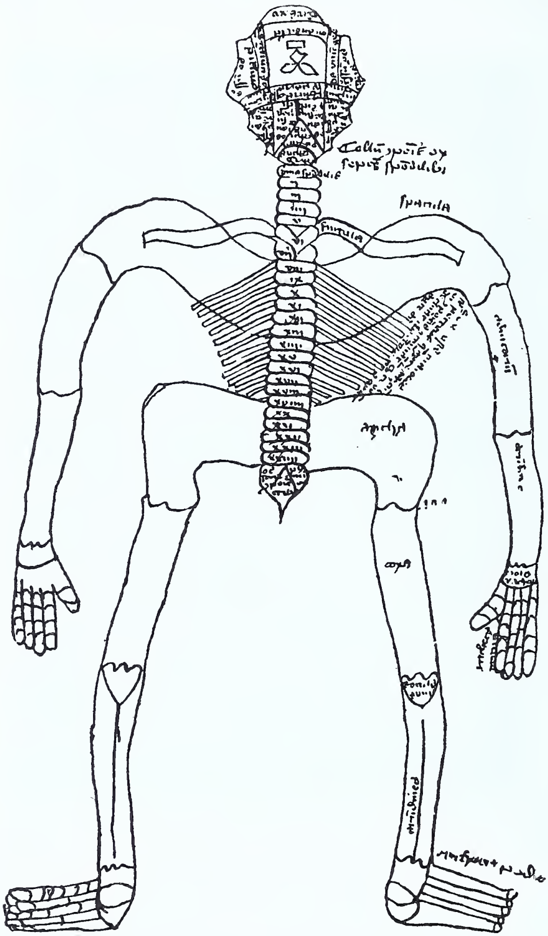


ANATOMICAL DIAGRAM OF THE FOURTEENTH CENTURY.
MS. Ashmole 399, f. 18.

learning, if it is to be of value, must be obtained at first hand. LUDOVICUS VIVES,[1] 1492–1540, a Spaniard who became a Fellow of Corpus Christi College in 1523,

[1] L. Vives, *De Tradendis Disciplinis*, 1523. Vives had been previously lecturing on Pliny's *Natural History* at Louvain. He had a restless southern temperament, and soon retired from Oxford to Bruges with the gout.

advised that a student of science should learn from those persons who have first-hand knowledge, 'for this



THE HUMAN SKELETON AS DRAWN IN THE FOURTEENTH CENTURY.
Cod. lat. Monacensis 13042, after Sudhoff, *Studien*, 1907.

is what Pliny and other great authors undoubtedly did', and above all 'let him not only keep eyes and ears intent, but his whole mind also, for great and exact concentration is necessary in observing every part of nature'.

It was in this spirit that Vesalius (1514-64) became the founder of modern anatomy. As a young student he had followed, though doubtless with some misgivings, the practice of his teacher Sylvius, who is believed to have trusted descriptions as written by Galen 'more than he trusted his own eyesight, but in the end his sight and his reason conquered, and at last he taught only what he himself could see and make his students see'. Dispensing with the aid of unskilled barbers, he dissected the human body with his own hands.[1] The outcome was a great work on 'The Structure of the Human Body', printed at Basle in 1543, before the author had reached his thirtieth year. In England the work of Vesalius was soon followed by a most interesting work by Thomas Vicary which is said to have appeared in 1548, though no copy is now known to exist, and which was republished in 1577 by the Chirurgions of S. Bartholomewe's Hospital. It is entitled *A profitable Treatise of the Anatomie of Man's Body*.[2] Payne and D'Arcy Power have shown that it was a compilation from an earlier anatomical manuscript of the fourteenth or fifteenth century reduced into the form of a text-book likely to be helpful to a student: the eleven editions that appeared before 1651 testify to its popularity. Power suggests that Vicary did not know, or did not think it worth while to incorporate, the work of Vesalius, or even of Geminus, who was one of his own colleagues, as surgeon to King Edward the Sixth. Payne dated the original MS. as 1392.

Chamber of Merton College probably used as a textbook an English translation of the *Surgery* of Lanfrank (*d.* 1306) which he lent to John Halle to help him in the preparation of his 1565 edition of the *Chirurgia parua Lanfranci* 'which was translated out of Frenche into the olde Saxony englishe, about twoo hundred yeres past'.[3] But even before the publication of the

[1] Shipley, *Heritage of Science*, p. 219.

[2] Edited for the Early English Text Society in 1888 but see F. Payne, in the *British Medical Journal*, 1896, vol. i, and D'Arcy Power, *Notes on three sixteenth century English Books connected with London Hospitals* in *The Library*, 1921, vol. ii, p. 82.

[3] D'Arcy Power, *The Library*, 1921, ii, p. 84.

Anatomy of Vesalius, the necessity of dissecting had already made itself felt, and was in fact being met, though the laws in force relating to dead bodies made it impossible for medical students to obtain licitly any practical instruction in anatomy; while on the Continent the difficulty of obtaining bodies was even greater than in England, and even as late as 1723 Haller in Tübingen had to do all his dissection on dogs. Albinus of Leyden only received one body per annum, while in Paris Haller had no other means of procuring bodies than by theft, and, as is well known, had to fly for his life when discovered.

In England, however, dissection as an essential of medical training, was recognized in 1540, when by the statute of 32 Hen. VIII, c. 42, four bodies were given annually to the United Company of Barbers and Surgeons,

> the Maistres or Governours of the misterie or cōminalty of Barbours and Surgeons of London and their successours yerely for ever aftre their sadd discretions at their free libertie and pleasure shall and may have and take without contradiction fower psonnes, condempned adjudged and put to death for felony . . . for anathomyes, . . . and to make incision of the same deade bodies or otherwise to ordre the same aftre their discretions at their pleasures, for their further and better knowledge instruction insight lerning and experience in the said science or facultie of surgery.

So that the would-be students of Oxford had either to go to London, or to have a body sent.[1] But the standard of teaching in the new study had been so much raised before the end of a decade, that the Edwardian Statute of 1549 enacted that a student of medicine was to study for six years and to see two dissections. He had also to make three, or at least two, dissections himself.[2]

Elizabeth in 1565 granted a like number of bodies to the College of Physicians, and Charles II further increased the allowance from four to six.

[1] Sir D'Arcy Power informs us that he believes that the Barbers and Surgeons at Oxford had a right similar to that enjoyed by the London men.

[2] J. de Trokelowe, *Annales Edw. II* (1728), p. 347.

AMPUTATION SCENE, 1660

From a window in the Bodleian Library.

Doubtless it was to such increased facilities for dissection that the most important anatomical discovery of of the century was largely due: viz. the demonstration of the true structure and relations of various parts of the Vascular System, upon which the Circulation of the Blood depends. Harvey's great discovery naturally figures most appropriately in the introduction to the history of Physiology, but it must be remembered that it was as a Lecturer on Anatomy that he introduced his new doctrine to the College of Physicians in 1616, although he waited twelve years before publishing it.[1]

In 1623 a small endowment for the regular teaching of Anatomy in Oxford was provided by Mr. Richard Tomlyns of Westminster. The salary of the praelectorship was at first only £25, but this was augmented in 1639. The post was always to be held by the Regius Professor of Physick.

> The chief office of the Reader is every Springtime immediately after the Assizes are ended, to procure an intire and sound body of one of the Malefactors then condemn'd or hang'd; or, if that cannot be done to get an intire and sound Body of some other Person; which being thus procur'd he is oblig'd to have it prepar'd and cut up by some Skillful Surgeon.[2]

He was to lecture four times on the corpse and have it decently buried 'for which he is to allow fourty shillings'. Every term he must 'read publickly upon the Bones' thrice.[3]

Dr. Thomas Clayton, who had been appointed King's Professor of Physick in 1611, was duly nominated first Tomlyns Reader in Anatomy, and gave an inaugural lecture on March 12, 1624. The lectures were delivered in the Anatomy School,[4] and the students appear to have been helped by a small reprint of Bartholin's *Institutions of Anatomy* which appeared in Oxford apparently for their special use in 1633.

The stipend of the Reader was secured on 26 March 1639, when Tomlins, then of Richmond, Surrey, gave

[1] W. Harvey, *Exercitatio de Motu Cordis*. 1628.
[2] Hearne, ii. 379.
[3] Macleane, *Hist. of Pembroke College*.
[4] After 1683 in the Ashmolean Museum.

£500 for the purchase of land for the perpetual and constant maintenance of an Anatomy Lecture to be hereafter read by his Majesty's Professor of Physick and his successors for ever.[1] And a note in the University Accounts shows that the £500 which had been borrowed from the Bodleian Library Chest 'for the Anotomy (*sic*) purchase' was repaid on July 26.[2]

By an Act of the 2nd of Charles I[3] the Anatomy reader might demand the body of any person executed within twenty-one miles of Oxford.[4] And, as the supply of executed criminals was apt to be precarious, the Professor of Anatomy had to summon his class hastily, when opportunity favoured a demonstration.

So with money and 'subjects' anatomy-teaching should have been booming, but there was a set-back —Dr. THOMAS CLAYTON,[5] who had succeeded his father of the same name in 1647, 'being possest of a timorous and effeminate humour, could never endure the sight of a mangled or bloody body', a fact that was well known among his pupils and was indeed an inspiration to one of them.

Sr Thomas Clayton or a fearfull Anotamie Lecture.

To the Tune of the Spanish Pavion.

Thee 12th day of this month there readd
Uppon a man both hang'd and dead
Sr Tho: Clayton this is hee
That breaks the bond of Unitie
Hee would have rays'd the best of men
His brother.

[1] Bodleian Archives S.E.P., L. II. 16.

[2] Macray, *Annals of the Bodleian Library*, 1890, p. 89.

[3] Gutch, *Collectanea Curiosa*, ii, p. 45.

[4] The Act was similar to that of 9 Geo. IV, cap. 31, by which the Body of a Murderer if executed in the county of Middlesex or City of London. . . . shall be conveyed to the Hall of the Surgeons Company, or to such other place as the said Co. shall direct, . . . for the purpose of being dissected. If executed elsewhere the body shall be delivered to such surgeon as the Court or Judges shall direct, for the same Purpose. Repealed by 24 & 25 Vict., c. 95 (1861).

[5] T. CLAYTON secundus became Warden of Merton and was knighted in 1661. Wood gives an amusing description of the home-coming of the new knight on March 30, 1661.

His wife that made him of the chayre
Had thought to make the sonne and heyre
A proctour(?) by hir husbandes helpe
A prettie and a lovely whelpe
For such a place most fitt to be
A shame to th' universite
His mother.

But what's this to our businesse nowe
I am about to tell you how
He did delate on every part
By peeping on his bookes of art
And Barnard's finger was the tongue
That taught the discontented thronge
Anatamie.

O how he div'd in flesh and blood
It made us all afrayd that stoode
To see this fearce and bloodie Knight
To graspe those gutts like a ravenous Kite
Instructing us both all and some
Untill we sweatt and cri'd each one
How hot am I?

This Knight when he began his speech
. . . . . .
And when as hee was compassd rounde
Hee stoode like a lame Jade in a pounde
Good Lord: how pale and white
As if he had come for the nonst . . .
In foro.

Hee trembled more to reade I hope
Then the fellow did when hee came to the rope
And when we preass'd and throng'd and sweatt
And brought the professour into an heate
Hee sayd all's not so sweete as a nutt
Keepe out the thronge be pleas'd to shut
The doore here.

Behold: quoth the worthie Knight
What I brought for your delight
To entertayne your eyes a while
See an Indian snake and a Crocodile
But some men may object and say
What kinde of reference have they
To a bodie.

And though my speech it doth reflect
Uppon my schoole that is bedeckt
With forrayne beastes. Yet do not say
My speech was taken for a straye (?)
And think mee not because I can
Speake more of those than of the man
A noddie.

[*Four stanzas omitted*]

Well noble Knight our Anotamiste
Take my advice. Bee pleas'd to desist
From reading. And mistake no parte
No not a liver for the hart
As last you did. Trade not in blood
Be advised by your freinds, o good
Sr Thomas.

[MS. Tanner 306, f. 273.

Sir Thomas wisely resigned the Anatomy Readership in 1650 to his deputy WILLIAM PETTY. Between 1640 and 1650 Petty, being very poor,

'came to Oxon, and entred himself of Brasen-nose college. Here he studied Physick, cut up doggs and taught anatomy to the young scholars'. Anatomy was then but little understood by the University, and I remember he kept a body that he brought by water from Reding a good while to read on, some way preserv'd or pickled.[1]

Petty was a universal genius. He is the founder of statistical studies on Demography in England. The remarkable group of scientists who founded the Royal Society used frequently to foregather in his rooms in Oxford.

A public dissection by these early anatomists was rather a sporting event, for there was always a chance that their subjects might come to life. On a particular occasion Drs. Willis and Petty had secured for their anatomical demonstration a 'recent subject', the body of a woman who had been hung in December 1650, on the gallows-tree in the Parks, according to Routh, or in the Castle Yard, according to Watkins, for the murder of her child. It was found, however, on unpacking her, that some vital heat still remained. The care and skill of the Professor and his assistants were accordingly

[1] Aubrey's *Lives* and Hearne's *Diary*.

turned to the means of restoring life, which after much perseverance they succeeded in doing.

Ann Green was a slippery quean,
In vain did the jury detect her;—
She cheated Jack Ketch, and then the vile wretch
'Scap'd the knife of the learned dissector.[1]

According to Evelyn she was bled, put to bed to a warm woman, and brought round by spirits and other means. 'The young scholars joined and made a little portion, and married her to a man who had several children by her, she living fifteen years after.'[2]

The succession of Anatomy Lecturers after William Petty, whose deputy was HENRY CLERK, was:

JAMES HYDE 1650/1 C.C.C.
JOHN PARYS 1661 C.C.C.
THOMAS JEAMSON 1669 Wadham.
JOHN LUFFE 1674 Trinity.
ROBERT PITT 1684 Wadham.
STEPHEN FRY 1686 Trinity.
JAMES KEIL c. 1705?

SEVENTEENTH-CENTURY DISCOVERIES.

A first-hand acquaintance with the fabric of the human body and a critical comparison of their own observations with the printed words and plates of the text-books soon led anatomists to the finding of discrepancies and brought about an abundance of discoveries and rediscoveries. For instance, it has been asserted that the Lacteals were known to Erasistratus, but had been forgotten long before our era. Again, they were rediscovered in 1622 in a dog by Aselli of Cremona, and their passage into the thoracic duct was shown by Pecquet in 1651. Similarly the honour of the discovery of the Lymphatics has been claimed for several people.

In Oxford GEORGE JOYLIFF appears to have anticipated Bartholinus and Rudbeck. Rudbeck saw them in a dog in January 1651, and Bartholinus saw them in the following

[1] T. Warton, *Life of President Bathurst*—quoted from Cox, *Recollections*.

[2] *Diary*, 22nd March, 1675, and Wood's *Life and Times*, i. 165, 169–70.

December, and published them in 1653. But Dr. Robert Stapley, who was a contemporary with Joyliff at Pembroke College till Oxford was made a garrison for the King, about the year 1643, told Plot that Joyliff had often demonstrated them to him when they were students

NATHANAEL HIGHMORE OF TRINITY COLLEGE.
From the Frontispiece to his 'Corporis Humani Disquisitio', 1651.

there (1639–43). Evelyn too noted that on 25 Feb. 1649 'Came to visit me Dr. Joyliffe, discoverer of the lymphatic vessels and an excellent anatomist.'[1] Joyliff afterwards, in June 1652 when at Cambridge to take a Doctor's degree, demonstrated them to the famous Dr. Glisson.[2] Dr. Highmore is also believed to have 'noted

[1] In 1657 Evelyn 'Saw at D. Joyliffe's two Virginian rattle-snakes, alive, exceeding a yard in length . . . the Doctor tried their biting on rats and mice, which they immediately killed : . . .'
[2] Professor of Medicine at Cambridge 1636–1677.

something of them, though veiled under a different name and description'.

The same Dr. Highmore treated of Human Anatomy, on the lines suggested by the new Doctrine of the Circulation of the Blood, and appropriately dedicated his book to Harvey.

Nathanael Highmore, 1613–84, was a Scholar of Trinity College and was in residence when Harvey came to Oxford after Edgehill. They became friends, and in 1651 Highmore, who had settled in practice at Sherborne, dedicated to Harvey his first work, on Human Anatomy.[1] This treatise was published at The Hague, and, like most of the books on anatomy of its period, gives an account of pathological appearances and of comparative anatomy, as well as of the normal structure of the human body. He was familiar with the anatomy of the dog and of the sheep, and had dissected an ostrich. Though perfectly sound in his views as regards the circulation of the blood, the physiological remarks of Highmore are sometimes medieval. Thus, he believed in an *alexipharmaca dispositio vitalium* which enabled an Oxford student of his acquaintance to devour spiders with impunity. His plates are based on those of Vesalius, and he frequently attacks Spigelius. His name is remembered on account of his discovery of a cavity in the superior maxillary bone to which his attention was drawn in a woman patient in whom an abscess of this cavity, ever since known as the *Antrum of Highmore*, was drained by the extraction of the left canine tooth.

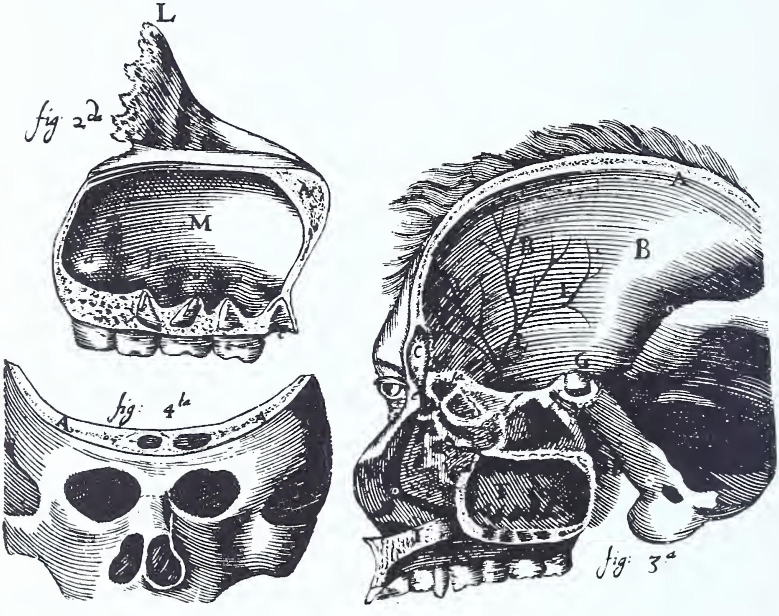
> Concerning *Highmore's* Cave or Cavity, which is internally discover'd in the *Sinus* of each Maxillary Bone, it is observable, Chyrurgeons and unskilful Anatomists are frequently mistaken, who if a Hurt be violent or successive in these Parts, as it commonly happens in the Venereal Disease, take this for a *Caries* or rottenness of the Bone, especially when they can penetrate so deep into it with a Probe, and find this vast Cavity.[2]

He became a magistrate for Dorsetshire, and attained considerable practice as a physician. He never took fees from the clergy. By his will 4 March 1684, he endowed

[1] *Corporis humani disquisitio Anatomica*, pt. I, c. 2.
[2] Erndtel, 1706, p. 68.

an exhibition to Oxford from Sherborne School, and left 21 copper plates of anatomical figures to the Royal Society and his long Tables of the Muscles to the Anatomy School at Oxford.[1]

Plot regarded him as the discover of a 'new ductus for the carriage of the seed from the testes to the parastatae', and author of a new description of the vessels



THE ANTRUM OF HIGHMORE, 1651.

Figs. 2 and 3 show the Antrum (M) in the Maxillary Bone.
Figs. 3 and 4 show the Sinuses (C) in the Frontal Bone.

and fibres of the Spleen, previously considered to be veins, and of 'the intricate plexus of the Parastatae'.[2] His work upon the former organ has been commemorated by the association of his name with the *Corpus Highmorianum* or 'mediastinum testis', which supports the vessels and ducts of the organ in their passage to and from the substance of the gland.

[1] Gunther, *Rolfe Family Records*, 1914, p. 227. Highmore's original MS. of the *Anatomia Restaurata* is in the Sloane collection.
[2] Plot, *Nat. Hist. of Oxfordshire*, 1677, p. 301.

Medical students were greatly assisted in their studies by the anatomical preparations that were being imported from Italy at this time. Such preparations were highly prized by their owners. For instance on April 2, 1649, Moulins, 'the great Chirurgeon', came to see and admire the *Tables of Veins and Arteries*, which JOHN EVELYN had purchased and caused to be drawn out of several human bodies at Padua.[1] Ten days later Moulins in return invited Evelyn to see a private dissection at his own house. In later years, these same Tables were borrowed to illustrate anatomy lectures at the College of Physicians, and after being kept for some time in the museum of the Royal Society, were transferred to the College of Surgeons, where they are still preserved—the oldest anatomical preparations in that great collection. In Oxford students of Anatomy could consult the specimens in the Anatomy School (which are listed on pages 264-77), and in the College Libraries. At St. John's, for instance, on the 12th July 1654, Evelyn visited the Library and saw there the 'two skeletons which are finely cleansed and put together'.

As time went on courses of Anatomy became more and more thorough and better defined, until 'for anatomy the students had in the spring to attend the dissecting of one human body and to hear four lectures, each two hours long, upon it, and in the autumn to hear three lectures on the human skeleton'.[2] Moreover, the study became fashionable, for it was known that even the King, Charles II, was 'fond of seeing dissections'. On the

[1] In 1645 Evelyn attended 'the famous anatomy lecture, celebrated here with extraordinary apparatus, lasting almost a whole month. During this time I saw a woman, a child, and a man dissected with all the manual operations of the chirurgeon on the human body. The one was performed by Cavalier Veslingius and Dr. Jo. Athelsteinus Leonoenas, of whom I purchased those rare tables of veins and nerves, and caused him to prepare a third of the lungs, liver, and nervi *sexti par:* with the gastric veins, which I sent into England and afterwards presented to the Royal Society, being the first of that kind that had been seen there, and, for aught I know, in the world, though afterwards there were others.' Evelyn then departed to Venice and purchased treacle; but his Tables did not arrive in England before the spring of 1649.

1652. Nov. 5. 'Dr. Scarborough was instant with me to give the Tables . . . to the College of Physicians. . . '

[2] Fox Bourne, *Life of John Locke*, 1876.

11th May 1663, Pierce, the surgeon, told Pepys 'that the other day Dr. Clerke and he did dissect two bodies, a man and a woman before the King with which the King was highly pleased'. Pepys also records on 17th February 1662/3 on the authority of Edward Pickering, another story of a dissection in the royal closet by the King's own hands.

We have now arrived at what may be regarded as the heroic age in the history of British Science. It was characteristic of this prolific period that the frontiers between the various natural sciences were readily crossed by men of outstanding genius who made important and simultaneous advances in many directions. There was no narrow 'specialization' in the work of a Wren, a Boyle, or a Hooke. The early Fellows of the Royal Society, universally 'philosophic in mind', would scarcely have recognized the many subdivisions into which the modern biologist classifies his subjects. Yet it was the anatomists of the seventeenth century who laid the foundations of these later subdivisions.

The senior in this group of anatomists was THOMAS WILLIS (1621–75) (see p. 59) whose outstanding work was the publication of the best detailed description of the Nervous System[1] that had yet appeared. Just as the illustrations to the Anatomy of Vesalius had been drawn by Johann Stephan von Calcar, a pupil of Titian, so the success of the work on the Anatomy of the Brain of Willis was in large measure due to the elaborate anatomical drawings of CHRISTOPHER WREN.[2]

Although only twenty-one years of age at the time, Wren was no novice in anatomy. On leaving Westminster School at the early age of fourteen, he had been chosen by Dr. Charles Scarborough as his assistant, demonstrating and making anatomical preparations and various experiments for his patron's lectures at Surgeons

[1] Willis, *Cerebri Anatome cui accessit Nervorumque descriptio et usus*, London. It was printed by Ja. Flesher in 4to and by Tho. Roycroft in 12mo in the year 1664.

[2] After acknowledging help from Tho. Millington, Willis adds: 'Caeterum alter, Vir Insignissimus Dr. Wren, pro singulari qua pollet humanitate, plurimas Cerebri et Calvariae figuras, quo exactiores essent operae, eruditissimis suis manibus delineare non fuit gravatus.'—*Cerebri Anatome.* Imprimatur, Jan. 20, 1663.

Hall.[1] Consequently he came to Willis, a pupil with the training of a scholar.

Among Wren's anatomical researches must be mentioned his Operation to remove the Spleen with safety. The operation is described by Boyle[2] in the following terms:

Nor is it a small Convenience to the Anatomist, that he may in the Bodies of Brutes make divers instructive Experiments, that he dares not venture on, in those of Men; as for Instance, that late noble, and by many not yet credited Experiment, of taking out the Spleen of a Dog without killing him: For, that this Experiment may be useful, we may elsewhere have Occasion to shew; and that it is possible to be safely made, (tho' many, I confess, have but unprosperously attempted it, and it hath been lately pronounced impossible in Print) ourselves can witness. And because I have not yet met with any Author, that professes himself not to relate this Experiment (of the Exemption of a Dog's Spleen) upon the Credit of others, but as an Eye-witness; I am content to assure you, that that dexterous Dissector, Dr. Jolive, did the last Year, at my Request, take out the Spleen of a young Setting-dog I brought him; and that it might not be pretended, the Experiment was unfaithfully, or favourably made; I did Part of it myself, and held the Spleen (which was the largest in Proportion to his Body I ever saw) in my Hand, whilst he cut asunder the Vessels, reaching to it, that I might be sure there was not the least Part of the Spleen left unextirpated; and yet this Puppy, in less than a Fortnight, grew not only well, but as sportive and as wanton as before, which I need not take Pains to make you believe, since you often saw him at your Mother's House, whence at length he was stol'n. And tho' I remember the famous Emperick Fiorovanti, in one of his Italian Books, mentions his having been prevail'd with by the Importunity of a Lady (whom he calls Marulla Graeca) much afflicted with splenetick Distempers, to rid her of her Spleen; and adds, That she outlived the Loss of it many Years: Yet he that considers the Situation of that Part, and the Considerableness of the Vessels belonging to it, in human Bodies, will probably be apt to think, that tho' his Relation may be credited, his Venturousness ought not to be imitated.

[1] *Parentalia*, p. 187.

[2] *Essays of experimental natural Philosophy*, 1663.

The Operation and Method of Cure, by Dr. WREN.

PRovide a Dog, as big as a Spaniel, and having tied him in a fit Posture on the right Side, with a Cushion under him, that his Belly may turn a little up; first clip away the Hair, and mark with Ink the Place for Section, drawing a Line two Fingers breadth below the Short-ribs; cross the Abdomen at right Angles to the Musculus rectus, beginning short of it a Finger's breadth, and so carry it up the Length of three Finger's breadth towards the Back; then thrust in a sharp Knife, like a Sow-gelder's Knife, till you feel you have just pierced thro' the Muscles and Peritonaeum, having a Care of the Guts; thence rip up freely, carrying on the Point of the Knife to the End of the Line; then put in two Fingers, and while another presses down the Abdomen, draw out the Spleen just without the Wound, having a great Care of pulling it too far out, because of disordering the adhering Vessels within, the Stomach, the Caul, the Arteries, and Veins; then either tie the Veins and Arteries with untwin'd Thread, but strong, and in three or four Places, Caul and all, and so cut them off close to the Parenchyma of the Spleen, and anointing the Ends of the Vessels and Wound of the Caul with Balsam, or Oil of Hypericon, put them in their Places, or else sear off the Vessels, and anoint them with the Juice of Sengreen and Plantain beaten with Whites of Eggs; or else, cum Unguento Diacalcitheos dissolv'd with Vinegar and Oil of Roses, especially the Nerve; then sew up the Wound with the Suture call'd Gastroraphia, leaving at the lower End room enough for Matter to come out, first anointing the Wound with Balsam, then ℞ Olei Mirtini & Rosarum, ℥ ii. Cerae alb. ℥ i. Farinae Hord. ℥ ß. Boli Armeni. & Terrae Sigillatae, ana ℥ vi. make a large Plaister of this to cover the Wound, and all the Muscles about; swath his Belly warm, and lay him upon his left Side in Straw; after six Hours let him Blood in the left hinder Leg, two or three Ounces, more or less, according to the Bigness of the Dog: The next Day if there seem to lye any clotted Blood in the Abdomen; out of a Glister-pipe (one holding the Dog in his Arm, or hanging over the Table, so that the Wound may be downward) inject half a Pint of Decoction of Barley with Honey of Roses and red Sugar, till you have wash'd out the clotted Blood, then tent the remaining Hole with the yellow Salve, and wrap him up in the former Plaister as before till the Wound begins to suppurate.

He compos'd a Treatise of the Motion of the Muscles, explaining the whole Anatomy by Models form'd in Pasteboards. These were presented to that eminent Physician, and his excellent Friend, Sir Charles Scarborough; but lost at the Fire of London: there is extant only the first Draught of a Letter from Oxford to Sir Charles, concerning the Bone of the Arm, wherein is a Hint of the Pasteboards.[1]

In a Catalogue of his MSS. this is mentioned as 'No. 42. Of the *Os Brachii*'. No. 43. is on the Anatomy of a freshwater eel, more than 40 inches long, and six inches in girth, with figures. No. 44. is Of the Instruments of Respiration, &c.

A considerable testimony to Wren's skill was that some years afterwards he was specially requested by Charles II to prepare magnified drawings of insects as seen under the microscope.

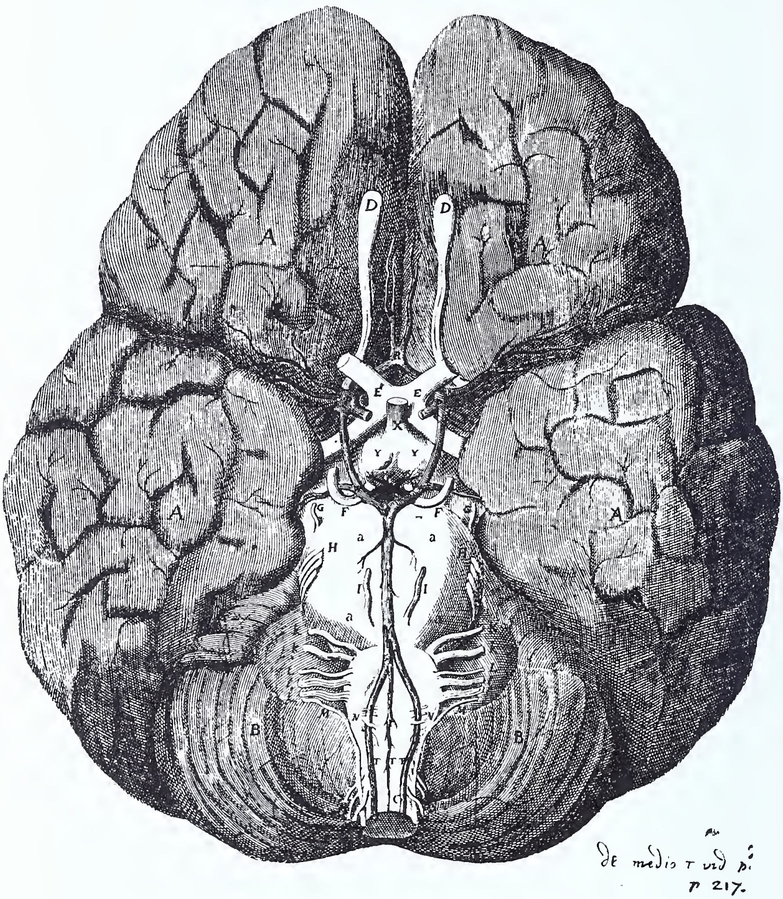
It was doubtless due to this early training in the extreme accuracy of observation and of drawing which the study of animal morphology requires, that the foundations of his success in the architect's profession, which he subsequently adopted, were laid, and indeed may have had much to do with his choice of it. 'Had his philosophical pursuits not been interfered with by the absorbing work of the arduous profession to which he devoted himself in later life, he could not have failed of securing a scientific position higher than was attained by any of his contemporaries, with of course one exception—Newton.'[2] 'Since the time of Archimedes there scarce ever met in one man in so great a perfection such a mechanical hand and so philosophic a mind.'[3] He received credit for his published figures of the Organs of Respiration and for having 'exactly measured and delineated the spheres of the humours of the eye whose proportions were only guessed at before'. (Sprat, *D.N.B.*)

Besides Wren, Willis had the assistance of Dr. Millington, Dr. Edmund King, Dr. Masters, and chiefly of Dr. Lower. 'His method of dissecting the Brain is new and most natural; and so exact that there is scarce any one part in it, but what has received considerable advancements from him.' We cannot, however, follow him in his attempts at localizing the functions of the brain. With Lower he worked out the curious plexus of the

[1] Wren, *Parentalia*, pp. 237–8.
[2] F. C. Penrose in *D.N.B.*
[3] Hooke, Preface to *Micrographia.*

cerebral and spinal veins and arteries for the first time, whence the anastomosis at the base of the brain between

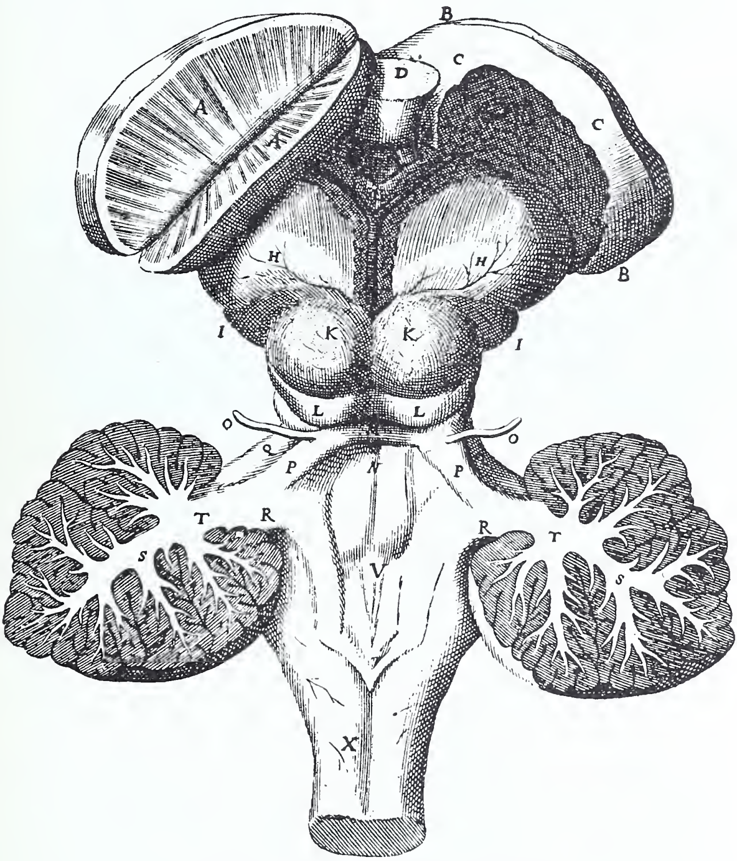
Figura Ia



WREN'S DISSECTION OF THE BRAIN, 1664.
From Willis, Cerebri anatome.

the branches of the vertebral and internal carotid arteries is known as the Circle of Willis. By this arrangement the brain is supplied with blood by four arteries, and the 'Circle' connexions ensure a continuous flow of blood even though the supply by one or even two of the afferent arteries be interrupted. The Circle of Willis

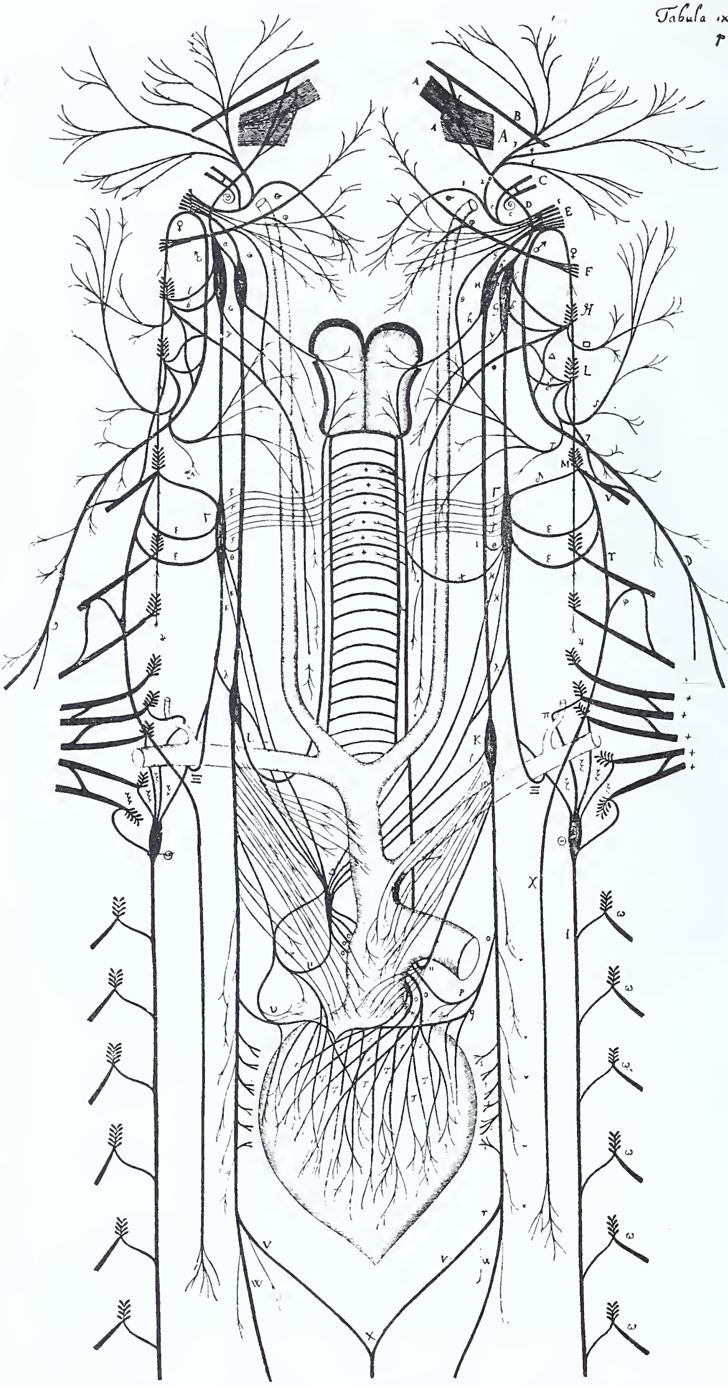
Fig: VIII.[a]



WREN'S DISSECTION OF THE BRAIN.
After Willis, Cerebri anatome.

is admirably shown in Wren's drawing of the brain reproduced above. Both dissectors were indefatigable in tracing out the course of the nerves, led on by the hope

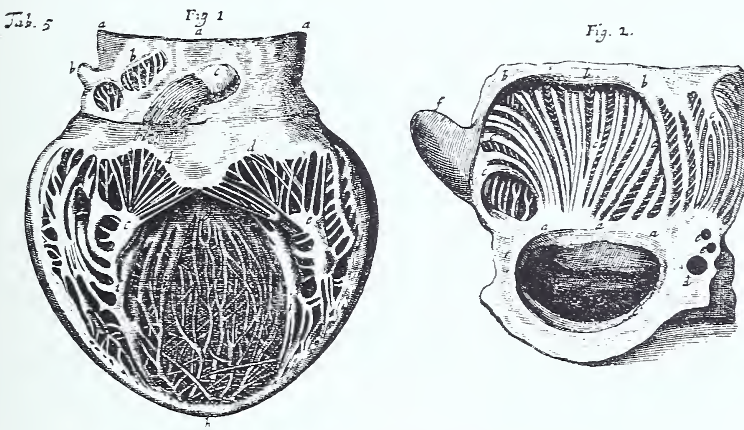
Tabula ix^a
p 223



DISSECTION OF THE NERVES OF THE NECK. PERHAPS BY WREN.
One of the thirteen plates in Willis's Cerebri anatome, 1664.
Photographed from Sir W. Osler's copy.

of discovering the secret sympathies of the parts. Dr. Richard Lower,[1] who helped, or rather instructed Willis in his book *De Cerebro*, eventually went to London where he 'was esteemed the most noted Physician'. He died in 1691.

Many important anatomical observations are contained in Lower's *Tractatus de Corde*. In addition to his physiological experiments, he therein describes the anatomy of



Lower's Dissections of the Heart, 1669.

the thoracic duct, through which the chyle reaching the blood 'serveth for the nourishment of the several parts of the body', and he infers that both arteries and veins must end in fine hair-like branching tubes which must freely communicate by innumerable branching capillaries too fine to be seen by the eye.

Several of Lower's observations are recorded by John Ward, his intimate friend and pupil. On Nov. 16, 1664, Thursday, Lower and John Warde made a dissection 'first of ye Testicles, of ye spleen yn of a bitch wherein wee saw many excellent things; ye parastate; vasa deferentia, prostate and so ye common passages'.[2] He also continued Wren's work on the eye, and we have Pepys's evidence of his skill in the dissection of that organ:

[1] See pp. 66 and 130.
[2] *Medical Society's Transactions*, 1920, vol. 43, p. 276.

that he sometimes added a little sal armoniack, observing that it never coagulated the spirit of wine.[1]

At least two of Boyle's spirit preparations were preserved for many years in the Museum of the Royal Society in London, where they were duly described by Nehemiah Grew in 1681. The oldest was one of

a young linet, which being first embowel'd, hath been preserved sound and entire, in rectified spirit of wine, for the space of 17 years. Given by the Honourable Mr. Boyl. Who, so far as I know, was the first that made trial of preserving animals this way. An experiment of much use. As for the preserving of all sorts of worms, caterpillars and other soft insects in their natural bulk and shape, which otherwise shrink up, so as nothing can be observed of their parts after they are dead. So also to keep the guts, or other soft parts of animals, fit for often repeated inspections. And had the Kings or physitians of Egypt thought on't, in my opinion, it had been a much better way of making an everlasting mummy.

The other spirit preparation was of a 'male humane foetus', of which:

the skin hath been kept white and smooth for so long a time, *scil.* above fifteen years, by being included with rectified spirit of wine in a cylindrical glass; to the middle of which the foetus is poised, by means of a glass bubble of an inch diametre, the neck whereof is fastned to the anus of the foetus by a wyer.

The use of spirit of wine as a preservative for all manner of natural objects was strongly advocated about 1689 by William Courten *alias* Charleton, 1642–1702, in his directions to his collectors:

Take Brandy, that of grain is as good as the other, to every quart take ½ a ℔ of Turpentine, a. handful of sage and about ye bigness of a small nut of camphire, put these into a glass and distil them.[2]

Further he counsels:

That when ever the spirit becomes yellow you must distill it again and then put into it half ye quantity of a small nut of camphire.

[1] *Phil. Trans.*, 1666.

[2] British Museum MS. Add. 3962.

The manner of stopping the bottles.

Boyle yor cork with bees wax and comon oile using a moiety of each, rub the bladder with comon oil puting ye innermost part of it into ye bottle first, then ye cork over it which you must cover with comon wax and then cover it with another piece (?) of bladder then take *minion* and colour it round about.

Dried preparations were the rule at that time. John Evelyn's Tables of the Veins, already mentioned, are amongst the oldest now in existence. The preservation of animals in balsam came under discussion by the Oxford Philosophical Society in 1685, when Dr. Herman's collection of curiosities, preserved in that medium, was being described to the Royal Society on April 1.

The history of anatomical injections has recently been reviewed with scholarly care by Prof. F. J. Cole of Reading.[1]

Wren first suggested to Boyle at Oxford not later than 1656[2] to ligature the veins of a living animal, open them on the side of the ligature nearest the heart, and inject with 'slender syringes or quills fastened to bladders'. He recommended as the subject 'pretty big and lean dogs'. This operation appears to have been frequently practised in Oxford, and also in London before the Royal Society. 'And they hope likewise, that beside the *medical* uses, that may be made of this *invention*, it may also serve for *anatomical* purposes, by filling, after this way, the vessels of an animal as full as they can hold, and by exceedingly distending them, discover *new* vessels.' 'To Oxford, and in it, to Dr. CHRISTOPHER WREN, this invention is due.'

Wren, then a youth of twenty-four, injected wine and ale into the blood of a living dog by one of the veins, and noted that the animal became extremely drunk. The experiment he takes 'to be of great concernment and what will give great light to the theory and practice of physic', and Sprat refers to it as that 'noble anatomical experiment of injecting liquors into the veins of animals'.

[1] Cole, *Hist. of anatomical injections* in Singer's *Studies in the History of Science II*. Oxford 1921.

[2] 1659 is the date given in the *Phil. Trans.* for 1665, but Cole has pointed out the error.

Injections have been stated to have been a Dutch invention, but they were constantly employed by the early Oxford anatomists. Thus, Richard Lower in a letter to Boyle on June 24, 1664, writes: 'We took a little branch of the mesenterical artery, and syringed it with milk, and it ran into all the arteries of the mesentery, which was the pleasantest sight I have lately seen in anatomy. One thing more I tried, that the arteria hepatica goes into all parts of the liver; for if it be syringed, it (the milk) will come out of all the lobes of the liver, if you cut off the edge of them'. . . 'Without syringes, anatomy is as much deficient as physick would be without laudanum.'

The same anatomist in 1666 was the first to undertake transfusion of blood from an artery of one animal into the vein of another, and in the following year Jean Denys performed the same operation on a man—'a circumstance of great exultation to the French'. A few years earlier Boyle also, in discoursing *Of the Usefulnesse of Naturall Philosophy*,[1] suggested a medium for injections that solidified. 'Perhaps there may be some way to keep the arteries and the veins too, when they are empty'd of blood, plump, and unapt to shrink overmuch, by filling them betimes with some such substance, as, though fluid enough when it is injected to run into the branches of the vessels, will afterwards quickly grow hard. Such may be the liquid plaister of burnt Alabaster, formerly mention'd, or ising-glass steeped two days in water, and then boild up, till a drop of it in the cold will readily turn into a still gelly. Or else Saccarum Saturni,[2] which, if it be dissolv'd often enough in spirit of vinegar, and the liquor be each time drawn off again, we have observ'd to be apt to melt with the least heat, and afterwards to grow quickly into a somewhat brittle consistence again.'

This, Grew[3] believed to be the first unequivocal mention of the use of injection media which solidify like wax. Whether Boyle did actually use wax is uncertain. He was always very reticent about his achievements. Willis at any rate found an immediate

[1] Published in Oxford 1663.
[2] Lead acetate, or Sugar of Lead.
[3] Grew, *Musaeum Regalis Societatis*, 1681, p. 8.

use for the new method. He had previously injected the carotid artery with liquor 'tincted' with saffron, but used ink for demonstrating the *rete mirabile* of ruminants and, in 1672, the vascular system of a lobster. The media which yielded the best results were 'quicksilver, hot and flowing gypsum, wax mingled and made liquid with oyl of turpentine, or some such matter'.[1]

By the use of these and kindred media new powers of preserving were in the hands of curators of anatomical museums, but it was not in Britain that the highest results were obtained. Frederik Ruysch, 1638-1731, of Amsterdam brought the art of preserving to far greater perfection. 'All the bodies which he injected had the tone, the lustre, and the freshness of youth. One would have taken them for living persons in profound repose, their limbs in the natural paralysis of sleep. It might almost be said that Ruysch had discovered the secret of resuscitating the dead. His mummies were a revelation of life, compared with which those of the Egyptians presented only the vision of death.'[2] Erndtel, one of the foreign visitors to Oxford, visited him in 1706 and saw at his house 'an incredible quantity of Anatomical preparations and a wonderful treasury of natural curiosities, excellently preserved as if fresh'—better, in fact, than if preserved by the secret methods of Bilsius. Unfortunately Ruysch never published his methods, and in 1717 his museum, containing over 1,300 anatomical preparations in liquid, was purchased by Peter the Great and removed to St. Petersburg. But Ruysch's notable success in the application of the methods discovered by earlier Oxford experimentalists, became an undoubted incentive to the curators of other anatomical collections.

The state of anatomical studies of the time in Oxford was summed up by Dr. Wallis in a letter dated Nov. 1700.[3] Dr. Wallis wrote that

> Dr. Musgrave while he was Fellow of New College (upon request of some persons agreeing for that end) did with them go through a course of Anatomy; and the like hath been

[1] T. Willis, *Pharmaceutice Rationalis*, Oxford 1675.
[2] Cole, *Anatomical Museums*.
[3] Dr. Wallis, *Letter*, Nov. 1700. Reprinted in *Collectanea*, Oxf. Hist. Soc. 1885.

done (more or less) by Dr. Willis, Dr. Lower, Dr. Hannes and others, for their own satisfaction, and for the information of such others as have desired it. And now of late Dr. Keil,[1] sometime at Oxford and sometime at Cambridge alternately, hath with divers companies (successively) gone through a course of Anatomy.

And there seldome happens a publike execution of condemned persons but that one or more bodies are privately dissected for that end. And, at other times, the like is oft performed on the bodies of other animals; whereby many usefull discoveries, in anatomy, have been here made, which were not before observed.

But Doctors trained solely on anatomy did not impress every one, and there may have been a modicum of truth in the criticisms and caricatures made of such men as Lower, Wharton, and Willis. 'They flay Dogs and Cats; take livers, lungs, calves-brains, or other entrails, dry, roast, parboil them, steep them in vinegar, etc., and afterwards gaze on little particles of them through a microscope:—then obtrude to the world in print whatever false appearances gleamed into their eyes; and all this to no other end, than to beget a belief in people that they who have so profoundly dived into the bottomless pores of the parts, must undeniably be skilled in curing their distempers.'[2] After the foundation of the Oxford Philosophical Society, the most active anatomists in Oxford appear to have been Drs. PITT of Wadham College and W. MUSGRAVE of New College, both of whom were greatly interested in physiological questions.

The former informed the Royal Society on April 8, 1685, when he was admitted a Fellow, that the coecum was full of glands.

Instruction does not seem to have been conducted in a very regular manner, and we are indebted to one of our foreign visitors for an interesting note on an Anatomy Lecture in August 1710.

[1] James Keill, of Northampton (1673–1719), author of *The Anatomy of the human body abridged*, 1698, was the younger brother of John Keill the Newtonian, translated Lemery's *Course of Chemistry* in 1698, thereby introducing English chemists to the current theory of the relation of acids and alkalies. He spent eight years in confirming the experiments of Sanctorius and was amongst the first to measure the velocity of the blood flow.

[2] G. Harvey, *The Conclave of Physicians*, 1686.

'In the afternoon [of August 28] the Messrs. Grassy took us to their countryman, D. Lavater of Zurich, a grandson of the well-known theologian and son of the Professor of Medicine at Zurich, to hear the beginning of a *Cursus Anatomicus.* As he had only recently obtained a license to lecture, and had no corpses to dissect, (which he was hoping to obtain from London), he began with Osteology. He certainly gave an excellent account of the production, nutrition and classification of the bones, and he is said to have uncommon knowledge and skill in Anatomy. Among other things he showed the production of bones on the skull of an embryo very clearly, how the fibres are quite soft at first and only in time acquire hardness and a bony nature *per accretionem*; and further how the fibres for greater consistency and firmness, all run from the centre to the periphery. He lectured in English, which he speaks fairly fluently. Englishmen would not have understood his Latin very well, partly because of his pronunciation, partly from their ignorance of the language. I was surprised at the ignorance of the people, how everything is so strange to them, and yet there are some old *socii* among them. About twelve people attend the lecture regularly. The place devoted to this *Cursus Anatomicus* is a small vaulted room under the Ashmolean and behind the Laboratory, and well adapted to Anatomy on account of the coolness.'

For the supply of subjects for dissection Oxford anatomists were still dependent upon the gallows of Oxford and Abingdon. By the before-mentioned Act of Charles I

the Tomlins lecturer is impower'd every spring, to demand the dead body of any condemn'd Malefactor, suffering Death within one and twenty miles round *Oxford,* before it is interr'd by directing his Precept or Warrant to the Sherriff, Under-Sheriff, or his Bailiffs, etc for procuring and delivering up the same; which Body shall be dissected by a skillful Chirurgeon in the presence of this Professor, who is publickly to read thereon, and to shew and describe the Situation, Use, Nature and Office of all the parts of the Body, at four distinct Lectures, as prescrib'd in the Statute made for this purpose. This Lecturer is also every *Michaelmas* term to read three distinct Lectures on a Skeleton, and to give an account of the Bones and their Office, Situation etc. And to this Lecturer there is yearly paid by way of Pension 25*l.* viz. 12*l.* 10s at *Lady Day,* and the same at *Michaelmas* out of which Pension the Lecturer pays three pounds to the Chirurgeon for preparing the Body, and 40*s* for burying it. All Students in *Physick*, and Chirurgeons, in the University, are oblig'd to hear this Professor read his said Lectures, under the Pain of 2*s* Mulct *toties quoties* absent. The Chirurgeon is in the Nomination of the Professor.[1]

The dissection usually took place in the Lent Term, when a body was procurable, but in 1714, according to the author[2] of an *Essay towards the improvement of Physic*, it was not easy for students to get a body to dissect at Oxford, 'the mob being so mutinous'. In 1719 private lectures on Anatomy were advertised in the newspapers[3] to be delivered by CHRISTOPHER FURNEAUX, Fellow of Exeter College, assisted by THOMAS BLATHWAIT, surgeon.

Subscriptions are taken in at Mr. Powell's, an apothecary, over against the public schools in Oxford where the Course is to be performed. N.B. Forty-two subscribers are already entered.

The provision of bodies was regarded by students as one of their rights under the statutes, so much so that on one occasion when the body of a criminal was not forthcoming in 1721 they seized upon the child of its unfortunate parents who were conveying it in a coffin to be buried, and carried it into Exeter College, where it was dissected.[4] The anatomy lecturers at about this time were CHARLES TADLOW of St. Johns, 1716, and PHILIP CODE of All Souls.

The next reader in Anatomy, Dr. FRANCIS NICHOLLS,[5] of Exeter College, was the most distinguished anatomical teacher of his day, but he left Oxford for London before 1738, where he married a daughter of the famous Dr. Richard Mead, and like his father-in-law became physician to the King. Corroded anatomical preparations

[1] J. Ayliffe, *Ancient and Present State of the University of Oxford*, 1714.

[2] J. Bellers, the quaker, quoted by G. C. Peachey, *A Memoir of William and John Hunter*, 1924.

[3] *Daily Courant* 2 March 1719, quoted by Peachey, *l. c.*

[4] Hearne, *Collections*, and another instance in vol. 91 under date March 31, 1721.

[5] For a recent account of Nicholls see the sketch of the early teaching of anatomy in England to 1746 in Peachey, *W. and J. Hunter*, 1924.

were first made in Oxford by him,[1] and with such success that he has been widely credited with their invention, but the idea was probably borrowed from the Dutchman, Govard Bidloo,[2] who filled lungs with a fusible bismuth-mercury alloy, and then removed the soft parts by corrosion, a method that was worthy of wider application. Nicholls's art in the making of injections was known to and commended by Cuvier and, doubtless, in 1741 he transmitted the technique to his pupil WILLIAM HUNTER, who may therefore also be regarded as a scion of the Oxford school.

In a manuscript copy of Hunter's lectures, now in the possession of Professor Cole, four lectures out of eighty-two are devoted to injection methods. 'He states that nothing has contributed more to the promotion of anatomical discovery, and that "there is no making a good practical anatomist without it". His watery injections are made from glue, isinglass, or gum arabic, and for the finest injections he used turpentine thickened with a little resin.' He also made lead casts of the vascular and other body cavities.

Before 1738 Dr. Nicholls had deserted the anatomy school, and about that year NATHAN ALCOCK, M.D. of Leyden, began lectures on his own account. He taught Physic also, as the aged Regius Professor, Woodford of New College (1730-59) made a sinecure of his office. The University was shamed into appointing a Chemistry Reader, T. Hughes, M.D., Trinity, and summoning Dr. THOMAS LAWRENCE from London to lecture in Anatomy.[3] Alcock was allowed a room by his own college, Jesus. This was crowded, while the authorized readers addressed the walls of the empty museum, which at last they resigned to their rival. Alcock received his degree of M.A. in 1741 by decree of Convocation after some opposition, and proceeded M.B. in 1744.[4]

[1] Frank Nicholls (1699-1778), *Compendium Anatomico-Oeconomicum*, London 1736. He was also the author of *De Anima Medica* 1750 and *De motu Cordis et Sanguinis* 1775.

[2] Bidloo's *Anatomia* was printed in 1685.

[3] Lawrence advertised lectures 'At the corner of Lincoln's Inn fields near Clare Market'. *London Evening Post* 27 Sept. 1743, 7 Jan. 1746, 12 Jan. 1748.

[4] Wordsworth, *Schol. Acad.* The succession of Anatomy Lectures during the Regius Professorship of W. Woodford was

An advertisement that appeared in Jackson's *Oxford Journal* for August 18, 1753, seems to indicate that medical students were not less reticent about appearing in public than now. It is obviously intended to refer to Dr. Alcock.

This is to inform the Publick

That on the first Day of *Michaelmas* Term next, there will begin at the *Laboratory* under the *Museum*,

A COURSE of ANATOMY

By RICHARD LUMMY, *formerly Bone-scraper to several eminent* Anatomists, *and now Retailer of Scandal to the* Old Interest.

AT the Time when the most unexceptionable Characters are exposed to Defamation, to obviate Reflections it cannot be thought impertinent to declare, that although the Lecturer has taken no degree in Physick, nor ever studied the Science of Anatomy in the vulgar mechanical Way, yet he humbly conceives that by the Advantage of a retentive Faculty in appropriating to his own use the System of an excellent Preceptor, whom he served for many years in an inferior Capacity, he is properly qualified for the Province he proposeth to engage in. His Lectures being fairly transcribed, any Person who has a bad Ear or a short Memory, shall be at Liberty to enrich his Common Place Book from the Original.—That the work he intends to communicate is not his own composition, he apprehends will be no Disparagement, but the greater Recommendation of it. On this Occasion he will outshine himself by a borrowed light.

After describing

Vices (great as his Imperfections are) which the Operator in Anatomy holds in Detestation.

the writer concludes:

Should it be recollected that he was discarded by Dr. A——k for ill Behaviour, let it be remember'd, that within the memory of man a Lecturer of higher Rank was turn'd out of his Station with Ignominy for Insolence and Ingratitude to his Constituents. For further Anecdotes the Anatomist

NICHOLLS 1729; LAWRENCE 1745; ALCOCK, unofficial; J. SMITH *c.* 1757. The London Anatomy Lecturer of 1744–5, JOHN FREEMAN, may have been the son of J. Freeman, vintner of Oxford. He was apprenticed to T. Bigg, the surgeon, for 7 years for a premium of £367 10*s*.

appeals to his Life, which is near finish'd, and will be offered to the Publick with all convenient Expedition.

In his enumeration of great men of Science Sir A. Shipley alludes to the fact that one who was perhaps the greatest of all British anatomists JOHN HUNTER (1728–93) had resided for some terms at Oxford, where, fortunately for science, his training did not materially detract from his after success in his life's work. 'They wanted to make an old woman of me, or that I should stuff Latin and Greek at the University, but', he added significantly, pressing his thumb on the table, 'these schemes I cracked like so many vermin as they came before me'. In view of this, his own criticism of his studies in Oxford, an account of his anatomical work can hardly be incorporated in this volume, but it may be noted that in 1783, exactly one hundred years after the opening of the Ashmolean Museum of Natural History in Oxford and one hundred years before the opening of the Natural History Museum at South Kensington, John Hunter built his large Anatomical Museum in Leicester Square. However, the inadequacy in the Oxford equipment was soon to be made good.

Dr. Lee's Readerships and the Anatomy School at Christ Church.

In 1750 Dr. MATTHEW LEE of Christ Church founded a Readership for anatomy in connexion with his own college, and provided the funds for a building, the Anatomy School, for dissections, the delivery of lectures, and for a museum. Lee was a Westminster Student of Christ Church, who held one of the Studentships given to the Faculties of Law and Medicine. He had practised as a doctor, first in Oxford, then in London, and dying in 1755 left his estate to trustees, to pay certain sums to (1) his wife and (2) to Mrs. Knapp, who died in 1759 and 1761 respectively. And then there were to be seven benefactions, including (5) £100 yearly 'for the maintenance of a Lecturer of Anatomy', to be appointed under very stringent conditions. He was to be a Westminster Student of Christ Church and an M.A., studying Physic in the University of Oxford; he was to be a layman, and if he took Orders was *ipso facto* disqualified; he was 'to take, teach and instruct no Gentleman Pupil or Pupils in any Art or Science except Anatomy, Physick or Botany', and was to go through two 'regular and compleat courses of Anatomy each year, in each of which he shall dissect at least one adult human body and distinctly explain and regularly demonstrate all the bones, viscera, blood vessels, muscles, nerves and all other parts of the human body with their respective uses'. Four students and two commoners selected by the Dean might attend his lectures free, the others were to be charged a fee.

(6) Dr. Lee provided that £40 per annum should be paid towards the expenses of making proper anatomical preparations, and procuring at least two adult human bodies. There was a penalty for failure in performance of this duty.

(7) £30 yearly was to go to instruction of four Westminster Students in Mathematics and Experimental Philosophy in all its branches. Their course was to last three years. Thus £140 per annum was to go to Anatomy and the main object was the advancement of Westminster Students. The Court of Chancery sanctioned the arrangements in 1765.

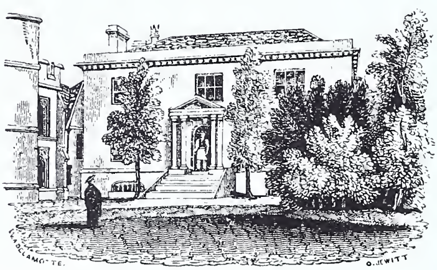
The Lee's Anatomy School was built in 1765 on the south side of Christ Church under the direction of JOHN PARSONS, 1742–85, of Christ Church,[1] who was nominated first Lee's Reader in Anatomy in the year he took his M.A. and three years before his M.B. He provided excellent preparations, and read two courses of lectures in anatomy every year. Francis Nicholls's *Compendium Anatomico-Oeconomicum*, an illustrated syllabus of 39 lectures first delivered in 1746, was still being used as a text-book at Christ Church thirty years later. F. H. EGERTON, 1756–1829, of Christ Church and All Souls, as a medical student in February 1777 used an interleaved copy of the Compendium as a note-book.[2] Egerton has one or two notes of local interest, as for instance, that 'A stone of a considerable size was found

[1] Cf. *A select account of the late Dr. J. Parsons, Professor of Anatomy in Oxford*, 1786.

[2] Presented by Richard Walker, with other scarce books, to Magdalen College Library.

on dissecting the pelvis of Strap, executed for murder in March 1775 at Oxford' (p. 28).

In 1780 Parsons was elected first Lichfield clinical professor of the Radcliffe Infirmary. By this ample provision of an Anatomy School at Christ Church the need for the old Anatomy School near the Bodleian was superseded, and being found to be admirably adapted for an extension of the growing library, was emptied of contents, which the librarian was pleased to describe as heterogeneous and gruesome, and was finally in 1789 fitted up for Greek and Biblical manuscripts. In 1794 it was called the 'Auctarium'.



THE ANATOMY SCHOOL AT CHRIST CHURCH.
From Ingram, *Memorials of Oxford.*

The new Anatomy building was adorned by two skeletons which were said to be the bones of criminals hanged at Oxford,[1] and so it was almost a foregone conclusion that that quarter of the House should have gone by the name of *Skeleton Corner*. Ingram[2] describes the lecture room as affording space enough for an interesting collection of preparations illustrative of human and comparative anatomy, which were ranged round the walls in neat glass cases. There were also several beautiful wax models of the human body, executed at Florence, which had from time to time been purchased by the Dean and Chapter of Christ Church, in pursuance of the intentions and views of the founder of the Anatomy School. Below the lecture room were spacious apartments for carrying on dissections.

[1] Cox, 1790, *Recollections.* [2] *Memorials*, 1837.

Sir Christopher Pegge, Fellow of Oriel, as Regius Professor of Medicine 1801-22, and Lee's Lecturer in Anatomy, at first attracted a numerous class. 'It was then thought not *to be the thing* to leave Oxford without attending one course of these lectures, and the propensity to hard reading *for the Schools* had not yet set in so strong as to leave no spare time for other pursuits.'[1] But later on Sir Christopher, who had been one of the lights of the medical school in the last decade of the eighteenth century, is described as a 'desultory' lecturer, so much so that 'the protection of the Dean and tutors of Christ Church could never make his anatomical school famous beyond the walls of the University, or popular with the young men within them'.[2]

A visitor, Dr. Gibbes, Physician to the Bath City Infirmary (1801–22), has the following note:

> By the indulgence of Dr. Pegge, the anatomical Professor at Oxford, I was permitted to examine the receptacle in which the bodies are deposited, after he has finished lecturing on them. This place is a hole dug in the ground to the depth of about 13 or 14 feet; and to remove all offensive smell, a little stream is turned through it.

In 1818, at the same time that the *Kaleidoscope* found its way even into the drawing-rooms of our gravest dignitaries, *Craniology*, afterwards called *Phrenology*, 'with a good deal to say for itself, but not enough to establish its claim and justify its pretensions, demanded to be admitted among the sciences'.[3]

[1] Cox, *Recollections of Oxford*, 1870, p. 141. At the age of 25 he assumed wig, large turned-up hat and gold-headed cane. He and his contemporaries were described in

The Oxford Medical trio.

I would not call in any one of them all,
For only 'the weakest will go to the *Wall*';
The second, like Death, that scythe-armed mower,
Will speedily make you a *peg* or two lower;
While the third with the fees he so silently earns,
Is 'the *bourn* whence no traveller ever returns'.

Circe, alias Sir C[hristopher]

'Like Circe, Sir C. can prescribe a mixt cup,
But mixtures Circeian beware to drink up.'

[2] Lord Holland, *Further Memoirs of the Whig Party*, 1807–1821.
[3] Cox, *Recollections*, p. 93.

In 1822 Dr. Kidd succeeded to the Anatomy Readership, but he abandoned the cocked hat, wig, and gold-headed cane of his predecessor. According to Tuckwell[1] he was 'a little man, trotting' about the streets in a 'spencer', a tailless great-coat then becoming obsolete, and worn only by himself and Dr. Macbride. Although spoken of by Henry Acland, with all the reverence of a grateful pupil, as 'an admirable man gifted with a real scientific insight', he appears to have let down the study of anatomy in Oxford. On the resigning of his Lee's Readership, his class consisted of one or two members of Christ Church, and one from another College, with an occasional medical apprentice from the town.

Important administrative changes occurred during Kidd's tenure of the Readership. The history of the Lee Trust is somewhat intricate, but it may be summarized as follows. The Lee estate realized a capital sum of about £30,000. This was expended in the purchase of two estates, one in Bucks, the other in Warwickshire. From the date of purchase in 1775 the income increased, and in 1825 the Dean and Chapter asked for an improved scheme which was granted by the Court of Chancery in 1827. Dr. Lee's Reader in Anatomy was to have £200 instead of £100 per annum. There was added a charge for the increase of the living of Butler's Marston (the parish in which the estate lay), and the living was limited to Westminster Students. In 1832 the Dean and Chapter again went to the Court of Chancery owing to difficulties that had arisen through the passing of an Act of Parliament restricting the use of bodies for dissection. Dr. Kidd obtained leave to lecture on models and preparations instead of on actual bodies: but the Act was repealed, or became inoperative before the Court of Chancery had adopted any conclusion. (*Report of 1852 Commission*, Part ii, p. 282.)

The arrangements at Christ Church were not such as commended themselves to any one of international experience, and Dr. Carl Gustav Carus, physician to the Court of Saxony, reported adversely.[2]

[1] *Reminiscences of Oxford*, 1901, p. 61.

[2] Carus, *The King of Saxony's journey through England and Scotland in 1844*.

We have also visited the *theatrum anatomicum*, the whole arrangements of which brought back the arrangements of Vesalius to my mind. Above the Professor's table, hung a human skeleton, and a figure showing the muscular conformation of the human subject, so that they could be let down and drawn up again by cords: the latter was that sort of preparation which Albinus was celebrated for, and is such as to cause a feeling of disgust in an uninitiated spectator. All round the theatre, behind the amphitheatrical seats of the audience, were skulls and anatomical preparations, everything quite in the antique style. Professor Kidd, a good-natured old gentleman, quite corresponded with these ancient treasures. He may, probably, formerly have had some talents, or at least some liking for personal activity and inquiry. But, at a later period, without any excitement from without in a University devoted almost entirely to philology and theology (which is indeed no *Universitas*) and without sufficient inward power and excitement, the stagnation of all philosophical study, of natural history, soon put a stop to his activity.[1]

Dr. Kidd made frequent gifts of zoological specimens to the Ashmolean Museum and evidently approved of the extension of the anthropological and anatomical series there. To the 'tatooed head of a New Zealand Chief killed in battle and dried by the natives' presented by Justly Hill of New College in 1822, Kidd added plaster casts of the crania of natives of Nookta Sound and Otaheite, and was doubtless consulted in 1824 when two examples of the anatomical craftsmanship of J. Paxton of Oxford and of the Royal College of Surgeons were presented to the Museum by the maker. They were:

A model in wax representing the distribution of the nerves of the face; consisting of the Pes anserinus, the frontal nerve, and the infra orbitary nerve, their ramifications, and their union with each other.

and

A model of a recently dissected foot, showing, 1st, the cellular and compact structure of the bones; 2nd, the muscles

[1] Atlay, *Acland*, 1903.

and their tendons; 3rd, the arteries, injected red; 4th, the veins, injected blue, and the upper portion opened to show the valves; 5th, the white nervous cords and filaments; 6th, the absorbent vessels injected with quicksilver.

To these J. S. Duncan added 'An injected foot'.

Kidd resigned in 1845. Henry Wentworth Acland was appointed in his place, and delivered his inaugural lecture on Oct. 22, 1845, in the Lecture Theatre at Christ Church. He introduced Histology into Oxford. We have the description by an original member of his class, W. Tuckwell. 'The lectures were delivered in the downstairs theatre, whence we ascended to the room above to sit at tables furnished with little railroads on which ran microscopes charged with illustrations of the lecture, alternately with trays of coffee. A few senior men came from time to time, but could not force their minds into the new groove. Dr. Ogle, applying his eye to the microscope, screwed a quarter inch right through the object, and Dr. Kidd, after examining some delicate morphological preparation, while his young colleague explained the meaning, made answer first, that he did not believe in it, and, secondly that if it were true, he did not think God meant us to know it. So we were mostly undergraduates; and greatly we enjoyed lectures, microscopes, and the discussions which Dr. Acland encouraged.'[1]

After 1850 the University took increased interest in Science. Dr. Acland, who was made Lee's Reader in 1845 and Regius Professor in 1857, was strongly of opinion that it was the business of the University to establish a vigorous school of Natural Science, but not to attempt the special training required by Medical men.[2] It would appear that in consequence of this view of Dr. Acland's (as the income of the Lee trust was still improving), the Lee's Readership in Chemistry was founded in 1857.

The Ordinance of 1858 legislated for two Lee's Readerships in Anatomy and Chemistry. In 1860 the Dean and Chapter went to Court for a further scheme, and a serious departure was made from Dr. Lee's original scheme. The

[1] Tuckwell, *Reminiscences of Oxford*, p. 45.
[2] Evidence to Commissions of 1852 and 1877.

Court sanctioned the application of a part of the revenue for Lectures in Law and Modern History, and for exhibitions to persons studying Law, Modern History, Physiology, and Mathematics; and Mr. Sidney Owen became Lee's Reader in Law and Modern History. In 1866 the Court increased the payment of the Lee's Reader in Modern History, abolished the Exhibitioners, and substituted Lecturers with permission to teach any Sciences or subjects recognized in the University Examinations. This arrangement terminated about 1869.[1] Acland's view was that the Lee Trust was available for the general purposes of Natural Science in Oxford: and this also appears to have been the view of Rolleston. This principle governed the loaning of the Collections, which were originally kept in Christ Church, and are now in the Museum on loan from the Governing Body. 'When Acland became Reader there were no Collections or preparations of any kind.'[2] The Collections were made on the Hunterian principle in order that Students who went to pursue their studies in London might find themselves at home in the Collections there (p. 283). Dr. Rolleston continued this policy, and was supported by grants from Christ Church.[3]

Lee's Reader in Anatomy was originally to reside for six months in each year: later he seems to have combined his functions in Oxford with work in London. His stipend was £200 a year. After 1858 Lee's Readers were required to reside and teach, and their income was raised from time to time till it reached the limit which the present Statute prescribes. This increase, with a decrease in proceeds from the Lee estate, has made it necessary to supplement Lee income from the corporate revenues.

It was found in 1912 that only a small fraction of the annual income devoted to Lee Professors and Readers came from the Lee estate. The Governing Body was anxious to associate the name of Lee with its contributions to Natural Science, but in view of the small proportion which the proceeds of the Lee estate bore to the complete charges upon the House, Christ Church

[1] Minutes of Governing Body of Christ Church.
[2] Report of Royal Commission of 1852, pp. 282 foll.
[3] Evidence to Royal Commission, 1877, pp. 270 foll.

thought themselves justified in making any arrangements which the needs of the University might require.

Some details of the expenditure of the Lee income from 1796 to 1860 are printed at the end of the section on Zoology since they refer principally to the study of Zoology and of *Comparative* rather than to that of *Human* Anatomy.

Note to p. 63.

EDMUND DICKENSON 'was one of those very great men whose merits are better known abroad than at home'. *Hermippus Redivivus*, 1771, p. 160.

Note to p. 92.

NATHANAEL HIGHMORE

Dr. Petty to the Hon. Mr. Boyle. Dublin, April 15, 1563.

'My cousin Highmore's curious hand hath shewn you so much of the fabric of man's body, that you cannot think but that so complete a piece as yourself will be always at some little fault or other.'

THOMAS SYDENHAM

MEDICUS IN OMNE AEVUM NOBILIS

Memorial in St. James's, Piccadilly.

IV

PHYSIOLOGY

The composite Science of Physiology had its birth in that short but prolific period when the Natural Sciences were studied as though there were no barriers between them, with the result that great and simultaneous advances were made by a band of researchers that was remarkably small. Physiology came into being when the methods of experimental Physics and Chemistry were sufficiently well based to admit of their being applied to the living organism; and in both departments the Oxford leaders of science in the seventeenth century played a conspicuous part. By showing that the by-paths of physics and chemistry could be brought into the service of humanity, they stimulated a progress which is comparable to that of the rapid exploration of the physiological properties of radium and X-rays in modern times.

Since the first names that will be mentioned are those connected with fundamental discoveries relating to the circulation and to respiration, it will not be out of place to consider the state of knowledge on these subjects before the advent of our own pioneers in the seventeenth century.

Apparently before the middle of the sixteenth century no progress was made on the teaching of Galen, and it does not seem to have occurred to any one that it was possible to advance beyond his views. Oxford students would have been taught that there were two bloods, the natural and the vital, in two practically closed systems, the veins and the arteries. The liver was the central organ of the venous system, the 'shop', as Burton of Christ Church calls it, in which the chylus was converted into blood and from which it was distributed by the veins to all parts of the body for nourishment. The veins were rather vessels containing the blood than tubes for its transmission, 'irrigating canals', as Galen called them. Galen knew the structure of the heart, the arrangement of its valves, and the direction in which blood passed, but its chief function to him was not, as it is to us, a mechanical one: the heart was the seat of life, in the left ventricle were the vital spirits generated by a mixture of inspired air and blood. By an alternate dilatation and collapse of the arteries blood and vital spirits were kept in constant motion. Galen had demonstrated that the arteries and the veins communicated at the periphery. A small quantity of the blood went, he believed, from the right side of the heart to the lungs, for their nourishment, and in this way passed to the left side of the heart; but the chief communication between the two systems was muscular through *pores in the ventricular septum*, the thick wall separating the two chief chambers of the heart.

Even after the new views of Harvey had been expounded, an author as responsible as Robert Burton of Christ Church, when summarizing the medical knowledge of his day, was still able to write that 'The left creek (i.e. ventricle) has the form of a cone, and is the seat of life, which, as a torch doth oil, draws blood unto it begetting of it spirits and fire, and as a fire in a torch so are spirits in the blood; and by that great artery called aorta, it sends vital spirits over the body, and takes air from the lungs'.[1]

Such was the darkness the pioneer physiologists broke through. The honour of the first step forward is due to a Spaniard, Michael Servetus,[2] of Villanueva da Sigena, physician and martyr to science, burnt on the field of Champel at Geneva, an offering to the Moloch of theology. Sir William Osler has noted that Servetus had the advantage of the most stimulating education in anatomy to be had then in Europe. He had studied in Paris with Sylvius, and had been prosector to Guinther, two of the most ardent of the revivers of the Galenic

[1] *Anatomy of Melancholy*, p. 175, quoted in Osler, *Servetus*. 8vo, Lond. 1909.

[2] Servetus lived from 1509? to 1553.

anatomy; he was fellow-student and prosector with Vesalius, and by his genius he proved a worthy colleague. He found out that the *venous blood on the right side of the heart passes to the left through the lungs*, i.e. he discovered the pulmonary or lesser circulation. But so little did he appreciate the significance of his discovery that, instead of making it the theme of a treatise, he merely used it as an illustration in a discussion on the nature of the Holy Spirit in the fifth book of his *Christianismi Restitutio*. There he circumstantially narrates how the blood is transmitted from the right ventricle, not through the septum or mid wall of the heart, but 'from the pulmonary artery to the pulmonary vein, by a lengthened passage through the lungs, in the course of which it is elaborated and becomes of a crimson[1] colour. Mingled with the inspired air in this passage, and freed from fuliginous vapours by the act of expiration, the mixture being now complete in every respect, and the blood become fit dwelling-place of the vital spirit, it is finally attracted by the diastole, and reaches the left ventricle of the heart.'[2]

The discovery was soon 'in the air'. Realdus Colombus in 1559 and Caesalpinus in 1569 have each been held to have first discerned the fact of the lesser circulation; but neither they nor any one else can be regarded as having forestalled Harvey as the first to discover the general circulation and to demonstrate the complete circulation of the blood by experimental methods.

But, on the whole, physiology at the time of Harvey was as Galen had left it; and the anatomy of man, as taught in the schools, was based on the anatomy of monkeys. Meanwhile the practice of exact observation was rapidly gaining ground in all Sciences. Although in Medicine the great name of the illustrious Harvey, 'the greatest physiologist the world has seen' (Munk), will at once rise up in the mind of any one who may be assessing

[1] Dr. Singer has pointed out that Servetus wrote *flavus*, which can hardly be translated crimson.

[2] R. Willis's (*Servetus and Calvin*, 1877, pp. 207–8) translation of the passage in the *Christianismi Restitutio* (1553, pp. 170–1) dealing with the pulmonary circulation. See also his *William Harvey*, 1878, pp. 70–86.

the contributions of our University to the science of Physiology, yet Oxford can hardly lay claim to Harvey, because his views on the Circulation of the Blood were expounded, long before he came up to Oxford, in the Lumleian lectures delivered before the College of Physicians from 1616 onwards, and they were published in his *Exercitatio Anatomica de Motu Cordis et Sanguinis* in 1628, just seventeen years before a Royal mandate elected him Warden of Merton College.

But if Cambridge trained the man who discovered the Circulation, it was Oxford that produced the virtual discoverer of oxygen, JOHN MAYOW, of All Souls College, on whose groundwork rests all our later knowledge of Respiration. In his own language, 'Respiration consists in the separation from the air by the lungs, and the intermixture with the blood-mass, of certain particles absolutely necessary to animal life, and the loss by the inspired air of some of its elasticity. The particles of the air, absorbed during respiration, are designed to convert the black or venous blood into the red or arterial.' Mayow also declared the placenta to be the lungs of the foetus, and knew that stimulation of the third nerve contracts the pupil.

Oxford was, however, connected with Harvey's later work, on Generation, 'a golden fleece, a vast treasure . . . of admirable observations' (Sir George Ent[1]); it is entitled *Exercitationes de Generatione Animalium, quibus accedunt quaedam de Partu, de Membranis ac Humoribus Uteri: & de Conceptione*, 4to, 1651. Its immediate success may be gauged by the fact that four editions appeared in 1651. We know that in the preliminary studies for this work GEORGE BATHURST of Trinity College assisted Harvey. He kept a sitting hen in his chamber at Trinity to incubate the eggs which they opened daily in order to ascertain the progress and way of generation. It is possibly at this time that another scientific Fellow of the College, the ingenious FRANCIS POTTER, B.D. (1594–1678), whose name has been mentioned several times already in connexion with his mechanical and horological contrivances, may have

[1] Geo. Ent, of Sidney Sussex College, incorporated at Oxford in 1638. His Anatomy Lectures are contained in MS. Ashmole 1476.

made the acquaintance of Harvey and have learnt from the master's own lips of the physiology of Circulation. And having thus acquired first-hand knowledge of experiments, his active mechanical mind may have been led to imagine the possibility of the transfusion of blood from one animal to another. John Aubrey[1] records the circumstances as follows:

[At] the Epiphanie, 1649, when I was at his house, he then told me his notion of curing diseases, etc. by transfusion of bloud out of one man into another, and that the hint came into his head reflecting on Ovid's story of Medea and Jason, and that this was a matter of ten yeares before that time. About a yeare after he and I went to trye the experiment, but 'twas on a hen, and the creature to little, and our tooles not good: I then sent him a surgeon's lancet. Anno . . . I received a letter from him concerning this subject, which many yeares since I shewed, and was read and entred in the bookes of the Royall Societie, for Dr. Lower would have arrogated the invention to himself and now one (Richard Griffith) Dr. of Physique, of Richmond is publishing a booke of the transfusion of bloud,[2] and disires to insert Mr. Potter's letter: which I here annex *in perpetuam rei memoriam*.

Worthy Sir,

I am sorrie that I can as yet give you no better account of that experiment of which you desire to heare. I am as yet frustrated *in ipso limine* (but it is by my owne unexpertnes, who never attempted any such thing upon any creature before); for I cannot, although I have tried divers times, strike the veine so as to make him bleed in any considerable quantity.

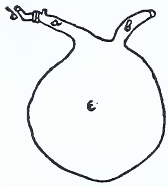
I have prepared a little cleare transparent vessel (like unto a bladder), made of the craw of a pullet; and I have fastened an ivory pipe to one of the neckes of it, and I have put it into a veine which is most conspicuous about the lowest joint of the hinder legges; and yet I cannot procure above 2 or 3 drops of blood to come into the pipe or the bladder.

I would have sent this bladder and pipe in my letter unto you but that I feare it might be an occasion that my letter might not come into your hands.—This is the rude figure of

[1] Aubrey's *Brief Lives*, ed. A. Clark, 1898, ii, pp. 166–7.

[2] This page is annotated in another hand (not Potter's). 'Hanc designationem Dr. Harveus frivolam et impossibilem omnino esse asseruit; sed tamen quaere. Consult Dr. Glisson.'

it which I do here set down because I thinke it the most convenient for the purpose :—



a = the necke of the craw which goeth to the mouth.

b = the other necke which goeth from the craw to the gissar. Another pipe may be tied to this end and put into the veine of another living creature at the same time.

d = a little crooked ivory pipe, fastened (as a clister pipe is) to a bladder.

e = the capacity of the craw or bladder.

A general treatise on physiology, entitled *Oeconomia animalis*, first appeared in London in 1659 from the pen of Dr. Walter Charleton of Magdalen Hall, who is mentioned on p. 35 in connexion with his theories as to the cause of disease and on p. 100 as a zoologist. His work on the Animal oeconomy was afterwards reprinted with alterations as *Exercitationes Physico-anatomicae.* In 1683 he published *Three Anatomie Lectures* which dealt with the physiology of the heart and the circulation. He had been appointed to a post in London in 1664 'to have the care of dissecting bodies for one year'.

The Physiology of Speech was considered by Professor Wallis (1616–1703) in his *de Loquela*,[1] and further in a letter to Robert Boyle dated Oxford, March 14, 1661/2, and printed in the *Philosophical Transactions* for July 18, 1670. Wallis had been educated at Emmanuel College, and was the first pupil of the Regius Professor, Francis Glisson, to maintain Harvey's doctrine of the Circulation of the Blood. He incorporated as an M.A. of Exeter College in 1649, and connected himself with the County by marrying on February 1, 1682, Miss Elizabeth Harris, of Sounden House. Being financially in easy circumstances, he was able to cultivate a variety of interests. In several cases he was successful in restoring speech to the dumb,[2] a matter in which Dr. William Holder, the brother-in-law of Sir Christopher Wren, was also interested.[3] In these studies both workers may have

[1] An appendix to his *Grammatica Linguae Anglicanae*, Oxford, 1653.

[2] *Phil. Trans.*, July 18, 1670.

[3] *Phil. Trans.* 1669; *Elements of Speech*, 8vo, Lond. 1669.

profited by the pioneer work of Wilkins, who long before 1669 had showed how the epiglottis, larynx, aspera arteria, and oesophagus help in the production of the various speech sounds or phonetics. Wallis rose superior to the troubled times in which he lived, for in his own words he declares that by 'a moderate compliance with the powers in being, I have been able to live easy and useful, though not great'.

Thomas Willis, like Sylvius, made a reputation by research on the structure and blood-supply of the brain, but his work is superior in many ways to that of his Flemish contemporary. Withington, indeed, goes so far as to estimate Willis's observations on the action of drugs as second only (in that age) to those of Sydenham, while his speculations on the part played in pathology by the nervous system, or 'animal spirits', anticipate some of the best results of the Vitalistic School. His views *De Urinis* were communicated in the form of a letter to Dr. Ralph Bathurst of Trinity whom he addressed as 'Ornatissime Domine'. Doubtless the letter was in the hands of Boyle when he formulated his own views upon the same subject.

Willis's pupils included Wren, Lower, Mayow, and Locke.

Anatomical and Medical subjects seem always to have engaged much of Wren's attention. He may have been first led to them by sympathy with his sister, Mrs. Holder's, pursuits. She was very skilful in healing, and is said to have cured Charles II of a hurt in his hand (Phillimore, p. 224). His cousin, Thomas Wren, in his early days had been a practising physician, and Wren himself had experience as demonstrating assistant to Dr. Scarborough. We also read of his being busied with an invention for purifying and fumigating sick rooms by nitrous fumes.[1]

At the time when Wren was studying anatomy as well as astronomy at All Souls College, the fundamental discoveries in the physiology of respiration and circulation were still recent. And although Harvey was dead, he had successors worthy of him amongst the band of workers living in the prolific years that followed the

[1] *Parentalia*, p. 213. Twelve pages of the *Parentalia* are devoted to Wren's anatomical and medical pursuits.

Restoration. Before Wren left Oxford to take up the duties of the Gresham professorship he made experiments which led to the invention of a method for the transfusion of blood from one animal to another. This appears from a letter of Boyle dated 1665, in which he speaks of the experiments 'started by Wren at Oxford about six years agone, long before others, as we know, thought of such a thing' (*D. N. B.*). Wren was especially interested in the possibility of injecting fluids containing remedial agents directly into the veins of animals, but whether he had heard of Potter's earlier experiments of transfusing blood is not known. The account as given by Plot [1] is as follows:

> The learned and ingenious Sir Christopher Wren . . . was the first author of that noble experiment of injecting liquors into the veins of animals, first exhibited to the meetings at Oxford, about the year 1656,[2] and then carried by some Germans and published abroad; by which operation divers animals were at once purged, vomited, intoxicated, kill'd or revived, according to the quality of the liquor injected (*Hist. R. Soc.*), whereof we have several instances in our *Phil. Trans.* of 4 Dec. 1665. From whence arose many other new experiments.
>
> Particularly that of transfusing of blood out of one animal into another, first performed here at Oxford about the latter end of February 1665 by that most exquisite Anatomist and eminent Physician Dr. Richard Lower (1631–91), Student of Christ Church.[3]

By means of long tubes the blood from the vertebral artery of one dog was made to pass into the jugular vein of another, and it appeared proved that there was no reason to fear any mischief, for the character or nature of one animal was not likely to be changed by injecting into its veins the blood of another. These experiments of 1665 are reported on by John Ward,[4] who, perhaps, rode over to Oxford from Stratford-on-Avon to witness them.

With the enthusiasm of a true experimentalist Lower

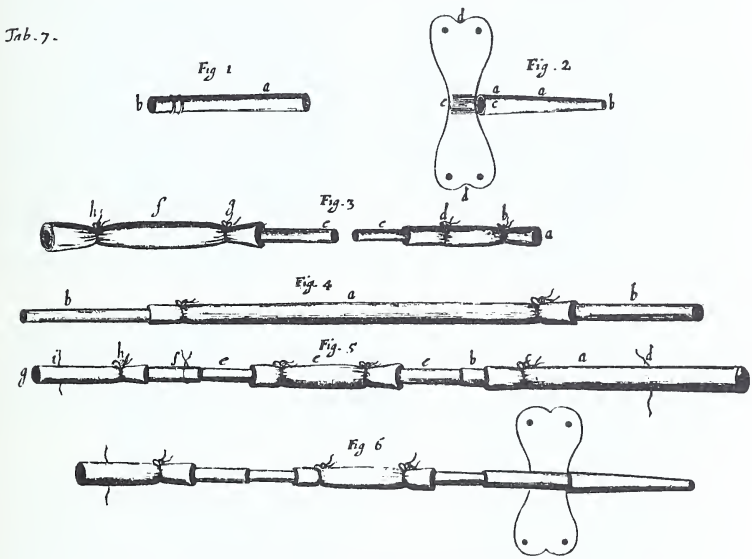
[1] Plot, *Nat. History of Oxfordshire*, 1677, p. 304.

[2] Timothy Clarck, *Letter* in *Phil. Trans*, No. 35.

[3] Lower, *The success of the experiment of transfusing the blood of one animal into another. Phil. Trans.* 1666, p. 352. The experiment was performed in the presence of Dr. Wallis and Dr. Millington and others.

[4] *Med. Soc. Trans.*, vol. 43, p. 277.

'intended the experiment to be prosecuted to the utmost variety the subject will beare; as by exchanging the blood of Old and Young, Sick and Healthy, Hot and Cold, Fierce and Fearful, Tame and Wild, animals'. He also considered it proved that 'those animals that want blood or have corrupt blood may be supplied from others with a sufficient quantity and of such as is good'.



LOWER'S TRANSFUSION TUBES, 1666.

Fig. 1. A silver tube *a*, ending in a nozzle *b*, with two raised rings to prevent the ligatured vessels from slipping off.
Fig. 2. Silver tube for passing blood into a man's arm. The end *b* is inserted into the brachial vein and the tube is kept in place by a thread passed through the holes in the lugs *d d*.
Fig. 3. To the tubes *c c* are tied a cervical artery *a* and a jugular vein *f* by ligatures *d* and *g* respectively. Knots that can be easily tightened or loosened at *b* and *h* regulate the blood flow.
Fig. 4. As india-rubber tubing for connexions was not available, Lower used a length of cervical artery (*a*) to connect tubes *b b*.
Fig. 5. The complete apparatus for transfusing from one animal into another. *a*. Jugular vein into which blood from artery *g* of another animal is to be passed. Both vein and artery are tied to silver tubes *b* and *f*, at *c* and *h*. Tubes *b* and *f* are then joined by *e e e*, the connecting tube described in fig. 4.
Fig. 6. A similar apparatus for passing blood from an animal into a man.

So sensational an operation and one of such obvious utility could not fail to find many imitators. In 1667 Dr. King transfused from a vein instead of an artery, and he experimented with a sheep. In France, Denis and Gayant repeated the process, and with such success that it was alleged that a sheep 'almost blind with age', that could hardly stir before, had two hours after a transfusion leapt and frisked. And the French savants unwittingly did Lower the greatest honour they could when they claimed for themselves the priority, but in October 1667 the Royal Society published 'a Vindication of this discovery from Usurpers'. In the following month a transfusion was practised on a man. Dr. Lower and Dr. King in the presence of 'considerable and intelligent persons' transfused the blood of a sheep into one Arthur Coga. After the operation the subject 'found himself very well' and 'urgeth us to have the experiment repeated upon him'.

In 1669, three years after going to London, Lower published the work by which he is best remembered, the *Tractatus de Corde item de Motu et Colore Sanguinis*. It was dedicated to Dr. T. Millington and found immediate acceptance at the time.

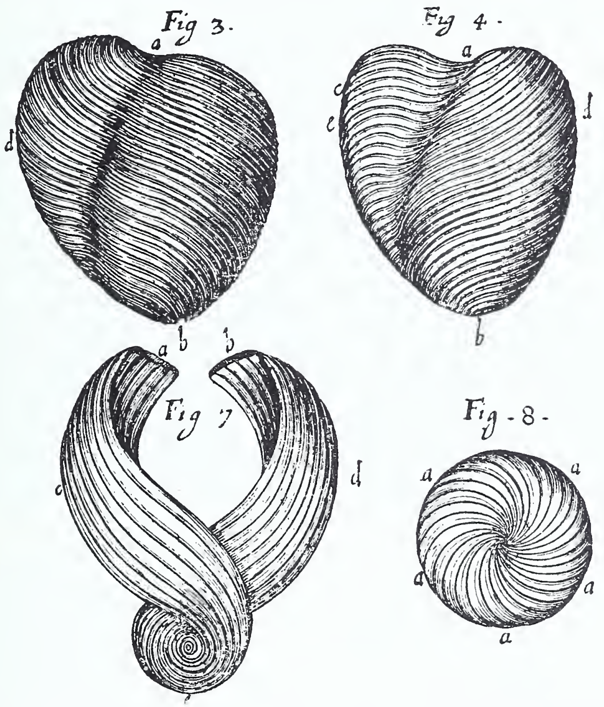
> Lower was the first that published the true method of dividing it [the heart] into its several Muscles, illustrating the same with most elegant cuts; and by attributing to it a Muscular motion, and showing several ways how it may be impeded or disturbed, has done a good piece of service towards the advancement of the Pathological part of Physick.[1]

He proved, in addition, that the beating of the heart is influenced by nerves going to the heart muscle, by ligaturing the vagus nerve, whereby the heart-beats became irregular and feeble. His experiment was repeated by the Webers in 1845; but with the advance of physiological knowledge they showed that such ligatures stimulated the nerves, exciting a nervous impulse that inhibited the heart's motion. The recognition of the real significance of respiration was due in no small measure to Lower's experiments and explanation of the difference in colour between arterial and venous blood, a matter which will be mentioned again later.

[1] Plot, *loc. cit.*, p. 304.

His computation of the frequency of the Blood's circulation through the heart is very ingenious, and the cause he assigns of the florid colour of it when emitted, I think is new, and believe generally received.[1]

Lower's last contribution to physiology was his



LOWER'S DIAGRAMS SHOWING THE SPIRAL ARRANGEMENT OF THE HEART MUSCLES. 1669.

Dissertatio de Origine Catarrhi, 1672, wherein he denies the old doctrine that catarrhal defluxions come from the brain.

Having discovered the channels that carry away the serum that is separated by the glandules of the brain, to be those two foramina in the os cuneiforme, which empty it into the jugular veins, he has sufficiently detected how far the Ancients were mistaken, in making the causes of several distempers to

[1] Plot, *loc. cit.*, p. 305.

be defluxions or humours falling from the brain. Willis mentions this passage, but it is believed to be Lower's invention.[1]

The stimulating effect of Lower's researches is very clearly shown in the Diary of one of his pupils, John Ward of Christ Church.[2]

The functions of the spleen are mentioned several times. 'The recurrent nerves in a dog's neck being cut ye dog afterwards could not bark.' 'Mr. Lower cut a dogges windpipe and let him run about. Hee had a week so hee could not smell, but would eat anything as I am told.' 'When one would discover ye ductus chyliferus of Pecquet presse ye Mesenterie somewhat hard and a thinne pellucid liquor will come out at ye top.' 'Inquire whether there is any such thing as a woman having a suture down her forehead as people commonly report. I have searched 34 skulls or thereabouts, and of these all I found but 4 wch had a suture downe ye forehead to ye very nose: another which seemed to have a squamiferous suture upon ye vertex and which I admired much att. I suppose nature does vary in such things and I wish I could discover something of her operations, especially whether epileptick persons have any sutures.'

'View ye blood of all animals as to its thickness or thinness; yt of Turkies seems to me to be very thick.' 'Turkey's blood again a 2nd time observed and found to be thick immediately after its being out, wch well might bee in regard to its fulness of spirits wch soon flies away and so leaves ye masse very thick, or whether ye blood naturally is thicker yn that of other animals. Remember to kill a turkey and another fowl together and observe wch blood soonest coagulates.'

The activity of the Oxford physiologists attracted several members of the sister University, among whom was Walter Needham. He came to Oxford in 1660 and attended the lectures of Willis and of his old Westminster schoolfellow Lower, his senior by a year. In 1664 Dr. Needham related to the Royal Society how in

[1] Plot, *loc. cit.*, p. 305.

[2] *John Ward and his Diary. Medical Society's Transactions*, 1917, vol. 40, pp. 16 and 17.

Oxford they had by blowing into the receptaculum chyli continued the pulse of the heart, without the exercise of the lungs. No wonder that when writing to Boyle on November 17, 1664, Oldenburg rejoiced to find anatomical experiments and observations so well pursued at Oxford. And undoubtedly the most important of these experiments and observations were those relating to the physiology of Respiration.

The fundamental experiment in respiration was due to ROBERT BOYLE, who showed in 1660 that if even a part of the air were removed from a receiver by his new pneumatic engine or air-pump, any animal that might be shut up in it would die, and that in this there is some similarity between the breathing of an animal and the burning of a candle. Air is necessary for both. At the early meetings of the Royal Society these experiments were shown over and over again to delighted spectators.[1] But it was not conclusively proved that the movements of the chest wall had not as much to do with respiration as the air, until 1667 when at the meeting of the Society on October 24, HOOKE showed that an animal could be kept alive merely by blowing air through its lungs by bellows, and that therefore breathing movements of the lungs were an accessory, but not essential to respiration, as some had previously believed.

The next step was the explanation of the difference between arterial and venous blood. From remote antiquity anatomists had believed that there was a profound difference between the dark blood in the veins and the bright blood in the arteries, and that if one ever changed into the other, it did so in the heart. To RICHARD LOWER is due the discovery that the blood in the arteries is the same as that in the veins, and that the difference in colour is due simply to exposure to air in the lungs. His observations on the blood-flow[2] caused him to doubt 'whether there could be that great difference between

[1] Boyle's *Pneumatical Experiments* on animals in 1662–3 included experiments on ducks, vipers, grass snakes, frogs, kitlings, oysters, crawfish, gudgeon, greenfinch, sparrow, mouse, linnet, tadpoles, and various insects, &c. He also began investigating the phenomena of phosphorescence with his pneumatic engine, and came to the conclusion that air had a good deal to do with it.

[2] Lower, *Tractatus de corde*, 1669.

venous and arterial blood which the vulgar think', but he was unable to satisfy himself of the correctness of the view, until he availed himself of the method of artificial respiration devised by Hooke. He then noticed that the blood in the pulmonary veins of an animal kept alive by artificial respiration was bright red in colour. He further saw that when the artificial respiration was stopped, when no fresh air was driven into the lungs, when the animal was suffocated, the blood in the pulmonary veins and in the left side of the heart became dark and venous. He took dark venous blood from the vena cava, and injected it artificially through the lungs. He found that so long as insufflation of the lungs was kept up the blood ran out of the pulmonary veins florid in colour, but ran out dark and unchanged if no fresh air was driven into the lungs.[1] Having thus assured himself that air in the lungs caused the blood to change colour, he confirmed his conclusion by observing that a clot of dark venous blood soon becomes florid when exposed to the air, and finally he inferred that the change of colour was due to air being actually taken into the blood, i.e. that arterial blood = venous blood + air, and that the same fresh air is as essential to efficient breathing as it is to a flame, 'in fact where a fire burns readily, there can we easily breathe'.

It will be noticed that at this stage 'pure air' was believed to be an elementary substance and not a mixture, although it might have other things mixed with it that would thereby render it foul or at any rate less pure.

The crowning discovery of the secret of respiration was made by Mayow, a chemist who had had the advantage of assisting Lower with his dissections and experiments. He was almost certainly present at one of Lower's transfusion experiments, for he has placed on record his surprise that an animal when transfused with bright blood 'scarcely found it necessary to draw his breath at all, although before he had been breathing deeply and panting'.

John Mayow (1640–79) of Wadham College, was, like Lower, a Cornishman by descent, although he was born in the London parish of St. Dunstan in the West.

[1] M. Foster, *History of Physiology.*

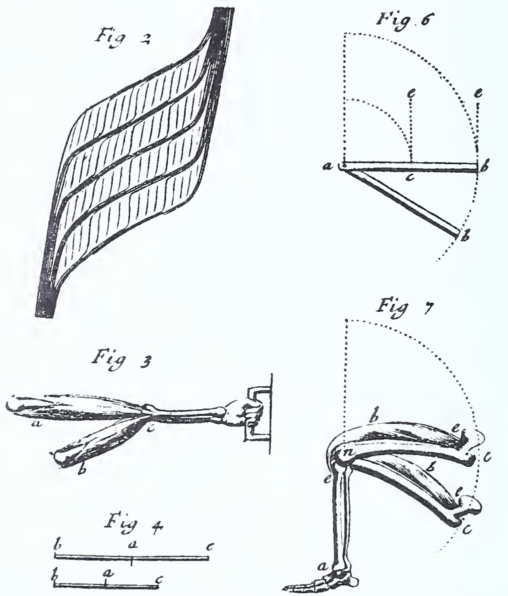
Gifted with extraordinary talents, the discoverer of oxygen became a Fellow of All Souls College at the age of seventeen. There he studied law and, fortunately for science, medicine. In a short time he had not only mastered the outlines of anatomy and chemistry, as they were then taught, but had attempted to get at the general or elementary principles that underlay the facts. In his twenty-eighth year he published his first work, the *Tractatus de Respiratione*, 1668,[1] in which was first clearly stated the existence of a special gas in the air necessary both for life and combustion. (See vol. i, p. 31.)

His chemical researches on the nature of nitre and on combustion indisputably proved that pure air was not a simple elementary body, as had been previously supposed, but that a part of it consisted of a gas that was necessary for the maintenance of combustion. This part was the 'more active and subtle part', to which he gave the name of 'nitro-aereal particles' because he found that they were also present in nitre. Nor did he stop here. Having shown that his nitro-aereal particles, which a century later were called *oxygen*, caused the change of colour of the blood in the lungs, and were essential to life, he argued that they were also essential to the vital activity of other parts of the body, to the muscles for their muscular contraction, and to the brain for its generation of animal spirits. And lastly, having noted that the heat given out by a candle flame is due to the burning in nitro-aereal particles, he also inferred that animal heat must be due to a similar cause, and that the greater heat which is the result of violent exercise must be due to the greater supply of nitro-aereal particles caused by increased respiration.

His idea that the source of body heat is situated in the muscles then lay dormant for two centuries, when Helmholtz once more called it into life.

[1] Mr. J. Fulton informs me that there are copies of the *Tractatus Duo* in Bodley and at the R. College of Physicians: the title of the two tracts (*de Respiratione* and *de Rachitide*) is dated 1669, and the second title-page, that of the *de Rachitide*, is dated 1668. The Leiden edition 1671 is in Brit. Mus. and Surgeon-General's Library. English transl. by Jury with Greek title Ραχιτιδη, 1685, is in B. M. and Bodley. A 1687 edit. Oxford with the title *Mothers Family Physician* is under Mayow in the Surgeon-General's Library. The *Tractatus Duo* also appeared in 1708 (B. M., Bodley, and S.-G. L.).

Owing to his early death, and partly, too, to the misrepresentation of his views in the unintelligent abstracts, hurriedly drafted by Hooke for the Philosophical Transactions, the transcendent merit of Mayow's work was not recognized in Britain until it was rediscovered by Drs. Beddoes and Yeats at the end of the eighteenth century.



Mayow's Diagrams to explain Muscular Action. 1674.

Fig. 2. Arrangement of Muscular Fibrillae.
Figs. 3 and 4. Muscular Contraction.
Figs. 6 and 7. Action of Muscles used in Jumping.

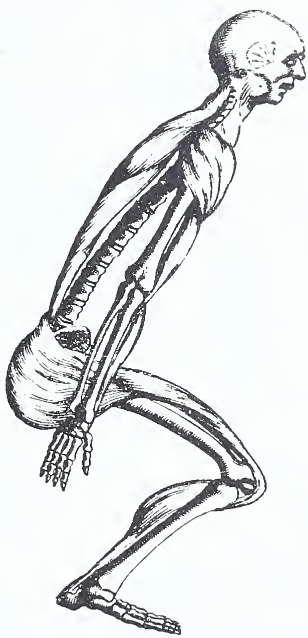
Of the tens of thousands who have breathed Sheldonian air at the last two hundred and fifty Encaenias, we wonder how many have known that either in the Arena or in the cellar beneath it, was printed in 1674 the work of the first man in the world who was able correctly to explain their Respiration, the *Tractatus Quinque* of the discoverer of Oxygen, John Mayow.[1]

[1] Joh. Mayow, *Tractatus Quinque Medico-physici. Quorum primus agit de Sal-nitro et Spiritu nitro-aereo. Secundus de Respiratione. Tertius de Respiratione Foetus in Utero et Ovo. Quartus de Motu*

'I flatter myself that henceforward Mayow will share the glory of Verulam and Newton, and be named with due respect by all.'[1]

In the fourth Tract he taught that the contraction of the heart was more likely to be due to the Fibrillae,

Fig 8



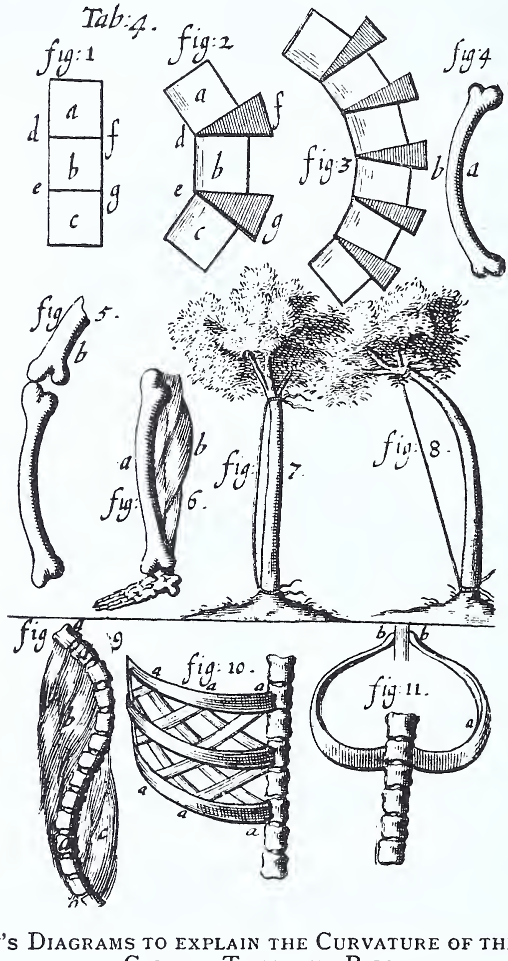
THE MUSCLES USED IN JUMPING.
After Mayow, 1674.

transversely set into the greater fibres, than to the carneous fibres, by reason both of their position and size and number. The fifth Tract gives by far the best of

Musculari, et spiritibus Animalibus. Ultimus de Rhachitide. Oxonii, e Theatro Sheldoniano. 1674. It also appeared at the Hague in 1681 and in foreign edits. Dutch 1684, German 1799, French 1810. There is an excellent account of Richard Lower and John Mayow by Francis Gotch. Oxford, 1908.

[1] Beddoes' *Chemical Experiments and Opinions, extracted from a work published in the last century.* Oxford, 1790.

the earlier writers' accounts we have, of the reason for the incurvation of the leg-bones and spine in Rickets.



MAYOW'S DIAGRAMS TO EXPLAIN THE CURVATURE OF THE SPINAL COLUMN, TIBIA, AND RIBS.
Mayow, *De Rachitide.*

Some really remarkable *Memoirs for the Natural History of Humane Blood, especially The Spirit of that Liquor* appeared in 1683/4 from the fertile pen of ROBERT

Boyle. Although, as he acknowledged in the preface addressed to the Ingenious and Learned Doctor J. L. [John Locke], he 'being no profess'd Physician, . . . had not the Opportunities of examining that [the blood] of Sick Persons molested with particular Diseases', yet he set out thirty heads under which observations ought to be made in order to complete a first survey of the subject.

His headings or 'titles' were:

1. Of the Colours of Humane Blood Arterial and Venal.
2. Of the Taste ,,
3. Of the Odours ,,
4. Of the Heat ,,
5. Of the Inflammability ,,
6. Of the Aerial Particles naturally mixed with it.
7. Of the Specifick Gravity of blood entire.
8. Of the Specifick Gravity of the two obvious parts, the Red (and Fibrous) and the Serous.
9. Of the Consistence of entire blood.
10. Of the Disposition of blood to Concretion, and the time wherein it is performed.
11. Of the Liquors and Salts that coagulate blood.
12. Of the Liquors and Salts that impede or dissolve its coagulation.
13. Of the Liquors and Salts that preserve it.
14. Of the Mixtures that Humane blood may admit from Aliments.
15. Of the Spontaneous or natural Analysis of blood into a Serous and a Fibrous part.
16. Of the respective Quantities of the Serous and Fibrous parts.
17. Of the Differences between the Serous and Fibrous parts.
18. Of the Artificial or Chymical Analysis of blood, and first of its Spirit.
19. Of the Vol. salt of blood and its Figures.
20. Of the Phlegm of Distill'd Humane Blood.
21. Of the two Oyls of Humane Blood.
22. Of the Fixt Salt of ,, ,,
23. Of the *Terra Damnata* of Humane Blood.
24. Of the Proportion of the differing Substances chymically obtained from Humane Blood.
25. Of the Fermentation or Putrefaction of Humane Blood, and its Phaenomena.

26. Of the Mechanical uses of Humane Blood, as in Husbandry, etc.
27. Of the Chymical uses of Humane Blood.
28. Of the Medicinal uses of Humane Blood.
29. Of the Difference between Humane Blood as 'tis found in sound Persons differingly constituted and circumstantiated, as men, women (when menstruous, and when not), Children, Moors, Negro's, etc.
30. Of the Affinity and Difference between the Blood of Men, and that of divers other Animals, as Quadrupeds, Birds, Fishes, and Sanguineous Insects.

After this amazingly exhaustive treatment of his subject, Boyle goes on to say

I do not think it unlikely that some of the Titles of our intended History of the Blood and a greater number of the particulars that you will meet with in it, may seem frivolous to you at the first perusal. But perhaps in process of time, these very things will not appear impertinent, nor be found useless.

After suggesting that other liquors, such as Gall, *Lympha*, *Succus Pancreaticus*, Spittle, and Milk might be advantageously treated of in the same manner, he subjoins a 'set of Titles for the History of Urine'. 'I think Urine to be a Liquor which, as much despis'd as it is by others deserves to be solicitously enquir'd into by Physicians, Naturalists and upon special Accounts by Chymists; who will perhaps be excited to seek and hope for great matters, both for Medicine and Alchymy, from this Liquor skilfully handled, when they consider that the *Phosphorus*, of which I have elsewhere related so many new, and some of them surprizing, *Phaenomena*, is made, at least according to my way of Meer Urine by a simple Distillation.'

Boyle's Titles for the Natural History of Humane Urine emitted by Healthy men are thirty-one in number and they correspond so closely with the Titles for the history of the Blood, that we need not reprint them at length. The following titles are adapted to the special nature of urine.

9. Of the Differences between fresh and stale Humane Urine.
11. Of the Spontaneous Separation of Parts in Humane Urine.

12. Of the vulgar Analysis of Humane Urine by Distillation.
15. Of the Spirits of Humane Urine.
16. Of the Phlegm of ,, ,,
17. Of the Volatile Salt of Humane Urine.
18. Of the Fixt Salt of ,, ,,
19. Of the compounded Salt of ,, ,,
20. Of the shining Substances obtainable from Humane Urine.
21. Of the Salt that is predominant in Humane Urine.
22. Of the Empyreumatical Oyl, or Oyls of Humane Urine.
23. Of the *Mellago*, or Rob of Humane Urine, and its uses.
25. Of some accidental Differences of Humane Urine, as 'tis emitted in the morning, or at certain Distances from meat, or after the use of certain Aliments, or Medicaments, as Sparagus, Turpentine etc. Or at differing Seasons of the year as Winter, Summer etc.
28. Of the Affinity and Difference between Urine, Blood, Gaul, Milk etc. and divers other Liquors, or Juices belonging to the Animal Kingdom particularly of the comparison between Humane Urine and that of Beasts.

Boyle certainly discovered that blood serum and urine behave differently when acted on by acids, for from the former he separated 'some white Concretions that quickly subsided to the bottom and there appear'd like a very light and tender Cheese-Curd'[1]: an observation of first-class importance.

Several of the meetings of the Oxford Philosophical Society, 1683-90, were taken up with discussions of physiological subjects.—LEE of Brasenose College read a discourse on Digestion in Aug. 1684, which was further expanded by Dr. W. MUSGRAVE of New College at subsequent meetings.[2] The latter experimentalist carried out several experiments on dogs with a view to settling certain questions connected with the Circulation, and the chemical members of the Society were constantly engaged on the investigation of organic substances.

An early attempt at estimating the values of certain constants relating to the physiology of Circulation was made by JAMES KEILL (1673–1719) by a method of calcu-

[1] Boyle, *Nat. Hist. of Humane Blood*, 1683, p. 72.
[2] To be printed in vol. iv of this work.

lation.[1] Having imbibed some mathematical notions from his elder brother John, he proceeded to discuss by mathematical methods the physiology of secretion, the amount of blood in the body, and the muscular motion and force of the heart. He computed the velocity of the blood current to be 156 ft. per minute (too low); the force of the heart's systole to be 5 oz. (now 3·6 foot-lb.); the quantity of blood expelled by the heart at each beat at 2 oz. (now 6 oz.). The results were adversely criticized by Dr. Jurin, a most skilled controversialist.

For a brief period in 1708 elementary instruction in Physiology was given by Dr. John Keill, the mathematician, at Christ Church, in his course of lectures on Experimental Philosophy. Keill is reported to have taught that there was air in the Thorax, outside the lungs, though some people opposed that opinion. Desaguliers, another physicist, used regularly to demonstrate the 'Air' in the blood by showing how it frothed when put into a receiver exhausted by an air-pump.[2]

About the middle of the century the science was sufficiently advanced to encourage the hope that regular courses of lectures might be given in it; and Dr. Malcolm Flemyng (*d.* 1764), a pupil of Monro at Edinburgh and of Boerhaave at Leyden, wrote in Feb. 1753 to Haller, to suggest the possibility of teaching physiology at Oxford. Flemyng is remembered for his realization that motor and sensory nerves are anatomically distinct.[3]

Meanwhile researches of a more practical order were not uncommon. We gather from the diary of the Rev. James Woodforde of New College that he and his friends anticipated a recent research of Dr. H. M. Vernon on *The influence of dilution on the Toxic action of alcoholic liquids*.[4] But whereas Vernon tested the result of drinking alcohol by typewriting, Woodforde's friend

[1] Keill went into practice in Northampton in 1703. His principal works were *The Anatomy of the Human Body*, 1698 (15th edit. 1771); *An Account of the Animal Secretion, the Quantity of Blood in the Humane Body and Muscular Motion*, 1708, of which the 4th edit. contained 'A Dissertation concerning the Force of the Heart', by James Jurin, M.D., with Dr. Keill's Answer and Dr. Jurin's Reply.

[2] Desaguliers, p. 404.

[3] *Dict. Nat. Biog.*

[4] Vernon, *Brit. Journal of Inebriety*, Oct. 1920.

attempted to test it by writing out a chapter of the Bible by hand.

1761. Nov. 4. Dyer laid Williams 2*s.* 6*d.* that he drank 3 Pints of Wine in 3 Hours, and that he wrote 5 verses out of the Bible right, but he lost. He did it in the B. C. R., he drank all the Wine, but could not write right for his Life. He was immensely drunk about 5 Minutes afterwards.[1]

Dr. THOMAS BEDDOES, who had acted as reader in Chemistry from 1788 to 1793, had a medical training that enabled him to turn his chemical knowledge to good account. In university teaching in the eighteenth century the two sciences were very closely associated. At Glasgow Black professed both Anatomy and Chemistry, and at Edinburgh Medicine and Chemistry were one. Humphrey Davy began as apprentice to an apothecary and surgeon. It was the golden age of pneumatic chemistry. What more natural than that Dr. Beddoes, hearing of the fact, recently discovered, that every newly-isolated gas had physiological effects of its own, should foresee important therapeutical applications. He thereupon abandoned the study of pure, for that of applied science, and founded a 'Pneumatic Institution' at Bristol, perhaps hoping for a satisfactory return from the new venture. Davy was put in charge of the laboratory, and the result, his discovery of the valuable anaesthetic nitrous oxide or laughing gas, is far famed. The effects of the new gas were soon made known by a sister-in-law of Dr. Beddoes, Maria Edgeworth.

'A young man, a Mr. Davy, at Dr. Beddoes', who has applied himself much to chemistry, has made some discoveries of importance, and enthusiastically expects wonders will be performed by the use of certain gases, which inebriate in the most delightful manner, having the oblivious effects of Lethe, and at the same time giving the rapturous sensations of the Nectar of the Gods! Pleasure even to madness is the consequence of this draught. But faith, great faith, is, I believe, necessary to produce any effect upon the drinkers, and I have seen some of the adventurous philosophers who sought in

[1] *The Diary of a Country Parson: The Reverend James Woodforde 1758–1781.* Oxford, 1924.

vain for satisfaction in the bag of "Gaseous Oxyd", and found nothing but a sick stomach and a giddy head.'

In another contemporary it is reported that

> Dr. Beddoes astonished all green and philosophical amateurs, with his account of his having turned a *black man, white*! with oxygenated muriatic acid; but the philosophical bubble burst in less than a month!—the epidermis had been slightly affected, without injuring the *rete mucosum*.—The whole affair ended, by all the town considering the chemist, not as a philosopher, but a conjuror.[1]

[1] *Flim-Flams*, ii. 188, 1806.

V

ZOOLOGY

In the early days of the University, students had perforce to be 'content with the landmarks of science fixed by their fathers'. By the end of the fourth century the Church had settled that there is only one way to deal with those who think for themselves, and this is set out by De Foe in his *Shortest way with Dissenters*: if a man insist on having an opinion of his own, that is pernicious and jeopardizes his eternal salvation, it is much safer to burn him than to allow his doctrines to spread. It was only after ecclesiastics had been shorn of extreme powers of repression that advance in biological studies became possible.

Pliny, Aristotle, and the Bible were the chief 'original' sources of zoological knowledge throughout the Middle Ages. While for those who craved more sensational reading there were the pages of Aelian's seventeen books *de Natura Animalium*, brightened regardless of truth with marvels and traveller's tales. From these several sources arose a popular text-book known as the *Physiologus*. For many centuries it was widely read and repeatedly copied and altered.[1] It is believed to have been compiled in Alexandria in early Christian times, to have taken account of the Natural History of the Bible and of that of the various animals or monsters known to the compilers. Certainly almost all the animals mentioned in it were familiar to Egypto-Hellenic civilization. The stories are usually introduced with a text from Scripture and conclude with a moral.

In course of time the Church looked with suspicion on

[1] MS. Bodley 2393, xiith cent.; MS. Ashmole 511, xiiith cent.; MS. Bodley 764.

a work in which passages of holy writ were closely allied with others, which might provoke some souls to scoffing and some to heresy. So Pope Gelasius in 496 passed censure and declared the *Liber Physiologus*, 'which was written by heretics', to be *apocryphus*. But the stories made too successful an appeal to human nature. People of all nations continued to transcribe and rearrange the chapters as seemed best, alphabetically or in zoological order; and many of the tales found their way into the popular literature of the day, and even helped the fancy of the artists employed on the decoration of medieval churches. In Oxford the Pelican of Corpus Christi College recalling its young to life by its own blood is but one of the emblems of the *Physiologus*, and the Phoenix of the well-known Fire Insurance Company is another. A versified extract from it was made by a bishop Theobald in the eleventh century which was eventually printed at Delft in 1487. It only dealt with twelve selected animals.[1]

The first English writer on zoological subjects who has claim to our attention is ALEXANDER NECKAM, 1157–1217, the foster-brother of Richard I. Of his work *De Naturis Rerum* there are MSS. in the Libraries of Magdalen, No. 139, Corpus Christi College, No. 245, and St. John's, No. 51. It is chiefly remembered by reason of an account which he gives of certain medieval inventions such as mirrors of glass and the mariner's compass. This natural history was partly derived from Solinus, Isidore, and Cassiodorus, but to his extracts from them the author added much that was derived from his own observation. His merit lay in the eagerness he displays for a better groundwork than mere authority. In his choice of animals Neckam selected such as were neither too commonly known to the vulgar, nor totally unknown. Beginning with the crocodile, serpent, rhinoceros, viper, toad, weasel, fox, ape, bear, wolf, deer, camel, elephant, dragon, lion, onager, and hyena, he reaches the 'noble animal' man, with an interesting disquisition on sight, and refraction and reflection of light by *glass* mirrors. He explains that since man withdrew his obedience from his Creator, the obedience of the greater number of wild animals has been with-

[1] *Physiologus Theobaldi Episcopi de naturis duodecim animalium.*

drawn from him; but to reprove and abate his pride, the power of tormenting him has been given to some of the most insignificant of animated beings. Gnats attack him in the eyes . . .; fleas disturb his sleep at night and his contemplations by day; flies intrude into the liquors he drinks and into the food he eats. Moreover, if man had not sinned, there would have been no venomous or poisonous thing on the earth. After this

NECKAM'S LICE THAT TORMENT SINNERS, 1491.[1]

discourse on Man, he proceeds to treat of domestic animals, including bees and silkworms, given to man after the Fall out of compassion for the human race.[2]

To Neckam, too, has been ascribed a much later compilation of which there is also a manuscript at

[1] Familiarity, however, bred other views as to the utility of lice. A seventeenth-century Student of Christ Church, ROBERT LOVELL, after stating that the place of their occurrence is 'sufficiently known to every one', adds that 'If breeding in the heads of those that have been long sick, they prognosticate health', and that 'They are eaten by rusticks to help the jaundise'. Even so exalted a personage as Edward Gibbon, when a Lord Commissioner of Trade and Plantations, slept in a bed that occasionally required to be 'thoroughly cleaned from buggs'. *Notes and Queries*, Sept. 8, 1923.

[2] The *De Naturis Rerum*, edited by T. Wright, appeared in the Rolls Series for 1863.

Corpus Christi College, No. 274, which once belonged to George Nycholl. It is an encyclopaedic work in which some two hundred and fifty animals are described. They are grouped in classes in alphabetical order.

The first book *De animalibus quadrupedibus*, beginning *Canes ut dicit Jacobus* (*i.e. Acconensis*) *docibiles bestie sunt ad omnem ludum*, discusses 24 mammals ending with the *Vulpis*. Book 2 *De Avibus* enumerates 42 species from *Aquila* to *Upupa*. Book 3 *De Monstris marinis*, 52 in number, from *Aludes* to *Zephius*, including the Ipopotamus. Book 4 *De Piscibus marinis*, 83 in number, *Anguilla* to *Virgales*. Book 5 *De Serpentibus*, 51 *Aspis* to *Vipera*. Book 6 *De Vermibus*, 46 *Apis* to *Vermis*. The compiler then proceeds to treat of Trees, Herbs, Precious Stones, Metals, the Regions of the Air, and other matters.

In the thirteenth century the intellectual stimulus following on the rediscovery of Greek and Arabian literature reached us through the intercourse of our student travellers with the south and east of Europe. Chief among the discoverers of the Greek learning must be ranked MICHAEL SCOT of Oxford, subsequently 'Astrologer to the Lord Frederick, Emperor of Rome'.[1] At a time when serious study would have been impossible in England, a more favourable entourage at Toledo in 1210 enabled Scot to learn Arabic and to translate the work of Avicenna on animals.[2] But he is better known through the translation by which he made Aristotle's History of Animals available to the student world. It was rendered from an unidentified Arabic text, and the date 1221 is inscribed in the manuscript copy belonging to Caius College.[3] By such labours as these did our travelling scholars make known the great literature of antiquity, and lead their fellow-countrymen to realize the necessity by the foundation of Colleges, of increasing the efficiency of their two Universities.

The translations of Michael Scot ensure him a name in literature, but he should also have been mentioned in

[1] Colophon to Scot's *Astronomia*. MS. Canonici misc. 555.

[2] The Vatican copy of his *Abbrevatio Avicennae* has a colophon 'explicit an. dom. MCCX'.

[3] MS. 109, ff. 102 v–103 z: 'Et juro ego michael Scotus qui dedi hunc librum latinitati quod in anno 1221 xii kal. novembr. die mercurii.' . . .

our volume on Astronomy, for it was by Astrology and Necromancy that he was famous in the Middle Ages.

Dante, Villani, Boccacio, and Sir Walter Scott have immortalized his traffic with the devil, his marvellous invisible rides on a demon horse with magical powers, and the like, stories that gripped the popular imagination far more securely than the real facts of his life. But it appears fairly certain that he was born before 1180, and having begun his studies at Oxford and Paris, continued them in Bologna, Palermo, and Toledo. In drawing attention to the fact that Scot dedicated this translation to Frederick, Mr. Wood Brown emphasizes the interest displayed by the Emperor in zoological matters. Not only did he keep an elephant, a camelopard, camels, dromedaries, lions, leopards, panthers, a white cockatoo and other rare birds, and a white bear, but, when desiring to study the process of digestion, he caused the surgeon's knife to be used on living men. He also experimented on the artificial incubation of hen's eggs and got an Egyptian over to teach him how to incubate ostriches' eggs by the heat of the Apulian sun.

Scot was sent by Frederick II on a mission to the universities of Europe to make known to them his rendering of Aristotle; and in 1230, according to Roger Bacon, who belittled Scot's labours as a translator, 'Michael Scot appeared [at Oxford], bringing with him the works of Aristotle on Natural History and mathematics, with wise exposition, so that the philosophy of Aristotle was magnified among those who spoke Latin'.

Nevertheless it was by Scot's translation that Medieval Oxford was introduced to the surpassing interest of Aristotle's Zoology, and thereby was begun the domination of Aristotle over Oxford that was to last for seven centuries. Scot's work reached a still wider public in 1496 when a Latin Aristotle was printed in Venice. The version was 'partim è Greco, partim ex Arabico', made by learned men by order of Emperor Frederick II.

Clearly Oxford owes much to Michael Scot, but he is probably less well remembered amongst us for his Aristotle, than as a Scotsman whom Dante put into hell.[1]

[1] *Inferno*, c. xx. The following works by Michael Scot are in Oxford: *Astronomia* or *Liber Particularis*, MS. Canon. Misc. 555. *Liber Introductorius*, MS. Bodl. 266. *Liber in quo continetur Magisterium Speciale*, MS. Bodl. 44. *De Alchemia*, MS. C. C. C. CXXV.

Another transmitter of Aristotelian zoology was Albertus Magnus who died in 1282 and whose manuscripts may have been widely read even before they were printed in 1478. And the work of Albertus Magnus, with interpolations from Isidore of Seville (VII cent.) added to the *Physiologus*, gave rise to the *Hortus Sanitatis* of Johannes de Cuba.

Such were the materials from which subsequent zoological works were constructed. One that passed through many editions was the *Liber de Proprietatibus Rerum*, a voluminous and encyclopaedic work by a Franciscan, Bartholomaeus Anglicus, written in Latin about 1250 and translated into English in 1397. It was first printed in 1494 by Wynkyn de Worde, and again in a 'newly corrected, enlarged and amended' form under the editorship of Dr. Stephen Bateman in 1582. The book was entitled 'Bateman uppon Bartholome: His Booke *De Proprietatibus Rerum* . . . with such Additions as are requisite, unto every severall Booke. Taken foorth of the most approved Authors, the like heretofore not translated in English. Profitable for all Estates, as well for the benefite of the Mind of the Bodie.'

We have cited these works and editions to show how slow were the steps by which ancient learning was made available for the medieval Englishman, and how, even when it had been brought within his ken, the slavish adhesion to authority caused him to be supplied with zoological learning gleaned from the observation of the fauna of the Mediterranean countries and beyond, which had never been checked by modern observation and was quite ill-adapted for students of English zoology. It is from a source such as Bartholomew that Shakespeare derived much of his knowledge of natural history: for the rest he would have gone straight to Nature, and following the pregnant advice of Ludovicus Vives of Corpus Christi College, would have had 'recourse to gardeners, husbandmen, shepherds, and hunters', and have observed the nature of things 'in the heavens, in clouds and in sunshine, in the plains, on the mountains, in the woods'.

Vives was probably well acquainted with the old works from the twelfth and thirteenth centuries on falconry and the care of horses, some of which were derived from Arabian sources. Of such there is still an example in the library of his College, a copy, made in 1448, of a Latin translation by Theodore, the philosopher of Moamyn Falconarii *De scientia venandi per aves et quadrupedibus ut solatium habeatur*[1] which follows after a copy of the *Doctrina circa regimen equorum* by Laurentius dicto Bugus de Urbe.

At the same time the Founders of Colleges at Oxford, as at Cambridge, harshly interdicted the study of live animals, either in captivity or in natural surroundings. At Magdalen none of the Demies or Fellows was permitted to keep 'a Harrier, or other Hound of any kind, or Ferrets, or a Sparrow-hawk, or any other Fowling Bird, or a Mavis or any other Song Bird'. And monkeys, bears, wolves, and stags in addition to ferrets and hawks were banned by Henry VI when he drew up statutes for King's College. We are, however, glad to think that at any rate some of the early Fellows were sufficiently human to break their statutes, and that in quite early times not only were dogs kept, but also swans, a she-bear, and marmosets and other live stock.

In the fifteenth century zoology showed signs of moving within the pupa case in which it had been so long enveloped. JOHN FREE, a Fellow of Balliol 1449 († 1465, see p. 24), wrote excerpts from Pliny's Natural History which may still be read in MS. Balliol 124, a manuscript presented to the College by WILLIAM WORCESTER or BOTONER (1415–82?), himself a scholar of Great Hart Hall, then attached to Balliol. Worcester, like Free, had read medicine and was a traveller with wide interests. He has left an antiquarian or topographical account of a journey in 1478 in which he describes the country between Bristol and St. Michael's Mount, with a few brief observations on animals which are still of value.

The Rabbits and Puffins of the Scilly Islands are noted for the first time.

> Insula Rascow (= Trescoe) pertinet Abbati Tavystock, continet in longitudine 3 miliaria, et in latitudine 3 miliaria, inculta, cum cuniculis et avibus vocatis *pophyns*.

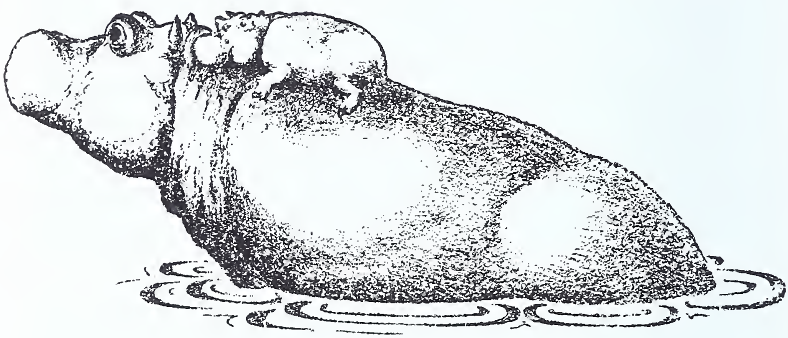
[1] MS. C.C.C. No. 287.

And another island

non est populata, nisi silvestres herbas, aves vocat mewys [sea-mews] kermerertes [cormorants] et Katones et muscae, idest mowses.[1]

A similar Scillonian population is noted in Leland's MS. of 1533, now in the Bodleian.

Another instance of the renewed interest that was being taken in Natural History, is supplied by the four volumes of manuscript *Notes and Observations on the Natural History of Pliny* written by JOHN CLAYMOND Demy of Magdalen 1483, and afterwards the first Presi-



THE HIPPOPOTAMUS CARRYING ITS YOUNG.
After Dr. Chalmers Mitchell, Childhood of Animals.

dent of Corpus Christi College.[2] As a Demy Claymond was one year junior to Richard Wotton, afterwards bedel in Oxford, to whom in 1492 was born a son, EDWARD WOTTON, our first great Zoologist, a man of European reputation. He was educated at Magdalen College School, and having been a chorister 1503, and Demy 1506, was elected to a Fellowship at Magdalen College in 1516.

While Wotton was a Demy of the College, the curious hieroglyphic statues were erected round the quadrangle. Several animals figure among them, but the most remarkable of all is the River Horse on the North side.

[1] Wm. Botoner, Itinerarium sive Liber Rerum Memorabilium Ex cod. autographo autoris in bibl. C. C. C. Cant. No. 210. Edited by J. Nasmith, 1778.

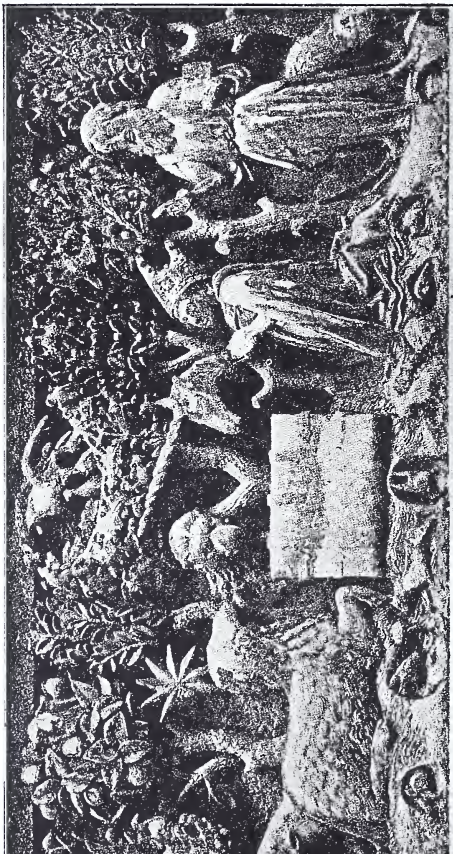
[2] Gunther, *Daubeny Laboratory Register*, iii, p. 349.

As will be seen from the sketches, the statue is true to nature in so far as it represents the way in which the

THE RIVER HORSE AND YOUNG IN MAGDALEN COLLEGE. *c.* 1506.

old hippopotamus carries her young one. The problem as to how the carver-naturalist got his information is still unsolved.

At Merton College, too, over the entrance gate is a delightfully realistic representation of rabbits, posing



FOWLS OF THE AIR LODGING IN BRANCHES IN AN ORCHARD WITH PLEASANT FRUITS.

ANIMAL SCULPTURE OVER MERTON COLLEGE GATE. *c.* 1500.

WOLVES. LAMB. LION. UNICORN. BEAR.

THE ROCKS ARE A REFUGE FOR THE CONIES.

in and out of holes as conies of the Scripture. Behind them are a lion, a lamb, wolves, a bear, and a unicorn, and in the background trees laden with pleasant fruit and birds. It is altogether as unlikely as a 'wilderness' as that St. John the Baptist and the Founder of Merton College should ever be seen in one together: it probably represents the Holy Mountain described in Isaiah xi. 6–9. The sculpture appears to be of the same date as the Magdalen hieroglyphics, and is far more true to nature than that of the representation of the Scorpion among the zodiac bosses over the vaulted archway under Merton College Hall (1274). According to some accounts it is a carving of the thirteenth century, but this appears to be highly improbable. The drawing of the trees in the background is very like that which may be seen in fifteenth-century manuscript miniatures and even in fifteenth-century printing.

Claymond continued to take an interest in the younger Wotton and introduced him to Fox, the Founder of Corpus, who made him *Sociis compar*, and facilitated his travels abroad. In 1521, or 1523–4, Edward Wotton obtained leave to go to Italy to continue his studies, and chiefly to learn Greek. Like Harvey, he graduated M.D. at Padua. On his return home he was admitted a Fellow of the College of Physicians, becoming president in 1541–3. He was physician to the Duke of Norfolk and to Margaret Pole, the mother of Reginald the Cardinal, with whom Wotton corresponded. But his chief interest lay in the systematic study of zoology. A part of his work entitled *De Differentiis Animalium* appeared in his lifetime. It was a folio, dedicated to Edward VI, printed by Michael Vascosanus in Paris and 'probably unsurpassed in typographical excellence by any contemporary work', it was, moreover, praised by Neander for the eloquence of its language.[1] I was fortunate to recognize a copy of this work in the holograph of his son HENRY WOTTON written in 1547–9 while he was a bachelor at Christ Church.[2] Like his copy of Ruellius in the Goodyer Library at Magdalen and two other books of his in the Physick Garden, it is signed with his initials and motto.

H . *Spes nō cōfundit* . W.

At the end of vol. i he wrote '11 Dec. 1547'; at the end

[1] 'No one had written of animals more learnedly and elegantly than Wotton.' Neander, *Explicatio Orbis Terrae*, 1597, p. 410.

[2] Jesus College MS. 90, 100. Cf. Gunther, *Early British Botanists*, p. 224.

of vol. ii 'τέλος σὺν θεῷ 1548 ultimo Junii. Non omnia possumus omnes'; and at the end of the table of contents '3 April 1549'. It may be that the son induced the father to get the book printed.

Edward Wotton was the first Fellow of the College of Physicians to bring Zoology into the list of subjects on which a physician should be informed. Like many another savant of his day he was a correspondent of Conrad Gesner (1516-65) of Zurich, who was twenty-three years his junior, and the author of the great *Historia Animalium* of which volume i began to appear in 1551, and volume iv, which came out in 1558, contains a reference to Wotton's work. Wotton certainly appears to have forestalled Gesner in collecting materials for a History of Insects, but he did not live to complete it. The work was continued by two Cambridge men, Thomas Penny and Thomas Moffett, both of Trinity College, neither of whom was to live long enough to publish it. Wotton died in 1555.[1]

Penny, who entered Trinity College in 1550, had probably not heard of Wotton until, in the course of his Continental tour, he worked with Gesner in Switzerland. He is believed to have been with Gesner when he died, and according to Sir A. Shipley certainly helped to arrange the natural history specimens which the great master left. He may have brought back for further study in this country Gesner's drawings of butterflies. Penny undoubtedly seems to have left considerable literary remains. How, when compiling a new edition of his *Phytologia Britannica*,[2] between 1650 and 1656 had access to Penny's botanical papers. His insect notes and Gesner's drawings passed into the possession of Moffett (1553–1604) also of Trinity College in 1569, but later of Caius in 1572. After taking an M.D. degree at Basle, Moffett proceeded in 1579 to Spain and Italy, where he studied the silk-worm and collected further notes for a monograph on Insects. To these notes were added those of Edward Wotton,

[1] Four years after the death of Wotton another fellow of Magdalen, Peter Morwent, translated Gesner's work on distilling medicines into English, publishing it under the title of *The Treasure of Evonymus*. 1559. It was reprinted in 1565 and 1575.

[2] Gunther, *Early British Botanists*, p. 234.

but it was not until eighty years after Wotton's death, or thirty after Moffett's that the work was printed under the title of *Insectorum sive Minimorum Animalium Theatrum—ad vivum expressis Iconibus super quingentis Illustratum*, 1634. Engraved portraits of Wotton, Moffett, and Penny adorn the frontispiece. One hundred and three years after the death of Wotton, the work, which he was the first to begin, appeared in English as an appendix to Topsell's *History of Serpents* in 1658.

Meanwhile, William Turner, botanist and ornithologist, of Pembroke College, Cambridge, and later proposed as President of Magdalen College, Oxford, had been more successful in getting his books out as he wrote them. He, too, was a friend and correspondent of Conrad Gesner, as also was John Caius (1510–73), himself tutor to Thomas Moffett.[1]

The reviving interest in English Zoology is also shown by occasional notes in general works such as the *Britannia* of William Camden, who is evidently reminiscing from Carew's *Survey of Cornwall* when he observes that

> In the rocks underneath [St. Michael's Mount], as also along the shore everywhere breedeth the Pyrrhocorax, a kind of crow, with bill and feet red, and not, as Plinie thought, proper to the Alpes only. This bird the inhabitants have found to be an Incendiarie, and theevish beside: for, often times it secretly conveieth fire sticks setting their houses afire, and as closely filcheth and hideth little pieces of money.

While Sir T. Browne, 1605-82, was in residence at Broadgates Hall from 1623 to 1624, he presumably received such preliminary training as was customary among medical students. His wider fame rests on his power of getting outside himself and the narrow sphere of professional experience. He was a scholar-naturalist, singularly gifted with a poetic instinct, yet a sceptical unveiler of fallacies; he was equipped as few have been for his pastime of philosophical research into the fairy world of animal and vegetable life.

His fondness for animals was innate. In the well-

[1] Their works are Turner, *de Avibus*, Cologne, 1544, reprinted Cambridge 1823. Caius, *De rariorum animalium atque stirpium historia*, London, 1570.

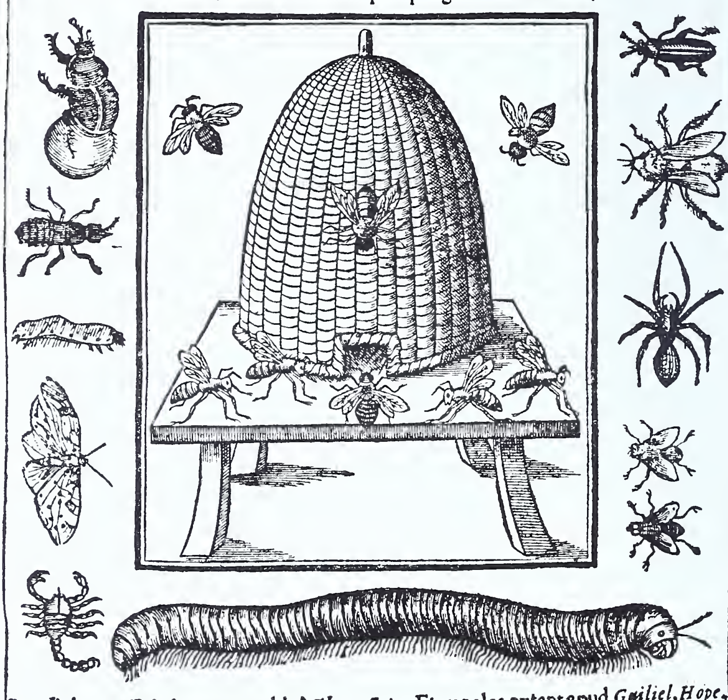
INSECTORVM
SIVE
Minimorum Animalium
THEATRVM:

Olim ab

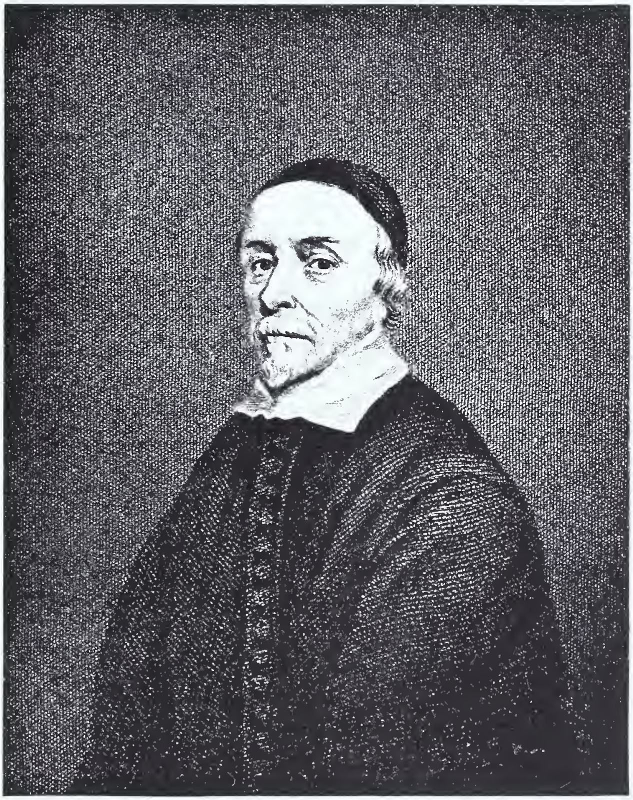
EDOARDO WOTTONO.
CONRADO GESNERO.
THOMAQVE PENNIO

inchoatum

Tandem
THO. MOVFETI Londinâtis operâ sumptibusq; maximis concinnatum, auctum, perfectum:
Et ad vivum expressis Iconibus suprà quingentis illustratum.



Londini ex Officinâ typographicâ *Thom. Cotes*. Et venales extant apud *Guiliel. Hope*, ad insigne Chirothecæ, prope regium Excambium. 1634.



WILLIAM HARVEY

From the Cambridge County Geography of Essex

Dorothy Brown   Tho Brown

known picture of the family group of the Brownes, he is painted a quaint little figure on his mother's knee, in red cap and coat, clasping a black rabbit. The child was the father of the man. After Browne had been established thirty-five years in Norwich, Evelyn found his 'whole house and garden a paradise, and cabinet of rarities, medals, books, plants, and natural things'. Among these was a collection of eggs of such birds as storks, cranes, and water-fowl, gleaned from the broads and marshes of Norfolk. In addition to birds, fishes, and natural curiosities, he had a garden of rare plants. These, which were a great attraction to scientific visitors, may have occasioned Evelyn's earlier correspondence with him.

As a eugenist Browne's theory was not quite in accord with his practice, since in spite of the aspiration expressed in the *Religio Medici* that 'we might procreate like trees', he shortly afterwards followed the ordinary fashion of mankind, and married Dorothy Mileham, a Norfolk woman, 'a lady of such symmetrical proportion to her worthy husband, both in the graces of her body and mind, that they seemed to come together by a kind of natural magnetism'.

Observations on natural history are scattered through his various works. Many, investigated in *Enquiries into Vulgar and Common Errors*, were evidently the result of a methodical hunt of years duration, but without any orderly grouping of the subjects. He explains the 'conceit of the Centaurs', disposes of the solemn stories of combats between toads and spiders which ended in favour of the spider, graphically describes the 'flammeous light' of the glowworm, testifies to the shapely form of bear-cubs, discourses on the alleged uncanny power of wolves to strike men dumb. His *Hydriotaphia* or *Urn Burial*, 1658, is a pattern for a treatise in which anthropological research and historical records are to be combined.

The *Garden of Cyrus* or the *Quincunxial Lozenge*, is a disquisition on groupings in the form of a five in cards ⁙. Incidentally he interspersed in it many interesting observations on the forms of plants and the laws of vegetation, with ideas on growth which to some extent anticipated later works on phyllotaxis.

Among the posthumous writings which deserve notice are several dealing with interesting aspects in natural history: 'Observations upon several Plants mentioned in Scripture'. 'Of Garlands or Garland Plants'. 'A Letter on the Fishes eaten by our Saviour with his Disciples'. 'Answers to certain Queries about Fishes, Birds, and Insects, etc.'. He had a mind that was always on the alert. A Catalogue of Sir T. Browne's Museum was compiled by Dr. Charleton and is contained in his Commonplace Book, now Sloane MS. 3413 in the British Museum.

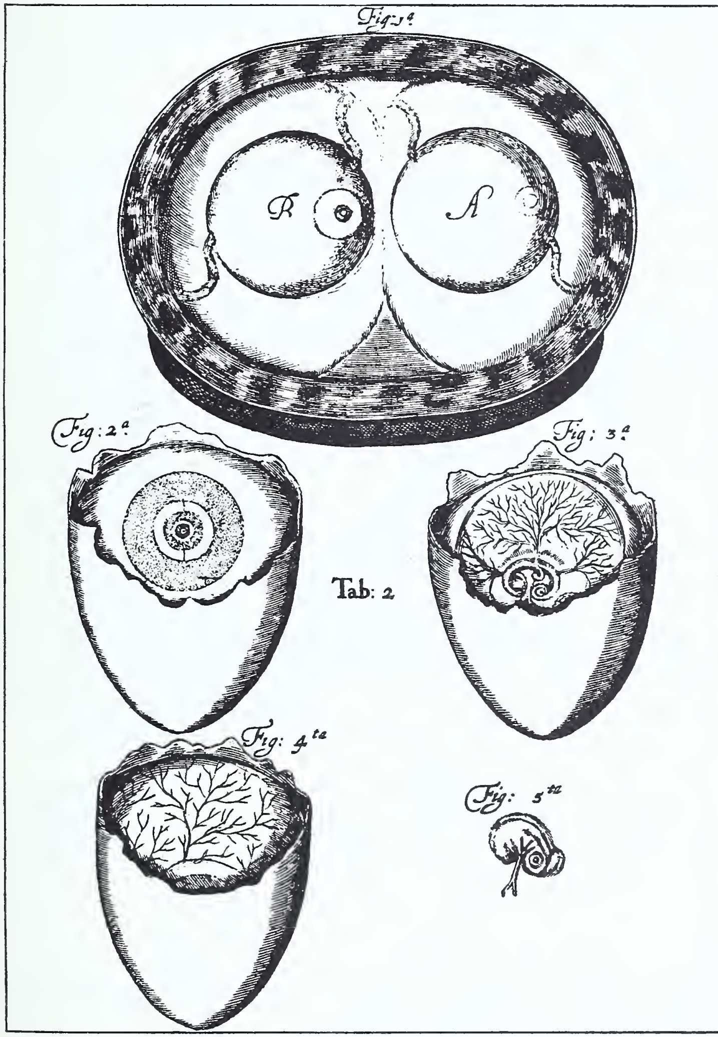
Among contemporary ornithologists we must not forget the name of WILLIAM HARVEY whose interest in birds dated from May 1633, when he visited the Bass Rock on a journey to Scotland with Charles I. The circumstances of the publication in Oxford of his later work on the early stages of the Development of the Chick have already been recounted. The research was prosecuted in the rooms of G. Bathurst in Trinity College, and Highmore was engaged in similar studies there. The extent to which Harvey's views on Generation may have been influenced by his Paduan teacher, Fabricius of Aquapendente, can hardly be defined, but he seems to have gone beyond him in suspecting that mammals were no exception to the rule that animals are produced from eggs. Farther than this, it was hardly possible at that time to go.

The figures we print of the developing chick are from NATHANAEL HIGHMORE's little work, the *History of Generation*. It appeared in 1651 in the same year as Harvey's *De Generatione*, and Highmore could hardly have been expected to see more than he drew, without a microscope. It was not till quite twenty years later that this instrument helped Malpighi to a further advance.[1]

The first Figure demonstrates the Eggs taken from their shels in a dish, with the Chalazae, and Cicatricula: which in *A* that was never sat on, is but small. In *B* that hath endured the heat of the Hen one whole day, something dilated. In some new layed Eggs, I have seen it no more altered the third day.

The second Figure delineates the second dayes observa-

[1] Malpighi, *De formatione pulli in ovo*, 1673.



HIGHMORE'S DRAWINGS OF CHICKS IN THE FIRST DAYES INCUBATION.
The History of Generation, 1651.

tions and change in the Egg; the large dilation of the Cicatricula, with all its Circles.

The third Figure shews the growth of the Chick, and alteration in the Egg, the fourth day.

The fourth and fifth Figures, shew the fifth dayes addition to the former growths.

The fifth shews him taken from the Yolk and White, with a delineation of all his parts, as they appear lying round together in the Egg.

Fig. 7.

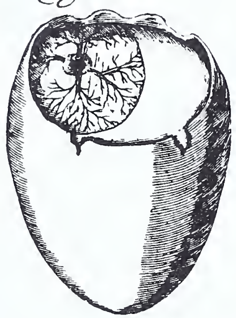
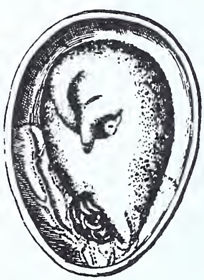


Fig. 8.



The seventh Figure shews what progress the Chick hath made in his formation, in the third day after incubation.

The eighth shews the Chick perfectly formed in his shell not long before his exclusion; with the Yolk about whole; describing the manner of his lying in the shell.

Christopher Merrett, 1614-95, of Gloucester Hall 1631 and of Oriel College 1633-4, is often quoted as the author of a *Pinax rerum Naturalium Britannicum* in which many British animals and plants are listed for the first time. It was a useful work. Merrett became one of the original Fellows of the Royal Society, and acted for a time as resident Librarian of the College of Physicians in Amen Corner, a post to which he was nominated by his friend William Harvey.

A less valuable book was the *Panzoologicomineralogia*, or a *Compleat History of Animals and Minerals* by a Student of Christ Church, Robert Lovell, 'philotheolog-iatronomus'. It was printed in 1661 at Oxford by Henry Hall, and contained 'the Summe of all

Authors, both Ancient and Modern, Galenicall and Chymicall, touching *Animals*, as to their Place, Meat, Name, Temperature, Vertues, Use in Meat and Medicine, . . . Sympathie, Antipathie, Diseases, Cures, Hurts and Remedies'. It is provided with a *Universall Index* of the

CHARLETON'S LONDON HOOPOE, 1677.

Use and Vertues, and was dedicated to King Charles II. But its very superabundance of medicinal lore makes it an unsatisfactory book.

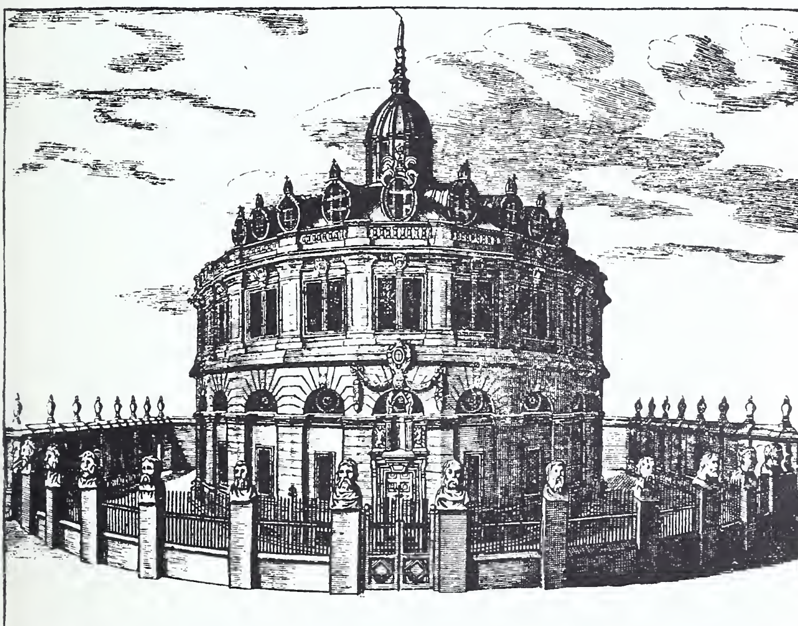
Dr. WALTER CHARLETON, 1619–1707, of Magdalen Hall achieved the distinction of taking his M.D. Degree at the age of twenty-two and of being appointed Physician-in-Ordinary to the King in the same year. He went to live in Russell St., Covent Garden, and wrote several medical and physiological treatises (p. 51). His contribution to zoology was a curious work, the *Onomasticon Zoicon, Plerorumque animalium Differentias et Nomina propria pluribus linguis exponens cui accedunt Mantissa Anatomica et quaedam de variis Fossilium generibus.* Lond. 1668. It contains a systematic list of all animals with which the author was acquainted, and also a description of the menagerie in St. James Park that belonged to Charles II. In several respects Charleton was a forerunner of Linnaeus. He emphasized the importance of nomenclature, for 'nomina si nescis, perit cognitio rerum'. He had a clear idea of genera and species, and his system, like that of the botanist John Goodyer, was largely binomial, though not exclusively so. The book is illustrated by a few engraved plates of great perfection. His helpers were Drs. Ent and Merret. He refers to many specimens in the Museum of the Royal Society: it is a pity that he does not tell us anything about the contents of the Anatomy School of his own University. Charleton tells us that he often shot Blackheaded Gulls on the Thames, and that a Hoopoe had been given him which was killed near London in the winter of 1666. He gives good engravings of the Hoopoe and also of the Angler Fish, which he dissected himself. The title page to the second edition of his book, printed in the Sheldonian, shows that in 1677 the Theatre yard was enclosed by Wren's wall.

William Charleton, one of the early benefactors of the Ashmolean Museum, made a considerable collection of zoological specimens, incorporating many that he purchased from Tradescant's widow (see p. 288) in 1667. In his neatly written manuscripts in the British Museum[1] we see that he availed himself of the services of travelling friends and relations to add to his exotic specimens. In 1686 he furnished directions for collecting to his cousin Posthumus Salwey 'who went for ye Streight in ye Smirna yacht', and in Sept. 1689 to James Reed 'who went to ye West Indies', whom he furnished with full instructions as to the things he most desired. He strongly advocated the use of spirit of wine as a preservative. Specimens sent home were to be directed

[1] MS. Add. 3962.

GUALTERI CHARLETONI
EXERCITATIONES
DE
Differentiis & Nominibus ANIMALIUM.
Quibus accedunt
MANTISSA ANATOMICA,
Et quædam
De variis FOSSILIUM generibus,
Deque differentiis & nominibus COLORUM.

Editio secunda, duplo fere auctior priori, novisque iconibus ornata.



OXONIÆ,
E THEATRO SHELDONIANO, An. Dom. 1677.

to 'Mr. W. Charleton at Mr. Wm. Cockram's, merchant, in Swithens Lane in London'.

In the seventeenth century the chief contributions to sound zoological literature were made by two members of Trinity College, Cambridge, John Ray (1628–1705) and Francis Willughby (1635–72) whose labours were so interdependent that they must be mentioned together. They were the first of the moderns to recognize the principles by which the natural affinities of animals should be determined; and to see that a thorough reform in the classification of the vegetable and animal kingdoms had become necessary; that the only way of bringing order into the existing chaos was by arranging the various forms of life according to their structure; that zoological literature must not be burdened with inapplicable passages and quotations from ancient writers, and perpetuate the erroneous or vague notions of predecessors. Speculation must be abandoned, facts only adhered to. One of the first results of their method, and perhaps the most important one, was, that having recognized the 'species' as such, they defined this term, and fixed it as the base from which all sound biological knowledge has to start.

Although they had divided the work, Ray taking the plants, and Willughby the animals, yet they collaborated in making observations and collections during their travels in Great Britain and on the Continent. The Oxford libraries supplied Willughby, who had visited the university in 1660 for the purpose, with the rare books necessary for his studies, but unfortunately he died young without publishing, but bequeathed his manuscripts and an annuity of £60 a year to his friend. No one could have had a more faithful executor: and notwithstanding the pressing nature of his own great work on the Vegetable Kingdom, Ray found time to revise and complete Willughby's three works: his *Ornithologia*, 1678, his *De Historia Piscium*, fol. Oxford, 1686, and his *History of Insects*, in 1710. The cost of the plates in the *Ornithologia* was defrayed by Willughby's widow, and Linnaeus based his classification of birds on the arrangement therein adopted.

The gathering of the first Fellows of the Royal Society in Oxford was not particularly fertile in zoologi-

JOHN WILKINS OF WADHAM COLLEGE

From Hodgson, History of Aeronautics

cal research or discovery. There were no collections, and without specimens for examination and comparison, but little can be accomplished. Two notable advances in method deserve special notice, indeed we can think of none that have been more fruitful in their application. The first is due to Robert Boyle, and had the simplest of beginnings. It was his method of preserving or embalming the embryo of a chick in a glass filled with spirit of wine, to which he sometimes added a little sal armoniack, observing that it never coagulated the spirit of wine. The results of his experiment are described on p. 105. Before that time, dried preparations were usual.

The second advance was the application of the Microscope to biological research.

Among the minor contributions to learning were the researches of Warden WILKINS on bees. And his bee-hives or Colony hives were still to be seen in Wadham Garden in 1677, having been set up for over twenty years (Plot). He had evidently continued the earlier hobby of FRANCIS POTTER of Trinity, who several years earlier had also experimented with bees and had shown Aubrey their thighs under a microscope.[1] Plot's notes on Oxford bees are quoted on p. 179.

Other lines of zoological research were advocated by Dr. CHRISTOPHER WREN, who was also a zealous advocate of the importance of anatomy. He wrote:

The Seasons of Fish and Fowl are retarded or accelerated by Weather: foreign Fowl are observ'd to come in great Multitudes, near the Time of their Departure, to some Coasts of *England*, and there to stay for a Wind which when it happens for their turn, in a few hours there is not one to be seen in the whole Country. The Seasons of Fish depend much upon the Seasons of the Water-flies and Insects their Food; in two rivers parted by the same Meadow I have known the difference of ten days or more. The Seasons of the Insects are themselves very considerable. The Multitudes or Paucity of venemous creatures, and of many other the like things are very well worth registring; and all other things found to be either consequences, signs, or presages of weather and seasons.

I could wish we were frequent in Dissections of Animals, of any Sort whatsoever, and that Figures be drawn, where

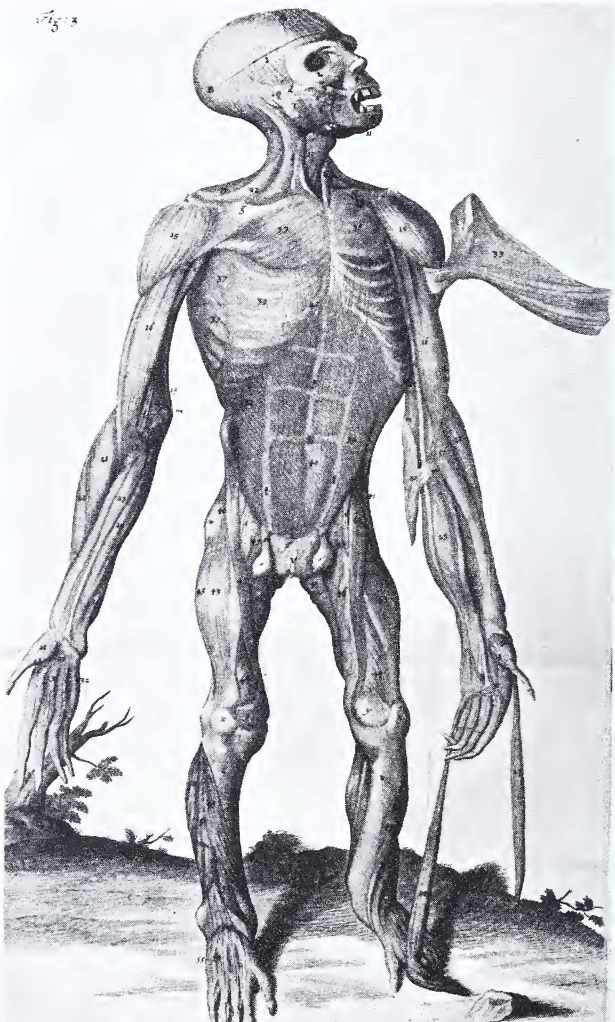
[1] Aubrey, *Wiltshire*, p. 68.

Nature appears anomalar, as she is most in Fishes and Insects; especially in the parts that serve for Concoction. And with this we may take in the experiments about Generation: The Spring should not be lost, for observing the Progress of hatching Eggs; and likewise the springing of Grain and Seeds; which in a ruder Proportion gives some light to the Generation of Animals. Tame Rabbets may be kept purposely for Dissection, as well because they are frequently pregnant, as because of late, some Observations have been made from them which seem to thwart those of Dr. *Harvey*, how truly, will be worth our Enquiry.[1]

Wren's ideas were admirably carried out by Edward Tyson, 1651–1708, of Magdalen Hall, in a series of monographs on the anatomy of a variety of animals including the chimpanzee, musk hog, porpoise, Virginian opossum, rattlesnake, embryo shark, lump fish, tapeworm and roundworm.[2] He observed that many strong-scented animals, besides the *Hyaena odorifera*, and the *Catus zibethicus* or Civet cat, have follicular repositories or bags, near the anus, in which their respective scented humours are contained. He found such bags in Fiber Castor, or Beaver, whence *Castoreum*; *Gazella indica* or *Capra moschi*, whence Musk; and in Sepia, Loligo, and Purpura. His first observation was made on a male Pole-cat dissected at Oxford February 4, 1674, and the observation was confirmed in a female Pole-cat, March 2, 1675. Later on he found similar scent bags in the Fox, Weasel, and Cat. (Plot.) His work on the Porpoise was discussed by the Royal Society on June 3, 1680, when Wren was in the Chair. At the same meeting the Fellows considered certain problems connected with Eugenics, more particularly the cause of monstrous births. The discussion was opened by a case of 'Siamese twins' from Somerset, described by John Aubrey, and Wren surmised that most monstrous births proceeded from twins. Examples of hybrids between different species were mentioned, it being generally observed, 'that all these mixt productions were barren,

[1] Wren, *Parentalia*, p. 222.

[2] Two of Tyson's beautiful paintings in a MS. at the Royal College of Surgeons, of dissections of Lophius and of the Stomach of a Gazelle, have been figured by Singer, *Studies in the History of Science*, ii, pl. 12. Tyson was also a student of finger prints.



TYSON'S DISSECTION OF THE MUSCLES OF A CHIMPANZEE

A PYGMIE

After Tyson, 1699

and would not go on to propagate their like'[1]—a most important generalization.

Variation among domestic animals was also illustrated by a great number of instances, including a 'pheasant of Surinam', described by Sir Christopher Wren.

Wren, too, played a most important part in the early application of the microscope to the study of small and apparently insignificant things. He thus introduced the naturalist to the new and powerful engine of research that has had so profound an effect upon science and philosophy and indeed on the whole course of civilized life. Already in 1664 ROBERT HOOKE, 1635-1702, of Christ Church, pointed out that 'the Science of Nature has been too long made only a work of the Brain and the Fancy: It is now high time that it should return to the plainness and soundness of Observations on material and obvious things. It is said of great Empires, That the best way to preserve them from decay, is to bring them back to the first principles, and Arts, on which they did begin. The same is undoubtedly true in Philosophy, that by wandring far away into invisible Notions, has almost quite destroy'd itself, and it can never be recovered, or continued, but by returning into the same sensible paths, in which it did at first proceed.'

By the advice of Dr. Wilkins, Hooke proceeded to engage on microscopical observations yet 'with much reluctancy, because I was to follow in the footsteps of so eminent a person as Dr. Wren, who was the first that attempted anything of this nature; whose original draughts do now make one of the Ornaments of that great collection of Rarities in the King's Closet. . . . But at last being assured both by Dr. Wilkins and Dr. Wren himself that he had given over his intentions of prosecuting it, and not finding that there was any else design'd the pursuing of it, I set upon this undertaking, and was not a little incourag'd to proceed in it, by the honour the Royal Society was pleased to favour me with'.

With the aid of the Compound Microscope which has been figured in vol. i, p. 288, Hooke studied a great variety of vegetable and animal forms. He did more to popularize the newly-invented instrument than any other

[1] Birch, *Hist. Royal Society*, iv, p. 41.

Englishman of his time. It supplied him with an inexhaustible fund of 'experiments' to show to the Royal Society. And in 1667, only three years after he had been appointed Curator of Experiments, he was able to produce a remarkable volume of 'Observations made on Minute Bodies of very varied kinds by Magnifying Glasses', under the title *Micrographia*.[1] The book had really been written in 1664, and the engraved plates appear to have been ready before January 20, 1665, when Pepys took home a copy, 'a most excellent piece, of which I am very proud'.

In this work Hooke described and figured plant cells in cork, and in the pith of a number of plants. Among animal structures he made microscopic drawings of the hair of different mammals; of the scales of a sole and other fishes; of the stings of bees; of feathers, pointing out that certain colours, i.e. the blue of the eye of the peacock's feather have no real existence but are due to a texture visible under the microscope; of the feet, eggs, wings, and compound eyes of insects; of the teeth of a snail. He made enlarged drawings of the external features of several flies and the gnats, of the feather-wing'd moth, of a spider and ant, of mites, flea, louse, vinegar eels, sponge, and of the Polyzoan *Flustra*.

Ten years later Hooke investigated the microscopic structure of muscular fibre, describing it as being like a necklace of pearls, and in 1677–8 published observations on Animalculae in pepper-water.

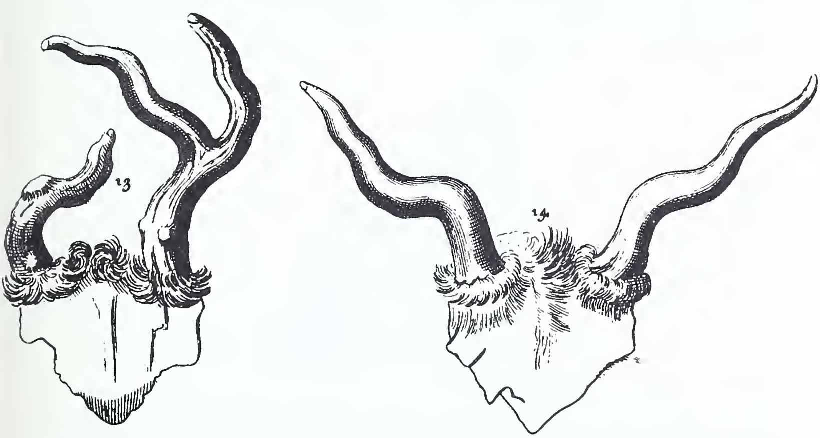
During the last quarter of the seventeenth century a great incitement to the study of all branches of Natural History was due to the action of the Clarendon Press at Oxford in beginning the publication of the Natural Histories of the six English Counties of Oxfordshire, 1677, Staffordshire, 1686, Lancashire, Cheshire, and the Peak, 1700, and Cornwall, 1758. It is a pity that this good work of our printing Press should not have been continued.

In the pioneer volume ROBERT PLOT devotes Chapter VII to his discursive notes *Of Brutes*. Amongst whole-hooft *Quadrupeda* he met with three *Horses* remarkable for their *age*; one at Souldern, another at Sherbourn, and a third at Aston Rowant, each reported to be about

[1] Hooke, *Micrographia*, printed 1667.

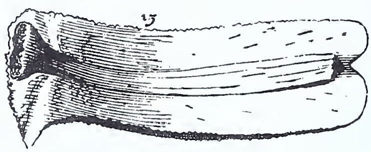
forty years old. Amongst cloven-hooft Beasts a *Hog* at Upper-Tadmarton had been fed to the extravagant greatness of near 13 hands high. Sheep bearing two lambs at a time, *double Ews,* were preserved at Darnford, Newington, and Dorchester. Sheep with four horns and

with one horn resembling a *Unicorn* were bred at Ricot by Lord Norreys (Figs. 10–12). At Newington Mris. *Dunches*' prolific cow produced a calf before



she was eleven months old, and at Hardwick, near Bicester, another cow threw *tergemini*, or three identical triplets. The Deer at Cornbury had irregular dwarfed heads (Figs. 13, 14) so long as the Park was a

Cony-warren, but when the warren was destroyed by the Earl of Clarendon, the deer developed *fair branched-heads* once more. The strange alteration was attributed to the *urin* and *crotizing* of the *Conies.* Amongst *claw-footed Animals* Plot met with nothing so strange as the rib of a Dog, or some such like beast,[1] set



in a bone interceding two other ribs, that the intercostal parts were filled with it (Fig. 15). It was found about Oxford, and given to him by the Right Reverend Father in God, *Thomas* Lord Bishop of *Lincoln,* and its figure was dedicated to the Hon. James Herbert of Tythrop.

Amongst the inhabitants of the lowermost *Heaven* Plot could not find any of the *feathered* Kingdom that had not been noted by the Learned and Industrious *Francis Willoughby*, 'except perchance a *little Bird* sometimes seen, but oftner heard in the *Park* at *Woodstock* . . . commonly called the Wood-cracker'.

Lord Norrey's St. Helena Hen.

Lord Norreys, a great lover of *Curiosities* in all sorts of *Animals*, kept a rapacious, carnivorous '*Hen*' from the *Isle* of St. *Helen*, having her beak near its end, crook'd after the manner of a Vultur, and striking with

[1] Perhaps the rib of a Turtle!

her pounces like a *Hawk*, though her talons indeed are not much more turned than those of the common house Hen. Plot having stated why it cannot be either the *Gypaetos* of Aldrovandus or the *Percnopteros* of Johnston, then proceeds to give a most excellent description, and figure of the Egyptian Vulture, *Neophron percnopterus*, Linn.[1]

He regards as occasional visitors the Hoopoe, seen by him on Otmoor, while another (p. 270) was killed near Cassington; the Cormorant, one killed from St. Mary's steeple (tired with a long flight) in 1675 about harvest time, and another young one taken up in Arncot-field. But he wisely suggests that the *Toucan* of 1644, was an escape from a ship.

Of albinos he noted a white *Linnet*, given him by Lane of Deddington, and the partially white pheasants kept by Lord *Norreys* of Ricot. But when he came to submit the phenomenon of albinism to severe examination his mind was too obfusticated with the fumes of a chemical laboratory to reach any convincing explanation. After suggesting that whiteness often proceeds from a defect of moisture or nourishment he goes on to guess that this Nature

> does by giving some certain individuals of each species a skin of finer and more contracted *pores* than others, which will cause *whiteness* in feathers, hair, etc. by not permitting of the *Sulphureous particles* to expire, which give *variety* of colours; thus we see in the *cicatrization* of wounds where the skin is drawn together like a purse, and the pores closed up, the hair comes constantly *white*: thus the subtile *veterinarians* procure white stars, or other desired marks in the fore-heads of their horses, and I have seen the skins of *black* Grey-hounds powdered with white, or made Ermyness, by applying wood-ticks to their skins when young, both which are performed also by *cicatrization* and closing the *pores* of the skin, thereby hindering the exhalation of the *Sulphur* in those parts.

Pyed Birds are produced by crossing common coloured

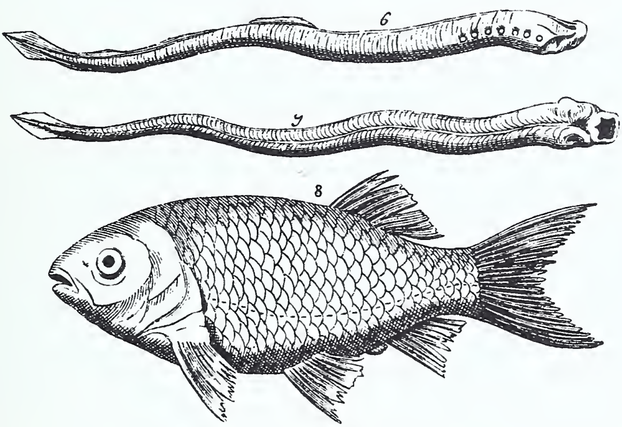
[1] My friend Mr. Regan informs me that this bird has been recorded from Kilve, Bridgwater Bay, Somerset, Oct. 1825, and from Peldon, Essex, on Sept. 28, 1868. The late Lord Lilford informed my father that he had seen Vultures flying high over the south of England, but would not publish his observation for fear of being disbelieved by some other ornithologists who had not seen them.

and white parents. In 1674 the Rev. Mr. Hinton of Witney gave Plot an *Egg* of about the size of a Pigeon's egg with another imperfect one in it, thus illustrating the *Ovum in Ovo* described by Harvey and shown by him to that incomparable Prince *Charles* the *Martyr*; and that other shown by the King of Denmark to Thomas Bartholin, *c.* 1669.

Plot comments on the absence of *Snakes* in the *Northern parts* of *Oxfordshire.* Indeed at Blechington it was believed that an imported snake would instantly die. Plot put the matter to the test by getting leave 'in the absence of the *Family*' to enclose a snake in the court of Lord Anglesey's house to see what time would produce. A gardener was left in trust to observe it strictly. After three weeks' time the snake was found *dead*, and without sensible external hurt. Plot surmised that the death could not be ascribed to the talismanical figure of the snake-stones, Ophiomorphites (= fossil Ammonites) in the rocks, for they and snakes occur happily together elsewhere, and so again the chemical laboratory came to his aid, and he diagnosed death from Saltpetre, Sulphur, and Vitriol, 'but whether by *one*, *two* or *all* these, though we dare not pronounce, yet it is caused by some such *mineral steam* disagreeable to the *Animal*'.

'To the Fishes, whereof we have a sort in the River Isis, that we call here a Pride, of the long cartilagineous smooth kind, concerning which Authors seem so obscure, that I know not whether it be described at all; or if it be, it is done so imperfectly, that perhaps it may be acceptable if I contrive another. The Fish the most like it of any I can find, is the *Lampetra parva fluviatilis* of Rondeletius, rendred by Dr. Charlton and Dr. Merret, the Stone-grig: it having a mouth cut neither perpendicularly downward, nor transversly, but hollowed as it were between two cheeks, without an under jaw, after the manner of Leeches; on the top of its head it has one and on each side seven holes that supply the place of gills; and under the belly a small line, reaching from the mouth to the exit of its excrement; it moves by a winding impulse of its body, without the help of any other fins but the pinnulae at the tail, by which it steers its course; and thus far it agrees with the Lampetra fluviatilis.

'But though they agree in some particulars, they differ in as many, our Pride being streaked from the top of its back down to the afore-mentioned line at the bottom of its belly, with lines of a distinct colour from the rest of its body, like the Pricka marina of Aldrovandus, whereof the Lampetra is not said to have any: Beside the two pinnulae of the Lampetra, whereof one stands on the top of its tail, and the other a little higher on the back, some space interceding; the Pride has another underneath its tail, joyning with the other from above at the tip, making



Plot's Fishes.

6, 7. Lamperns, *Lampetra fluviatilis.*
8. Rudd, *Scardinius erythrophthalmus.*[1]

the whole tail to end like the head of a spear. Moreover, the eyes of the Pride are very obscure, and not such plain round ones as are given the Lampetra, not only in the description but Cut of Rondeletius; And though it have a hole in its head, yet it stands not as Rondeletius describes it in the Lampetra, just in the middle between the eyes, but more forward in the extremity of the head, near the upper lip; all which may plainly be seen Tab. 10. Fig. 6, and 7. Whence 'tis easie to conclude, that either this Fish has not been described at all, or so very meanly, that there was almost

[1] Mr. C. Tate Regan, who has kindly identified Plot's animals for me, points out that the description of the eye does not quite fit.

a necessity of giving another, either of which I suppose will excuse this attempt.[1]

29. Beside the Pride which we think undescribed, we have another sort of Fish plentiful in the Cherwell (scarce ever found in Isis but below the place where the Rivers joyn) that is more certainly so; and that a Fish of the squammous kind, which they call a Finscale, somwhat like a Roach, only the belly fins, and the single one at the exit of the excrement, and those at the tail are much redder then those of a Roach; it has also a full black eye, incompassed with a yellow iris, whereas that of a Roch is red; it is also a much deeper and thinner Fish, but yet neither so deep or thin as a Bream; from which also it differs not only in the redness of its fins, but in that the single fin placed next the exit of its excrement, is not continued to the tail as it is in the Bream: Its fins at the gills are much whiter than the rest, and that upon the back of a dirty bluish colour: its scales, especially near the back, are of a greenish yellow colour, on which from the gills to the tail there runs a crooked line of points, one on each scale, as in Tab. 10. Fig. 8. The fishes most like it of any described, are the Bollerus or Bordeliere, and the Phoxini, Rose or Rosiere of Rondeletius; but that they cannot be the same is plain from hence, in that the Bordeliere is confest to have no teeth, whereas the Finscale has teeth as large as a Roach; and the Phoxini never to be found without spawn, or to exceed half a foot in length, whereas I have seen Finscales, even in time of year when one might well have expected it, without any spawn; and some of them (particularly the described one, Fig. 8) from the mouth to the fork of the tail a foot long, and four inches and a half in depth, beside many other differences that might also be brought.

'The *Evenlode* has a sort of *Chub* peculiar to it, and equalling the perch or tench in goodness. Two *Salmon*, about a yard in length, were taken about 1670 in a small brook near Lillingston-Lovell.'

[1] Ray wrote a letter to Dr. Robinson, dated at Black Notley, Apr. 1, 1685, in which he states his belief that Plot's Lampetra and Finscale are undescribed. A large part of the letter is printed in Birch, *Hist. Royal Society*, iv, p. 389, and the letter itself may be consulted in the Royal Society's Letter-book, x, p. 62.

'Of the feminine monarchy of *Bees*[1] none are more memorable than the Bees of Ludovicus Vives, who, being sent in 1520 by Cardinal Wolsey to Oxford to be Professor of Rhetoric there, and being placed in the *College of Bees* (Corpus Christi being so called by the Founder in his Statutes) was welcomed thither by a swarm of bees, which to signifie the incomparable sweetness of his Eloquence, settled themselves over his head under the leads of his Study (at the west end of the Cloister) where they continued for about 130 years and were known as *Vives his Bees.*'

In the year 1630 the leads over Vives his study being pluckt up, their stall was taken, and with it an incredible mass of hony: but the Bees, as presaging their intended and imminent destruction (whereas they were never known to have swarmed before) did that Spring (to preserve their famous kind) send down a fair swarm into the Presidents garden, which in the year 1633 yielded two swarms; one whereof pitched in the garden for the President; the other they sent up as a new Colony to preserve the memory of this mellifluous Doctor, as the University stiled him in a Letter to the Cardinal. Thus far Mr. Butler.

And there they continued, as I am informed by several ancient members of that Society that knew them, till by the Parliament Visitation, in Anno 1648. for their Loyalty to the King, they were all, but two, turned out of their places, at what time with the rest of the inhabitants of the College, they removed themselves, but no further than the East end of the same Cloyster, where as if the feminine sympathized with the masculine Monarchy, they instantly declined, and came shortly to nothing. After the expiration of which ancient Race, there came, 'tis true, another Colony to the East corner of the Cloyster, where they continued till after the return of his most Sacred Majesty that now is: but it not being certain that they were any of the remains of the ancient Stock (though 'tis said they removed thence to the first place) nor any of them continuing long there, I have chose rather to fix their period in the year 1648. than to give too much credit to uncertainties.

And thus unhappily, after above six score years continuance, ended the famous stock of Vives his Bees.

In Plot's time there was discovered an excellent method of *Bee-houses* and *Colonies*, but none then extant

[1] Butler, *History of Bees*, No. 59.

was comparable to the methods practised by John Lad of Over-Worton and W. Tayler of Warkwork who had *Apifactories* in Oxfordshire. According to the Rev. Mr. Clark of Drayton they profess

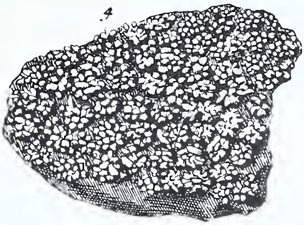
1. That they can take swarms out of any stock that is able, and neglects to swarm, without any prejudice to the stock. 2. That they can take hony out of a stock without that hazard to the Bees, which (they say) the way proposed by the Author of the Colonies is subject too. 3. That they can secure any stock from the invasion of Robbers. 4. That they can so order an old stock, that the Bees shall gather pure Virgin hony. 5. If a stock be in a low condition, they can preserve and recruit it, so as it shall do well. 6. They can take away a Queen where there is more than one in a hive, and place her in a stock where the Queen is dead, or otherwise wanting, and by that means keep the subjects together, which would else disperse. 7. If a Queen wants subjects, they can draw out of several stocks supplies in what number they please, that shall settle under her government. And these operations they commonly practice, which because profitable to them, they are unwilling should be made too common, which yet they are so ingenious as not to deny to communicate to fit persons upon reasonable terms.

In May 1685 a swarm of bees at University College was the subject of a communication by Dr. Plot to the Royal Society. The bees were reported by Obadiah Walker to have settled on an elm branch that a commoner held in his hand, when he was walking near the hall, and were hived.[1]

Plot described one *Water Fly* as a specimen of what he intended, treating others 'as fast as he could compass the method of their productions'. He called it '*Musca è Phryganio saxatili*', there being a stone, as well as a stick Caddis, or Cad-worm; in the generation of which, Nature seems to observe the following method. First, there appears on the stone to which many of them stick, as in Tab. 10, Fig. 4. only little bubbles of a glutinous nature, like the spawn of frogs, which by the descent of gravel and sand that stick to them, are formed into stone Caddis houses, including the Animal therefore called the stone Caddis; which after it has continued in its rough-cast stone house its due time, gets off the stone either to the

[1] Birch, *Hist. Royal Soc.* iv, p. 400.

bank of the River, or climes up some reed, where also leaving its house, it becomes a flye, somwhat like in shape to the Muscae διττότριχες, or *bipiles Moufeti,* that




CADDIS FLIES FIGURED BY PLOT.

Fig. 4. Egg cases, probably of *Agapetus fuscipes.*
Fig. 5. ? *Agapetus fuscipes*, magnified.

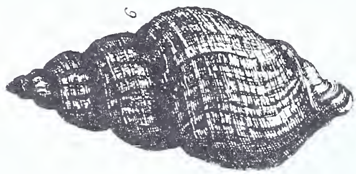
come of the stick Caddis, only it is shorter, and wants both the Antennae and forked bristly tail; but most of all like the Breise, only the Briese is all gray, and this has a black head and dark brown wings.'

The sort of *Gammarus* or *Crey-fish* found in Salford stream do 'not boil to a brisk red colour, but at best of a dirty yellowish red, which I suppose must be attributed to the badness of the water, infected with ill qualities perhaps by the Moor through which it passes, which is very agreeable to one of Cardans signs of good water: "Vbi aqua bona (says he) astaci debent esse valde rubri, cum coquantur": whence 'tis easie to conclude (if the Symbol be truly put) that where they boyl of a different colour, the water must needs be naught.'

Of Mollusca he examined fresh-water Mussels, *Mytilus fluminum maximus subviridis* from ponds at Bradwell, Hanwell, and Shotover Forest in hope of finding pearls, but there were none. Oxfordshire contains all the fresh-water snails mentioned by Lister,[1] and Plot could add nothing to his descriptions save that the *Cochleae fasciatae ore ad amussim rotundo* seem to be all viviparous. Plot thus appears to have discovered the young in *Paludina vivipara*, which he remarked, died in large numbers in the summer of 1676. Of land shells he gives a figure of a common Whelk discovered, by the younger Bobart,

[1] *Philosophical Transactions*, No. 105.

creeping on the grass in Cornbury Park. How it got there was, and still is, a mystery.



Knowledge of insects was extended through the translation of Godartius' *Of Insects* by Martin Lister, who printed 150 copies at his own expense in 1682. And further important work was accomplished in London by Nehemiah Grew, but in Oxford, zoological studies appear to have been afflicted with the somnolence of the eighteenth century.

Dr. William Sherard (1658–1728) of St. John's College, remembered as 'the regent of the botanic world', was our greatest patron of botanical studies. His letters to Richardson and Moyle[1] show him also to have been interested in birds. 'I describ'd about forty sorts at *Smyrna*' (where he was Consul from 1702 to 1718), 'mostly such as I cou'd not make out by Mr. Willughby.'

Sherard's work is an example of the stimulus towards the improvement of zoological science that a direct contact with a foreign fauna affords. The pundits at Oxford were satisfied with a so-called natural history written in 326 B.C., and based on the discoveries of Alexander the Great during his eastern campaigns. The more active spirits found outlet for their energies in commentary that was puerile and in a gradual apotheosis of *Language*, with concomitant neglect of *Matter*, in classical writings. Fortunately, however, the allurement of oceanic discovery and the expansion of foreign trade were favourable to the advancement of science, and gave a few members of our university the opportunity of seeing nature for themselves. For those who were unable to travel and open the pages of the great book of nature, there were specimens, living or dead, of foreign forms of life in collections brought home by travellers, or

[1] Harting, *Rodd's Birds of Cornwall*, 29.

pictures of exotic animals and plants and landscapes made by them, all of which may implant in the mind a first impulse to travel into distant countries.

The persistent neglect of collections made by early scientific travellers has been very detrimental to the progress of the Biological Sciences.

A most important contribution to our knowledge of the zoology of northern Africa and the Levant was furnished by THOMAS SHAW 1694–1751 of Queen's College.[1] After taking his Master's degree in 1720 he went out as chaplain to the English factory at Algiers; visited Egypt and Cyprus in 1721, Jerusalem and Mount Carmel in 1722, Tunis and Carthage in 1727. He made several journeys into the interior of Algeria, Tripoli, and Morocco. After his return to England he became a fellow of Queen's College and of the Royal Society, Vicar of Godshill, Regius Professor of Greek, and Principal of St. Edmund Hall (1740) which he raised 'from a ruinous condition by his munificence', and was termed its 'instaurator'. His large folio volume of travels[2] is finely illustrated with plates of animals and plants and is full of interesting descriptions of insects, mammals, and fishes. An attempt to identify the animals of the Bible gave point to his researches, and his antiquarian tastes led him to publish *inter alia* the first good picture of the skull, bill, thigh-bone, and tibia of a mummied *Ibis*. His book was most favourably received: 'Fly, fly to secure it,' advised Dibdin.[3] And Gibbon specially

[1] The atmosphere of Queen's College appears to have been particularly favourable to the production of naturalists during the eighteenth century. GEORGE WALDRON, matric. 1706, described the natural features of the Isle of Man in a work whence Sir Walter Scott drew much of the information reproduced in *Peveril of the Peak*. W. G. MATON, physician to Queen Charlotte, was an accomplished naturalist. JOHN WALLIS, matric. 1733, was the author of a Natural History of Northumberland. EDWARD RUDGE, matric. 1781, described new plants from Guinea. The work of SHAW, PENNANT, and BARRINGTON is mentioned in our text.

[2] T. Shaw, *Travels or Observations relating to several parts of Barbary and the Levant*, 1738; 2nd. edit. 1757. He printed as an appendix, a *Method of making Sal Armoniac in Egypt* from camel dung, which he learnt from Dr. Lisle, fellow of Magdalen College. It is of interest as a very primitive operation of Organic Chemistry practised by the Arabs. His correspondent was probably the Rev. Dr. THOMAS LISLE, who wrote *A Letter from Cairo* in August 1734.

[3] Dibdin, *Libr. Comp.* 1824.

excepts him from the crowd of 'blind' travellers who do not use their eyes. Several of his natural history specimens were left to the University.

The great attraction of exotic forms of life was felt by Sir Ashton Lever, 1729–88, who matriculated at Corpus Christi College in 1748. After forming at his seat at Alkrington Hall near Manchester the best collection of indigenous live birds, he purchased about 1760 several hogsheads of foreign shells at Dunkirk. These, with his collection of stuffed birds and many anthropological objects, formed the nucleus of a museum, which he moved up to London in 1774 and installed in Leicester House, Leicester Square. It filled sixteen rooms, the passages and staircases, and was called the 'Holophusikon'. Madame d'Arblay visited it in 1782 (*Diary*), six years before it was sold by lottery to James Parkinson, who exhibited it in the Rotunda on the south side of Blackfriars Bridge. In this new abode the collection was described by George Shaw of Magdalen Hall,[1] and again by E. Donovan at the time of its sale in 1806.

The study of systematic biology was sufficiently far advanced by the middle of the eighteenth century to make it quite clear that, owing to the great differences between southern and northern species, the English renderings of the names of animals and plants in the classical authors were wholly misleading. To provide scholars with the material essential for the understanding of ancient Greek writers on animals and plants, Dr. John Sibthorp, 1758–95, of Lincoln College undertook two journeys in Greece and the Levant, where he collected and studied the flora and fauna. In 1784 he engaged at Vienna a very excellent draughtsman, Ferdinand Bauer, who under his instructions drew the animals he had obtained on his tour at Constantinople, in Crete, Cyprus, and in the islands of the Aegean. Bauer's zoological drawings are bound up in four volumes, entitled *Fauna Graeca Sibthorpiana, or Drawings of the Animals of Greece and the Levant*: they illustrate 18 mammals, 85 birds, 19 amphibia, and 100 fishes of Cyprus.

[1] G. Shaw, *Museum Leverianum*, 1792.

THOMAS PENNANT OF QUEEN'S COLLEGE

After Gainsborough

Vol. i. Contains Mammalia (11), Tortoises (4), Amphibia (3), Lizards (12), Snakes (15), Fish (49).

Vol. ii. Fishes, pls. numbered '95 to 178'.

Vol. iii. Birds, 114 pls., briefly described by P. L. Sclater, *Ibis*, 1904.

Vol. iv is a volume of studies in pencil: comprising about 62 leaves of fish, 7 of birds, 2 of snakes and 1 bat.

That Sibthorp's fine work for zoological science should have been neglected is due to the fact that in this home of classical learning scholars specialized on a few works by the popular authors of which there were many translations, and left the writings of scientific authors severely alone. Among such neglected classics is Dioscorides, of whose works no English translation has ever seen the light. For several generations Sibthorp's zoological work has remained hidden away in a botanical library. Its rightful custodians have other duties than that of securing its publication, and few zoologists have ever seen it.

Thomas Pennant, 1728-98, of Queen's College was, however, also an exception to eighteenth-century somnolence. In his boyhood he was given a copy of Francis Willughby's *Ornithology* by his kinsman Richard Salusbury, the father of Mrs. Thrale, and to this gift he attributed his early taste for natural history. He was for a time an undergraduate at Queen's College, where he matriculated in 1744, but did not take a degree. In 1754 he travelled in Ireland, but here he kept a very imperfect journal; 'such', he adds, 'was the conviviality of the country'. In 1765 we find him visiting France, and staying with Buffon. At Ferney he visited Voltaire, whom he found 'very entertaining and a master of English oaths'; on his return journey at the Hague he met the celebrated Pallas. The first part of his *British Zoology*, begun in 1761, appeared in 1766, and his *Synopsis of Quadrupeds* five years later.

At various times in his life, Pennant thoroughly explored a large part of Britain. He also visited the Farn Islands off the Northumbrian coast in 1769 and the Isle of Man in 1774; he travelled round the coast of Scotland—altogether a most interesting life—and made copious notes on the fauna, especially on the birds of the coast. In 1781 he published *A History of*

Quadrupeds, a new and enlarged edition of his *Synopsis*; and three years later his *Arctic Zoology* appeared, partly based on information received from G. Low.

Pennant occupies a leading position amongst the zoologists of the eighteenth century, and although his work has been considered below the standard of that of Buffon, he was a really learned man, and he had an undoubted faculty for making dry and obscure things readable and plain. The estimation in which Pennant was held by his contemporaries is partly illustrated by Dr. Johnson's appreciation—'He's a whig, sir, a sad dog. But he's the best traveller I ever read; he observes more things than any one else does'—and partly by the fact that the premier book of Nature Study in the English language was addressed to him and to another member of Queen's College, DAINES BARRINGTON, in the form of letters.

This, *The Natural History of Selborne*, was the work of GILBERT WHITE,[1] 1720-93, Fellow of Oriel College.

No work by any of the great Masters of Science of either University has had a greater popularity than the letters of this country parson, who but for them might have remained unknown. *The Natural History of Selborne* was the first book of the kind to appear in this country: after a hundred and thirty years it is still sought after by numberless readers to whom the scenes and animals described in it are equally unfamiliar. It was not written for publication. It was part of a private correspondence carried on between White and Pennant from 1767 to 1776 and with Daines Barrington 1769-1787, the whole with additional letters being printed in 1788, when the index, 'an occupation full as entertaining as that of darning of stockings', was prepared.

It is not easy to analyse the secret of its great success. Professor Alfred Newton, who has, perhaps, better than any other critic, penetrated beneath the

[1] White's principal writings are:
Account of the House-Martin or Martlet. *Phil. Trans.* lxiv, 1774.
Of the House-Swallows, Swift, and Sand-Martin. *Phil. Trans.* lxv, 1775.
The Natural History and Antiquities of Selborne. 4to. London, 1789.
A Naturalist's Calendar, with Observations in Various Branches of Natural History. 8vo. 1795.

surface of White's somewhat stiff literary style, notes his genius for nearly always observing the right thing in the right way, and for placing before us in a few words the living object he has observed. In a sense he almost identifies himself in feeling with the animal he is describing. He was 'a scholar and a gentleman', and a philosopher of no mean depth. Lowell set down the 'natural magic' of White to the fact that, 'open the book where you will, it takes you out of doors'. All is told with a complete absence of self-consciousness or self-importance. His observations or remarks stand on their own merit, but they are narrated with a faint shade of humour that is all his own. From cover to cover there is the charm of a country life which is peculiarly English, something of the feeling of the English School of Landscape Painting and of the English Country House. The beauties of *The Natural History of Selborne*, apart from the way in which they directly appeal to naturalists, grow on the reader who is not a naturalist, and the more they are studied the more they seem to defeat analysis.

The outlines of White's career have often been sketched. We will but recall that his grandfather, Gilbert White, had been a Demy of Magdalen contemporary with John Hough, afterwards President of the College, and had been appointed Vicar of Selborne in 1681 when the living was held in low esteem and passed over by all senior Fellows, for the house had 'naked walls' and there were hovels in the front court. In this house Gilbert White was born on July 18, 1720. His younger brother, JOHN WHITE of Corpus Christi College, also gifted with a taste for zoology, corresponded with Linnaeus about the Fauna of Gibraltar, where for a time he was stationed. Gilbert came up to Oriel in 1740: he was elected a Fellow in March 1743-4, and in 1752 became Proctor and Dean of the College.

At about the same time he began to keep a 'Garden Kalendar', which he kept up until 1767, thereafter continuing it as a more elaborate 'Naturalist's Journal'. His zoology was largely self-taught. He had his Selborne always before his eyes, Ray's *Synopsis Methodica Avium et Piscium* serving him as a text-book, and he was 46 years of age before he embarked on the study of botany. Much of his life he spent on horseback riding about visiting friends and relations in Sussex, London, and Oxford, taking clerical duties, but declining livings until the one and only one he wished for should become vacant. Meanwhile his uncle Charles, who died in 1763, had left him his Selborne house, known as the 'Wakes', and he preferred to live there amid 'Nature's rude magnificence' at Selborne, where we may think of him, led by the Muse he invoked for his invited friend:

> Oft on some evening, sunny, soft, and still,
> The Muse shall lead thee to the beech-grown hill,
> To spend in tea the cool, refreshing hour,
> Where nods in air the pensile, nest-like bower.

And far below

> There, like a picture lies my lowly seat,
> A rural, shelter'd, unobserved retreat.

In striking contrast to the life-work of the author of Selborne is that of the next Oxford zoologist on our list. Like White, GEORGE SHAW, 1751–1813, of Magdalen Hall was a born naturalist; he was destined for the church, but his love for science proved too strong, and he went to study medicine at Edinburgh. In 1787 he took his degree of M.D. and set up in practice in London. In 1887 he took part in founding the Linnean Society of London. In 1791 he went into the British Museum as assistant-keeper of the natural history department and succeeded to the keepership in 1807. While the breezy Hampshire uplands nurtured the sportsman and observer of open air life, London produced the museum naturalist, the describer of dried skins. Dr. Shaw was the author of *Speculum Linnaeanum* 1790; *Museum Leverianum* 1792; *Zoology of New Holland* 1794; *General Zoology* 1800–12; *Naturalist's Miscellany* in 24 vols. 1789–1813. He was emphatic on the necessity of illustrating his work with coloured plates. The descriptions of the 'Naturalist's Miscellany' are written in most elegant latinity.

For Dr. G. Shaw was a scholar, as it is called, as well as a man of science. The peculiarity of his conversation was a phraseology, adopted for the sake of the jest, in which science and scholarship were forced into the service of common life. If he meant to tell you that some one offered to shake hands with him, he would say, 'The animal protruded its tentacula'. He excused himself to his brother, the Argonaut, who reproached him for appearing before breakfast in a well-worn coat, 'it is my ante-jentacular coat, Jack'; and answered his apologies for troubling him with a letter to London, by saying, 'I shall put it into the denarian post, and there my trouble will end'.

I spent a day with him most agreeably at the Museum; and saw that well-guarded collection to great advantage. We even went down into the cellars, where was a vast vault filled with coal. 'This puts to shame the subfenestral carbonaria of your alma mater.' Every university-man knows how the coal-porter brings his sack on his shoulder, and empties the load into the hollowed-out window-seat.[1]

For nearly a century the natural history collections belonging to the University had been allowed to fall into a sorry state of neglect for which it is difficult to blame the keepers, who were either incompetent or underpaid, generally both. With the appointment of the Duncans, matters took a different turn.

The elder brother John Shute Duncan 1769–1844, of New College, only held the keepership of the Ashmolean Museum for three years, being succeeded by his brother Philip Bury Duncan 1772–1863, also of New College, in 1826. Their services will be referred to below, but it must be mentioned that the Zoological Museum once more became a living entity during the reign of the younger Duncan from 1826–55. He rescued the relics of the Tradescant Collection, he rearranged the Museum and catalogued it, and in many departments the value of his work has persisted to the present day.

Archbishop Howley said, 'I question whether any two men with the same means have ever done the same amount of good'. And to crown all they were human: in their museum the Buckland children might ride the stuffed zebra, and know all the animals as friends, if not yet as relations.[2] It was at this period too that the habits of a Cape hyaena ('Billy') were studied by Buckland in Oxford. He was given shins

[1] H. Best, *Personal and Literary Remains*, p. 224.
[2] *Life of Frank Buckland.*

of beef and performed admirably on them, 'leaving precisely those parts which are left [in the Hyaena cave] at Kirkdale, and devouring what are there wanting, and leaving splinters and scanty marks of his teeth on the residuary fragments which are not distinguished from those in the den'. At Christ Church the great geologist was also carrying out his more careful but cruel experiments of immuring living toads in holes in rocks, in order to test the possibility of the truth of the stories about living toads being found imprisoned in rock cavities, or even in a lump of coal.

At this time zoological teaching in Oxford was non-existent. A keen student could attend the anatomy lectures of Sir Christopher Pegge and the chemical classes of Dr. Kidd. One of those who did so was William John Broderip 1789–1859, of Oriel College, who afterwards adopted the legal profession, and accumulated in his chambers at Gray's Inn a superb collection of mollusca which was ultimately purchased for the British Museum. With Sir Stamford Raffles he was one of the founders of the Zoological Society in 1826. He was a most delightful writer: few books of their kind are more pleasant to read than his *Zoological Recreations* 1847, and *Leaves from the Note Book of a Naturalist* 1852. In 1837 he wrote on the Dodo, effectively demolishing the view previously expressed by J. E. Gray that the pictures of the Dodo were made up artificially by joining the head of a large vulture to the legs of a great gallinaceous fowl.

Another collector, and one to whom Oxford owes her first chair of zoology, was Frederick W. Hope 1797–1862, of Christ Church. Through his munificence and love of entomology Oxford has come to possess the only considerable zoological collection, besides books, which is really of first-rate importance when judged by international standards. And when bestowing his insects Hope also founded a professorship to which J. O. Westwood was nominated. For reasons of health this benefactor was obliged to winter abroad on the Mediterranean, where he made a special study of crustacea and fish and continued to add to his previous gifts to Oxford. Hope also collected a fine series of portraits of naturalists and more than 20,000 engravings of natural history objects, all of which are believed to have been given to Oxford by him.

THE ANATOMY SCHOOL AT CHRIST CHURCH 1796-1860

The Anatomy School, in 'Skeleton Corner', as it was called, was the centre of anatomical and zoological studies in Oxford for nearly two-thirds of a century. A fair idea of the way in which it was managed is obtainable from the Accounts and from the Minutes of the annual visitations by the Dean and other members of the Governing Body of the House. From these Minutes, which cover the period 1796–1860, the following items have been abstracted :

Extracts from the Minute-book of the Anatomy School, Christ Church.

At a Visitation of Dr. Lee's Anatomical Theatre held Oct^{r}. 29, 1796. The following donations, made to the School since the last Visitation, were exhibited by Dr. Pegge, and ordered to be deposited in their proper places and to be entered in the Catalogues.

Three books. Rev. Mr. Palmer.
Bradypus tridactylus with young. Marquis of Buckingham.
Expenditure by Dr. Pegge.

Walter on the Nerves	2	2	–
Foot of a Horse, injected		10	6
Anas tadorna stuffed	1	1	0
	3	13	6

Ordered that this be allowed and paid to Dr. Pegge.

Ordered, that a mahogany case, the property of the last Anatomical Reader, be purchased for use of School, and that a new Green Cloth be allowed for the Upper Room.

Expenditure allowed at Annual Visitation of the Anatomy School.

1797. 24 Oct. £5 12 6

Dried preparation of Ductus arteriosus and Ductus venosus of Foetus.
Dried preparation of Vesiculae seminales of Horse.
Wet preparation of Placenta injected.
Spirit preparations of Hydatids from Human Body.
Large jaw bone with two serrated teeth, in calc. schistus from Stonesfield, purchased for 10*s.* 6*d.*

Expenditure allowed at Annual Visitation of the Anatomy School.

1798. 26 Oct. — 9 19 10

Section of Head of Horse.
Heart and great Arteries of Horse with part of spine.
Uterus of Calf.
Scull of Caribb from Mr. Jannings.
Young Emu. Marquis of Buckingham.
Chicken with 4 legs, etc.

1799. — 38 19 0

A long list of anatomical preparations were acquired.

1800. — 27 16 8

1801. — 15 18 5

1802. — 10 19 0

Cast of Venus of Milo.
Skeletons prepared by Knapp.

1803.

1804. — 37 0 11½

Preparation of Heart by Dr. Bourne.

1805. — 39 5 0

Preparations from Italy.
A Platina Retort, gift of Rt. Hon. Ld. Grenville. The Lee's Reader was permitted to lend it, when wanted, to public Reader in Chemistry, taking always an acknowledgment for it and requiring it to be returned when no longer wanted.

1807. — 26 17 4

Tiger's Head.
Red Deer head.
Skulls of Chinese and York.

1808. — 7 9 11½
21 3 0

Sir Christopher Pegge gave 2 skulls from New South Wales.

1809. — 31 3 11

1810. — 60 10 9

Spirits of wine	£10	4	9
Preparation Glasses	21	0	0
Jawbone of Mammoth	5	5	–
Head bones of Ornithorhynchus	3	3	–

Sir Ch. Pegge's donations—
Coluber natrix with pike in mouth.
Hirudo medicinalis laid open.
Crawfish casting its shell.
Stomach of cod.
Intestines of dogfish.
79 specimens in all, including many invertebrates. This series was the foundation of the study of Comparative Anatomy in Oxford.

1811. 84 18 10

Long series of Vertebrate preparations from Sir Ch. Pegge.

Pegge engaged W^m. Pembry to keep preparations in order and repair them, and ordered a new green silk curtain to his private cabinet of preparations.

1813. 56 7 9

47 specimens of Vertebrates from Sir Ch. Pegge.

1814. 47 5 0
40 6 5

1815. 54 7 7

1816. 133 2 $10\frac{3}{4}$

A Microscope ordered and a Lecture Table.

1817. 91 18 0

Cary, mathematical Instrument maker, for a Microscope £14 16 8.

1818 (?). 43 15 8

Dr. Kidd presented specimens showing the conversion of animal matter into adipocere.

1819. 120 6 8

Wax model of adult female.

Anatomie du Gladiateur combattant, pres. by Dr. Alex. Hood.

1820. 100 3 $4\frac{1}{2}$

Large Air Pump for drying the preparations (Cary. £55 13).

Kidd's model of Eye.

1821. 144 8 6

Quicksilver Pneumatic Trough.

Scales of usual size but made with great accuracy.

Platina evaporating cups and Thermometer.

1822. 116 7 $6\frac{1}{2}$

Model of Chinese Monster (donation).

Purch. 76 lb. Quicksilver @ 4/6 per lb.	£17 2 0
Balance with platina pans	11 16 6
Cary for platina cups and thermometer	18 19 9

1823. 83 17 $6\frac{1}{2}$

Buckland gave a cast of a fossil Rhinoceros head.

Kidd purchased Anatomical drawings.

1824. 101 17 $8\frac{1}{2}$

13 drawings of the Gryllotalpa made according to Kidd's instructions £12 12 0

1825. 69 18 5

Weiss' instrument for extracting poisons from stomach.

1826. 125 4 11

£50 allowed to Kidd for an Assistant in the Dept. of Comparative Anatomy.

1827. 134 10 8

		Expenditure allowed at Annual Visitation of the Anatomy School.
1829.		798 7 6½
	Dr. Ogle for expenditure at sale of Brook's Museum £378 15 2.	
	Dr. Ogle for specimens £25 0 0.	
1830.		399 11 9
1831.		214 2 6
1832.		175 1 8
	Allen for asst. £50	
1833.		184 13 6
	Dr. Auzoux's Model. Cost £145	
1834.		54 5 1
1835.		64 1 8
1836.		82 1 6
	Mr. Hitchings, Surgeon (one corpse) £20	
1837.		78 3 8½
	" " (spring course) £20	
1838.		73 17 9½
	" " " " 20	
1839.		94 12 2
	" " " " 20	
1840.		50 12 0
	" " " " 20	
1841.		97 5 11½
	" " (2 courses) 40	
1842.		67 10 11½
	Dr. Kidd's account included an assistant in dissection £10 – £19 9.	
	Microscope of Alex. D. Campbell Esq. of St. John's £17–	
1843.		41 12 5
1844.		20 0 9
1845.		39 8 1
1846.		70 7 8
1847.		288 16 5
	Acland	
	Animals for dissection £22 18 –	
	Instruments 15 3 11	
	Spirits and Glass 68 15	
	Books and Drawings 40 6 11	
	Coals and Carpentry 23 10 6	
	New Shelves 60 4 1	
	Assistant (Dr. Melville for 6 months) 50 – –	
1848.		{ 296 14 4 89 1 0
	Osteological Specimens purchased in Paris £85 1 –	
	W. Pembrey appointed Assistant.	
1849.		274 17 4½
1850.		208 17 11
	Orang outang £5.	
	Dr. Carus £50.	

1851. Wyatt, builder £65. Carus £60.	368	13	3
1852.	116	1	9
1853. Asst. for April £10.	275	15	9
1854. Dowson (Assistant) £40.	200	19	9
1855. Pathological female (wax model) £60. Assistants (Dowson and another) £100.	297	3	7
1856.	219	11	2
1857.	415	14	6

With regard to the large expenditure incurred in 1829, it may be noted that during the previous year Dr. Buckland discovered that a considerable sum had accumulated which might be claimed for the benefit of the Museum. In July 1828 he wrote to Sir R. Murchison in great delight at his discovery. 'I am going to town in a day or two to attend the opening of Brooke's sale, for I have found out £1200 that we can lay out for our anatomical school at Christ Church, which will quite set us up, unless we find powerful rival bidders in the two new London Colleges.'[1]

In November 1857 GEORGE ROLLESTON was elected Lee's Reader in the place of Dr. Acland, who resigned on being appointed Regius Professor of Medicine, and at the annual visitation the Dean was requested to convey to Dr. Acland the high sense entertained by the Lee's Trustees of the excellent services rendered by him. The present author would however here note that the efficiency of a scientific department in which material objects for study are a *sine qua non*, depends in no small measure upon the annual grant paid to it. During the half century preceding 1847, the year of Dr. Acland's appointment, the annual grant to the Anatomy School was on the average under £70 a year, indeed it had been as low as £20 three years previously. During Acland's tenure of the office, twelve years, he received no less than £3,280 13*s*. 10*d*. for his department—or about £273 a year! and he had a stipend of £600 a year.

It was also ordered that Mr. Dowson's salary should be paid up to Christmas 1857 and that on his then retiring,

[1] Gordon, *Buckland*, p. 88.

a gratuity of £50 should be presented to him. CHARLES ROBERTSON was appointed as assistant to Rolleston at a salary of £60 a year, and it was arranged that Woodward's wages should be paid by the Lee's Reader.

1858.	Last payment under the Acland regime	£228	7	$0\frac{1}{2}$
	First „ „ Rolleston „	41	6	4
1859.	Second „ „ „ „	86	14	$4\frac{1}{2}$
1860.	Third „ „ „ „	91	8	10

In 1858 in addition to the establishment charges, Rolleston expended £5 4*s*. on a Smith and Beck microscope, and in 1859 he asked that £10 be paid to the porter to keep the building clean. In this year he gave two courses in Anatomy and Physiology, attempting to realize the objects of Matthew Lee. He arranged practical classes in which students received instruction by actual demonstration and dissection. He noted that of forty-eight persons attending, fifteen were Christ Church men. Thirty-six tickets of admission were granted to visitors; and seventy-eight descriptions of anatomical preparations were added to the manuscript catalogues, pains being taken to render them as serviceable to students as possible. It was Rolleston's chief aim to make the best possible use of the specimens already collected, rather than to add to the collection. The *Pathological Series* was removed to the medical department of the New University Museum. 783 persons visited the School.

In 1860 Rolleston was appointed Linacre Professor of Anatomy and Physiology and he carried off Charles Robertson to the University Museum with him, whither the Collections of the Lee's Trustees soon followed. Robertson was appointed Demonstrator of Anatomy, and his skilful work became widely known beyond the University through his *Zoological Series with Dissections in Illustration* that was exhibited in the Educational Department of the Exhibition of 1862. To this favourable conjunction of a young and enthusiastic professor, Rolleston, with a skilful dissector, Robertson, and of the Lee's and other zoological collections *under the same roof* with the magnificent collection of books in one of the best of existing scientific Libraries, the Radcliffe Library, the world of science owes one of the best modern original text-books, Rolleston's *Forms* *of Animal Life*, 1870, which reappeared in a second edition as the most learned text-book of its day in 1888, having been mostly rewritten by W. HATCHETT JACKSON of New College. There is no doubt that as a course for students the application of Comparative Anatomy in accordance with the methods of Rolleston and of the Oxford School has proved the best training at any University.

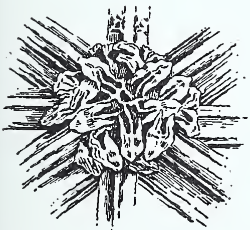
VI

BOTANY

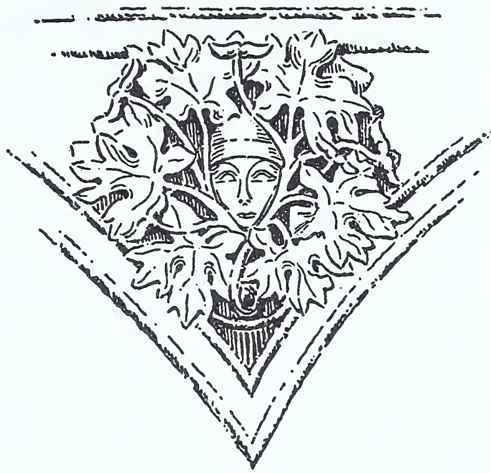
The earliest representations in Oxford of plants, that are undoubtedly of local origin, are stone carvings by the hands of unknown masters of Gothic sculpture. They have left us here, as elsewhere, deep-wrought corbels and bosses that tell of close observation of nature; as, for instance, the cleverly designed boss of Arrowhead leaves (*Sagittaria sagittifolia*) in the vaulting of the Latin chapel in the cathedral. But the finest assemblage of all may be seen on the stone arches that once bore the shrine of St. Frideswide.

Mr. S. A. Warner, the latest writer on the subject, recognizes twelve distinct species, some of which are thought to have been chosen in allusion to the healing powers of the saint, while the oak and the ivy refer to her place of refuge. However this may be, all who have studied the carvings agree in praising their marvellously natural and accurate detail. By Mr. Warner's permission we reproduce four illustrations from his new work on Christ Church.

Maple, *Acer campestris*, with winged seeds.	S. side.
Sycamore, *Acer Pseudoplatanus*, with winged seeds.	N.
Oak, *Quercus robur*, with acorns and empty cups.	N.
Hawthorn, *Crataegus Oxyacanthus*, with two distinct leaf forms on the same spandrel.	W.
Ivy, *Hedera Helix*.	N.
Water Crowfoot, *Ranunculus aquatilis*. On boss.	S.
Columbine, *Aquilegia vulgaris*.	S.
Greater Celandine, *Chelidonium majus*.	S.
White Bryony, *Bryonia dioica*.	W.



ARROWHEAD BOSS, XIV CENTURY.



MAPLE, *c.* 1289.

HAWTHORN, *c.* 1289.

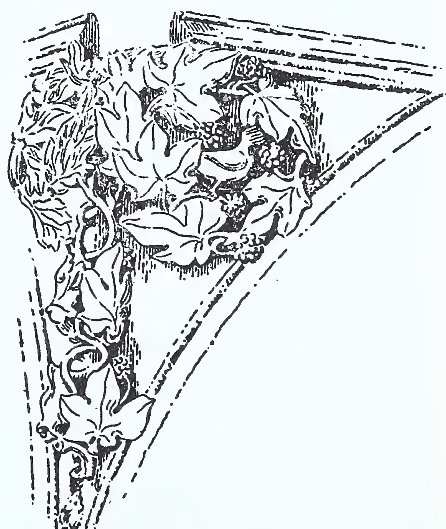


FIG. IVY.

Hogweed, *Heracleum sphondylium.* On cusp. E.
Vine, *Vitis vinifera,* with grapes and tendrils. E.
Fig, *Ficus.* E.

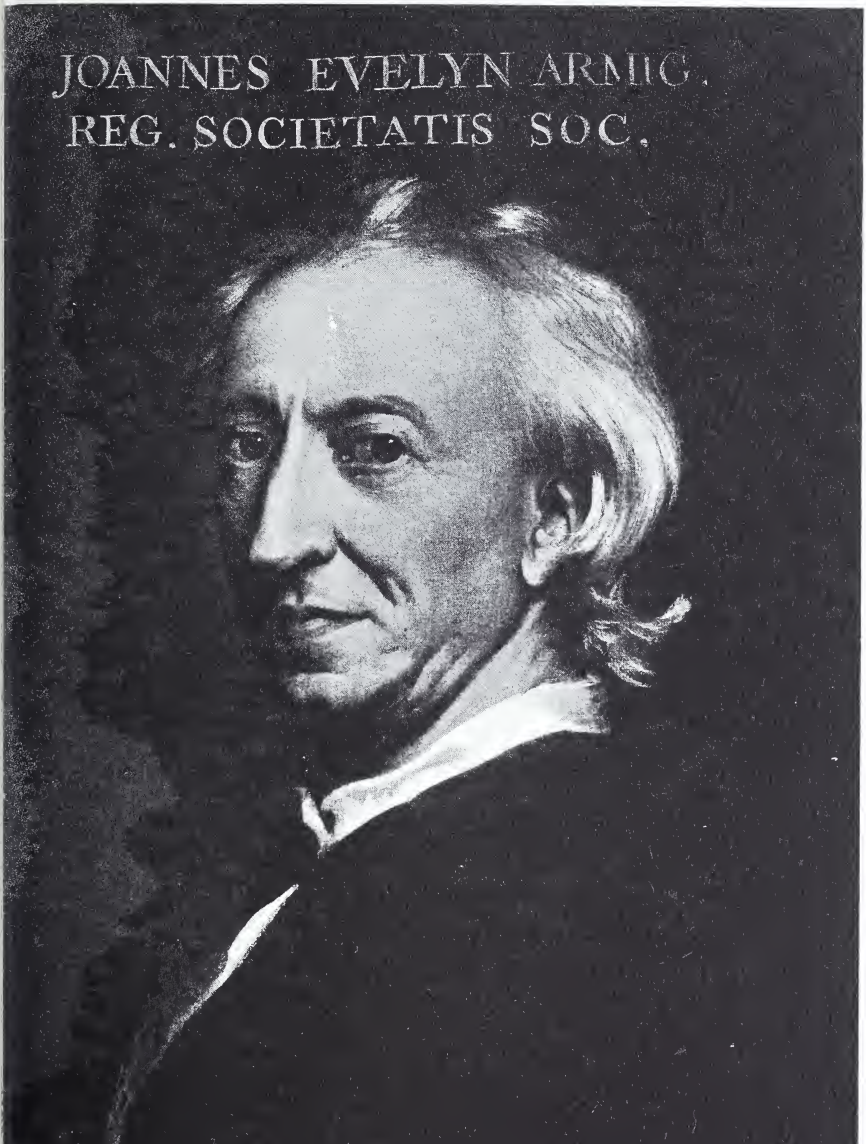
Accounts of the antiquities of the Oxford Physick Garden, founded by the Earl of Danby in 1621, and of the contributions to Botanical Science, especially in the direction of systematic botany, have been published so recently that it is unnecessary to traverse the same ground again.[1]

The leading botanists who interested themselves in the early progress of the Garden were the BOBARTS, father and son, PHILIP STEPHENS of New College, WILLIAM BROWNE of Magdalen, ROBERT PLOT, and ROBERT MORISON of Aberdeen, while improved methods in the cultivation of fruit were practised or described by RALPH AUSTEN and ROBERT SHARROCK, both of New College, and 'very knowing in vegetables', by WILLIAM HOOPER of Magdalen, and by FRANCIS DROPE, and their example was doubtless followed by many an Oxford man in various parts of the country, as for instance by OLIVER LE NEVE of Hart Hall, at Witchingham in Norfolk.[2] NATHANAEL HIGHMORE of Trinity on retiring to Purse Candel in Dorset became a great florist. In a letter to Oldenburg, dated Oxford, Aug. 29, 1664, Robert Boyle quoted his practical experience, presumably gained in Dorsetshire, that 'there is scarce any mold comparable for flowers to the earth which is digged from under old stacks of wood, or other places where rotten wood has been lain'. The names of the EVELYNS, father and son, of Balliol and Trinity respectively, will be celebrated as long as histories of Gardening are written.

Special mention must also be made of WALTER STONEHOUSE of Wadham and Magdalen; of WILLIAM HOW of St. John's College, the young compiler of the first British Flora, the *Phytologia Britannica*; of CHRISTOPHER MERRETT of Gloucester Hall and Oriel; of

[1] Gunther, *Oxford Gardens*, 1912; Vines and Druce, *Dillenian and Morisonian Herbaria*, 1907, 1914; Gunther, *Early British Botanists*, 1922.

[2] *Calendar of Correspondence of Oliver le Neve*, edit. by W. Rye, Norwich 1895.



JOHN EVELYN, THE DIARIST

William Cole of New College; and especially of Thomas Johnson; all of them members of the circle of John Goodyer of Hampshire. Robert Lovell, a Student of Christ Church, compiled *A compleat Herball*, which was printed in Oxford by Henry Hall, and reached a second edition in 1665.

Of the professors of the eighteenth century, Sherard's nominee, Dillenius, and John Sibthorp were the only two whose botanical work did not bring Oxford botany into disrepute. For a time George Shaw, the zoologist, acted as deputy lecturer.

In the Museum, Herbarium, and Library at the Garden there are no really old botanical specimens or pieces of apparatus of historic interest, with the exception of the older *horti sicci*. The following are the more important of the old collections of Dried Plants:

	Specimens.	Locality.	Approximate date.
Gregory of Reggio	300	North Italy	1606
Jacob Bobart	2,000	Oxford Garden	1656–1670
Bobart and Robert Morison	6,500	General	1680–1714
Charles Du Bois	13,000	,,	1690–1723
William Sherard	14,000	,,	1696–1726
Thomas Shaw	660	Barbary	1720
James Dillenius	575	Britain	1724–1741
John Sibthorp	2,000	Greece	1786–1794

In addition, the following of the older collections of dried plants are preserved among the manuscripts in the Bodleian Library:

John Southwell's collection of dried flowers and leaves. **c. 1620–30.**
MS. Arch. Selden B. 3 (3333).

Purchased at Leyden for £4. The specimens are neatly fastened by paper straps. Near the beginning is an attached leaf bearing 'Thiss anatomized Iuye-leafe I found in mye Garden at Croyden Mar: 19: 16$\frac{39}{40}$', stated to be in Archbishop Laud's hand.

The Tradescants' Hortus Siccus (?).

MS. Ashmole 1465.

Probably collected for or by the Tradescants, ff. 3–160.

G. Wheler's Hortus Siccus.

MSS. Ashmole 1800–3.

In four volumes containing 80, 114, 90, and 104 leaves.

Liber Plantarum ccccl xii Medicinalium secundum Pharm. Londin.

MS. Ashmole 1502 (7528).

William Howlet's Collection. **xvii cent.**

MSS. Bodl. Adds. D. 94–6 (27839–41).

a. 'Volumina 3ia Plantarum desiccando conservatarum, curâ Guil. Howlet M.D., privigni V. Cl. Pe: Barwick, qui mihi Dono Dedit J W [or T. W.].

MS. Bodl. Adds. D. 97 (30312).

b. 'Catalogus Plantarum quibus utuntur medici.'

Barbadoes Plants.

MS. Rawlinson, C. 403 (12257).

Descriptions of 74 plants, with leaves of some.

T. Br.'s Physick Garden Plants. **Early xviii cent.**

MSS. Lat. misc. d. 25–6 (31821–2).

'Plants taken from the Table-book and observed growing in the Physick Garden.' The lists in the hand of 'T.Br.' who was apparently living in Oxford early in the eighteenth century. The collection was presented by the Librarian of Oriel College in 1895.

Edward Morgan's Hortus Siccus. **1672–82.**

MSS. Ashmole 1797–9 (6547).

Each of the three volumes contains about 160 leaves. Morgan lived at Bodesclen, cf. Gunther, *Early British Botanists*, 1922, p. 308.

The vegetable rarities collected by Tradescant, and handed on by Ashmole to the University in 1683, have with possibly a single exception, disappeared. In 1912 we reported that all were lost or destroyed, but we have since discovered one specimen that was catalogued as being in the Ashmolean collection in 1830.

It is in 'visible hiding', a solitary botanical rarity, removed from all the other botanical collections in the University and placed in so conspicuous a position as to escape notice. It is no doubt where Acland or Rowell put it, tied up alongside one of the round iron shafts that support the roof over the zoological and geological collections in the University Museum. In Duncan's catalogue it is described as a 'Bamboo cane, 60 feet long, in two pieces, the lower part of which had a circumference of 16 inches'.

The Ashmolean collections also included a series of twenty-four Wax Models of Fungi made by Louis Calamai of Florence and presented to the Museum by Dr. Buckland; and another series of thirty-two Skeletons of Leaves and Seed Vessels presented by J. S. Duncan. Both series are listed in the Catalogue of 1836.

A few collections of dried plants are preserved in some of the College Libraries, e.g. at Corpus Christi College where there are a few dried leaves collected by William Clayton, and inserted in his painted copy of *Dodoens* 1616 which he presented to the Library in 1667. In 1676 William Creede also made a collection: 'The number of ye plants which I collected and gum'd in my booke ye first yeare I made my Collection viz. 1676, was was very neare thirteen hundred.'[1] Merton received the *Herbarium vivum* of Charles Willughby, M.D. and a fellow of the College in 1673. And an extensive collection by Robert Huntingdon, Fellow 1680, from eastern Mediterranean lands gives names of plants in French and Arabic, but no localities. But the most interesting of all, the herbaria of John Goodyer, c. 1620, formerly in the library of Magdalen College, have been allowed to perish without record by their proper custodian. At Wadham is the *Hortus siccus* of William Paine, 'Bottanist', from the Rivers, Fields, Woods and Gardens of Dorset, Somerset and Wilts. A.D. 1729. And perhaps of the same date is the Oglander herbarium at New College.

Though she is the happy possessor of these valuable collections, Oxford can hardly pride herself on having rendered them very accessible to students. Her teachers have not known how to use them, and, as a consequence, the dried plants have lain by without rendering to science

[1] Note in Stevens, *Cat. Oxon* (Corpus Library P. 14. 3).

the full services of which they might have been capable. And yet there would have been many willing students of Botany, had the University only provided suitable instruction for them.

Lord Herbert of Cherbury, for instance, who had come up to University College in his thirteenth year, rightly advocated the study of plants as a 'fine study, and worthy a gentleman to be a good botanic, that so he may know the nature of all herbs and plants'. The experience of Sir Joseph Banks in the eighteenth century has not been very unlike the experience of other would-be botanical students within the memory of the present generation. The story is well worth repeating.

Having passed a few months among his favorite plants, it became necessary that he should proceed to Oxford, to be entered as a gentleman commoner of Christ Church, as had been decided on shortly before the death of his father. His love of natural history was not diminished, and he hoped that means would be found among the learned of the college to enable him to pursue it. Botany, however, was the prevailing object of his wishes; but he found, to his severe disappointment, that no lectures were given by the botanical professor. Though disappointed, he was not of a temper to be discomfited, much less defeated. He made application to the botanical professor, and obtained permission from the learned doctor to find out and engage a lecturer, the expense to be wholly defrayed by his pupils. In vain, however, was his search in Oxford; no one could be found, there, capable of undertaking the class; but he heard of one at Cambridge, and forthwith went over to that university.

The delight of Banks may be imagined on his falling in with the very kind of person best suited to his purpose, whom he at once engaged and carried back with him to Oxford—Mr. Israel Lyons, a learned botanist and good astronomer. He delivered a course of lectures on botany, and gave lessons on astronomy to the students, in which Banks of course largely participated; but Lyons very soon returned to Cambridge, after delivering lectures on both subjects to about sixty pupils: he was a learned mathematician and became a calculator for the "Nautical Almanac". Banks did not forget his friend and instructor. He obtained for him the appointment of astronomer to Captain Phipps, on his Polar voyage.[1]

[1] Sir John Barrow, *Sketches of the Royal Society*, p. 15.

Among our pioneers we may number LHWYD, the first writer on fossil plants in England. A few Oxford men of the eighteenth century distinguished themselves beyond the University radius. RICHARD RICHARDSON (1663–1741) a wealthy amateur who acquired an unusual knowledge of Cryptogams, some of which he grew in his hot-house, stated to have been the second hot-house constructed in England. LIGHTFOOT, b. 1735, of Pembroke College compiled a *Flora Scotica* in 1777, which was partly based on his own observations in 1772, and on the Dillenian Cryptogamic herbarium at Oxford. THOMAS ANDREW KNIGHT (1759–1838), up at Balliol about 1778, is remembered for his work on sap in 1801, supported by experiments on the 'ringing' of trees. He was a great friend of Sir Humphrey Davey.[1] AYLMER BOURKE LAMBERT (1761–1842) of St. Mary Hall, an original member of the Linnean Society, completed an important monograph on the genus *Pinus*, and described the *Cinchona*. WILLIAM HERBERT (1778–1847) of Christ Church and Exeter College, afterwards Dean of Manchester, made a special study of hybridization in the Amaryllideae.

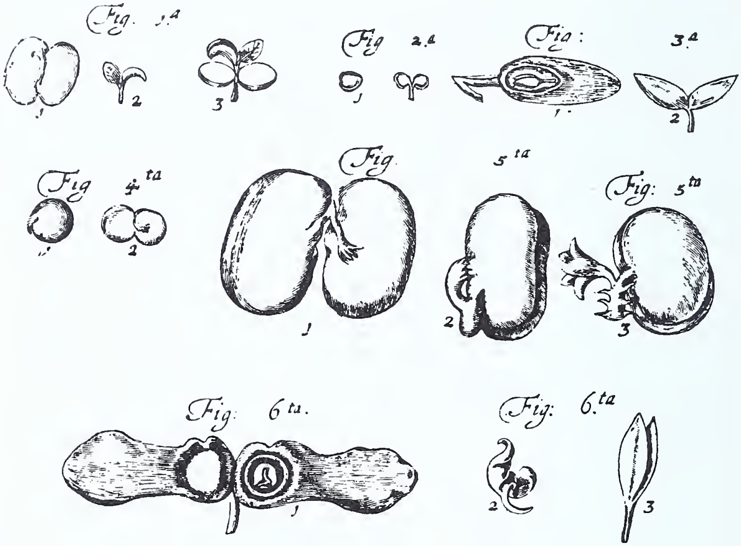
Banks's story of the neglect of Botany at Oxford is confirmed by others. The doleful tale of the shortcomings of the Garden, of its useless greenhouses and extravagant management, has already been told, so that there is no need to repeat it again here. A great change for the better was made in February 1834 by the appointment of CHARLES GILES BRIDLE DAUBENY as professor of Botany. Daubeny was a real 'live wire'. He raised a considerable fund for the restoration of the Garden, he swept out the 'Augean stables' of his department; and for thirty years of the nineteenth century the Botanic Department and botanical studies really flourished in Oxford. Daubeny was a man with a European reputation earned by the merit of original work in many fields.

PHYSIOLOGY OF PLANTS.

In the general revival of science that occurred during the seventeenth century, plants were soon recognized

[1] Reynolds Green, *History of Botany*, pp. 295–305.

as fit subjects for the experimentalist. The methods of the Belgian pioneer, Van Helmont, were repeated with modifications, and in their turn suggested further lines of research. For instance Sir Kenelm Digby,



Highmore's Figures of the Germination of Seeds, 1651.

Fig. 1. The Kidny Bean opened; in which is a little crooked leaf folded up, which being displayed, shews it self, as in the second; and when, being set, it arises above ground, it is such a Plant as the third shews; with the very same leaves and no other.

Fig. 2. A Colewort seed: the first shews both leaves, with the stalk folded up, as they lie in the husk of the seed; the second shews it come up out of the ground.

Fig. 3. The small germen of an Ash; lying with his two leaves in the kernel of an Ash, both in the husk inclosing them. The second shews him sprung up above the Earth, at his first coming abroad.

Fig. 4. The young germen of the Pease in the midst of the grain, and its breaking forth.

Fig. 5. The young plant in the midst of the Bean: with the manner of his putting forth, with the same leaves displayed in the third, which are wrapt up in the first and second.

Fig. 6. The young Maple wrapt up in his husk: the second shews him a little unfolded, when it is taken out of the husk. The third shews him gotten from his shell, and the surface of the earth.

the pupil of Laud and of Thomas Allen, in the intervals of dabbling in other sciences is said to have been the first to notice the importance of vital air (i. e. of oxygen) to plants.[1] Digby's views on the physiology and reproduction of plants are stated and criticized by NATHANAEL HIGHMORE of Trinity College, who wrote 'A short Censure' on them. The sciences of physics and chemistry had hardly made sufficient progress to afford a firm basis for vegetable physiology, but in the work of Highmore, and particularly in his detailed sketches of the germination of seeds, may be seen a first attempt at an investigation that was carried further by Malpighi in his *Anatome Plantarum*. Curiously enough the work of Malpighi is quoted over and over again in histories of Botany, but the work of Nathanael Highmore is never mentioned, yet it anticipated that of Malpighi by a quarter of a century.

Highmore's drawings illustrate the scope of his work. They appear on the same plate as the two figures showing the later stages in the incubation of a hen's egg on p. 164. It will be noticed that he was aware of the leaf nature of some cotyledons.

The Transpiration of Plants was demonstrated in June 1669 by JOHN WILLS, M.A., Fellow of Trinity College:

He took two glass vials with narrow necks, each holding 1 lb. 8 oz. 2 drms. of water . . . into one of these glasses filled with water, he put a sprig of florishing mint (which before had grown in the water) weighing 1 oz.; the other glass he also fill'd with water, and exposed them both in a window to the sun. After ten days time he found in the bottle where the mint was, only 5 oz. 4 drms. of water remaining, and no more, so that there was 1 lb. 2 oz. 6 drms. spent, the mint weighing scarce 2 drachms more than at first.

From the other glass, where water was put of the same weight, and no mint, he found the sun had exhaled near one ounce of water, and therefore concluded it drew but so much out of the first glass, at least not more: So that allowing 1 oz. for what the sun had exhaled, there was in those ten days spent by the mint, 1 lb. 1 oz. 6 drms. of water; and the mint being increased in weight only 2 drms., 'twas

[1] Digby, *Discourse concerning the Vegetation of Plants*, 1660.

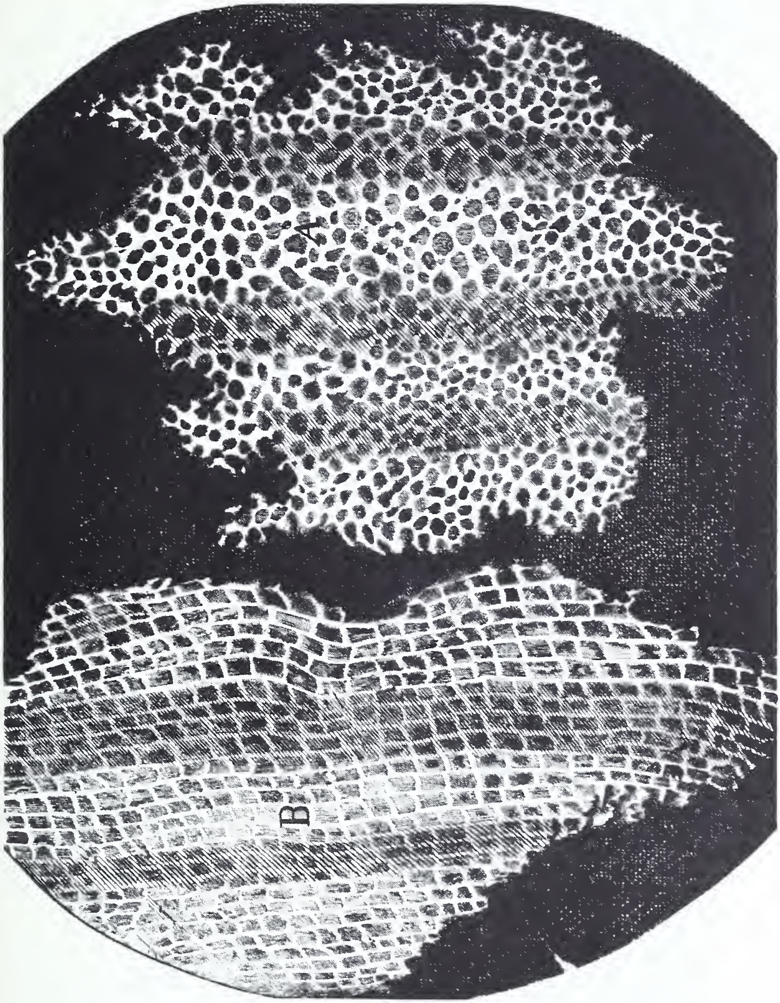
plain the mint had purely expired in those ten days 1 lb. 1 oz. 4 drms. that is each day above an 1/2 oz., which is more than the weight of the whole mint. Whence he concluded that . . . every sprig of mint, and most other herbs in the field, every summer's day attract more nourishment than their own weight amounts to.

He also argued that a plant with moist leaves like the *Pinguicula* and the *Ros Solis* sucks up moisture faster than the sun can exhale it, and is bedewed all over at Noon-day.[1]

The fundamental discovery that certain parts of the body of a plant are not solid but are divided up into 'little boxes or cells' is due to ROBERT HOOKE of Christ Church. By employing a method which has since become part of the training of every laboratory botanist, viz. that of cutting sections, Hooke demonstrated the existence of a cellular structure in the case of cork and of the epidermic cells on the under surface of a nettle leaf.[2] He even examined thin sections of charcoal by transmitted light, and discovered its similarity to cork. On cutting 'an exceeding thin piece of cork and casting the light on it with a deep plano-convex glass, I could exceeding plainly perceive it to be all perforated and porous, much like a honey comb, by that the pores of it were not regular'. To the hollow spaces he gave the name 'cells', and to the partition walls 'interstitia'. His extraordinary ingenuity of mind and his restless searching after new topics of interest prevented him from following up his discovery further—indeed it was not until a hundred and seventy years later that Schleiden formulated the complete generalization that all plants are made up of cells. But the first step in such a cell-theory was undoubtedly the achievement of Hooke.

Thirteen of the chapters of the *Micrographia* are devoted to the minute anatomy of plants. The matters treated of are Charcoal; Petrify'd Wood; Pores of Cork and other Bodies; Plants growing in the blighted or yellow Specks of Damask Rose-leaves and Bramble-leaves; Blew Mould and Mushromes; Moss; Form of Sea weed; Surface of Leaves; Stinging points of Nettles; Beard of Wild Oat; Seeds of Venice (= Venus) Looking-glass, Thyme, Poppy, Purslane.

[1] Plot, *Nat. History of Oxfordshire*, 1677.
[2] *Micrographia*, 1667.



HOOKE'S DISCOVERY OF VEGETABLE CELLS, 1667

The first graphic statement of the *Cell Theory*

These cells 'were indeed the first microscopical pores I ever saw, and perhaps, that were ever seen, for I had not met with any Writer or Person, that had made any mention of them before this'.

Micrographia, p. 113.

An important advance in our knowledge of the reproduction of the lower plants was made by ROBERT MORISON. The relatively bulky seeds that are produced by all the higher flowering plants are not produced by ferns, which nevertheless are sometimes found surrounded by a tiny progeny. The production of little ferns around the old ones suggested the production of seed, but as none could be seen, it was thought to be the invisible product of certain brown patches on the back of ripe fern-leaves, from which a fine dust can be shaken. Among those who believed in sympathetic magic this dust or invisible fern-seed was a valuable possession, for it was reputed to make its possessor invisible also. The application of the microscope soon put an end to the myth of invisibility, but Morison had previously tested the matter by actually sowing 'dust' from a hart's-tongue fern, and getting an abundant crop of prothalli, which he took to be the cotyledons of young ferns.

A matter of far greater originality was the discovery of the sexuality of plants made by Sir THOMAS MILLINGTON of All Souls College. Notwithstanding that mankind has always been well acquainted with the fact that plants produce seeds, and that seeds develop into plants, none of the early Greek Fathers of science understood that a process of fertilization always, or almost always, precedes the production of seed. Doubtless the early cultivators of the palm-tree were better instructed, but their special knowledge formed no part of the culture that had been handed down. Even so close an observer as Malpighi, armed with the power of his microscope, failed to detect the real secrets of the pollen and the function of flowers. It remained for our Sedleian Professor of Natural Philosophy to put forward the suggestion that in plants 'the *attire* (= anthers) doth serve as the male, for the generation of the seed'. This idea was not published by Millington himself, but was mentioned by him to Grew, who announced it in 1676 in a *Lecture on the Anatomy of Flowers*[1] and in his *Anatomy of Plants* published in 1682. More than a decade later, Professor Camerarius of Tübingen established the truth of Millington's discovery by convincing experimental proof.

[1] *Phil. Trans.*, Nov. 1676.

Millington was a man of a most charming personality, who filled the important office of President of the College of Physicians to the approbation of all. His praises have been sung by Garth in the fifth canto of his *Dispensary*, under the name of Machaon.[1]

In the eighteenth century questions of vegetable physiology appear to have lost all interest to the Oxford mind, but notable advances were made in Cambridge by Stephen Hales in his private Laboratory in Bennet College. He investigated transpiration and the movement of water in the wood, measured the forces of suction and root-pressure, and proved that air contributes largely to the nutrition of plants. His book of *Statical Essays*, 1727, attracted the attention of the scientists of the four leading countries of Europe and was translated into their languages.

At Oxford we have to pass over a hundred years and more before we meet with any notable attempt to advance the science. In 1834 CHARLES DAUBENY of Magdalen College was appointed to succeed Dr. Williams in the Sherardian Chair of Botany, and once more the torch of botanical research was kindled in Oxford. In the year before his appointment to the chair, Daubeny had prepared a *Memoir on the degree of selection exercised by plants with regard to the earthy constituents presented to their absorbing surface*,[2] and had also studied the Irritability of Plants. A research of the first importance soon followed. In Dec. 1835 he read a paper before the Royal Society *On the action of Light upon Plants, and of Plants upon the Atmosphere*. In this investigation he anticipated the work of Draper in 1844, by showing that although vegetable metabolism depends upon the brightness of light, yet light of the various colours of the spectrum differ in their action on plants. This fundamental discovery was made by introducing the fresh leaves of various plants into jars of water saturated with carbonic acid gas, by exposing them to sunlight transmitted through various coloured media and by

[1] Machaon whose experience we adore,
Great as your matchless merit, is your power.
At your approach the baffled tyrant, Death,
Breaks his keen shaft and grinds his clashing teeth.

[2] *Trans. Linnean Society*, xvii.

then collecting and measuring the oxygen given out by the leaves. The coloured media had been examined spectroscopically by Prof. Baden Powell, and, with the exception of the port-wine screen, are still in existence. The results clearly show a difference between the effect of the rays of various parts of the spectrum, and thus must be regarded as of epoch-making importance as inaugurating a new line of thought and of further discovery. Although chlorophyll is formed equally well in light of all wave-lengths, the formative processes require the more refrangible rays. The apparatus used by Daubeny in these classic experiments was piously preserved by the present writer, but it is now doubtful whether it will be permitted to remain for a whole century in the Laboratory which he built. He also found that the irritability of the Sensitive Plant depended on the light of certain colours. In after years his knowledge of vegetable physiology and of chemistry was placed unreservedly at the disposal of agriculturists, for whose benefit he published a long series of articles dealing with manures, the rotation of crops, the various ingredients of the soil, the vitality of seeds and the like.[1]

[1] Cf. *Bibliography* of Dr. Daubeny in *History of the Daubeny Lab.*, Oxford 1904. When on one occasion the announcement of one of Daubeny's Rural Economy lectures was published in the *Herald*, 'a day after the fair', the following effusion appeared in the next week's number:

Dr. Sibthorp's Professor of Rural Economy
Will deliver a Lecture next time—on Gastronomy.
Not calling his Magdalen cook's skill in question,
But himself cooking up some rare food for digestion.
No Ragouts will he offer, with Sauces suspicious,
Or high-seasoned Stews fit to feast an Apicius,
Denounced by a Paris, and held by a Prout
To be full of dyspepsia, head-ache, and gout;
But sound economical Soup for the many,
Such as Soyer dispenses—three pints for a penny.

In this Lecture, in truth be it said you'll be shewn
How to breakfast on Starch, and to dine off a bone;
How from sugar and gum loads of fat secrete,
And maintain with potatoes the animal heat;
How bread unfermented the palm bears away,
Unless arsenic unluckily comes in its way;
But how doe-cake and hominy 'beat all creation,'
So Jonathan tells us, for fattening a nation.

Attention has been drawn to long-continued periods of the neglect of Botanical science within the University; but we might also pursue the possible consequences of such neglect in the world outside, and find in the shortcomings of the study at Oxford a cause of its occasional neglect by the State. A memorable instance was pointed out in plain and forcible terms in the columns of *The Times* for July 10, 1872, after Kew and Dr. Hooker, a botanist of international reputation, had been so infamously treated by a relatively ignorant Commissioner of Works, a Mr. Ayrton, as to call forth an indignant memorial to the Premier, W. E. Gladstone of Christ Church, complaining of the treatment 'which the eminent Director of the Botanical Establishment at Kew has systematically received at the hands of Mr. Ayrton since his appointment to the office of First Commissioner of Works'. The memorial was signed by Sir Charles Lyell, Mr. Charles Darwin, Sir James Paget, Professors Huxley and Tyndall, and the Presidents of the leading scientific societies in London. Its object was to endeavour to avert the 'calamity to English science' of the resignation of Dr. Hooker. On reading between the lines one sees that if Mr. Gladstone had only been rather better educated while he was an undergraduate at Christ Church, he would not have permitted the Ayrton-Hooker episode to develop to the extent of becoming a 'scandal to the English Government'.

How Liebig, with due help from Kreatine, sends on
A slice of a fox with the flavour of venison.
Why Samoyedes and Fins on train oil will regale,
And a Greenlander dines for a month off a whale;
Whilst garlic in Italy tickles the palate,
And the Spaniard sups well on garbanzos and salad,
To Sandy his porridge and cakes are so dear,
Whilst a German's content with sour kraut and small beer;
Why beef to an Englishman's prowess adds fuel,
Though he's meek as a lamb, if you feed him on gruel;
Why, when Bruin wakes up in the spring from his lair,
And would fain, like a Christian, his toilet prepare,
He's sadly deficient in grease for his hair;
And what more than all else is likely to stagger us,
Why beans were taboo'd, like roast meat, by Pythagoras,
Who stinted his followers to Carbon on Fridays,
And kept all his 'Proteine compounds' for High days.
These, and many more facts than you e'er can conjecture,
Will be duly dish'd up, if you'll come to the Lecture.

VII

GEOLOGY

British Geology owes so much to Oxford men that it will not be far off the mark to call Oxford the cradle of the science in this country. But though it is a fact that the individual achievements of members of our University have been more pre-eminent in this than in any other branch of science, yet none has received so little recognition, financial or otherwise, from the University as a body.

Besides the illustrious collectors of fossils and minerals, Plot, Lhwyd, Borlase, Lister and others, we can also boast of, as belonging to us, those who have done most to promote the investigation of Nature in Geology. William Smith (1769–1839) 'the Father of English Geology' was a native of the little village of Churchill in the north of Oxfordshire; Buckland (1784–1856) the discerner of Diluvial formations, whose lectures were the most popular in the University at that time; Daubeny and Phillips, both renowned as teacher-researchers; and Lyell (1797–1875), of Exeter College, 'the man to whom English Geology owes most'.

Oxford men are all geologists. They have been so ever since the beginning of things. For do we not proudly explain that the Town is built on a gravel patch between the Cherwell and the Isis, and is therefore reasonably healthy, notwithstanding the clayey water-meadows all round. Who amongst us cannot discourse on the weathering of the Oxford stone, at once our greatest asset and the greatest drain on our resources. To it our buildings owe their rapid coming of age, and our builders a perennial prosperity. But though we are all geologists, the Geological Department is the most starved of all our Scientific Departments, and the Geological Trusts among the least observed of all our Trusts. The Science for which its adherents have given of their best most freely, is the one least honoured in Oxford to-day. Yet geology has always advanced in spite of the University. Not uniformly, but in tides or stages much as Nature proceeded when laying down strata round the Globe.

Floods and clays, formed stones and giants' bones have doubtless aroused the curiosity of the inhabitants of the Thames valley from the most remote times, but the interest was momentary, leading to nothing more. Even those who groped after learning in the pages of Aristotle or Herodotus, Strabo or Pliny, and encountered a reference to some strange geological event, made nothing of their find, though they could parallel the event in their own experience. Doubtless an occasional early Oxford student, like JOHN GARLAND (*fl.* 1230), would compile a *Liber de Mineralibus*, but the real science of Geology remained dormant till a man greatly gifted with a morphological mind arose, who, leaving books, went direct to Nature. No less a man than Leonardo da Vinci (1452–1519) who revealed to the modern world that in the shape of fossil shells lies the *proof* that they are remains of organisms that were once alive, and that the limits and levels of sea and land are always changing.

During the earlier centuries of the University, Oxford students contented themselves with the more obvious facts of physical geography and with a general discourse on the shape of the earth, much as did NATHANIEL CARPENTER of Exeter College, who 'delineated forth Geography in two bookes, containing the sphaericall and topicall parts therof' in a work that was printed at Oxford in 1625.

JOHN AUBREY (1626-97) of Trinity College shares with Martin Lister the first conception of a geological map. 'I have often times wished', he wrote in his *Natural History of Wiltshire*, 'for a mappe of England, coloured according to the colours of the earth; with markes of the fossiles and minerals.' He also observed

THE ORIGINATOR OF GEOLOGICAL MAPS

JOHN AUBREY

that the 'dirty clayey country' of North Wilts bred a race of slow and dull and heavy of spirit, melancholy, contemplative, and malicious men, very different to the chalk of the southern parts.

Both ROBERT LOVELL of Christ Church, with his *Pammineralogicon*, Oxford, 1661, and the more scientific WALTER CHARLETON of Magdalen Hall, with his *De Variis Fossilium Generibus*, 1668, endeavoured to epitomize all that was known of the minerals of their day. They were both biologists, and, as in the case of Linnaeus a century later, their works on stones have fallen into almost complete oblivion.

The idea that fossils, the medals of creation, might be used '*to raise a chronology* and to state the intervals of the time wherein such or such catastrophes and mutations have happened' is due to ROBERT HOOKE of Christ Church. He brought forward his geological views from 17 June 1667 to 1688, in the form of *Discourses of Earthquakes*, read to the Royal Society, but finally published two years after his death in the *Posthumous Works*, 1705.[1] He discoursed on the extinction of species, the possibility of changes of climate, and of other geographical features and boundaries, including 'the sad catastrophe of Sodom and Gomorrah'. He argued against fossils being a mere *lusus naturae*, and so disagreed with Plot, who as a chemist was naturally not very expert on this point. There is much common sense in the writings of Robert Hooke.

In 1677 an impetus was given to the study of local geology which reacted on that of other counties, by the appearance of the first and best *Natural History of Oxfordshire, being an Essay towards the Natural History*

[1] Hooke, *Lectures and Discourses of Earthquakes and Subterraneous Eruptions explicating the causes of the rugged and uneven face of the Earth, and What Reasons may be given for the frequent finding of Shells and other sea and land petrified substances, scattered over the whole Terrestrial Superficies*, 1705. Hooke's posthumous memoir is illustrated with seven plates of fossils, engraved from drawings found after his death among the Sloane MSS. There was no explanatory letterpress, a deficiency subsequently made good by his editor. Plate i contains 28 figures of Ammonites; pl. ii, Nautilus, Argonauta, Spirula (4 figs.); pl. iii, Echinoids (10 figs.); pl. iv, Mollusca, Sharks' teeth, &c.; pl. v, Mastodon tooth, Crab, Encrinites, Cidaris spines, Corals, &c.; pl vi, Ammonites, Bivalves, &c.

of England, dedicated to Charles II. It was a most notable achievement whether judged by the importance of its scientific contents, or the readable manner in which they were presented, or the value of the illustrations of nearly a hundred fossils engraved by MICHAEL BURGHERS, the University chalcographer of the day.

ROBERT PLOT (1640-96), the author, had matriculated from Magdalen Hall in 1658, where he was a pupil of Jos. Pullen, but had migrated to University College in 1676. No one before him had attempted so thorough a survey of his county. In 1670 he had issued, single sheet 'Enquiries to be propounded in my Travels through England and Wales', under seven heads, 'Heavens and Air', 'Waters', 'Earths', 'Stones', 'Metals', 'Plants', and 'Husbandry'. Four of his seven categories were geological, and to assure himself of the accuracy of the answers he projected a 'Philosophical Tour'. The circuit of his first report was, however, wisely restricted to his home County, and the result was the book that has brought him fame.[1]

The following list of names is an attempt to apply modern names to the fossils and minerals engraved by Michael Burghers in illustration of Plot's *Natural History of Oxfordshire*.[2] The original specimens were either in Plot's own collection, or in the possession of the various benefactors who contributed to the cost of the plates and to whom their respective plates are dedicated.

TAB. II. Dedicated 'To the right Worsp^ll the learned and curious Artist S^r JOHN COPE Baronet, this second Table of formed Stones whereof ye 9^th and 10^th are found in his own grounds is humbly dedicated by R. P., LL.D.'

1. *Selenite.*	Kimeridge Clay. Headington.
2 and 3. *Isocrinus* sp. (Stems).	L. Lias. Claydon.
4, 7, and 8. *Isastraea explanata* Goldfuss.	Coral Rag. Headington.
5. *Thamnastraea concinna* Goldfuss.	Coral Rag. Headington.

[1] Plot's other works include a treatise, *De Origine Fontium tentamen philosophicum. In praelectione habita coram societate philosophica nuper Oxonia instituta ad scientiam naturalem promovendam.* Oxford, 1684.

The Formation of Salt and Sand from Brine. Phil. Trans. xiii. 96.
Observation on the substance called Black Lead, l. c.. xx. 183.

[2] The modern names have been supplied by Mr. W. J. Arkell of New College.

6. *Isastraea explanata* Goldfuss. If Corallian. Steeple Barton.
   Or, *Isastraea limitata.*[1] If Gt. Oolite.
9 and 10. *Clypeus Ploti.* Inf. Oolite. Cotswolds.
11. *Micraster praecursor* Rowe (Cast). Chalk. Aston Rowant.
12. *Echinobrissus scutatus.* Corallian. Iffley.
   (Anal valley omitted)?
13. *Conulus conicus.* Chalk. Chilterns.
14. *Echinocorys vulgaris.* Derived from Chalk. Ewelme.

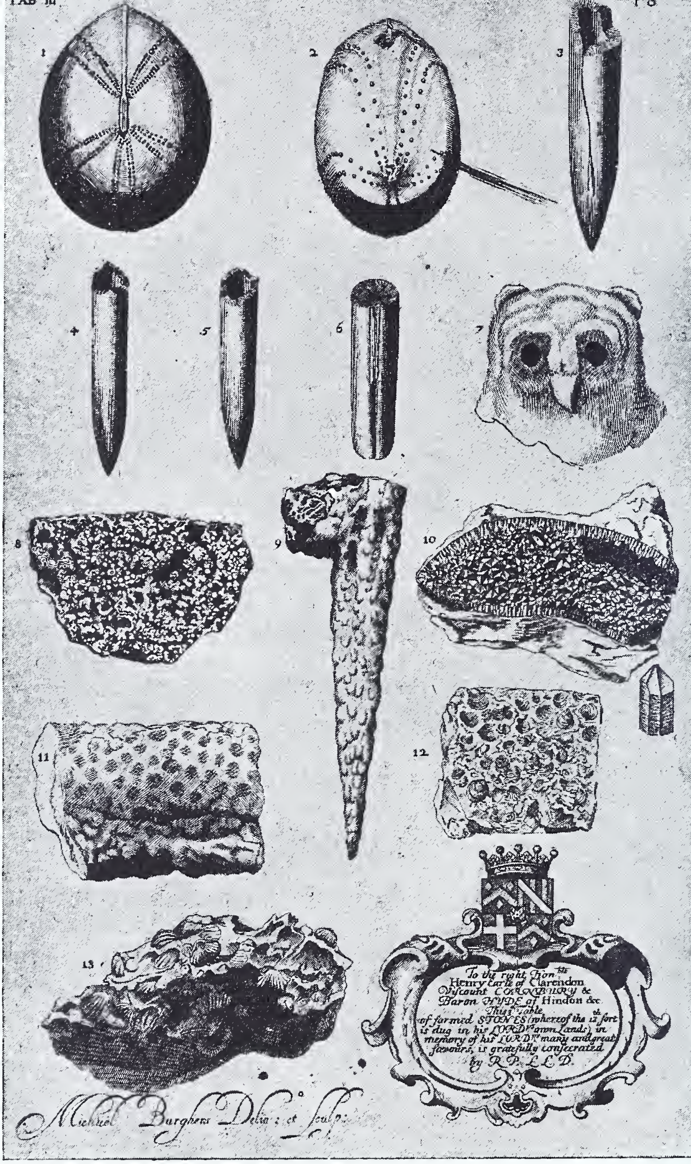
TAB. III. 'To the right Hon^{ble} HENRY Earle of CLARENDON, Viscount CORNBURY and Baron HYDE of Hindon, etc., this 3rd Table of formed Stones (whereof the 12th sort is dug in his Lord^{ps} own Lands, in memory of his Lord^{ps} many and great favours, is gratefully consecrated by R. P.'

1 and 2. *Echinocorys vulgaris.* Chalk. Pyrton.
3. *Belemnites abbreviatus.* Corallian. Headington.
4 and 5. *Belemnites* sp. Inf. Oolite? or Lias? Rollright.
6. *Belemnites sulcatus.* Oxford Clay. St. Clement's.
7. (Flint + imagination?) Whitchurch.
8. Weathered corallian limestone. (As quarried now at Wootton.)
9. Stalactitic calcite, from fissure in 1st. Corallian. Headington.
10. Calcite crystals lining cavity in 1st. Corallian. Headington.
11. Plant remains? *Stigmaria ficoides.* Coal.
12. Probably *Ostrea sowerbyi.* Forest Marble. Wychwood.
13. *Tetrarhynchia tetraedra* var. probably. M. Lias. Adderbury.

TAB. IV. 'To the right Hon^{ble} ARTHUR Earle of ANGLESEY, Viscount VALENTIA Baron of Newport Pagnel, Mount Norris, etc., Lord Privy Seale, &c., this 4th table . . . is humbly offered by R. P.'

1. *Pseudomelania Heddingtonensis.* Corallian. Headington.
2. *Cerithium muricatum.* Corallian. Headington.
3. *Spondylus spinosus* or *Pecten cretosus?* Chalk. Henley.
4. Gt. Rollright.
5. *Ceromya concentrica?* Corallian. Headington.
6. *Rhynchnonella concinna.* Gt. Oolite. Burford, etc.
7. Young *Epithyris Bathonica?* Gt. Oolite? Cornwell.
8. *Terebratula punctata?* Mid Lias. Hornton.
9. Loop of 'Terebratula' preserved in calcite.
10. *Pecten articulatus.* Corallian. Headington.

[1] Edwards and Haime, 1851, *Mon. Pal. Soc.*, p. 114.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To the right Hon.ble
Henry Earle of Clarendon
Viscount CORNBURY &
Baron HYDE of Hindon &c
This Table
of formed STONES (whereof the 12 sort
is dug in his LORDsps own Lands) in
memory of his LORDsps many and great
favours, is gratefully consecrated
by R.P. L.L.D.
Michael Burghers Delin: et sculp:

11. Like *P. demissus* as regards the wings, but probably meant for *P. leus*. Corallian. Headington.
12 and 13. *Pecten vagans*. Corallian. Headington.
14. *Lima?* (Localities too vague for determination.)
15, 16, and 17. *Lima rigida?* Corallian.
18. *Gryphaea incurva*. Derived from Lias. ?Gravels Cowley, etc.
19. *Ostrea* sp. 'Gravel.' (?)

Tab. V. 'To the Worsp[ll] Thomas Stonor of Watlington Park and Stonor Esq., this 5[th] table of Formed Stones chiefly resembling Shellfish of the Crustaceous kind, whereof the 3[rd] and 4[th] sort were found in his owne grounds, is humbly presented by R. P.'

1. *Modiola scalprum*. L. Lias. Cleydon.
2. *Lithodomus inclusus*. Corallian. Headington.
3. ? Internal cast of *Cidaris*. Chalk. Stonorhouse.
4. *Cidaris* sp. Chalk. Stonorhouse.
5. *Stomechinus* sp.? Gt. Oolite? Teynton.
6. *Pseudodiadema?* Gt. Oolite? Teynton.
7. *Thecosmilia annularis* Fleming (Fragment). Corallian? Nr. Shotover.
8. Probably *Cosmocerates*. Oxford Clay? Oxford.
9. *Quenstedtoceras lamberti*. Oxford.
10. *Cosmoceras* or *Aspidoceras*. Oxford.
11. ? L. Lias? Cleydon? Oxford Clay? Cleydon?
12. *Perisphinctes* (*P. giganteus* or *? bononiensis*). Portlandian. Thame.
13. *Stephanoceras Humphriesianum*. Inf. Oolite. Gt. Rollright.
14. *Coroniceras rotiforme* from the L. Lias? (No locality.)
15. *Aspidoceratas*. (*A. perarmatum* type.) Corallian. Sandford.

Tab. VI. 'To the right Worsp[ll] the virtuous and most accomplisht Gent. S[r] Thomas Chamberleyn Baron[t] this sixt Table of Formed Stones w[th] all imaginable respect is humbly dedicated by R.P.'

1. Flint. Chalk. Stockenchurch.
2. *Thecosmilia annularis*. Coral Rag. 'N[r] Shotover.'
3, 4, and 5. Flints.
6. Flint flaked by weathering. N[r] Shotover.
7. *Lithodomus* in flint? Sponge? Chilterns. N[r] Sherbourn.
8 and 9. *Cidaris florigemma*. (Spines.) Corallian.
10. Incrustation on grass. 'The cascade.' Summertown.

11. *Pleurotomaria* —? Teynton, or *P. reticulata*. ‘Nr Shotover.’
12. *Serpulae.*
13. *Serpulae.* } Corallian. ‘Nr Shotover.’

Tab. VII. ‘To the right Worspll Sr John D’Oyly Baront in whom lodg all the virtues of his anciente house. . . .’

1. Cast of a *Perna* (+imagination)? Corallian. Headington.
2. *Cardium dissimile.* Portlandian. Headington.
3. *Pholadomya Phillipsi.* Cornbrash. Brize Norton.
4. *Homomya gibbosa.* Inf. Oolite? Shetford.
5 and 6. Doggers in ‘Portland Sand’. Shotover.
7. *Trichites Ploti.* Corallian. ‘Nr Shotover.’
8. Half of a hollow flint from river gravel? Magdalen College.
9. *Micraster* sp. Chalk. Chilterns.
10.
11.
12. *Exogyra nana.* Corallian.
13. Probably *Ventriculites radiatus* Mantell. Chalk. Stockenchurch.

Tab. VIII. ‘To the right Worspll the learned and curious Artist Sr Thomas Penyston Baront this 8th table of formed Stones whereof the 4th 5th and 7th were found in his own grounds is humbly presented by R. P.’

1. Flint nodule. Chalk. Chilterns.
2. *Cyathophora* [*Stylina*] *ploti.* (Edwards and Haime.)[1] ‘Gravel’ (?) Oxford.
3. (*Anabacia orbitoides* from the Gt. Oolite?)
4. Probably *Megalosaurus* or *Cetiosaurus.* Cornwell.
5. Molar tooth of Ox.
6. Dogger concretion from the Portland Sand. Shotover.
7. ? Spindle whorl stone. Cornwell.
8.
9. *Anabacia complanata* (Defrance.)[2] Gt. Oolite.
10. Calcite.
11.
12. Iron Pyrites? Marcasite? Around Cornwell.
13 and 14. Crystals of Selenite.

This setting forth of the lists of Plot’s type-specimens acquires added interest when we remember that notwithstanding his intimate acquaintance with so many fossils, bearing so close a resemblance to recent

[1] See Edwards and Haime, *Mon. Pal. Soc.*, 1851, p. 106.
[2] *Loc. cit.*, p. 120.

forms of life that the Dane, Steno of Padua, would have had no doubt as to their origin, Plot sought to explain them as the result of an inanimate physical force. In this he was but following in the footsteps of observers such as Beal who in 1664 presented the Royal Society with a box of stones to illustrate 'the process of the plastic spirit in shaping perfect cockles, muscles, scollops, headless serpents, fishes, thunder-stones, etc.' Misled by chemical experiments in his laboratory, Plot appealed to what we now call the force of crystallization as the sole explanation of the diversity of organic form.

There is no other Principle that we yet know of naturally shooting into *Figures*, each peculiar to their own kind, but *Salts*; thus *Nitre* always shoots into *Pyramids*, *salt Marine* into *Cubes*, *Alum* into *Octo-*, and *Sal Ammoniac* into *Hexahedrums*, and other mixt *Salts* into as mixt *Figures*.

Of these spontaneous inclinations of *Salts* each peculiar to its *Kind*, we have further evidence in the *Chymical* Anatomy of *Animals*, particularly in the *Volatile Salt* of *Harts-horn*, which in the beginning of its ascent is always seen branched in the head of the Cucurbit, like the Natural *Horn*.

Plot then proceeds to suggest that the five *Points* of *Astroites* and *Asteriae* 'making angles where they are joined at the center of 72 *Degrees*' are due to a *Salt* not much different from *that* which forms *Snow* flakes with six principal *Radii*, all joined in Angles of 60 *Degrees*. *Belemnites*, which are all striated from a center seem to have somewhat of an *Antimonial*, but a more prevalent quantity of a *Nitrous Salt*. *Conchites, Pectinites* and *Ostracites* . . . seem to own their origin to *Urinous Salts*. And the helical figure of *Ophiomorphites* may perhaps be explained by the *Regulus Martis Stellaris*.[1]

Plot's method of gleaning facts by a questionnaire needs discrimination; to sift the answers takes both time and trouble. The lack of one or the other of these entities may, on a later occasion, have enabled the Staffordshire gentry to boast that they had 'humbugged old Plot'. He certainly went very wrong over the identification of the leg bone of a Mammoth found in the parish of Cornwell and kept in the Anatomy

[1] Plot, *loc. cit.*. p. 122.

School, which he took to have belonged to a son of Anak.

But what is *instar omnium* in this difficult point, there happily came to *Oxford* while I was printing of this, a living *Elephant* to be shewn publickly at the Act, *An.* 1676 with whose bones and teeth I compared ours; and found those of the Elephant not only of a different shape, but also incomparably bigger than ours, though the beast was very young and not half grown. If then they are neither the bones of *Horses, Oxen,* nor *Elephants,* as I am strongly persuaded they are not . . . it remains that (notwithstanding their extravagant magnitude) they must have been the bones of *Men* or *Women* . . . Sons of Anak . . . Titans . . . Giants. Plot, p. 136.

DWARD LHWYD (1660-1709), of Jesus College, and Keeper of the Ashmolean Museum, was the author of a prolonged inquiry into the nature of fossils. Having the advantage of collections which had already become considerable, he was able to produce a work of some importance, the *Lithophylacii Britannici ichnographia sive Lapidum aliarumque Fossilium Britannicorum singulari figura insignium distributis* . . . . . with letters about the more remarkable marine fossils and mineral species, London, 1699. In this work Lhwyd catalogued the figured fossils in the Ashmolean Museum, but owing to his absence on a collecting tour in Wales, many inaccuracies crept into the book, and a second and revised edition was issued in 1760 under the editorship of Lhwyd's successor in the Keepership, W. Huddesford.

Lhwyd's other contribution to geological literature was his tract *De stellis marinis*, fol. Leipzig, 1733, which contained the substance of his public Lectures at Oxford in 1701–7. It was also incorporated by Huddesford in the second edition of the *Lithophylacii*. He was proposed for the Fellowship of the Royal Society in 1708, but his candidature was opposed by Woodward who regarded all fossils as a consequence of the Flood, whereas Lhwyd was convinced that fossils originated from the semina of fishes raised by vapours from the sea, which falling with the rain were carried into the inner parts of the earth. The opposition was, however, unsuccessful.

MARTIN LISTER, 1638?–1712, though not originally an Oxford man, is deserving of special remembrance as one of the earliest benefactors of the Ashmolean Museum. He gave a fine collection of shells, with the original drawings, over a thousand in number, made by his daughters Susannah and Mary for the *Historia Conchyliorum*, 1685. He was created M.D., Oxon, 1684. His *Proposal for a new sort of Maps* appeared in the *Philosophical Transactions* for March 1683.

The Oxford naturalists of the eighteenth century described their local fossils and minerals as part of a general study of antiquities. Eminent among them Dr. WILLIAM BORLASE, 1695–1772, of Exeter College. He was best known by his *Observations on the Antiquities of Cornwall*, 1754, and by his *Natural History of Cornwall*, 1758; soon after this date he made over his entire collections to the Ashmolean Museum.

The cabinet inscribed with his name, in which the collections were kept, is now (1924) used for housing old wine bottles. Not a single specimen of the Borlase Geological collections placed in the care of Ashmole's keepers has survived. Borlase might as well have sent his treasures to Twickenham to add to the decorations of his friend Pope's grotto.

THOMAS PENNANT, 1726–98, the distinguished zoologist, left Queen's College in 1745, to travel in Cornwall, where Borlase advised him to make a special study of the fossils and minerals of the county. In 1750 he published a memoir on an Earthquake felt at Downing,[1] but his later works were zoological and topographical rather than geological, and have been referred to as such on

[1] *Phil. Trans. Abridgement*, x, p. 511.

page 185. Another Oxford geologist of the time was Mr. WICKHAM, 'a young clergyman who has a good fortune and lives with his father at Shirburn in Dorsetshire. He is a very agreeable gentleman and was not long ago at College. . . . He has for some time been a great Collector of Shells, and is now as fairly catch'd in the fossil trap as any one I have ever met with.[1]

The great work of WILLIAM SMITH (1769–1839) has been often reviewed. His introduction to Geology was made when as a lad he played at marbles with spherical fossil terebratulae, that he had collected from the Oolite rocks on which Churchill, his native village, was built. These Oolitic beds occupy the middle place among the principal divisions of the great Secondary group of rocks. Young Smith, thoroughly acquainted with the fossils of his local quarries, soon recognized that they differed from those of the Triassic and Lias beds that lie beneath, and from the Cretaceous and Wealden fossils of a higher level.

By profession he was a mineral surveyor and engineer, and business took him across a considerable tract of country. Starting from Bath, which stands near the Great Oolite, he carefully explored the Secondary formations above and below it. He ascertained that these always occur, like the tiles on a roof in a certain determinate order; that each formation contains fossils peculiar to itself, from which he deduced that the organisms of one geologic age differed from those of another, and that similarity of fossils enables a geologist to predicate identity of epoch; that the formations run diagonally across the kingdom in nearly parallel lines from north-east to south-west. His first account of his discoveries was published in 1799, and his great stratigraphical map of England and Wales was issued in 1815. This map, compiled in odd half-hours snatched from his professional labours, has been described as a Herculean achievement, which indeed it is, for Smith had no public support, and was not encouraged by any general sympathy with his labours.

Before the publication of Smith's researches only two of the entire series of Geological strata were known

[1] Letter of Smart Lethieullier to W. Huddesford, 1760. MS. Ashmole, 1822, f. 101.

approximately, but these, the Coal Measures and the older Tertiaries (London Clay, &c.), came just below and just above Smith's strata. So that when his new chapters were prefaced and followed by the previously discovered chapters, the middle and main portion of Geological History was complete. It needed only a beginning and an end. The beginning of the story was contributed by Roderick Murchison, who gave the name Silurian to the older fossiliferous system, and by Hugh Miller, who named the Old Red Sandstone, while the task of writing an appropriate ending was undertaken by Charles Lyell (1797–1875), a member of Exeter College. He studied the Tertiary formations, and established the four great divisions that have become familiar to us. Both Murchison and Lyell obtained knighthoods in recognition of their writings.

Smith introduced the names, Red Marl, Lias, Forest Marble, Cornbrash, Crag, Portland and Purbeck Beds, and London Clay, which have all been taken into general use, many having been adopted by foreign geologists to mark epochs of geological time.

There seems, however, to have been very little definite teaching of Geology in the eighteenth century, and even collections of fossils were only to be found in the 'cabinets of the curious'. The scientific use of the term 'Geology' is said to go no further back than 1778 when it was casually introduced by De Luc in one of his works. In London a good collection of fossils and minerals was to be found in the keeping of Sir Humphrey Davy at the Royal Institution, and in Oxford there was the disordered assemblage of minerals and organic remains in the Ashmolean Museum. In general matters geological were in a state of stagnation, a stimulation was needed.

This was given on November 13, 1807, by the founding of 'a little talking geological dinner club'. Thirteen chemists and mineralogists interested in Geology met at the Freemason's Tavern in Great Queen Street. Among them were Sir Humphrey Davy, James Parkinson, Richard and William Phillips, and George Bellas Greenough, M.P., the first president of the Geological Society of London, who was perhaps the keenest of the little party. The Rev. J. J. Conybeare of Oxford, Professor R. Jameson of Edinburgh, Dr. J. Kidd, Professor of Chemistry at Oxford, Professor John Playfair of Edinburgh and others were elected as honorary members. And thus was instituted the Geological Society 'for the purpose of making geologists acquainted with each other, of stimulating their zeal, of inducing them to adopt one nomenclature, of facilitating the communication of new facts, and of contributing to the advancement of Geological Science, more particularly as connected with the mineral history of the British Isles'. In the year 1811 the Rev. W. D. Conybeare became a member of the Society; and he was followed by William Buckland in 1813; Daubeny, Mantell, and Sedgwick in 1818; Lyell and Henslow in 1819; G. Poulett Scrope and Murchison in 1824.

The Geological Revival in Oxford

So long as the Ashmolean collections were accessible, and Lecturers on Chemistry drew on them to interest their pupils in the provenance of chemical substances, the study of geology must always have found some place, even though a subordinate one, in the curriculum of the University. The first to introduce Geology as a distinct subject was JOHN KIDD, M.D. (1775–1851), who was Professor of Chemistry from 1805–10. He was the author of a *Mineralogy* in 1809, and of *A Geological Essay* 1815. His teaching was given in a 'subterranean class-room' under the Ashmolean Museum where 'nearly all the scientific teaching at Oxford had been accomplished since the days of Robert Plot'. And there Buckland, J. J. and W. D. Conybeare, Daubeny, W. J. Broderip, and others received their earliest initiation. Dr. Kidd resigned the Readership of Mineralogy in 1813 and was succeeded by WILLIAM BUCKLAND (1784–1856), Fellow of Corpus, who taught mineralogy and geology.

In these days when Oxford scientific professors are too often chosen from any university in preference to our own, we like to think of Buckland as heir to the divine afflatus of what was best in Oxford geological tradition. Already as an undergraduate he took his first lesson in field geology, as he himself has told us, 'in a walk to Shotover Hill with Mr. Broderip, who knew much about fossil shells and sponges from Mr. Townsend, the friend and fellow-labourer of William Smith, "theFather of English Geology". The fruits of my first walk with Mr. Broderip formed the nucleus of my collection for my own cabinet, which in forty years expanded into the large amount which I have placed in the Oxford Geological Museum.' His lectures and his speeches were characterized by the 'union of the most playful fancy with the most profound reflections'.

One of his lectures delivered in the Ashmolean Museum is commemorated both in a picture and a poem.

SPECIMEN OF A GEOLOGICAL LECTURE

BY PROFESSOR BUCKLAND.

Attributed to Dr. Shuttleworth, late Bishop of Chichester.

In Ashmole's ample dome, with look sedate,
Midst heads of mammoths, Heads of Houses sate,
And Tutors, close with undergraduates jammed,
Released from cramming, waited to be crammed.
Above, around, in order due displayed,
The garniture of former worlds was laid,
Sponges and shells in lias moulds immersed,
From Deluge fiftieth, back to Deluge first,
And wedged by boys in artificial stones,
Huge bones of horses, now called mammoths' bones;
Lichens and ferns which schistose beds enwrap,
And, understood by most Professors,—Trap.
Before the rest, in contemplative mood,
With sidelong glance, the inventive Master stood,
And numbering o'er his class with still delight,
Longed to possess them, cased in stalactite.
Then thus with smile supprest. In days of yore
One dreary face Earth's infant planet bore;
Nor land was there, nor ocean's lucid flood,
But mixed of both, one dark abyss of mud,
'Till each repelled, repelling, by degrees,
This shrunk to rock, that filtered into seas,
Then slow upheaved by subterranean fires,
Earth's ponderous crystals shot their prismy spires,
Then granite rose from out the trackless sea,
And slate, for boys to scrawl, when boys should be.
But earth, as yet, lay desolate and bare,
Man was not then,—but Paramoudras were.

'Twas silence all, and solitude; the sun,
If sun there were, yet rose and set to none,
Till fiercer grown the elemental strife,
Astonished tadpoles wriggled into life;
Young encrini their quivering tendrils spread,
And tails of lizards felt the sprouting head.
(The specimen I hand about is rare,
And very brittle; bless me, sir, take care.)
And high upraised from ocean's inmost caves,
Protruded corals broke the indignant waves.
These tribes extinct, a nobler race succeeds;
Now sea-fowl scream amid the plashing reeds;
Now mammoths range, where yet in silence deep
Unborn Ohio's hoarded waters sleep.
Now ponderous whales . . . . .
[Here by the way, a tale
I'll tell of something, very like a whale.
An odd experiment of late I tried,
Placing a snake and hedgehog side by side;
Awhile the snake his neighbour tried t' assail,
When the sly hedgehog caught him by the tail,
And gravely munched him upwards joint by joint,—
The story 's somewhat shocking, but in point.]
Now to proceed.
The earth, what is it? mark its scanty bound,
'Tis but a larger football's narrow round;
Its mightiest tracts of ocean—what are these,
At best but breakfast tea-cups full of seas.
O'er these a thousand deluges have burst,
And quasi-deluges have done their worst.

It being the intention of the versifier to produce at present only a specimen of his intended Work, he has omitted the following fifty lines, exclusively geological, concluding with—

These bones I brought from Germany myself;
You'll find fresh specimens on yonder shelf.

As also a digression of 2,300, of which the concluding couplet is—

So curl the tails of puppies and of hogs;
From right to left the pigs, from left to right the dogs.

And also for the same reason the subsequent still more digressive digression, which is terminated by the following admirable reflection. The whole passage consists of 5,700 lines:—

Not wild, but tame cats only, tease their prey.

THE GEOLOGICAL LECTURE ROOM, OXFORD

1 2 3 4 5 6 7 8 9 10 11 12

WILLIAM BUCKLAND'S GEOLOGICAL LECTURE IN THE OLD ASHMOLEAN MUSEUM

Front Row:

1. Daubeny.
2. Martin Wall.
3. Buckland.
7. Bandinel.
8. Foulkes.
9. Coplestone.
10. P. Shuttleworth.
11. Bishop Legge.
12. J. S. Duncan.

Middle Row:

Behind 10,
P. Elmsley.

Behind 11,
P. Duncan.

Back Row:

Behind 6,
C. Rose.

The concluding couplet, which is given without any addition from the mouth of the learned lecturer, is here subjoined solely because it serves as an additional proof, if such were wanted, of the close connexion between geological speculation, and (not the ideas only, but) the language of complete poetry.

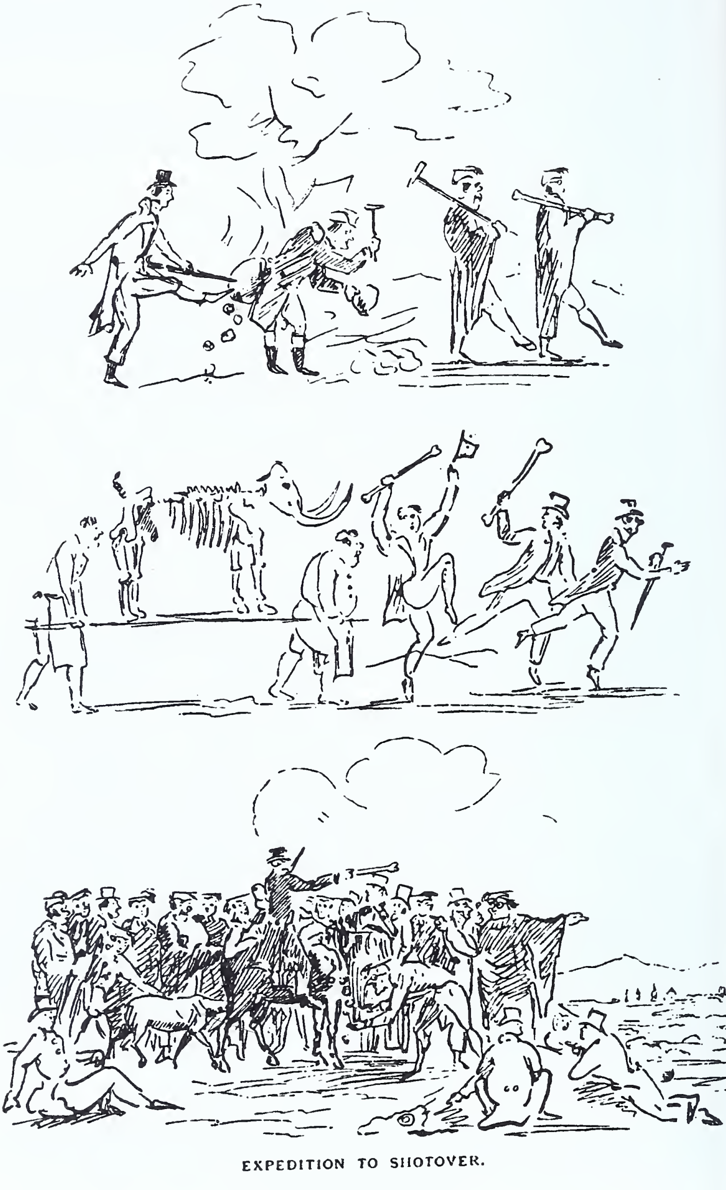
It will be observed, that though intended as a common sentence of Adjournment, it has all the fluency and grace of the most perfect rhythm, and of its own accord slides into verse, and hitches in a rhyme:—

Of this enough. On Secondary Rock,
To-morrow, Gentlemen, at two o'clock.

'His courses attracted in a high degree the attention and admiration of the university, and very largely contributed to the public recognition of geology as a science by the endowment in 1819 of a Professorship.'[1] This Professorship of Geology was created by the Prince Regent at the instance of Sir Joseph Banks, and to the delight of all his friends Buckland was nominated. He attracted the whole University by the novelty of the subject and his lively treatment of it. Howley, afterwards Archbishop, Sir Philip Egerton,[2] Whately, and P. Duncan attended the lectures, which he committed to the press in 1823 under the title *Reliquiae Diluvianae*; and this was succeeded by his *Vindiciae Geologicae*. How Buckland *lived* in his work is illustrated by Tuckwell's story of how on one occasion when he had been puzzling over the footprints of Cheirotherium on slabs of rock, the idea flashed upon him at two o'clock in the morning that the footsteps were testudinal. He woke his wife, and she hastened down to the kitchen to make some paste while he fetched in the tortoise from the garden; and the pair saw with delight that the footprints on the paste were almost identical with those upon the slabs of rock. He was informing his class of this discovery: 'It would seem', queried a sceptical Caledonian, 'that your animals always walked in one

[1] Mrs. Gordon, *Life of Buckland*, 1894. Portlock, *Obit. Notice* Geol. Soc. 1857, and Sollas, 1905, p. 219.

[2] Sir Philip Egerton, 1806-81, of Christ Church, in conjunction with his friend Viscount Cole, afterwards Lord Enniskillen, collected fossil fishes all over Western Europe, and described them in some eighty published memoirs. Both palaeontologists were among the helpers of Dr. A. Günther, the father of the present writer, and left their collections to the British Museum.



EXPEDITION TO SHOTOVER.

direction?' 'Yes,' was the reply, 'Cheirotherium was a Scotchman, and he always travelled south.'

Field work and geological excursions were an important item in his teaching, and were long remembered by those who were privileged to take part in them. Thirteen years after one of them, Edward Forbes, wrote the following effusion:

ON Dr. BUCKLAND'S GEOLOGICAL EXCURSION TO SHOTOVER HILL IN 1847[1]

BUCKLAND, STRICKLAND, FORBES, and GREENOUGH,
MARQUIS NORTHAMPTON, PRINCE CANINO,
DELABECHE on Fossils keen
STOKES and BRODERIP, ELY'S DEAN
And He who spanned the Menai stream,
And lifted high in air his massive iron beam—
(The work of giants, it would seem,
Or the Cyclops, or the Titans of the Poet's lofty Theme.)
He, too, is past, the shadow of a dream!
With their hearts so cheery, so rich their lore.
We hear their melodious voice no more,
Their pale ghosts flit on the Stygian shore,
With the shades of the mighty spirits of yore,
Where Achilles and Homer are gone before—
So Dante and Virgil sweetly sung,
And his lyre the mournful Orpheus strung,
With their fabulous myths and their gifted tongue—
Where rules that stern and silent Queen
Of sad and melancholy mien—
The dark and beautiful Proserpine.
  They're past, but still their name is dear,
Like the Evening Star, our twilight to cheer,
Their memory claims the generous tear,
As those who thro' Life's storm fulfill'd their career.
  These were Buckland's bold Banditti
Of the Geological Committee,
That storm'd without remorse or pity
Clay-pits, stone-pits, hedges, mounds,
Where the ochre of Shotover Hill abounds.
  Alas! we're no continuing city!
'Ere thirteen springs have run their rings—

[1] From Dr. Daubeny's *Commonplace Book* in Magdalen College Library.

When the thrush its vespers sings
And its scents the violet flings,
We look in vain the while
For their well-remembered tones! their ever welcome smile!
We miss, too, JOHNSON's radiant look,
Who watch'd the stars in Heaven's own book.
Thus with us, too, pranced his horse
The late ARCHDEACON WILBERFORCE
(With his good brother, in high force;
He, too, has run his mortal course!)
'Ere he fell over those boulders and blocks,
Those Roman metamorphic rocks;
All that the pious Protestant shocks—
All that the savage Calvinist mocks,
When we pray the Virgin and blessed St. John
T'intercede for our souls with her dear Son—
When we lose the light of the Sun,
When our mortal race is run,
When our earthly task is done,
And the grim Fates cut the thread they spun.—
When the bowl is broken, the silver cord loosed,
And to the sweet setting stars, our eyes are closed—
And then—and then—and then!
'When shall we three meet again?'

Oxford, July 4, 1860. E.

Buckland's wide knowledge was combined with an intellectual honesty that made him incapable of accepting any travesty of the truth. On his wedding tour he visited the shrine of Santa Rosalia in Palermo. It was opened with all due reverence by the priests, and the relics of the saint shown. Buckland at once saw that they could not be the remains of Santa Rosalia. 'They are the bones of a goat', he cried out, 'not of a woman'; and the sanctuary doors were abruptly closed.

Some ten years later he was tilting against protestant orthodoxy in Oxford. The theologians of Christendom had always taught the literal acceptance of the Mosaic story of Creation. Buckland, greatly daring, in 1836 published his Bridgewater Treatise, *Geology considered with reference to Natural Theology.* After that, the Deluge. 'The Clergy, the Dons, the Press fell upon him in a mass.' Dean Gaisford thanked God on the

Professor's departure for Italy, 'We shall hear no more of his Geology'. Pusey organized a protest against the conferring of a degree on Owen, and Keble clinched a bitter argument by the conclusive dogma that 'when God made the stones he made the fossils in them'.

'Worse was still to come; the "Six Days" were to be impeached; the convenient formula "before the Flood" to be dispossessed; the old cosmogony which puzzled Mr. Ephraim Jenkinson to fade slowly from the popular mind ... and in the great awakening of knowledge which severed theology from science and recast Biblical criticism, he [Buckland] was amongst the earliest and most energetic pioneers.'[1]

Another Wykehamist, eleven years younger than Buckland, was CHARLES DAUBENY (1795–1867), of Magdalen College. After taking honours in the school of Literae Humaniores he migrated to the Edinburgh Medical School, where he came under the stimulating influence of Professor Jameson.[2] Daubeny's geological apprenticeship was passed among the volcanoes of the Auvergne which he described in letters to his teacher, and which he afterwards worked up with other matter in his *Description of Active and Extinct Volcanos*, 1826. Unfortunately his outlook was limited by a theory inherited from Von Buch, that volcanic craters owed their form to elevation from below instead of to deposition from above. His knowledge of chemistry—he had been appointed to succeed Dr. Kidd as Aldrichian Professor of Chemistry four years earlier—enabled him to give effective support to the views of Gay-Lussac and Davy that water coming in contact with uncombined bases, such as potassium, &c., beneath the oxidized crust, was an efficient cause of the high temperature that led to earthquakes and volcanic eruptions.

In his vacations he visited all the volcanic regions of Europe; he analysed and examined all the gaseous emanations and hot springs from Bath to Thermopylae to which he could obtain access; his collections of rock-

[1] Tuckwell, *Reminiscences*, p. 36. In 1845 Oxford consisted of *Arians*, *Tractarians*, *Retractarians*, and *Detractarians*.

[2] Daubeny's notes taken of Jameson's lectures are preserved with other scientific manuscripts of the period in Magdalen College Library.

specimens from volcanic regions and of literature relating thereto were the most extensive and well arranged of any that had ever been brought together by an Oxford man; and he left all in trust to Magdalen College.

Although the manifold occupations of his last twenty-five years left him less leisure for geological research, he never forgot his first love, and even in 1867, the last year of his life, he published a paper on the subject of his first printed work in 1821, on the geology of the extinct volcanoes of France. Had there been no Buckland, Daubeny would perhaps have added the Professorship of Geology in Oxford to his other three Chairs.

At the beginning of the nineteenth century the aftermath of the controversy between German Neptunists and the Volcanists still promised to exercise a retarding influence on the knowledge of volcanic structure. So long as volcanic basalts were believed by the disciples of Werner to be of aqueous origin, so long was advance delayed. Even geologists as eminent as Von Buch and Alexander von Humboldt were for a time misled by their master's views, so that it took little less than an eruption of Vesuvius (in 1805) to correct them; but even so, a quarter of a century elapsed before the matter was placed beyond the pale of controversy.

After a visit to the Auvergne in 1802 Leopold von Buch explained volcanic craters by his fallacious theory of Elevation. He considered that rocks, originally lying in horizontal beds, were pushed up by subterranean forces associated with the earth's internal heat. He was reputed the greatest geologist of his day, and persuaded geologists generally that he had found craters of elevation in all the volcanic regions visited by him. The refutation of this theory was the work of a member of Pembroke College, Oxford, and of St. John's College, Cambridge, GEORGE JULIUS POULETT THOMSON (1797–1876), almost a contemporary of Daubeny's and some twenty-three years junior to Von Buch. Young Thomson spent the winter of 1817–18 in Naples and continued his studies there in 1819, incorporating the result with his researches on the volcanoes in Central France in 1825 under his newly adopted name of SCROPE.[1]

Scrope disproved the theory of the Elevation-Crater,

[1] *Considerations on Volcanoes.*

and laid the foundation of the present views on volcanic eruptions, viz. that a volcano is to be ascribed to the accumulation of volcanic products round a vent, which is usually situated over a superheated subterranean magma saturated with water and forced up to the surface by the force of expanding vapours. In these views Scrope was afterwards supported by Lyell, but, we regret to add, not by Daubeny, who was still obsessed by the 'Craters of Elevation' of Von Buch.

Scrope's later work upon the influence of subaerial denudation in the formation of valleys and the shaping of the surface features of the land was also of great consequence in advancing the progress of modern geology.

The time of which we are writing has been aptly described by Sollas (1907) as the 'Golden Age of Geology'. The Great Masters of this brilliant period are Buckland, Sedgwick, Murchison, De la Beche, Von Buch, Elie de Beaumont, Omalius d'Halloy and others. Each had made his particular contribution to the general fund of knowledge, it now remained for the master-mind to pass the sum of their attainments under review, to elucidate the leading conceptions of Geology, to discuss the causes both of the slow development of these studies and of the many false directions which they had too often taken.

This was the work of a member of Exeter College, perhaps the most eminent member that Stapledon's Foundation has ever nurtured, CHARLES LYELL (1797–1875). While an undergraduate his interest in geology was fostered by the lectures of Buckland, and it became enthusiasm during a three months' tour which he made with his parents through France, Switzerland, and Upper Italy. After visiting Cuvier, Humboldt, and Prévost in Paris in 1823, and touring Scotland with Buckland, he in 1828 went over the volcanic regions of the Auvergne, Rome, Naples, and Sicily. The result of these and other travels was the publication of *The Principles of Geology being an attempt to explain the former changes of the Earth's surface by reference to causes now in action*, 1830–3—a work 'in itself sufficiently important to mark almost a new era in the progress of our science' (Conybeare).

In this work he brought a great talent for exposition into play to make it as clear to the general reader as to the geologist, that geological changes have been brought about by natural agencies that are still in operation at the present day. He never ceased to lay stress on this point and to refute those who found in intermittent catastrophe the explanation of geological change.

More than any one else Lyell has taken 'the leading position in the world as the exponent of geological processes, and the chronicler of the advances made to our knowledge of the structure and history of the earth' (Woodward), and with this brief mention of the first of the Moderns we conclude this review of Early Geology in Oxford.

Geological Collections.

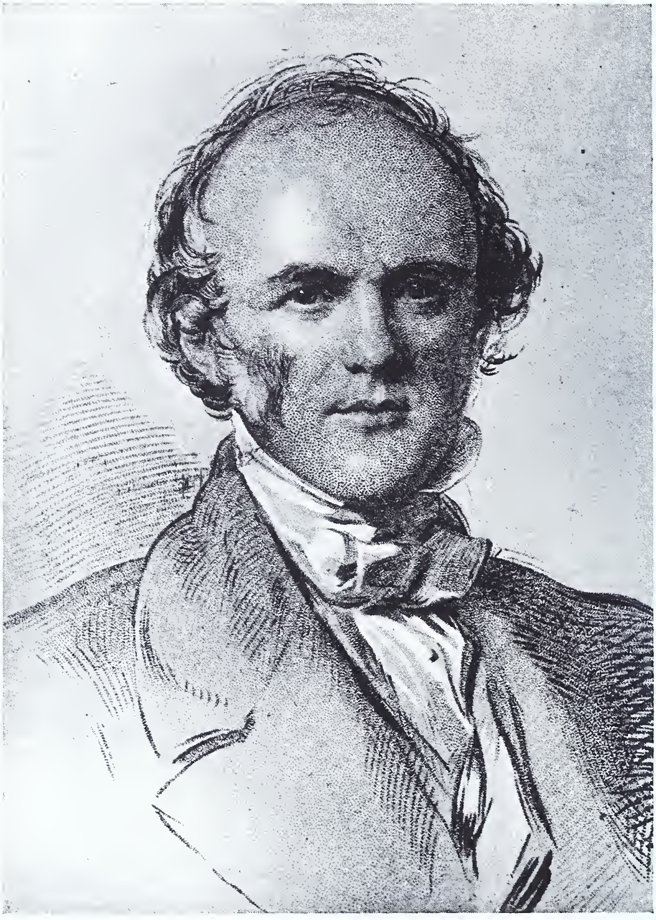
The old University Collections contained in the Anatomy School included many fossils and mineral specimens some of which are listed under more or less vague names in Hearne's Catalogue printed on page 274. We have also stray mentions of others, as, for instance, of a specimen of 'Orphiomorphit', which was identified by Plot as the *Cornu Ammonis cristatum* of John Bauhin. He adds that 'There is another amongst the κειμήλια of the Medicin School, of above eight inches diameter, taken up as they say somewhere about Corpus Christi College'.[1]

Plot also informs us that 'We have also here [in the Medicine School] at Oxford a *thigh-bone* that came from London, three foot and two inches long, which I guess may be of an agreeable proportion with ours'.[2]

Whether the entire Tradescant collection of stones ever arrived in the Ashmolean Museum is uncertain. It was certainly a collection of importance thirty years before. It was divided into two categories: *Gemmae* or Precious Stones, including 'Astroites' and 'Asteria', which may have been fossils, and *Fossilia*, which were classified under the heads 1. Metallica; 2. Terrae; 3 and 4. Succi concreti; 5. Lapides selectiores; 6. Materiae petrifactae. The complete list is given below on p. 406. There is reason to believe that Ashmole's own collection of fossils etc. did not come to Oxford, but was destroyed by the fire in the Temple. There is, however, a very

[1] Plot, p. 110.

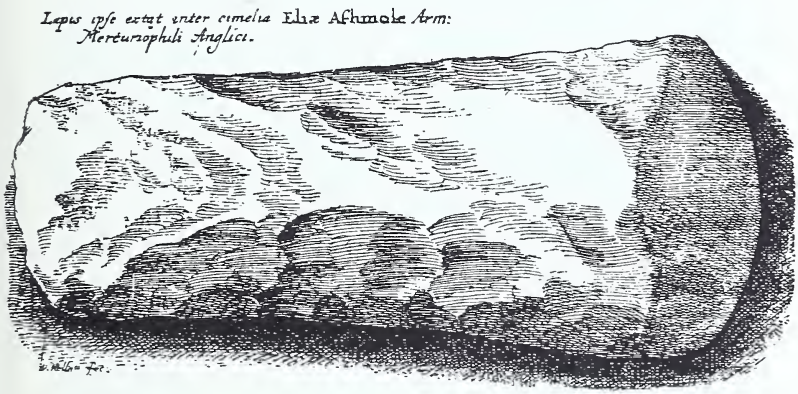
[2] *l. c.*, p. 135.



CHARLES LYELL OF EXETER COLLEGE

After a drawing by G. Richmond, R.A.

perfect representation of one of his specimens still extant. This, a fine flint implement, was engraved by Hollar for Dugdale as one of the illustrations to the *Antiquities of Warwickshire*, 1656. It was a specimen of the greatest value in the history of archaeological science, for it led to the foundation of the intelligent study of flint implements as a means whereby to 'date' the remains of early man, and of contemporaneous geological deposits. Before the discovery of Dugdale



Ashmole's Neolithic Flint Implement found at Oldbury.

and Ashmole it was assumed that flint was of too refractory a nature to be worked by man. Nevertheless, to such thoughtful persons as Paracelsus, the shapes of what are now universally recognized as 'worked flints' seemed to demand some explanation. Paracelsus called them *Gamahus*, and stated that of gamahus there are two varieties: i. Found in sand and streams, fashioned exactly as if made by man, but in fact created by God, and endowed with miraculous powers, and ii. Artificial stones on which images of men and animals have been impressed by a peculiar constellation.[1]

Dugdale was the first founder of the Science of Flint Implements by his recognizing Gamahus as artificial objects, made by the ancient Britons 'inasmuch as they had not the knowledge of working iron or brass to such

[1] Paracelsus, *Opera* ii, 1658, pp. 499, 502: Edm. Chilmead, London, 1650, p. 96.

uses', and his best illustration was drawn from Ashmole's specimen.[1]

Another, but less important, stone in Ashmole's collection was a great rarity, a *lapis odoratus*, a stone that smelt of violets, sent him by J. Sutherland, keeper of the Edinburgh Botanic Garden.[2]

It is highly probable that a rearrangement of the Minerals according to their chemical constitution was one of the first tasks that fell to Plot as keeper. A 'List of the Minerals', in the hand of the botanist, Professor Jacob Bobart the younger, is in the Bodleian Library.[3] It is written in a notebook immediately after a list of plants, and before 'Some few hasty notes from Dr. Plott', indicating that the writer was a pupil of Plot's. The MS., which may be dated c. 1685-90, begins

The following Metals, Oars etc. are Kept and to be seen in Mr. Ashmole's Musaeum in Oxford.

'Many more have been added since Dr. Plots time.'[4]

TAKEN FROM DR. PLOTTS TABLES, M.S.

Metals are *Perfect, Imperfect.*

Perfect:	*Gold* Native, Factitious
	Silver ,, ,,
Imperfect:	*Copper*
	Iron
	Soft Lead
	Tin

These also Native or Factitious.

The list is printed in extenso as *Appendix C*, pp. 440–7.

A most important accession was the Lister collection of Shells, which arrived in the early days of the Museum and comprised what was probably the finest series of recent and fossil shells in Britain. And in 1691, Plot gave his own considerable collection, which included the type specimens figured in his *Natural History of Oxfordshire*, 1677.

The successor in the Keepership, EDWARD LHWYD, followed Plot's example by also presenting the whole of

[1] Dugdale, *Warwickshire*, 1656, p. 778.
[2] Bruckmann, *Epist. Itineraria* 13, cent. i.
[3] MS. Lat. misc. d. 25, pp. 68–82.
[4] The note between quotation marks is a later addition. The reference is MS. Lat. misc. e. 29.

his collection of fossils in 1708. And with the exception of the Borlase collection of crystals, metals and minerals, given in 1758, the rest of the eighteenth century seems to have passed without further additions to the geological side of the Museum. This last collection included all the types of Cornish minerals described for the first time in the History of Cornwall. They have all been lost: but the original show case inscribed

GUL^{s}. BORLASE *A.M. S.R.S.* D.D.

with graffiti '*E. Thomas All Souls 1791*' (written twice over) is kept in the New Ashmolean Museum in Beaumont Street.

Towards the end of the century Sir Christopher Pegge once more aroused an interest by private lectures on mineralogy, and in 1800 his cabinet of minerals was acquired by the university by purchase. 'About this time Dr. Kidd, the first holder of the office of Reader in Mineralogy, began the formation of a new collection in Geology; to which William Conybeare and many others of his pupils contributed. Mr. Henry also presented through Dr. Kidd, a series of valuable specimens in mineralogy. Dr. Buckland, who followed Dr. Kidd in this office in 1813, and who became also reader in Geology in 1818, presented his entire mineral collection to the University in 1823. In 1824, the Rev. John Josias Conybeare bequeathed to the University another large collection of specimens in geology and mineralogy, together with cabinets containing them, and £50 for the purchase of additional specimens in mineralogy.'[1]

In consequence of these and many other additions, the collections became too large to be contained in that part of the Ashmolean Museum allotted for their exhibition, so in December 1830 it was settled that the western portion of the middle and upper storeys and attics in the old Clarendon Building recently vacated by the University Press, should be applied to the use of the Reader in Mineralogy and of the Reader in Geology. I have not been able to ascertain the exact date of the moving of the Geological collections. The physicist, Professor Rigaud, appears to have secured possession of his new

[1] Ingram, *Memorials.*

quarters by April 2, 1832, but owing to protracted discussions about cupboards, Geology did not get properly installed until much later. The cost of the removal and of the refurnishing of the new rooms and of those for the lectures on Natural and Experimental Philosophy was defrayed by a grant of £3,000 voted by Convocation on June 11, 1831, and the refitting was carried out under the supervision of the architect Sir Robert Smirke.

In 1832 Dr. Richard Simmons of Christ Church presented a choice collection of minerals, for which appropriate cases were provided in the north-west room of the Clarendon. But apparently the collections were not opened to the general public for some years, for on November 19, 1838, Dr. Buckland proposed an arrangement for opening to general inspection the collections of Mineral and Geological specimens 'now upstairs', and those presented by Dr. Simmons. The immediate result was that John Pillinger was engaged at £50 a year for various duties, including that of a general care of the rooms and the particular duty of attending at the Clarendon Museum from one to four on three days a week, to show the collections to visitors, and to work at fitting up cabinets, labelling and arranging collections under the orders of the Professor. He had also to answer the bell and to collect sixpence from each visitor.[1]

So satisfactory were the final arrangements that in 1843 Skelton was able to report that 'the Geological collection, belonging to the Professor of Mineralogy is one of the best in the Kingdom. It is remarkable as one of the oldest, if not actually the first collection of subjects relating to this science made in the kingdom.[2] In February 1851 the University added Dr. Beeke's collection of minerals by purchase for £140.

During the period of Buckland's indisposition, one of his pupils, H. E. Strickland, 1811–53, of Oriel College, a grandson of Edmund Cartwright of Magdalen, acted as deputy, and would in all probability have succeeded to the geology readership had not he met with an early death, being killed by a train while examining the rocks in a railway cutting on Sept. 14, 1853.

[1] *Hebd. Reg.*, 1833–41.
[2] *Oxonia antiqua restaurata*, 2nd edit. 1843.

The collections then fell to the care of John Phillips who was still delivering geological lectures in the Clarendon Building in 1858, within the memory of Professor Boyd Dawkins, who remembers him busy in preparing Buckland's collection for removal to the new Museum. And with Phillips the first Keeper of the new Museum we have reached the limit to our review of the early Geological Collections of the University.

Private Geological Collections.

No account of the geological collections of Oxford would be complete without a mention of the important collections brought together by Drs. Buckland and Daubeny. The Buckland collection was noted for its valuable remains of fossil vertebrates, while Daubeny's series of volcanic rocks collected from various parts of Europe are of great historic interest.

Fowler, the distinguished author of the *History of Corpus Christi College*, suggests that the earliest geological collection in Oxford to be 'arranged on scientific principles' was that of William Buckland (admitted to C.C.C. in May 1801), who, regardless of his own personal comfort, caused his large sitting-room, now the Undergraduates' Library in Corpus, to be fitted up as a Geological Museum. Thomas Arnold was among his early disciples there, and there the specimens remained until Buckland removed to Christ Church in 1825. A detailed and graphic description of the room is preserved in a poem by the younger Duncan.

PICTURE OF THE COMFORTS OF A PROFESSOR'S ROOMS IN C.C.C., OXFORD.

Procul este Profani
Procul inscii et vani.

Away, ye ignorant and vain!
Away, ye faithless and profane!
Jesters and dainty dandies fly hence,
But enter thou, dear son of science!
And here in mild disorder hurled,
Behold an emblem of the world,
In that chaotic state of old
When flints in Paramoudras rolled!
Here see the wrecks of beasts and fishes,
With broken saucers, cups, and dishes;

The præ-Adamic systems jumbled,
With sublapsarian breccia tumbled,
And post-Noachian bears and flounders,
With heads of crocodiles and founders;
Skins wanting bones, bones wanting skins,
And various blocks to break your shins.
No place is this for cutting capers,
Midst jumbled stones, and books, and papers,
Stuffed birds, portfolios, packing-cases,
And founders fallen upon their faces.
He'll see upon the only chair
The great Professor's frugal fare,
And over all behold, illatum
Of dust a superficial stratum.
The sage amidst the chaos stands,
Contemplative, with laden hands,
This, grasping tight his bread and butter,
And that a flint, whilst he doth utter
Strange sentences that seem to say
I see it all as clear as day;
I see the mighty waters rush,
And down the solid barriers push!
I see the pebbles pebbles chasing,
And scooping out of many a basin;
I see the dreadful dislocation,
And gradual stratification.
His eye in a fine frenzy rolling,
He thus around the fragments strolling,
Still entertains a fond illusion
That all the strata's strange confusion
He shall explain beyond conjecture,
And clear in the ensuing lecture.

P. B. Duncan.

May, 1821.

And even in his Christ Church canonry 'the sideboard groaned under successive layers of fossils, and the candles stood on ichthyosaurian vertebrae'. 'In the breakfast-room was a series of books, boxes and papers . . . all blended together in one mass of confusion . . .' In the drawing-room 'one of the round tables is formed entirely of coprolites. Another presents on its highly polished surface all the variety of lava, etc., found at Mount Etna'. Ultimately Buckland bequeathed the collection to the Vice-Chancellor of the University for the use of the Professors of Geology who might succeed him, with all the geological charts, sections, and engravings that might be in the Clarendon Buildings at the time of his death. When the New Museum in the Parks was completed, the collections were moved from the Clarendon Buildings, and a marble bust, erected by his friends and pupils, was inscribed with the pious wish that the relics of the past recovered by Buckland's industry might be preserved 'in perpetuum'.

'The subsequent history of the collection is a melancholy record of neglect. Owing to a variety of causes, a great part of this valuable bequest to the University remained in the same condition (and with perishing labels), in which it had been removed from the Clarendon,

Professor and Mrs. Buckland and Frank
From Mrs. Gordon, *Life of Buckland*

for half a century. The Hebdomadal Council were urged to apportion a space, when the enlargement of the Museum buildings was contemplated, for the "collection in the cellars", as it was called, and about 1892 a large room was placed at the disposal of the Professor of Geology. There the matter rests, and, it is feared, will continue to rest, unless the University makes a special grant to rescue this bequest from oblivion. Not only does this collection consist of Dr. Buckland's gatherings of the first-fruits of the new science but, as he was the greatest authority on geology at the beginning of the century, it includes specimens sent him from all over the world.'

Professor Boyd Dawkins[1] wrote respecting this once famous collection:

'In 1857 Dr. Buckland's collection was in the old Clarendon Buildings, partly in upright glass cases and partly in drawers below. Professor Phillips let me have the run of them, and I spent a good deal of time in working at them; they were all accessible and were mostly unpacked. They were removed to the New Museum, and the arrangement disturbed, so that at present the collection is in a state unworthy of Oxford. The Bucklandean tradition and name, which were maintained in Oxford down to the death of Phillips, are now almost unknown. The Bucklandean collections are now scarcely known as such.'

The collection of CHARLES DAUBENY of Magdalen comprised some fifteen thousand localized and catalogued specimens, contained in 492 drawers: it was the result of a life of travel and collecting. During the last decade of his life his mineral specimens were arranged after the chemical system of Rammelsberg,[2] and his geological specimens were grouped in four categories. 1. Stratified Rocks of all ages. 2. Plutonic and Metamorphic Rocks. 3. Volcanic Rocks, submarine and subaerial. 4. Miscellaneous collections of special topographical interest.

Many of Daubeny's rocks are to be regarded as *type specimens*, and are described in detail in printed memoirs. Of special importance are the long series of rocks containing phosphates and the volcanic rocks. Many of the specimens were specially chosen to illustrate the papers of other workers, Conybeare, Buckland, Jameson, Sedgwick, Murchison, Ramsay, Macculloch, Phillips, Scrope, and others. He had also incorporated in his collection rock-specimens brought home from the Arctic by Captain Parry, from S. America by Darwin on the

[1] Sir W. Boyd Dawkins, Honorary Fellow of Jesus College, Professor of Geology at Owens College. Quoted from Gordon, *Life of Buckland*, pp. 52-3.

[2] *Handwörterbuch des chemischen Theils der Mineralogie*, Berlin, 1841.

famous voyage of the *Beagle*, by Sibthorp from Greece and the Levant, by Buckland from Gailenreuth and elsewhere, as well as specimens of his own collecting from North America 1837–8, and from most of the countries of central and western Europe 1820–50. For these and other collections he built a Museum near the Botanic Garden and bequeathed the whole to Magdalen College with a Trust Fund to help the College to provide for their safe-keeping. The circumstances which have led to this fine collection remaining practically useless for further research are mainly two: 1, the appointment as sole Curator of a person who pretends to no knowledge of geology, and, 2, the alienation of rooms previously allocated to myself as a research fellow for working at the Daubeny collection.

A third notable private collection of fossils was that of James Parker, 1833–1912, of Oxford, son of John Henry Parker, the archaeologist. Parker's collecting period is described in detail in four notebook inventories of fossils obtained between 1847 and 1877. An early historic entry

> 1 Stonesfield Jaw bt. of Best Sept. 26 1858 with six other fossils for 4/-

refers to his unique specimen of a jaw of *Phascolotherium Bucklandi* figured by Phillips,[1] acquired for the Oxford Museum in 1913, and destroyed in 1919 by being cut into thin slices.

Within a year of the publication of Boucher de Perthes' discovery of flint implements in the valley of the Somme by Evans and Prestwich in 1859, Parker had visited the site and had brought back to Oxford a collection of the implements, and a set of drawings of sections made by himself of the gravels of St. Acheul.[2] With Boyd Dawkins, on April 22 and May 6, 1862, he ransacked Wookey Hole for palaeoliths and hyaena bones.[3] On July 15–16 of the same year he found a cache

[1] Phillips, *Geology of Oxford*, fig. 236.

[2] J. Parker, *Early Flint Implements from the Somme Valley*, 1862. *Report of the Lecture on the Flint-Implement bearing Beds of S. Acheul, delivered before the Ashmolean Society* Nov. 9, 1872. A twelve-page pamphlet, reprinted from the *Oxford Times*.

[3] Parker's plan of the smaller cavern of Wookey Hole was printed and published.

of *Megalosaurus* bones at Weymouth, which were duly sent to his house in the Turl in two hampers on July 31. In 1864 his acquaintance, Lord Dunraven, sent him the huge antlers of *Megaceros hibernicus* found in Oola bog near Tipperary. But the gem of his now important collection was a unique skeleton of *Streptospondylus Cuvieri*, a carnivorous Dinosaur from the Oxford Clay of St. Giles's pit, Summertown. For many years the bones reposed in the cellars of the Turl until 1913, when, with the rest of the Parker collection, they were purchased by the late W. E. Balston for presentation to the Oxford Museum. The skeleton was mounted at the British Museum; and now, in 1924,[1] is one of the chiefest treasures in our University Museum. He prepared a *Map and Sections of Strata South of Oxford* for the meeting of the excursion of the Geological Association of May 17, 1880, and also a *Rough Section of Purbeck Strata, Durlston Bay*, for a similar occasion in May 1910. These ephemeral publications are now difficult to obtain, as are his Map and three Sections of the South of Oxford, printed in colour. For field work he used a clinometer of his own invention, which his son has been good enough to give to be placed with the Evans Collection of Scientific Instruments in the Old Ashmolean Museum.

Of Parker's archaeological and architectural work this is not the place to speak, but notwithstanding these and his other preoccupations, he kept up an interest in geology to the last. In 1895 he acted as Secretary to the British Association committee on the *Ceteosaurus* remains found at Enslow Bridge, of which committee the present writer's friends Lord Ducie, A. H. Green, and Professor Ray Lankester were also members. Parker's notes and plans are still extant. Professor Green died in the following year.

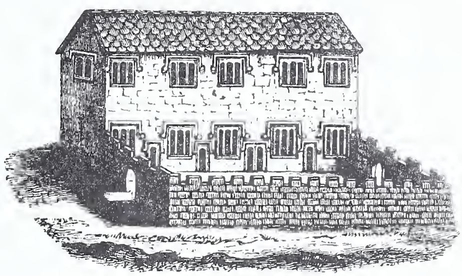
[1] *Geol. Mag.*, July 1905.

THE COLLECTIONS

VIII

THE BIOLOGICAL COLLECTIONS OF THE UNIVERSITY

In the early days of the University the masters, doctors, and professors in the various faculties taught in distinct rooms or Schools attached to various Halls, but, about 1439, accommodation was found for the Schools of Arts in one large ten-roomed building.



THE SEVEN SCHOOLS OF THE LIBERAL SCIENCES, *c.* 1439. From Ingram, *Memorials of Oxford.*

The situation of the University Library in 1605, when King James I visited it, was described as being in an Amphitheatre of Colleges 'and in the forefront thereof, in the place of Oakes, Elmes, and Pine trees, all of which are comfortable trees to defende her from the furious wrathe of wind and weather, are planted the Schools of the seauen liberall Sciences, to adorn and beautifie her with the inward plenty of their wisedome and treasure'.[1] Two of the rooms were in all probability devoted to the teaching of Astronomy and of Natural Philosophy.

[1] Anthony Nixon, *Oxford's Triumph*, quoted from Macray, *Annals*, p. 33.

In 1613 more ample provision for Arts teaching was made, by the erection of a new Schools Quadrangle on the East side of the Bodleian Library. On the South side Medicine and Anatomy occupied the first floor, and Natural Philosophy, the ground floor; and Astronomy was appropriately relegated to the East side, where, in after years, the Tower served as a convenient observatory. The scientific teaching staff was also greatly strengthened by the foundation within four years of the following four new chairs:

Savile Professor of Geometry	1619
" " " Astronomy	1619
Sedley Professor of Natural Philosophy	1622
Tomlins Reader in Anatomy	1623

Doubtless too the occupants of the chairs must have felt the need of apparatus or specimens for demonstration to their classes; but of proper repositories for such material objects there were none other than the libraries of the University and the Colleges.

The Bodleian Library.

From time to time pieces of scientific apparatus and specimens of natural history would drift into the Bodleian Library, perhaps accompanying a gift of books, perhaps at the request of Librarians, some of whom appear to have taken more pleasure in showing to visitors such rarities than in producing the volumes in their charge.[1] Some visitors probably appreciated them more highly than books, and the Bodleian show-cases are not entirely devoid of animal and vegetable relics, even under the enlightened management of the present day.

Oxford librarians have not as a class proved themselves to be reliable custodians of such scientific things, and it has frequently happened that rarities which have been the joy and the instruction of one generation have been lost or deposited in another institution in the next. So doubtless several of the items now catalogued as given to the Bodleian Library would have naturally

[1] Brome in a letter to Rawlinson. 'I am glad he [Thomas Hearne] has ordered some of his curiosities for the place he once loved, the Bodleyan Library.'

gravitated to the Anatomy School below. Still we are glad to think that Bodley has not been so heartless as to part with the long tress of hair and skull of the Unknown Lady. They now repose in the lower cupboard of the Bible Case, and have as much right to a place under the roof of the Bodleian as the portrait of the other Unknown Lady, even though the first ignota was an Egyptian. Specimens of hair from the heads of John Hampden (two hairs, 1643), Keats, R. L. Stevenson, P. B. and Mary Shelley, are also piously preserved as a stimulus to students of literature. Similarly the Ashmolean Museum of Art and Archaeology houses a lock of hair taken from the head of King Edward IV, in 1789 (No. 378), some braids of other hair in a watch chain (No. 373), and a large lock of the hair of Prince Charles Edward 'cut at the age of sixteen'.

Objects of Natural History in the Bodleian Library

The following entries relating to Bodleian rarities have been extracted from the *Registrum Benefactorum*.[1] Items which are listed in Hearne's catalogue of the Anatomy School (printed on pp. 264–74) are indicated by numbers.

Three large Pictt. of ye Muscles of a Human Body
Tho. Highlord, Civis Londiniensis 1662
[Carriage cost 4*s*. *Bodl. Accounts*. These were probably the pictures by Fuller in the Anatomy School, Nos. 301–3.]
Sceleton Humanum motionibus naturalibus mobile
Pellis Humana infereta [No. 179.]
Pueri Nigritiae corpus integrum exiccatum.
Sir Robt Viner Kt. & Bart, Lord Mayor of London 1683/4
[Perhaps this is No. 190 of the Anatomy School.]
'Cranium Hibernicum usneatum'.[2] [No. 204.]
Dr. John Lamphire, principal of Hart Hall, 1675

[1] They also occur in Phillips MS. 13841, and have been included in the list printed in Appendix B to *Early Science in Oxford*, vol. i, p. 382.

[2] A similar skull was noted by Borrichius, who visited the Anatomy School in 1663. 'A humane skull cover'd all over with moss, by the Paracelsians caled *usnea*. The moss is by them

Mummiatum cadaver[1] [No. 241.]
Aaron Goodyear, Turkish Merchant 1681

Calendarium ligneum perpetuum ligni quadrati angulis incisum more antiquo [a Clog almanack]
Rich. Davis A.M. Sandford, Oxon 1682?

8 Tabb. Anatomicae ab Amato Bourdono M.D. delineat. et aeri incisae Par. 1678
Chr. Willoughby D.D. Fell. of Magd. Coll. 1742

£70 towards the purchase of an Orrery
Rev. Jos. Parsons M.A. Merton Coll. 1760

Black negro baby preserved in spirits
A. Müller of Amsterdam 1818

A Crocodile from Jamaica [? No. 171.]
Dom. J. Desborow 1658

['A Case for Great Crocodile, 1671, 12*s*.' *Bodl. Accounts.*]

Capsula conchis marinis, artificio miro ingeniosissime tessellata [No. 53.]

Salamandra [No. 34.]

Alia nonulla Naturae mirandae
Rob. Southwell, Queens 1657

Balaena in Sabrinâ flumine capta [No. 126.]
Will. Jordan Apoth. Glouc^r. 1672

[14*s*. 6*d*. was paid for carriage from Gloucester. *Vice-Chanc. Accounts* 1675.]

Fragmenta lapidis in quo naturalis figura duorum Piscium

Frustulum Lapidis Asbesti

Conus cedri ex Monte Libano
Aaron Goodyear, Turkish Merch^t. 1681

commended by its peculiar virtue in the stopping of bleeding at the nose. Pomet and Boyle note that English druggists generally brought their heads from Ireland, that country having been remarkable for them ever since the Irish Massacre.' Salmon, *New London Dispensatory*, p. 195.

[1] Mummies were in great request in early Museums. Leyden boasted of a mummy of an Egyptian prince 1800 years old, and a second of a princess of about 1300 years old. The Royal Society was given one taken from the Royal Pyramids by the Duke of Norfolk. On the use of mummy in medicine, much has been written. Boyle knew it as a valuable medicine for staunching blood, and for healing fractures and bruises. Great cures were performed by it, 'but its greatest use is catching fish'. P. Pomet, *Hist. generale des Drogues*, Paris, 1694.

Eighteenth-century Accessions

Ovum Struthio-Cameli as Tabrè coelatum

J. Frederick, Commoner of Univ. Coll.

Cidaris Spine and two Fossil Shells

Collection of Moss Agates

Two Bladder Stones and a fragment of a third

[36601 MS. English 1593: now MS. Engl. misc. d. 80 (R).] See p. 371.

Papyrus plant, in its natural state

Anthropological Specimens

A furred robe made of the skin of the Tartarian boramez. Given by Sir Richard Lea, Queen Elizabeth's ambassador in Russia.

This robe was described by Sir Theodore de Vaux to the Royal Society on August 30, 1666. The boramez was supposed to be a plant animal, and Dr. Wren was desired to inform himself concerning the robe, and to view it on his return to Oxford.

Tubulus quo Nicotianae fumus hauritur

Jeremiah Carter, E. I. Merch^{t}. 1663[1]

Duae bicubitales sagittae plumatae et ferro armatae Indicae

Duae aliae sesquispithamales ⟨= 3 palms = c. 9 inches⟩ implumes cuspidibus ligneis barbatis et venenatis

Henr. Thurscross, E. I. Merch^{t} Lond. 1666

921. Magic staff, described in Macray (*Annals*, 2nd edit., p. 84) as being of 'dark polished wood 2 ft. 9 in. long, with a grotesquely-carved figure at the head, apparently of Mexican workmanship'. Lost for some years. Archbp. Laud.

[1] Carter was also a China merchant, and the pipe therefore probably Chinese. He gave at the same time a Japanese fan and some Chinese bric-à-brac, enumerated in the Benefactors' Register (H.E.H.C).

THE ANATOMY SCHOOL COLLECTIONS

The old Anatomy School was a first-floor room on the south side of the Bodleian Quadrangle. The only access was by the staircase in the corner, by which readers now ascend to the Bodleian Library. It was a fine large room, about sixty feet long, by twenty-five feet wide, well lighted by six windows, three on the south, one on the west, and two on the north, looking into the quadrangle. All the windows may be seen from the outside, but those on the north are now covered over by bookcases, dated 1788, introduced when the room was fitted up as the *Auctarium Bibliothecae Bodleianae* for classical and biblical MSS., the first of many extensions of the Library.

In this fine apartment were displayed the specimens that constituted the first Natural History collections of the University. Judged by some modern standards the contents, as described by the early visitors, may be subject for ridicule, but it would be wrong to assume that all the exhibits were of the same character. The more sensational curiosities were ground-bait to attract visitors. Masters of Arts gleaned that there were more things in heaven and earth than were dreamt of in the classicist philosophy; and the old Anatomy School was a most useful educational instrument in its day, demonstrating the incalculable and lasting value of the *Museum* as an aid to biological, as indeed to all education. It emphasized the lesson of the great superiority which learning from *things* has over learning solely from the *books* in the Library above, although the latter may serve as a useful adjunct when required.

The first reference to Anatomical collections is one contained in a MS. volume of travels by Jean Fontaine and Louis Schönbub,[1] who visited Oxford in 1630 or 1631. They noted 'Schola medica eadem in domo (i. e. in the University Schools) ubi (1) Serpens indicus 10 pedes longus; (2) pellis hominis totius; (3) collium (sic) album ex Mare Rubro'. And 'in parvo cubiculo' were kept

[1] I have to thank my friend Mr. H. E. Craster for drawing my attention to this MS. It is in the Royal Library of Copenhagen (New Royal MS. 4° 369) and is mentioned by Macray, *Annals of the Bodleian*, 2nd ed., p. 74.

'gladius Indicus, toga pellibus agninis quae crescunt in terra Tartariae facta (magnitudinis sunt pellis cuniculi)'. Evidently all manner of suitable objects were being actively collected, for the writer of a poem on the new glass windows in the Oxford Cathedral has the following passage:

Jonas his whale did all men's eyes so foole
That they'ld have beg'd it for the Anatomie Schoole.[1]

A skeleton in the School that was the subject of a lecture on Dec. 3, 1632[2] was probably the predecessor of the one prepared by Thomas Trapham in 1634.[3]

Another early reference to the curiosities preserved in the Anatomy School occurs in the manuscript diary of a German traveller, G. Christof Stirn of Nürnberg.[4] After he had visited the Bodleian Library, in 1638, and had found it 'in general not so excellent as is reported', and had been shown the West Indian idol, the Egyptian idol, the portraits of learned men, the University arms on the ceiling, an astronomical compass or calendar made of pure gold, a portrait [of Queen Elizabeth] in feather-work, and Joseph's coat 'which he was wearing when he was sold to the Egyptians', he went down to the Anatomy School, where he saw 'in a lower room some skeletons, a human skin, a basilisk, a piece of the pillar of salt (? = Lot's wife), two feet of a man who had been hanged with only two toes on each, a huge shell of a tortoise, and many similar objects'.

On July 12, 1654, John Evelyn took his wife to see the collections, which he may have remembered from the time when, in his first week as a Balliol freshman, he visited the 'several rarities of the University, which do very much affect young comers'. They found 'the

[1] British Museum MS. Sloane, 1435 f. 122.

[2] MS. Smith 91 (p. 1), *Praefatio in Praelectione de sceleto in Schola Medicinae.*

[3] MS. Bodley 869 (2754) is inscribed 'ex dono T. Trapham, chirurgi licenciati Oxon: qui etiam sceleton publicum paravit in usum Academiae anno Domini 1634'. 'Trappam of Abendon, chirurgian, who sewed on the old king's head when he was beheaded and said "he had sewed on the goose's head", was buried at St. Elen's churchyard at Abendon under one of the windowes [on 29 Dec. 1683]. Trappam was chirurgian to Oliver Cromwell at Worcester fight.' Wood, *Life.*

[4] Stirn's *Travel Diary*, MS. Bodley Adds. B. 67.

Physic or Anatomy School adorned with some rarities of natural things; but nothing extraordinary save the skin of a jackal, a rarely coloured jackatoo, or prodigious large parrot, two humming birds, not much bigger than our humble-bee, which indeed I had not seen before, that I remember'.

For the next account of this University Rarietäten Kammer, we rely on the French traveller Monconys, who visited the School on June 11, 1663.

'On another side [of the Bodleian quadrangle] is a room for dissection, where there are several sorts of animals, fishes, birds and other curiosities; but there was nothing that I had not seen in thousands of places. There is a skin of a man, and one of a woman, and they show a small cube of wood, in which, though no joint is perceptible, there is a thick copper ring, without sign of soldering, passed through the middle of one of the faces.' Then, after alluding to two collections of coins, he continues: 'In a small room they showed us a skin robe of many colours, so they have to say that it was Joseph's. And there too we saw a black marble in the middle of which was a lizard, formed so perfectly that it appears to be petrified: but I believe it to be merely a *lusus naturae*, that has shaped the animal in white marble, unless it be a drawing "par une filament". It is of a different substance, at least of a different colour, and it is marked by streaks a little less dark than the body of the beast, which is grey.'[1]

Monconys might also have been shown the new skeleton which had just been made and paid for out of the Vice-Chancellor's account.[2]

To ⟨Thomas⟩ Adams ⟨the smith⟩ for making a scheleton £6
To ⟨John⟩ Wild ⟨the carpenter⟩ for a case for the scheleton £2

In the same year (1663) came Olaus Borrichius, who had previously seen the fine Anatomical Theatre at Leyden,[3] which he considered far superior.

[1] Monconys, *Journal des voyages*, ii, p. 52. Lyon, 1666.
[2] V.C. accounts 1662–3. Wood, *Life and Times*, iv, p. 66.
[3] In Evelyn's day (1641) the repository at Leyden was 'well furnished with natural curiosities: skeletons from the whale and elephant to the fly and spider; which last is a very delicate piece

Theatrum anatomicum cum Lugduno-batavo nequaquam conferendum. Merebantur aspici duo vasti crocodili, alter ex Nilo, ex Jamaica alter, allati. Item cranium humanum ex Hybernia allatum totumque usnea scatens. Os tendebatur quoque calculus humanus magnitudinis capitis annui pueri. Item cauda vaccae Indicae alba, setosa instar equinae, eaque duplo major. Item cranium humanum in anteriori parte quatuor tuberculis eminens, iisque pertusis largo foramine. Ceteroquin nihil in Anatomicis observare licuit Oxonii novum aut hactenus inauditum.[1]

On Oct. 24, 1664, when the foundations of the Sheldonian Theatre were being laid, Evelyn visited the Anatomy School for the third time at least.

We went to see the rarities in the Library, where the keepers showed me my name among the benefactors. They have a cabinet of some medals, and pictures of the muscular parts of man's body.

Three years later Vernon described the School in verse.

Insuper hic parvo videas inclusa recessu
Tot genera et rerum species, quot dicitur arcâ
Fatidicus clausisse *Noe*, quum corruit orbis
In mare tot volucrum, tot sunt exempla ferarum,
Tam variae classes. Verum hoc discrimine, quod quae
Tum metuere undas, Nunc sunt animalia *sicca*.
F[rancis] V[ernon] *Oxonium Poema*, 1667.

And in July 1669 Sebastian Faesch makes mention of

'corona Indica, tela, cochleae, optica quaedam et tabellae acu pictae ab Angla passionem Christi inferentes', i.e. Dame Eliz. Powlett's needle-work.[2]

Unfortunately there is no view extant of the interior of the Anatomy School at this time, but there are illustrations of foreign museums which enable us to picture to ourselves what the general arrangement of the exhibits

of art, to see how the bones could be separated from the mucilaginous part of that minute animal.'

[1] The letter of Borrichius, dated London 10 Aug. 1663, is contained in Th. Bartholinus, *Epistolarum Medicinalium*, iv, pp. 527-8. Copenhagen, 1667.

[2] *Festschrift zur 49 Versammlung Deutscher Philologen . . . in Basel im Jahre 1907*, p. 86. Basel, 1907.

may have been like. The accompanying figure is from the Anatomy Theatre of the University of Leyden.

In 1674–5 two notable additions figure in the Vice-Chancellor's accounts:

2/3 for bringing the Whale from Gloucester to the Anatomie-Schoole 14*s* – 6*d*
5/6 for bringing the great Thigh-bone to the Anatomie School 5*s*

Both items afterwards appear in Hearne's catalogue of curiosities as No. 126, 'A young whale found in the river Severn below Glocester', and No. 170, 'Thigh-bone of a Gyant'. The identification of the latter object was confirmed by Plot, who took advantage of a live elephant being shown in Oxford in 1676 to compare its teeth with those of a fossil mammoth, and decided that the latter must be those of a giant.

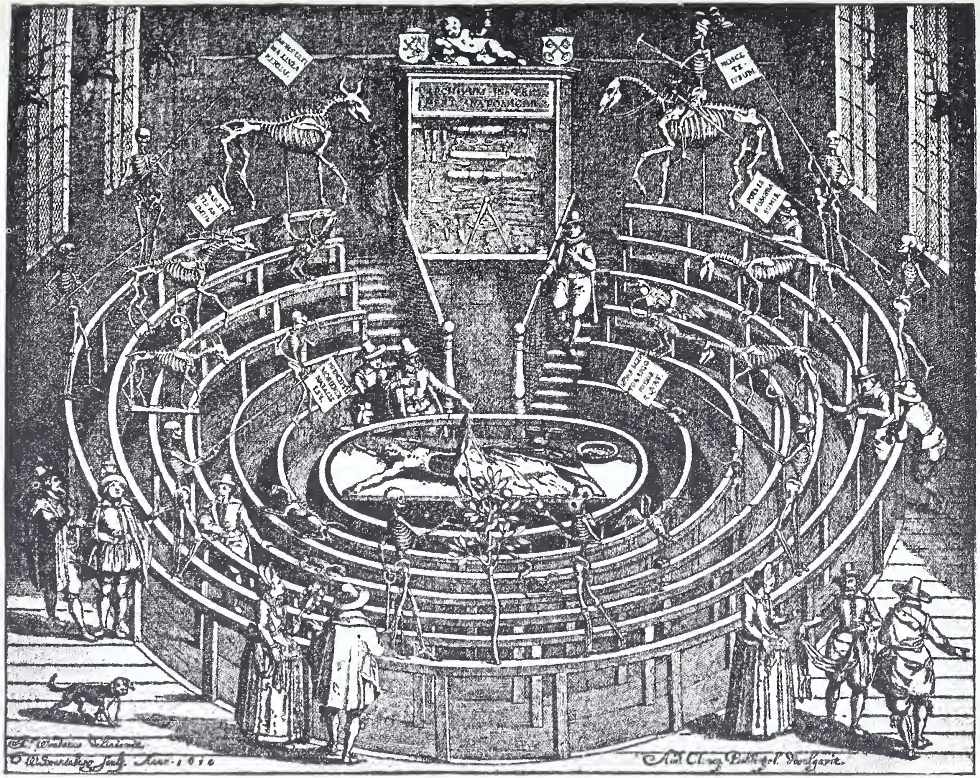
After the opening of the Ashmolean Museum in 1683, lectures which had previously been given in the Anatomy School were given in a room in the Museum, and though some of the specimens may have been transferred, the old School appears to have been used exclusively as a gallery where visitors were shown anthropological and pathological curiosities. The best descriptions of it are contained in the reports and journals of foreign travellers. For instance, in 1694, Benthem[1] reports that

> Under the same roof [as the Bodleian Library] on the ground floor is the Anatomy school; in which many other rarities are exhibited; a complete costume for a man and woman, as worn in Davis Straits. Arrows which are tipped with fish bones and sharp stones instead of iron. A great hair-ball found in a cow's stomach. Another, much rougher, taken from the stomach of a calf. A skeleton of a pigmy, with the teeth complete. A corn (Krähenauge), as long as one's little finger, cut out of a foot. A stuffed Moor, who died a heathen. A pelvis of a cow two ells in length, and many other things of the same sort.

The Anatomy School Catalogues

I had already copied out certain of the manuscript catalogues of objects exhibited in the Anatomy School when

[1] Heinrich Ludolff Benthem, *Engeländischer Kirch- und Schulen Staat*, Lüneburg, 1694, p. 327.



The Anatomy Theatre at Leyden, 1610.

my friend Mr. Craster very kindly handed over to me some notes which he had already made upon manuscript sources of information available in the Bodleian. For the following description of the catalogues I am indebted to him.

About 1675 an inventory[1] of the contents of the Anatomy School was compiled by one of the officials of the Bodleian Library. With the exception of the last four items on f. 201 and the three on f. 201 v, which are additions to the original list, it was written at one time. The handwriting is identical with one found in the Library hand-lists of c. 1675–85, and Mr. Craster suggests that it is by William Crabbe (or at least by one of the Crabbe tribe). We shall refer to this as List A.

A second List B, on f. 203–4 of the same book, was written at one time by another hand at present unidentified. It comprises more items than A. The items, arranged in the same order as in A, are grouped according to their position in the room, viz. east, north, west, and south parts, and drawer and table; the entries are more numerous, and occasionally the detail is fuller. Mr. Craster points out that both lists A and B may be as early as 1675 for (1) the whale from the Severn brought here in 1678 does not appear, though it is in Hearne's list, no. 126; (2) Dr. George Croyden whose gift is recorded as an additional entry on f. 201 v is presumably George Croyden, canon of Christ Church, who died in 1678.

The third list C is by Thomas Hearne. In Hearne's list each item is numbered. As first drawn up the list ended at no. 274. The date of this first part of the list is not later than May 19, 1705, for no. 275 was given on that date. As in lists A and B, Hearne proceeds round the room, but starts off with the table and drawers, and then proceeding to the south side goes round the room by way of the east end and north side to the west end, and finally gives a list of 'things in the box'. The box does not appear to have been there thirty years earlier. A comparison of the lists shows that the exhibits continued for the most part to occupy the same parts of the room, but Hearne does not follow the order of the two earlier lists. He naturally includes in his list the accessions of 1675–1705.

Hearne continued to add to his list at various dates, but after no. 274 (where his first list ends) he neglects the order

[1] Now MS. Rawl. D. 912, fol. 201.

of arrangement in the room. By the autumn of 1709 he had brought it up to no. 386, for (1) nos. 383-5 were presented on June 18, 1709; (2) Dr. Richard Rawlinson, who copied the list in October 1709 ends with no. 386; (3) no. 387 was presented on Nov. 7, 1709. Nos. 380-6 or most of them are accessions of 1708-9; but nos. 275-379 are not merely accessions of 1705-8 (although doubtless some of these numbers are accessions of those years); the bulk of them would appear to be accessions of earlier date which had previously been uncatalogued.

Nos. 387-415 are accessions of 1709-13. The last item, no. 415, was presented on Feb. 13, 1712/13. It led to the scene, a week later, which ended in Hearne being requested to hand over the key of the Anatomy School. See Macray's *Annals*, pp. 187-8.

D is Dr. Thos. Rawlinson's copy of Hearne's List nos. 1-386, with three items added in his own handwriting. These do not appear in Hearne's List C.

E. Hearne also kept 'A Catalogue of the Benefactors to the Anatomy Schoole in Oxon. and an account of the Rarities given by each of them under their respective names'. It was vol. 154 of Hearne's MSS. (E. Pr. 106) which failed to come to the Bodleian in Rawlinson's gift, although it is described as above, in Hearne's catalogue (MS. Rawl. D. 1168, fol. 84 v). In 1919 Mr. Craster discovered the missing Catalogue in the Ashmolean Museum, and after a joint examination with Mr. Leeds, came to the following conclusions:

1. The MS. is a catalogue of Benefactors to the Anatomy School and *not* to the Ashmolean Museum.

2. It was begun probably not before 1675, by a Bodleian Library officer, and was written up to about that date; i. e. the entries of about 1660-75 were entered at one and the same time.

3. It was continued by contemporary entries in the same hand for some years, i. e. to about 1685 or even 1690.

4. The hand is identical with that of List A of Rarities in the Anatomy School, and with that of several library hand-lists of about 1680-5, e. g. 'Catalogus C. Lists of MSS.'

5. It is *not* Hyde's hand, and the dates seem to indicate William (or possibly John) Crabbe. If begun 1690 it is rather Brooke Crabbe or John Crabbe, but *not* Joseph Crabbe whose hand occurs in MSS. Bodley 47 and 657.

6. The volume was continued by Hearne during the time he was Keeper of the Anatomy School.

7. Having come to the Ashmolean Museum, apparently by gift from Rawlinson, the blank and half-blank pages were used about 1800 as a janitor's book. A number of leaves are wanting. [H. H. E. C., 1919.]

This list of Benefactors is now MS. Rawlinson Q. e. 36, and is quoted below as E.

List of Objects exhibited in the Anatomy School, *c.* 1675.

The following combined list has been compiled from List A in MS. Rawl. D. 912, foll. 201-2, which is printed entire, with added matter from List B in the same MS. in brackets ⟨ ⟩.

The numbers prefixed to several of the items have been taken from Hearne's List (C.) compiled in 1705-9. The initials and dates at the ends of the lines give the first literary references to the specimen, viz. F[ontain] 1631, S[tirn] 1638, M[onconys] 1663, B[orrichius] 1663.

Catalogus Rariorum in schola Anatomicâ Oxoniensi

⟨*The East Parte*⟩

Sceletos humanus ⟨3 Scheletons⟩ S. 1638
179 Pellis humana una cum Capillitio, ⟨barba Unguibusque integra⟩ F. 1631, S. 1638, M. 1663
Pellis humana incrassata ⟨A mans skin Tanned⟩
⟨A peice of a womans skin Tanned⟩ M. 1663
184 Serpens Indicus 10 pedes longus F. 1631, S. 1631
187 Ovum Struthio-Cameli ⟨struthionis⟩
149, 186 Piscis volans
Sirenis manus
183 Vaccae Indicae cauda
Arbor seu frutex marinus qui capiti piscis Americani adnascebatur
166 Pes Ursi Albi ex Groenlandia transmissus
Erinaceus Marinus
? 171 ⟨Crocodilus⟩
Vespertilio Indicus ⟨A Sea-Batt⟩

⟨*The North Parte*⟩

196 Crocodilus B. 1663
Given by General John Desborough 1658
⟨Erinaceus Marinus⟩
Sorex Marinus
194 Cornu Alcis

⟨Serpens Indicus⟩
⟨Serpens Alter⟩
Canna Indica laevissima ⟨pendens 8 Vncias⟩
Cassia
Nux Indica Coco dicta
Conchae diversorum generum ⟨A Sea shell⟩
Avis Indicus Anonymus ⟨An Indian bird⟩
202, 233 Bestiola Africana ⟨vulgò⟩ Jackhall dicta Evelyn 1654
? 203 Cranium Hominis πελώριον B. 1663
204 Cranium Usneatum ex Hibernia B. 1663
[Another example was given by Dr. Lamphire in 1675]
⟨Animal Marinum ex littore Hib: Allatum⟩
205 Apri Americani dens
? 80 Clavus pedis Civis Oxoniensis ⟨seu Gemursa⟩ S. 1638
Testudo marina S. 1638
⟨A Tortose⟩
210 Draconis marini Penis
Corvus indicus
⟨Avis invsitata⟩
213 Avis Indica ⟨vulgò⟩ Maccaw dicta ? Evelyn 1654
⟨Vulpecula Marina⟩
208 Vertebrae è Colle Balenae
Stella piscis ex Oceano Indico
⟨A shell⟩
144, 222 Balenae Penis
Ciconia
286 Caput Hippopotami
Coralium ⟨Corall⟩ ? F. 1631
Caput Labracis ⟨*omitted*⟩
132 Struthionis Tibia
163 ⟨Cancer Marinus⟩
Penis Hippopotami
⟨Caput Labracis⟩
⟨A shell⟩
⟨Balaenae Marinae penis⟩
Rostrum pellicani
⟨Maxilla vulpeculae Marinae⟩
⟨Animal ex cane et vulpe genitum⟩
Dens piscis marini
⟨Nux indica⟩
Cuniculus marinus
Histrix piscis ex Oceano Ber[m]udico
⟨Concha marina⟩

⟨*West Parte*⟩

131, 232 Canna Indica Bambu dicta
Pellis Lupina ⟨ex Hibernia allata⟩
Mummia Ægypt [Given by Goodyear in 1681
⟨Cancer Marinus⟩
Ægypt. Hieroglyphicus
Piscis gladiatorus ⟨A sword fish⟩
⟨Rostrum piscis gladii⟩

Castoris pellis ⟨Castoris piscis⟩
125 Cati Americani pellis
Arbor Divae Mariae ⟨*omitted*⟩
19 Embrio Vitulinus in utero vaccae petrifactus ⟨*omitted*⟩
Given by N. Darrell, 1670

⟨*South Parte*⟩

171 ⟨A Greate Crocodile⟩ B. 1663, Bodl. Accts., 1671
Lectus Indicus alias Hammack dictus ⟨An Indian Hammack⟩
Echinus piscis
Lupus marinus
⟨An Indian Bird⟩
155 Avis insolita ex Ostio Sabrinae allata
Equus Marinus
Cornua Hirci Indici ⟨Orientalis cujus partibus interioribus lapis Bezoar eximitur⟩
Crumena Indica
⟨Conchae Marinae⟩
⟨A coney fish⟩
⟨A shell⟩
147 ⟨White coral⟩
?153 ⟨A Birds Bille⟩
Cameleon
Bufo marinus
⟨Stella piscis ex oceano Indico⟩
⟨A Birds bill⟩
⟨Cameleon⟩
Columba marina
⟨piscis volatilis⟩
⟨Cancer Marinus⟩
5 Rosa Hieracuntea ⟨Rosa e valle Jehosapat⟩
⟨Hirundo piscis volans ex oceano Atla[n]tico⟩
⟨Erinaceus piscis⟩
Vitulus Marinus
Rostrum Picae Avis ⟨*in pencil* 'on ye west end'⟩
22, 133 etc. Lignum petrifactum ⟨A peice of wood petrified⟩
⟨Piscis vulgò dictus⟩ Armadilla
156 Pasche Flemingo, Avis sic dicta ⟨A Passim = phlemingo⟩
157, 158 Dodo ⟨2 Doadoes⟩
160 Tibia Alcis
Serpens Africanus
⟨Concha Testudinis Marinae⟩
Alligator
⟨A snaile shell⟩
Cuniculus Indicus
⟨Echinus piscis⟩
⟨Armadillo⟩
169 Rhinocerotis Cornu
⟨A shell⟩

⟨*In ye Drawer and upon ye Table*⟩

Corona Regis Americani ⟨An Indian Crowne⟩ Faesch 1669

21 ⟨A peice of wood with Brasse ring in it⟩ M. 1663

⟨An Indian Tobacco pipe⟩

235 ⟨A Coco Nutt⟩

⟨A Shell⟩

[? 96] Calculus è Vesica Hominis ⟨A Stone out of a mans badder (sic)⟩ B. 1663

[? 123] Alter è Renibus ⟨A Stone out of a mans Kidneys⟩

? 112 Pigmaei Sceletos ⟨A Pigmey⟩

Scarabeus Indicus

[*This and the following entries are omitted in list B.*]

Instrumentum musicum Americanum

Sceletos Felis

Anguis cauda crepitans Anglice Rattle-snake ex Virginia allata

Vulpicula marina

[1] Frustulum montis Sinai *jam in musaeo Protobibliothecarii repositum* [Note added by Hyde]

Aqua Petrefacta

Concha è mari rubro ? F. 1631

Fistula Necogiana Indica [Pres. by J. Carter 1663

Chirothecae ex pellicis Muraenarum Wigornianae confectis

Pellis monstri marini, ex dono Georgii Croydon S.T.D.

Felis in angulo reperta et perquam arefacta

A Battle-Axe in ye time of ye Romans

End of List A *on fol.* 202.

⟨The forme of our Savioures Sepulcher⟩

Given by Aaron Goodyear, 1681, and still extant

⟨A Mans Boote⟩

⟨flyes Hornes⟩

⟨Indian Birds⟩

⟨An Abridgment of ye Lords prajre and 10 command:⟩

⟨Indian Musicke *added in a later hand* 'now in ye North window'⟩

End of List B *on fol.* 204 v.

This list would fairly represent the collection as it was when Charles II visited 'the Anatomy School, where many incomparable curiosities he viewed' on March 15, 1681. At the time Thomas Hearne of St. Edmund Hall was undoubtedly taking an interest in the collection. He had been appointed to a post in the Bodleian in 1701, which kept him on the spot, and he drew up a

[1] The following eight entries are in the same hand but written at a later date.

catalogue from a copy of which the following lists have been extracted and rearranged. Hearne's catalogue C and the copy D made of it by Rawlinson show that important additions had been made to the collections since the former lists A and B were prepared. List D is entitled

An exact and particular Account of the rarities in the Anatomy School transcribed from the original copy in Mr. Tho: Hearnes hands by me R. Rawlinson Octob^{r}. 1709. —Rawl. MS. c. 865.

In this list the rarities are entered in numerical order, which after no. 275 is also a chronological order, but to facilitate reference we have regrouped the scientific rarities in categories under selected headings.

The numerical references preceded by 'P.' refer to items mentioned in Pointer, *Oxoniensis Academia* 1749, pp. 157–60. The notes and names in brackets ⟨ ⟩ are chiefly those of the donors, and are taken from the List of Benefactors 'E' described on p. 259.

HUMAN ANATOMY AND PATHOLOGY

190. A Blackmoore mummied. ⟨Sir Robert Viner, Ld. Mayor of London, 1683–4. E⟩
241. Piece of an Aegyptian Mummy. P. 6
179. The Skin of a man stuff'd with the Hair on his head, etc., and nails on his fingers. ⟨M. Anthony Smith, chirurgeon in Oxon 1657. E⟩ P. 1
180. Skin of a woman, not stuff'd.
181. Skin of a woman's thigh.
⟨A pair of Gloves made of the Skin of a Tawny-Moore. Tho. Price of Gilston in Hertfordshire, June 14, 1712. E⟩
104. A Tooth, and some of the robes of K. Will: Rufus, taken when his monumt. was ransack'd by the soldiers att Winchester. ⟨Dr. Stanley, 1660. E⟩
45. A Mermaid's hand.
50. Scalp of an American, who was flead alive [vide Number 329].
24. The Hair of a Womans head found wrapped up and entire after her body was quite wasted in the Colledge Chappell of Eaton near Windsor. P. 99
329. Capilitium una cum cute a vivo Americano detractum poena talionis in Barbaros, qui e nostris captivos, illum in modum excamificant, palisque alligatos, solis ardoribus, et vesparum, asilorum, aliorumque insectorum morsibus objiciunt. [N]
⟨Lace made of Haire. Mr. Sidney Rance, 1710. E⟩

39. Two horns which grew out of the head of a woman in Tuttle Street, Westminster. P. 101
80. A Corn of 2 inches long of the toe of one Sarney, a wheelwright of St. Aldate's parish in Oxon. [in 1655]. (Fig. by Plot, *N.H.*, pl. x, fig. 16.) P. 100

42. The Teat of a Witch. ⟨Edward Bate. E⟩
99. A Moor's ear cut off at the last engagement between Tangier and the Moors.
175. Two sceletons in Green Frames, the one of a Man, the other of a Woman that had 18 husbands. [From St. John's College Library, where they were seen by Evelyn, 1654 (who pronounced them 'finely cleansed and put together') and by Benthem, 1694.] P. 2
176. Artificial sceleton.[1]
178. Sceletons of a man and woman.
189. A sceleton according to the natural motion made up by Theophilus Poynter[2] with the skin taken from it, whereon is the hair and nails. ⟨in a curious Press. Sir Robert Viner, Ld. Mayor of London, 1683–4. E⟩
25. A Woman's skull, with the Suture called *Sutura sagittalis* continued quite to the Nose.
203. Skull of a man out of which there grew 5 horns. P. 4
204. An Irish skull with Moss upon it. ⟨Robert Whitehall, fellow of Merton. E⟩ P. 5
319. A piece of the skull of a man, who had his head cleft. [N.]
37. The Under-jaw of a Woman, with a large wen upon it. (p. 275.)
177. Arm of a man cutt off, and the man living afterwards. ⟨Charles Atkins, chirurgeon in Oxon, Aug. 1696. E⟩
(Right Arm of a Woman.) ⟨Dns. Richardus Dashwood, juvenis summae spei, Dni. Roberti Dashwood Eq. Aur. filius, ex amore erga rei medicae atque antiquariae studiosus, dono dedit, brachium dextrum feminae cujusdam elegantissimae, morte immatura praerepte in Italia erutum. Annos autem ccc ut fertur sepulta fuerat. Hearne's note in E⟩
315. Several bones of a Man, hung up on the South part.

[1] 1706. April 17. One of the sceletons in the Anatomy schoole was wired by one Wells, a smith in Cat Street; by which he became an eminent bone-setter and a good surgeon. *Hearne.*

[2] Poynter was an Oxford surgeon living in Cat Street. Wood's *Life and Times*, ii, p. 402.

376. The tibia or thigh-bone of a man who liv'd at Thame [lame severall years] growing perfectly together in the joynt. ⟨John Williams, sexton of Thame, 1709. E⟩
198. Two statues explaining the muscles. P. 3
301. Curious pictures of the muscles, representing the side part of a man. [Thomas Highlord, 1662.][1]
302. Another of the back part.
303. Another of the fore part.
341. The Descendent Artery being stony. ⟨Edward Bate. E⟩

This was doubtless the specimen belonging to the Oxford surgeon Pointer, and removed by him in the presence of Dr. Millington from an ancient person before 1676. Cf. Plot, p. 212.

⟨A Monster with a Bunch upon his Back (spoyled). Isaac Dudley, Glover in Oxon. Ao 1693. E⟩

374. Bladder of a Woman.
93. Stone weighing above a pound taken from one Skingley in Oxon. [being 10 in. round one way *ferè*, and fully 11 the other. *Plot*]. P. 102
94. Shape of a prodigious stone, taken as is said, from an old woman living near Oxon.
96. A stone taken out of a man's bladder [by Mr. Basil Wood] after he was dead, weighing 16 ounces. ⟨E⟩
97. A stone taken of the bladder of the same man alive by Mr. Wood. ⟨E⟩
98. The true shape of a stone taken from a Gentlewoman aged 57 years, and the woman very well after. The stone weighed 9 ounces and a half, Nov. 8, 1693. ⟨Basil Wood, chirurgeon in Oxon. E⟩

⟨A Stone taken out of ye Bladder of an old Woman at Kittering in Northamptonshire, being 70 years old. Thomas Burnham, Cityzen of Oxon. E⟩

108. A stone taken out of Sir William Gore's stomach, late Alderman of London and once Lord Mayor, living in Milk Street, London. P. 103
113. A stone taken from the Kidneys of a Woman.

⟨A Shilling swallowed by [ ] and after some dayes vented out again. Dr. Hody of Wadham College. E⟩

212. A Pigmy. [Seen by Bentham, 1694.]

MAMMALS.

90. Skull of a Monkey.
246. An Indian Batt. ⟨From Mauritian Islands. Mr. Tho. Herbert. E⟩

91, 325. White Mole.

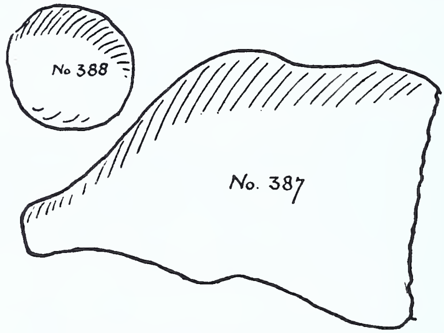
[1] It is assumed that these were the Tables of Muscles given by Highlord, but it must be remembered that in 1684 Highmore bequeathed his long tables to the Anatomy School, see p. 84.

166. ⟨A large⟩ Bear's foot from Greenland. ⟨Dr. Bathurst, Pres. of Trinity. E⟩
240. Skin of an Irish Wolf. ⟨Rob. Whitehall, fellow of Merton. E⟩ P. 12
202, 233. Jackall [Seen by Evelyn in 1654].
219. An intire dry'd Cat from Gloucestershire.
269. A dry'd Cat found in Hart Hall Buttery.
125. The skin of an American Catt. ⟨Ralph Harwood of Goreing, Berks. E⟩
⟨Sea Wolf. J. Gardiner, vintner in Greenwich. E⟩
⟨A Sea-Catt, or as others would have it a *Sea-Calf*, others a Seal. Mr. Anthony Howlet, poulterer in Oxon. E⟩
⟨An intire Sea-Horse's Head. Mr. Crisp. London. E⟩
172. Indian Cony. P. 14
101. Dried Mice.
116. White Mice. P. 15
4. White Ratt. ⟨Edw. Wrey at ye Sun Tavern at Kingston upon Thames. E⟩ P. 15
⟨A dryed Ratt. Mr. Crop of Xt. Church. E⟩
193. Sea-ratt. ⟨Dr. Favour. E⟩
251. A Beaver's Skin. ⟨Thomas Wells, gunsmith to ye Factory at Hudsons Bay.[1] E⟩
360. Stone of a Beaver.
239. Unicorn's Horn.
169. Rhinoceros's Horn. ⟨M. Hall, R. Jewkes, J. Vaughan, exors. to Mr. Selden. E⟩
324. Two very large balls taken out of the Stomach of a Horse belonging to the Earl of Abingdon. P. 104
380. A Monstrous Lamb, with one head and two intire bodies, given by Sr John D'Oyly, Feb. 2, 170$\frac{8}{9}$, being yearn'd in one of his grounds at Chislehampton near Oxford, anno 1707, being the year of the Union. ⟨E⟩
[Two ribs joined by intercostal ossification.] Plot, p. 191.
6. A Calf found dry'd in a very fatt cow, supposed to be in her 3 years [vide p. 50]. ⟨Nicholas Darrell Esq. of Kingscleer in Hampshire. E⟩ P. 16
19. Embryo vitulinus per triennium [uti visum est] in utero vaccae pinguissimae inclusus, et exinde eadem qua nunc est siccitate et duritie exsectus: Ex dono Nicolai Darrell armig. de Kings cleer in agro Hampton A.D. 1670.
12. Hair balls out of the stomachs of cows.
⟨A Hair-Ball taken out of ye Stomack of a very fatt Cow. Walter Horton Esq. of Catton in Darbyshire. E⟩
⟨A rugged Ball found in ye Stomack of a fat Cow. Rich. Cotterell. E⟩
387.[2] A stone, weighing about a pound and a half taken from the Maw of a Cow at Norton in Gloucestershire, and given by Mr. Mowe, Minister of that Place, Nov. 7th, 1709.

[1] Presented to the Anatomy School with a collection of ethnographical objects from Hudson's Bay.

[2] Nos. 387 and 388 are extracted from Hearne's own catalogue of the *Curiosities in the Anatomy School at Oxford*. MS. Rawl. B 399.

388. A stone taken from the bladder of a small Bitch in Yorkshire, given by Mr. Ibbetson, A.M., and Fellow of Oriel College.



HEARNE'S DRAWING OF STONES.
Reduced ½. From MS. Rawlinson B. 399.

183. An Indian Cow's Tail from Bantam in the East Indies. ⟨John Berkenhead, fellow of All Souls. E⟩
138. Antelope's Hornes. P. 112
⟨A pair of Indian Goat's Horns, called ye Antelop. Henry Box, London merchant. E⟩
160. Leg of an Elk. P. 111
165. Elk's Hoof. P. 111
194. Elk's Horn. ⟨Tho. Coles. E⟩ P. 111
38. Monstrous Pig. [With 2 Bodies and 8 Feet.] P. 10
17. Bristles taken out of the Stomach of a Hogg.
205. Tooth of an American Boar.
265. A very large Hog's bladder, brought from Abingdon.
347. A large tusk of an English Boar.
286. The Head of Hippo-potamus, or Behemoth.
162. Sea calf. ⟨Dr. Favour. E⟩
121. The Fin of a Dolphin.
226. A Dolphin's Head.
Sea-elephant. [10/- was paid for one in 1678.]
320. Another small tooth of a Grampus.
118. Vertebra of a Whale.
208. Neck-bone of a Whale.
314. Several pieces of Whale bone.
144, 222. Pizzell of a Whale. ⟨Charles Viner. E⟩
126. A young whale found in the river Severn below Gloucester.
[This, according to the Benefactor's Book, was presented by Will. Jordan, a Gloucester apothecary in 1672, but the item 15/- appears in the Library accounts for 1678, as having been paid for the carriage of the Severn whale from Lechlade.]
173. Armadilla. ⟨Dr. Favour. E⟩
" ⟨Dr. Croot. Dr. of Physick. E⟩
197. A very thick skin of a Sea-Beast.

210. Pizzle of a Sea-Dragon.
135. Sea-Horse. ⟨J. Gardiner, vintner in Greenwich. E⟩
229. Sea-Horse's Pizzell.

BIRDS.

129. The skeleton of an Ostrich. P. 20
132. Legg of an Estrich.
10. Halfpence and farthings with other Trash out of the Stomach of an Estrich. ⟨Mr. Gregory of Cucksam. E⟩
187. Estrich's Egg.
382. A Cormorant shott upon the River Cherwell in the year 1708. Given by Mr. *Buddard*, gardiner in Oxford. ⟨E⟩
43. A Cormorant. [? killed from St. Mary's Steeple in 1675. Plot, p. 178.]
295. A young Penguin.
273. Sea Pye.
259. A purse made of a Swan's foot. ⟨Thomas Wells, gunsmith, Hudsons Bay. E⟩
365. A purse made of the foot of a Soland Goose.
156. Pasche Fleminge.
225. A Stork's Head.
164. Crane's Bill.
33. Foot of a Turkey from America.
358. A large Cock's Spur.
102. A Cock's Egg.
103. An Egg found in another egg.
[? At Witney, 1674. Presented to Plot by the Rev. Mr. Hinton. Harvey had exhibited a similar specimen to Charles I. *Plot*, p. 180.]
⟨2 strange Egges, etc. Mr. Rich. Buckley at ye Bear Inn. E⟩
⟨A monstrous young Pullets Egg formed like a Snake. And
⟨A couple of Monstrous Eggs layd by one of his Pullets. Mr. Anthony Howlet, poulterer in Oxon. E⟩
⟨An Egge which he found in a game Turky's Egge. Mr. Rich. Walker, vintner in Oxon. E⟩
157. Dodoe's Head.
158. Couple of Dodoes.
[? Dodar-Birds, one of which watches whilst the other stoops down to drink. P. 26]
1. Avis diaboli, or Devil's Bird. [Taken at Paris. P. 24]
[A beautiful bird of exquisite blackness that bodes ill to Seamen. By some called the Black Bird of Paradise. Not of this Country. *Plot*, p. 176.]
⟨A bird call'd ye *Messenger*, by others a Willock (wasted). Mr. Anthony Howlet, poulterer in Oxon. E⟩
403. Magister Gerard è Coll. Wadham dono dedit Avem parvulam et minus vulgarem (quam *andmavent* vocant) ex Indiis ad rectam Martii 19° $17\frac{11}{12}$.
213. Indian Bird called Mackaw. [= the 'rarely coloured jackatoo, or prodigious large parrot'. Evelyn.]
209. Bill-Bird. P. 25
[The Pica Brasiliensis or Toucan, whose beak is near as big

as its whole body, found within two miles of Oxford in 1644. *Plot*, p. 178].

153. Bill of an Indian Pye.

134. Hopooe Bird [killed somewhere about Cassington by Mr. Painter of Woodstock. *Plot*, p. 177].

113. A Meevis Humming Bird. [Two humming birds were seen in the Anatomy School by Evelyn in 1654.] P. 23

280. A dry'd Swift. ⟨Tho. Payne. E⟩

276. An Indian Birds Nest curiously wrought, being of that sort which the Birds hang on the bough of a tree, to prevent the rapine of serpents, monkeys, etc., for which it has a very long neck.

52. Bird of Paradice. P. 22

155. Strange Bird taken in the River Severn.

REPTILES.

171. Crocodile. ['ex Nilo', seen by B, 1663.] P. 28

196. An American Crocodile. ['ex Jamaica', given by John Desborow, 1658.]

185. An Alligator.
⟨A little Crocodile. Dr. Favour. E⟩ ? the *Alligator*.

167, 207. Sea-Tortoise. P. 29

206. Land-Tortoise.

114. Young tortoises.

195. A⟨n American creature call'd⟩ Guiana. ⟨Richard Newlyn, fellow of Corpus Xti. E⟩

14. A Cameleon with its skin apart. ⟨Mr. Lloyd of Shoreditch near London. E⟩

148. Cameleon. ⟨John Gardiner, vintner in Greenwich. E⟩ P 64

29, 151, 243. A Lizzard.

214. Lizard brought from the Isle of Wight.

30. A Basilisk.

82. A Lizards tongue out of the West Indies.

143. Skin of a Rattlesnake.

211, 215. Rattlesnake.

81. Rattle of a Rattlesnake. [Living Rattlesnakes were seen in London by Evelyn 19 Oct. 1657.]

85. Teeth of a Rattlesnake.

83. A Lerna, or Water-Serpent from Jamaica.

161. African Serpent.

184. An Indian Snake 10 foot long. ⟨Dr. Favour. E⟩
⟨Skin of an Indian Snake. Charles Viner. E⟩

34. Salamander. [Robert Southwell 1657.] P. 59.

11, 292. An Artificial Tortoise. ⟨Mr. Gregory of Cucksam. E⟩

FISHES.

137. Sturgeon. ⟨taken upon ye Irish coast. Dr. Nicholas of Winchester Coll. E⟩ P. 37

340. A large piece of Icing-glass.

146. The Jaws of a Shark. ⟨Charles Viner. E⟩
231. A Shark intire.
309. Pastinaca marina Rondeleti, i.e. Ray Fish, Fork Fish or Puffen.
244. Saw fish. P. 38
245. Snout of a larger ditto. ⟨Carew Raleigh Esq. E⟩
13. Moon-Fish or Lump-Fish. ⟨Robt. Halsen, apothecary in Chichester 1674. E⟩
142. Sea-Toad. ⟨John Gardiner, vintner in Greenwich. E⟩ P. 41
⟨A Toad Fish. Fr. Willis, junr. E⟩
46. Horns which grew out of the snout of a Fish call'd ye Unicorn Fish.
149, 186. Flying Fish. ⟨from ye Atlantick Ocean. Henry Hawley of Oriel. E⟩ P. 39
154. Swallow Fish. P. 43
150. Snail Fish.
188. A large Puck fish. ⟨weighing 2 ounces and half. Tho. Hunsdon. E⟩
234. A Cony-fish.
236, 323. A Porcupine-fish.
237. A Cunny fish. [With horns.] P. 44
321. A large Globe Fish.
322. A lesser Globe Fish.
336. A small Sword Fish. P. 40
332. A File Fish.
333. Myny Piscis Rondeletii.
386. The Razor Fish.
266. Gloves made of a Lamprey's Skin. ⟨Thos. Lockey, D.D. E⟩
67. Stones taken out of old Cod's heads, good for the Stone.
⟨Stone taken out of ye Brain of Fish. Fr. Willis, junr. E⟩
86. Capps of a Sea Fish.
⟨Eel caught in Port-mead stream, representing a flameing Sword. Charles Harris, steward of Linc. Coll. July 22, 1690. E⟩

SHELLS.

130. A Fish called the Polypus.
57. Testa Nautili.
58. Strombus magnus.
59. Murex aculeatus.
60. Buccina.
61. Concha Venerea.
63. Turbines.
64. Knife-Fish [? = Solen legumen].
386. The Razour-Fish.
293. Shells of a Fish call'd the Sailer. ⟨Mr. Geddes, fellow of Balliol. E⟩
88. West India money made of shells.
105, 141, 174, 201, 228, 238. Several sorts of sea-shells.
199. Shell fish out of the Red Sea.
⟨A long Oyster. Mr. Anthony Howlet, poulterer in Oxon. E⟩
405. A very great Oyster shell. . . . T.H[earne] d.d. (*c.* 1712.)
31. *Concha Indica*, or Mother of Pearl.

44. Pinna marina.
53. A Trunk curiously adorned with shells.
62. Balani Gygantis.

CRABS and INSECTS

163. Sea-crabb.
227. A King's Crabb from the Island of Molucca.
316. An unusual Crabb.
⟨A Hive and Honey-comb built by ye Bees themselves in his backside. Mr. Violet Esq^{re} Bedle. E⟩
120. Mastick flyes, which spoyl the Mastick Trees etc.
66. Gryllotalpa Johnstoni, ex locustarum seu cicidarum speciebus, Anglos Fen-Cricket, Evechurre, Churrworm.

ECHINODERMS, CORALS, WORMS

107. Sea-eggs.
159. Star Fish out of the Indian Ocean.
139. Sea-Hedge-Hog. ⟨John Gardiner, vintner in Greenwich. E⟩ P. 32
212. ,, ,, ⟨Charles Viner. E⟩
⟨Several Echinus's out of Scotland and divers shells. John Urry, Student of Ch. Ch. 1710. E⟩
230. Sea-Hogg's-Head. P. 34
147. White Coral. ['ex Mare Rubro', seen by Fontaine, 1631.]
51. Several sorts of Coral.
136. Piece of Coral or Sea Fan.
223. Coral leaf or Sea Fan. ⟨Mich. Brooks. E⟩
92. A Worm above 3 yards long, voided by White, a Butcher at Woodstock, May 7, 1663.

PLANTS

5. Rose of the Valley of Jehosaphat, which will open of its own accord. ⟨Mr. John Davis of Deptford, Ao. 1660. E⟩
270. A Gourd ⟨from Nievis⟩ which will hold 30 quarts. ⟨Mr. Parkhurst, fellow of Corpus Xti. E⟩
109. Part of the Royal Oak. ⟨Wm. Prince, manciple of St. Edm. Hall. E⟩
A Salver made out of ye Oak in which K. Ch. II concealed himself from the Rebells; with an inscription on silver at ye charge of Sir Andrew Fountaine. Given by Mrs. Laetitia Lane. E⟩
⟨A Tobacco-stopper, made out of an Oake, that lately stood in St. James's Park, but was destroyed by the Duke of Marlborough for building his house at St. James's. The said oak came from an acorn planted there by K. Charles the second, being one of those Acorns that he gathered from the famous

Royal Oak when he was preserved in it from the fury of the Rebells in his defeat by them at Worcester. Given by the Rev. M. Gandy of Oriel College Feb. 13 1712/13. E⟩

69. A cup made out of the Walnutt Tree that was used to black K Charles ye 2ds Hands and face with, when he was disguised by Colonel Lane of Bentley in Staffordshire in order to make his escape out of England, ⟨and tipped with silver by Sir Andrew Fountaine, student of Christ Church⟩, given by Mrs. Laetitia Lane, daughter to the Collonell.

21. A ring in a solid block of wood, not known how it came in.

277. A Piece of wood with several holes, made so as if there had formerly been pith in them.

298. A very crooked piece of Willow, the body also grew extraordinary broad.

299. Another piece of wood, either Alder or Walnutt, one part grown very crooked so that the whole resembles a fiddlestick.

70. Pear stone.

71. Apple-Stone.

282. Bean Stone.

283. Plum Stone.

3. Candles made of Myrtle Berries. ⟨Fr. Willis, son of F. Willis, the Virginia merchant. E⟩

⟨A Virginia Candle made of Mirtle Berries. Mr. Crop of Xt. Church. E⟩

128. A Branch of the Palm Tree. P. 97

235. A Coco-nutt.

287. Bark of the Coco-Tree.

279. An Indian Bag made out of the rind of the Coco-nutt and the bark of the Coco-Tree.

131, 232. Indian Cane or Bamboo. P. 77

310. Root of Corn containing at least 50 stalks.

385. Indian Beatle-Nutts. The Indians cutt them in small pieces and then eat them with the leaves. These three last given by Captn Rawlings June 18, 1709 ⟨E⟩

2. A Radish Root in shape of a hand. ⟨William Chetle. E⟩

192. Cassava Root.

200. Cassia.

271. An Indian Cabbage Stalk.

281. An extraordinary Bunch of Nutts.

291. A Prussia shoe, made of the bark of a Tree. ⟨John Crabbe, follow of Exeter. E⟩

⟨A Purse made of ye bark of a Tree. Tho. Richardson⟩

⟨A little Tree as grew on a Fish his head. Wm Stanley of Southampton. E⟩

⟨A branch of a Cotton Tree, with the Cotton growing thereon. Fr. Willis, son of F.W. the Virginia merchant. E⟩

28. Very strange stuff, with which meadows were cover'd after wett years. Country people made carpets and cup-board coverings of it.

119. A Sea-spurge, hollow withinside like a cane.

FOSSILS and MINERALS

23. Petrifyed Bone.
40. Two monstrous teeth found as they were digging in a ground of Dr. Humf. Hyde near Kingston Lisle in Berks.
170. Thigh-bone of a Gyant [came from London, 3^{ft} 2^{in} long. *Plot*, p. 135; in 1675 Vice-Chancellor's accounts].
84. Back bone of a fish turn'd into a Copperass Stone. ⟨Mr. Charles Crisp, London. E⟩
9. A Cockle-shell in shape of a screw found in digging a well near Stanton Quintin in Wilts. ⟨Mr. Green of Ch. Church. E⟩
26. A Land Oyster.
51. Stones in Shape of a Hony-comb. ⟨John King. E⟩
68, 152, 191, 326, 327. Brain-stone.
122. A petrified Nut-meg. ⟨Mrs. Garrett of Oxon. E⟩
22, 133, 328, 329, 345. Petrifyed Wood.
36. Stone in shape of a Foot.
356. A Cucumer Stone.
357. A Snail Stone.
294, 306. Petrified Moss. ⟨Dr. Hody of Wadham College. E⟩
288. *Haematites*, or bloud stone.
65. Alumen Plumosum or Amianthum, Earth Flax or Salamander's Wool Hair: Found in Wales in the remotest parts of Anglesey, near Llanfarthâ, not far from Holy Head, in a rocky place near the sea side, where there is more of the same. 'Tis hard by a place call'd Manach dû, i. e. Monk's House, which was formerly a Monastery. The inhabitants call it Salamanders Wool.
278. *Alumen plumosum*, brought from the Indies. [Given by Aaron Goodyear 1681.]
117. A stone which will swim.

⟨A Stone found in a Well near Bostall. Mr. Cole, Innkeeper at ye Bear. E⟩

⟨Petrified Wood which swims. Mr. Harrison Apothecary in Oxon. E⟩

'Cornu ammonis cristatum J. Bauhin' of over 8^{in} in diameter, taken up somewhere about Corpus Christi College. *Plot*, p. 110.

In August 1710 Uffenbach again took stock of the University Collections,[1] and after noting that the Oxford

[1] As it occurred to me that many of the additions to the University Collection might have been derived from the Musaeum Tradescantianum, I carefully compared the catalogues of the two collections and came to the conclusion that at that date there was no evidence that any specimens had been transferred from one collection to the other. Moreover, a large proportion of the specimens in the Anatomy School had a local interest.

Anatomy School or Auditorium would not bear comparison with the anatomical theatre at Leyden, considered the following specimens as worthy of special mention.

A horrible big head or cranium with great long teeth, of a Hippopotamus. [Hearne's Cat. No. 286.

An extraordinary misbirth of a calf, which had been carried by the cow for many years and had then come to the light, dead and monstrous. [Hearne's Cat. No. 6.

Two small worm-eaten loaves of the time of the Siege of Oxford.

Indian and other garments, some from Davis Straits. Cf. Benthem.

Large calculi of men and animals, including the one mentioned by Borrichius. It was said to weigh 2 lb., but is not as large as a child's head. It was taken out of a woman of Woodstock after her death. [? Hearne's Cat. No. 94.


Fig. 1

The large corn or Clavus, mentioned by Benthem, p. 327. It was probably a large nail. (Fig. 1, cf. *Plot.*) [Hearne's Cat. No. 80.

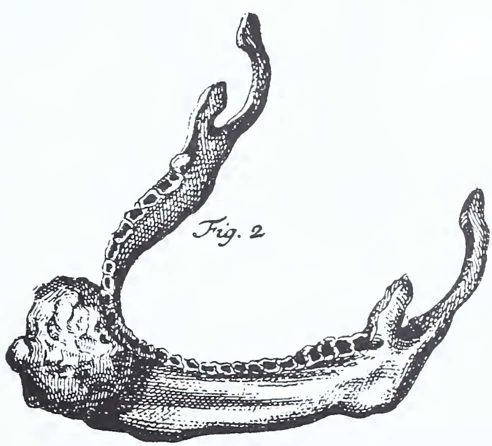


Fig. 2

Lower jaw of a woman, with a great swelling as big as a Welsh nut. She is said to have suffered severe toothache. (Fig. 2.) [Hearne's Cat. No. 37.

Hollow stick, filled with quicksilver. (Fig. 3.)
A petrified skull, more encrusted than the one at Cambridge.
[? Hearne's Cat. No. 204.

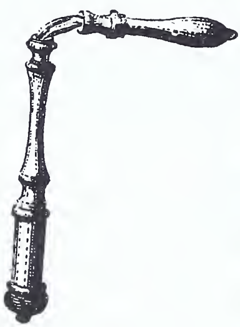


Fig. 3

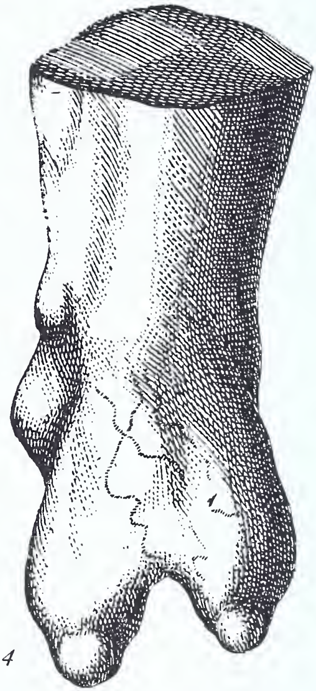


Fig. 4

A plaster cast of a human foot with two knobs instead of toes. Young Thomas Hearne is such an ignoramus that he shows it as a real foot. (Fig. 4.) [? Hearne's Cat. No. 104.

Skeleton of a Pygmy (Benthem, p. 327): teeth are quite white and pointed. It is considered to be the skeleton of a monkey. It is not an ell high. Cf. Tyson, *Orang*. The librarian maintains it to be an old male, because its dentition is complete. 'Credat Judaeus Apella.'

A small Whale said to have been caught in the river at Gloucester. [No. 126.

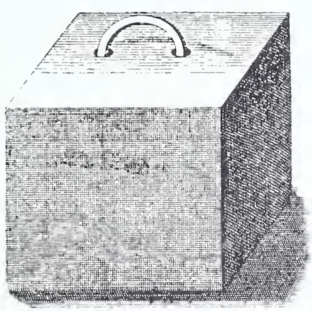
A frightful large Indian Bat, over an ell broad across the outstretched wings. [No. 246.

A monstrous Lamb with two bodies, eight feet, four ears, but one head. [No. 380.

An unheard-of large bone, said to have been found in the ground under St. Paul's Cathedral in London. Benthem is not right in describing it as the hip-bone of a Kühnen. It is a femur, 3½ spans long, and nearly 2 spans thick. [No. 170.

Urn found at Sittingbourne in Kent. [No. 27.

Sword with which James I knighted Sir Loin.
Bernard's Map of China. [Described by Craster in *Bodl. Quart. Rec.* ii.]
Bladder of a Man, a German ell long, and capable of holding 4 maas.
Fuller's Paintings of Muscles. [Nos. 301-3.
Skeleton and stuffed Skin of a Woman who had eighteen husbands, and, because she killed four of them, was hung. The skin may justly be called well-tanned leather. Benthem mentions the skeleton being in St. Johns in his time, but he errs when he speaks of seventeen husbands: there were eighteen.[1] [Nos. 175, 180.
Benthem's 'Stuffed Moor' is an amusing mistake for a Mummy which he saw here. It just shows what mistakes are possible, when things are only looked at superficially.
A large petrified *Fungum marinum*.
Two large Spanish Reeds, or rather *arundines* or *cannas*, grown in India. One was as thick as an arm, the other somewhat thinner, but much longer than the whole room, about 30 feet. It hangs obliquely against the wall. [Nos. 131, 232.
The Hand of a supposed Siren, dried. It is about half the length of a man's hand, and is quite like one . . . [No. 45.
Joseph's Coat. (Cf. Monconys.) . . .
[An Indian King's Coat, commonly called Joseph's Coat. Presented by Mr. Betts, a Londoner. *List* E.]



Cube of Wood and Ring. [No. 21.
Two large Crocodiles, mentioned by Borrichius. [Nos. 171, 196.
A Fine Cranium, overgrown with moss. (Benthem.) [No. 204.
Cranium humanum with the *quatuor tuberculis*, just as Benthem has it. [No. 203.

'On the whole things are in great disorder, full of dust and soot. There are also many things that ought not to be in an Anatomy, but rather in an Art Collection than

[1] Cf. p. 336.

in the Ashmolean Museum. When a lecture is given in Anatomy, it is not given here, but in one of the other Schools (i.e. in the Bodleian); presumably that none of the specimens may get injured, as might possibly happen.'

On July 22, 1712, Hearne was allowed a key to the Anatomy School, but without a continuance of his earlier privilege of pocketing the fees paid by visitors. On February 20, 1712-13, Mr. Keil, the Savilian Professor of Geometry, brought a visitor to see the Library, a Mr. Mollineux. Hearne showed the Anatomy School, which contained a calf which, being born in the year of the Union, 1707, had (it is to be presumed in consequence thereof) two bodies and one head. Unfortunately, Hearne also exhibited a portrait of the Pretender, which led to his being reported to the Vice-Chancellor and being deprived of the key of the Anatomy School with the amenities appertaining thereto.

Naturally Hearne regarded all subsequent transactions relating to the Anatomy School with a jaundiced eye, but doubtless, when he left, the old School was much neglected. He records in his *Diary*, '1715 Good Friday. The Anatomy School used to be swept this day; they began about eight and had not done untill 4 or 5 in the afternoon. But now the Library only below stairs was swept over, and that very slightly, and all things were left in a bad condition, to my very great concern.',

An inventory of some of the Rarities in the Anatomy School was again taken by John Pointer of Merton College and printed in his *Oxoniensis Academia* in 1749, but unfortunately, though stating that they were kept separate, he mixed them up with the rarities in the Ashmolean Museum. In his combined list he enumerates 124 items, some of which have already been indicated by the letter P. in the lists on pp. 264 to 273. The items are classified under the headings 'Relating to Men', Nos. 1-6; Beasts, 7-19; Birds, 20-26; Fish, 27-44; Precious Stones, 45-58; Things preserv'd in Spirits of Wine, 59-66; Indian Things, 67-80; Other Foreign Curiosities, 81-97; Natural Curiosities, 98-113; Artificial Rarities, 114-124.

The 'Things preserv'd in Spirits of Wine' are:

59. Salamander.	63. Flying Lizards.
60. Scorpion.	64. Chameleon.
61. East-Indian Spider.	65. Human Foetus.
62. China Butterfly.	66. Tea Plant, and other plants.

They are more likely to have been in the Museum than in the Anatomy School.

The Anatomy School is now attached to the Bodleian Library under the name of the 'Auctarium'.

We may here append

A List of Objects, possibly from the Anatomy School, which are now kept in the Bodleian Library.

A pair of horn spectacles. Square label 10.	Seal Case, Drawer 51.
Gyropium sanctae Catharinae osseum . . . sacratum. (= Sacred cotton-wool in which a bone of St. C. was wrapped.)	,, ,,
The slough of the locust.	In box labelled Nat. Hist. in Charter Case.
Cement of the Pyramids.	,, ,,
Part of the bricks of which the Pyramid near Satara was built.	,, ,,
An iron padlock. Square label (1) 5.	Seal Case, Drawer 52.
'A Turkey lock and key. With this kind are ye castles, ye Psilons and Joseph's Granaries secured.' Square label 13.	,, ,,
'Piece of ye Ilex (?)' (= a bowl of a Roman bronze spoon).	,, ,,

IX

THE ASHMOLEAN MUSEUM

The Tradescants and their Collections.

The nucleus of the Ashmolean Collection of Objects of Natural History consisted of the varied and celebrated rarities which were collected by the Tradescants, father and son, and exhibited to visitors to the botanical garden at South Lambeth, being known by the name of Tradescant's Ark.[1] The elder John Tradescant, who died in 1637, had travelled through Europe to Russia and had collected in Barbary and in several of the Mediterranean Islands. His Ark had also been considerably enriched by donations from other travellers and from his many visitors of rank, a list of whom is printed at the end of the Museum Catalogue published in 1656.

John Tradescant (? 1587–1638)

The Tradescants probably came of an East Anglian stock, and were not of Dutch extraction, as has been frequently stated, for they appear to have had blood relations at Walberswick in Suffolk, and Tredeskin or Tradeskin was a well-known name in certain villages in the eastern counties.[2] We first hear of John Tradescant, senior, in June 1607, when he married at Meopham in Kent, where his son John was baptized in the following August.[3] In 1611, as gardener to Lord Salisbury, he purchased flowers and fruit-trees of Dutch and French growers for stocking Hatfield,[4] but he probably did not stay long enough to see them bear, for Lord Salisbury

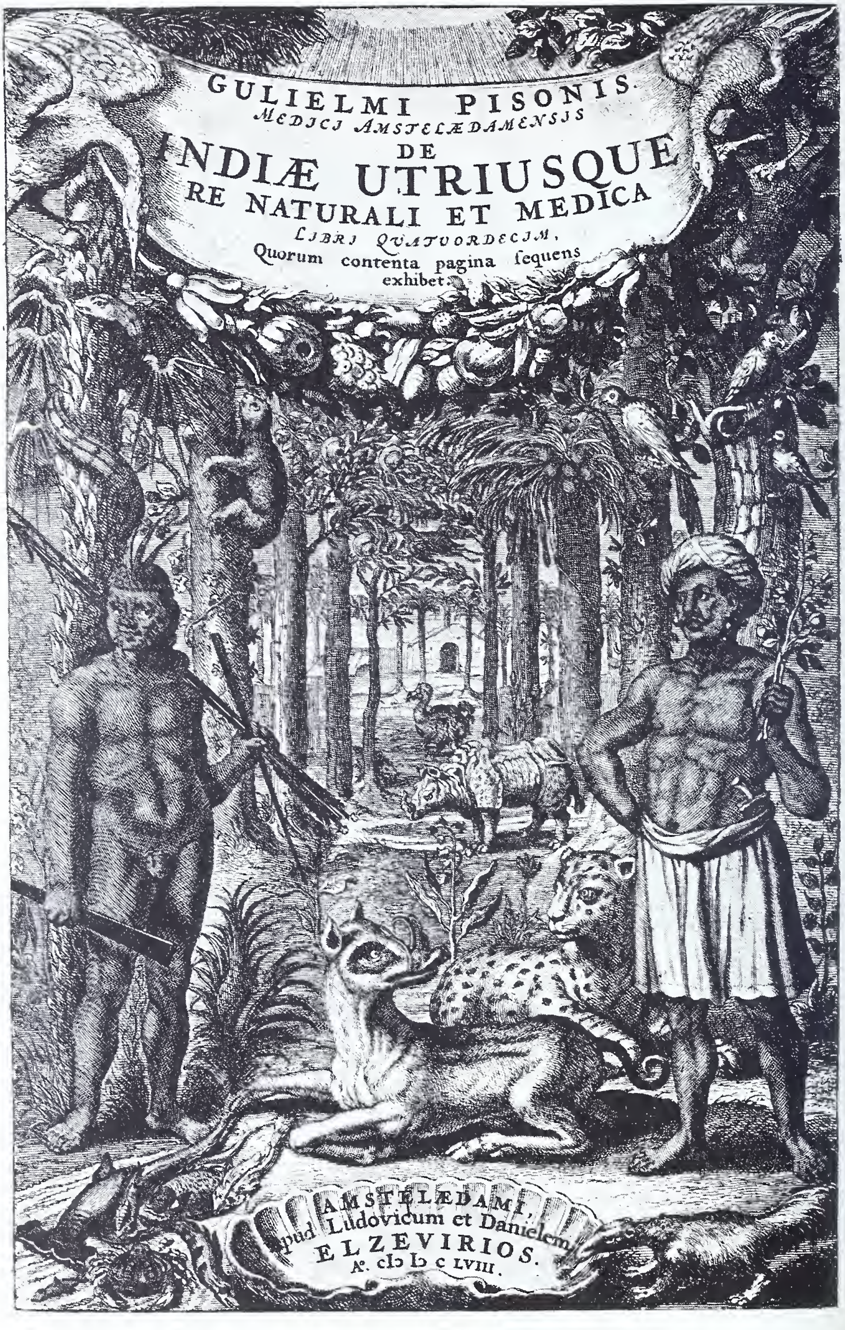
[1] *Arca* was the name given to the cabinet that contained Kentmann's 'Thesaurus fossilium' in 1565.

[2] *Notes and Queries*, Ser. i. v, 367; vi, 198; v, 474.

[3] *N. & Q.*, Ser. i. v, 266; Ser. iv. vii, 284.

[4] Gunther, *Early British Botanists*, 1922.

JOHN TRADESCANT THE ELDER



THE WEALTH OF TROPICAL LIFE IN 1658
which Tradescant's Museum served to illustrate in England
After Piso

died in 1612. In 1618 he accompanied Sir Dudley Digges, the grandson of Leonard Digges, of University College, on a 'voiag of ambasad' by sea round the North Cape to Archangel, where he gathered a number of interesting plants, thus making the first contribution to our knowledge of the Russian flora. On July 20, he had 'one of the Emporer's boats to cari him from Iland to Iland to see what things growe upon them'. He collected on Rose Island, then the emporium for Russian foreign trade, and in after years the spot chosen by Peter the Great for building and launching his first ship. Tradescant made notes on a large white fish which came after salmon (probably *Delphinus leucas*) and on several birds including '10 fesants, 6 pattridges, non like the Inglish', and a blackcock. He brought home three skins of *Linaria minor*, and the head of a Northern Diver which, years after, was 'discovered' by Hamel in the 'so-called Ashmolean Museum'. One of his shipmates, Nelson, pointed out to him 'Balaenarum tyrranus', the thrasher, *Delphinus orca*, pursuing a whale. In their dealings with the Russians, Tradescant and his party doubtless followed the prescription that Logan had found useful in 1611. 'Wee made much of them, and feasted them with our aqua vitae, biscuit, and figs, that we might the better obtayne their love.' They left Archangel on August 5 and reached St. Katherine's Docks on September 22.

Two years later he took advantage of Sir Samuel Argall's expedition against the Corsairs of Algiers to visit Formentera in the Balearic Islands and to introduce the Algerian apricot into English gardens.

But this and his other horticultural triumphs have been summarized elsewhere, and as the recently discovered unique copy of the catalogue of plants grown by him in 1634 in his garden at South Lambeth has been published,[1] it is unnecessary to enlarge further on that side of his activities. It is more relevant to our present purpose to note that on returning from the Mediterranean he appears to have taken service first with Lord Wotton at Canterbury and then with the Duke of Buckingham as gardener. While acting in the latter capacity he was encouraged to collect foreign

[1] Gunther, *Early British Botanists*, 1922.

rarities for the Duke, for in 1625 he wrote to a correspondent in Virginia that it was the Duke's wish that he should 'deal with all merchants from all places, but especially from Virginia, Bermudas, Newfoundland, Guinea, Binney, the Amazon, and the East Indies, for all manner of rare beasts, fowls and birds, shells, furs, and stones'.

This association of Tradescant with the Duke of Buckingham, of a born collector, 'a painful industrial searcher and lover of all nature's varieties', with a sympathetic and wealthy patron, was an event of far-reaching importance. Their alliance resulted in the establishment of the first Museum of Natural History in London, which was to become the first public Natural History Museum in Oxford, the exemplar of all others in England, and eventually that of the British Museum.

In 1627 he accompanied the Duke's ill-starred expedition to the Island of Rhé, apparently in the capacity of a collector of objects of natural history, and came home with the 'greatest Sea Stocke Gilloflower' (*Matthiola sinuata*). In the following year the Duke was assassinated, and Tradescant entered the service of James I and of his Queen. It seems likely that he at this time planted his garden and established his Museum at South Lambeth, endeavouring to fill both with all that was best and rarest 'he can hear of in any place in Christendom, Turkey, yea, or the whole world'.

The house popularly known as Tradescant's Ark was situated on the east side of the South Lambeth Road, nearly opposite what was called Spring Lane. The garden was well established by 1629. Lists of accessions for 1629-33, entered by Tradescant at the end of his copy of Parkinson's *Paradisus*, show that he was keeping up a correspondence with other well-known gardeners in 'forrin partes', including Sir Peter Wyche at Constantinople. He would have added to his Museum at the same time. In November 1632 Tradescant was at court making some inquiries about unicorns' horns which proved to be merely 'the snout of a fish, yet very precious against poison'.[1]

In 1634 he printed the Catalogue of his Garden and in the same year we meet with the first account of his

[1] *Court and Times of Charles I*, 1848, ii, 189, 504.

other collections, which must by then have become very considerable, in the journal of Peter Mundy,[1] a member of the East India Company on leave. 'I was invited', he writes in 1634, 'by Mr. Thomas Barlowe . . . to view some rarieties att John Tredescans, soe went with him and one freind more, where wee spent that whole day in peruseing, and that superficially such as hee had gathered together. . . .'

The next news of the collection comes from the Diary of Georg Christoph Stirn of Nurnberg.[2] It is important because it indicates that Tradescant's book was in use in July 1638. Stirn left Dieppe for England on July 2. In London he visited the Tower, where he was shown a fine horn of a unicorn, some couples of lions, a leopard, a lynx, an eagle, and a very large snake skin. He also saw some boars in the garden hard by York House, and an ostrich in the palace of the Prince of Wales.

'In the museum of Mr. John Tradescant are the following things: first in the courtyard there lie two ribs of a whale, also a very ingenious little boat of bark; then in the garden all kinds of foreign plants, which are to be found [enumerated] in a special little book which Mr. Tradescant has had printed about them. In the museum itself we saw a salamander, a chameleon, a pelican, a remora, a lanhado[3] from Africa, a white partridge, a goose which has grown in Scotland on a tree, a flying squirrel, another squirrel like a fish, all kinds of bright coloured birds from India, a number of things changed into stone, amongst others a piece of human flesh on a bone, gourds, olives, a piece of wood, an ape's head, a cheese etc.; all kinds of shells, the hand of a mermaid, the hand of a mummy, a very natural wax hand under glass, all kinds of precious stones, coins, a picture wrought in feathers, a small piece of wood from the cross of Christ, pictures in perspective of Henry IV and Louis XIII of France, who are shown, as in nature, on a polished steel mirror when this is held against the middle of the picture, a little box in which a landscape is seen in perspective, pictures from the church of S. Sophia in Constantinople copied by a Jew into a book,

[1] MS. Rawlinson, A 315, printed by the Hakluyt Society, 1920.
[2] MS. Bodley, Add. B 67.
[3] *Mus. Trad.*, p. 6, lanhado is mentioned amongst snakes.

two cups of "rinocerode", a cup of an E. Indian alcedo which is a kind of unicorn,[1] many Turkish and other foreign shoes and boots, a sea parrot, a toad-fish, an elk's hoof with three claws, a bat as large as a pigeon, a human bone weighing 42 lbs, Indian arrows, an elephant's head, a tiger's head, poisoned arrows such as are used by the executioners in the West Indies—when a man is condemned to death, they lay open his back with them and he dies of it—an instrument used by the Jews in circumcision (with picture), some very light wood from Africa, the robe of the King of Virginia, a few goblets of agate, a girdle such as the Turks wear in Jerusalem, the passion of Christ carved very daintily on a plumstone, a large magnet stone, a S. Francis in wax under glass, as also a S. Jerome, the Pater Noster of Pope Gregory XV, pipes from the East and West Indies, a stone found in the West Indies in the water, whereon are graven Jesus, Mary and Joseph, a beautiful present from the Duke of Buckingham, which was of gold and diamonds affixed to a feather by which the four elements were signified, Isidor's MS of *de natura hominis*, a scourge with which Charles V is said to have scourged himself, a hat band of snake bones.'

By a will dated 8 Jan. 1637 and proved 2 May 1638 he left his collections to his son with the proviso that if he desired to part with them, the 'cabinet of rarities' should be offered to 'the Prince'.[2]

John Tradescant, junior, was born at Meopham in Kent in 1608; and died in 1662. In 1637 he was engaged in a trading or collecting expedition to Virginia, procuring new varieties of plants, animals, and anthropological objects for the Museum at Lambeth. He would appear to have returned home before his father's death, and from now onwards we meet with more frequent references to the Museum by travellers and others. On September 17, 1657, Evelyn went 'To see Sir R. Needham, at Lambeth; and thence to John Tradescant's Museum, in which the chiefest rarities were, in my opinion, the

[1] *Mus. Trad.*, p. 53, gives *Albado* horn with Unicorn horn and Rinoceros horn.

[2] *N. & Q.*, Ser. I. vii, 295. His will (P.C.C. 65 Lee) has been abstracted by Mrs. Poole in an article on the De Critz Family, *Walpole Society*, 1912–13.

ancient Roman, Indian and other nations' armour, shields, and weapons; some habits of curiously-coloured and wrought feathers, one from the phenix wing, as tradition goes'.

Herrick alludes in *Hesperides* to 'Tradescant's curious shells'; and another poet writes:

> Thus John Tradeskin starves our greedy eyes
> By boxing up his new found Rarities.[1]

We have no early representation of the interior of Tradescant's Ark, and must fall back upon engravings of contemporary museums. We suppose that Tradescant would have paid due regard to the prominent placing of curiosities that would attract the interest of the general, rather than that of the learned, public. This practice was defended by as modern an authority as John Henry Parker when curator of the Ashmolean Museum. He argued that curiosities 'attract people, and when they are brought hither by curiosity they may stop to learn something better'.[2] Even to-day the utility of such ground-bait is illustrated by the exhibition of curios like Guy Fawkes's Lantern in the new Ashmolean Museum. At the same time we must give Tradescant the credit of having grasped the elementary idea of arranging his specimens as they should be arranged in a museum of Comparative Ethnography or of Comparative Anatomy. This is shown by his Catalogue. The entries 'Sixteen severall strange beaks of Birds', 'Twenty severall sorts of clawes of other strange birds, not found described by Authors', and other entries show Tradescant in the light of a pioneer curator of an Anatomical Museum on the lines which were afterwards followed with such signal success by John Hunter. The collection was of service to the scientific zoologists of the day. Willoughby,[3] for instance, worked through the birds and described some of the rarer species, e.g. the Dodo, the Indian Mockbird (*Caeruleus Indicus*), and the Brazilian Merula of Aldrovandus.

We do not suppose that Tradescant went quite as far

[1] T. Flatman, *Poems*. Verses to Mr. S. Austin of Wadham College. Edit. 1674, 89.
[2] Parker, *The Ashmolean Museum*, 1871.
[3] Willoughby, *Ornithology*, 1678.

as the Dresden curators of a rather later date, who interwove skeletons with branches of trees so as to form vistas in their museum. He would probably have taken the University Museum of Leyden as his model,—which indeed it was for the Repository of the Royal Society, 'a theatrical building resembling that of Leyden in Holland. . . . The rarities are put up into boxes as abroad; and the beasts and birds hanging round the room.'[1] The central idea was doubtless derived from the arrangement of the apothecaries' shops of the seventeenth century.

> Here *Mummies* lay most reverently stale,
> And there the Tortoise hung her Coat o' Mail;
> Not far from some huge *Shark's* devouring Head
> The Flying-Fish their finny Pinions spread.
>
> Garth, *Dispensatory*, 1726.

In illustration we figure the view of the interiors of the Museum of Ole Worm as it was in 1655, and of Imperato of Naples, 1599-1670.

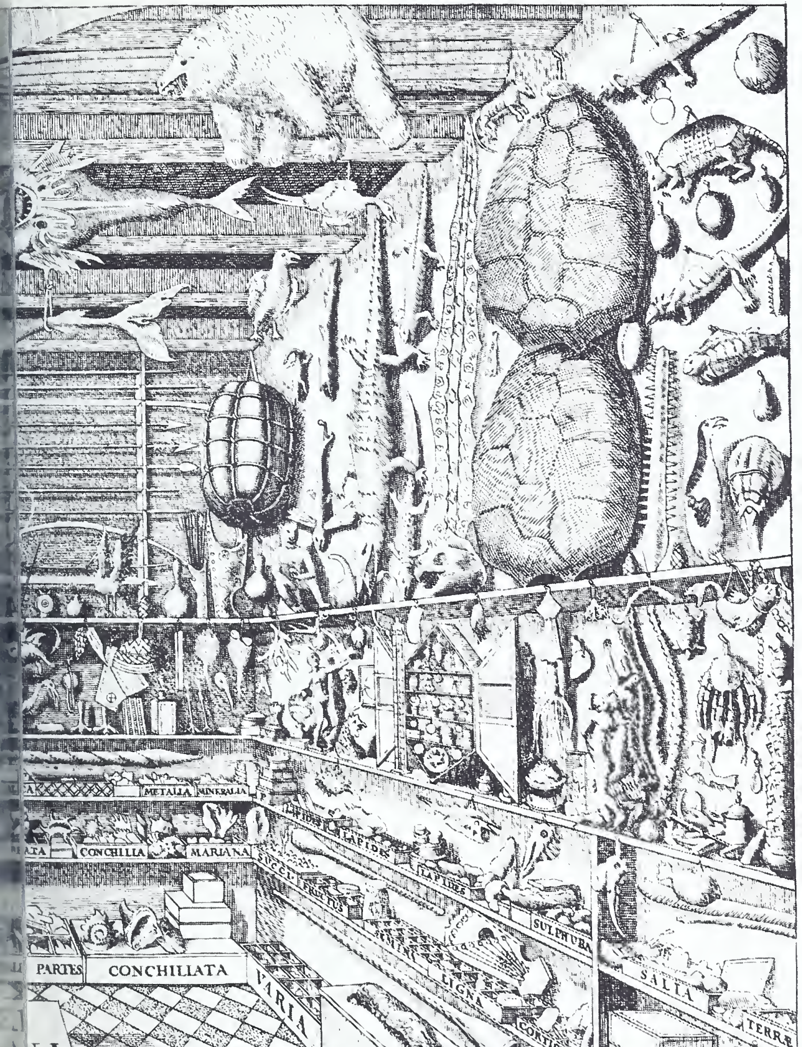
In 1648 Tradescant was paid £40 for laying out grounds at Oatlands Park.

Soon after 1650 Ashmole began to visit the Museum and to ingratiate himself with its owner. At that time Ashmole was thirty-three years of age, and nine years younger than Tradescant. He had recently married his second wife, and had just published his first book, the *Fasciculus Chemicus* 1650, a translation of a work written by Arthur Dee in Moscow and printed at Basel in 1629. He was a man of fashion, of insinuating address, whose repeated and appreciative visits were very much to Tradescant's liking; and Mrs. Ashmole, who had already had three husbands,[2] resided at the Tradescants' from 20 November 1652 until 17 January 1653. On the 14th of December 1652 they observed the comet. We see that Ashmole succeeded in making himself important in the eyes of Tradescant, probably by boasting of his astrological and alchemical knowledge.

[1] J. Macky, *Journey* [in 1714], 1722.

[2] This much-married lady, in an attempt to get rid of Ashmole in 1657, filled no less than 800 folios of paper with strong complaints against him. She died in 1668, and Ashmole married for the third time, the daughter of his friend Sir William Dugdale.

OLE WORM'S MU UM



N LYDEN, 1588–1655

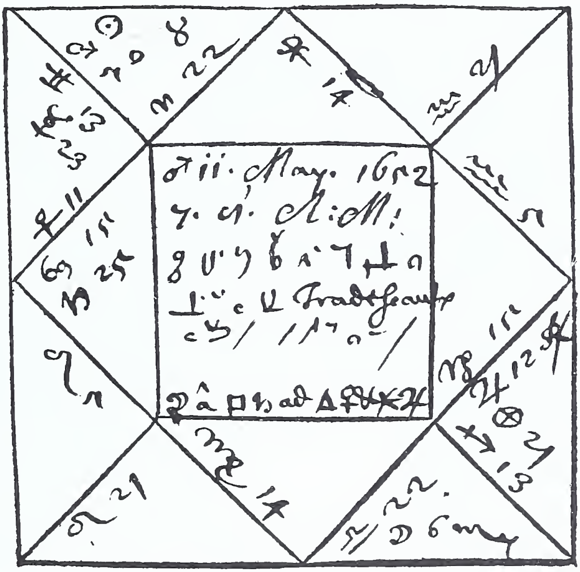
IMPERATO'S MSEU

From the plate in the ene

IN APLES, 16—
edi n of his book in 1672

We know that he cast Tradescant's horoscope, *cf.* MS. Ashm. 374.

Ashmole was likewise of great use to Tradescant at the beginning of their acquaintance. He made out the catalogue of the Museum[1] in common with Dr. Thomas Wharton (b. 1614), for whom he then busied himself in finding out a good wife by astrological calculations; and



TRADESCANT'S HOROSCOPE AS CAST BY ASHMOLE.

Tradescant acknowledged help from both friends in the preface to his book. When Tradescant's only son died, in 1652, as he had no hopes of children by his second wife Hester, he confided an intention which Ashmole noted in his diary on 12th December, 1659: 'Mr. Tradescant and his wife told me they had been long considering upon whom to bestow their Closet of Curiosities when they died, and at last had resolved to give it unto me.' On the afternoon of December 14 'they gave their Scrivener Instructions to draw a Deed of Gift

[1] *Musaeum Tradescantianum: Or, A Collection of Rarities Preserved At South Lambeth near London.* Printed by John Grismond, 1656.

of the said Closet to me' and on the 16th '5 Hor. 30 Minutes past merid, Mr. Tradescant and His Wife sealed and delivered to me the Deed of Gift of all his Rarities.'[1]

The subsequent events are somewhat equivocal and can be variously interpreted. John Tradescant died in the spring of 1662. In his will, dated 4 April, 1661, and proved on 5 May, 1662, he makes his wife sole executrix and 'Item, I give, devize and bequeath my Closet of Rarities to my dearly beloved wife Hester Tradescant during her naturall Life, and after her decease I give and bequeath the same to the Universities of Oxford or Cambridge, to which of them shee shall think fitt at her decease'.[2]

He had not been dead more than two years before Ashmole preferred a Bill in Chancery against the widow 'for the Rarities her Husband had settled on me'. (*Diary*, 30 May, 1662.) The cause was heard on 18 May, 1664, before Lord-Chancellor Clarendon, who made an award in favour of Ashmole 'to have and enjoy' the Closett or Collection of Rarities as catalogued in the *Museum Tradescantianum* 'subject to the trust for the defendant during her life'. Mrs. Tradescant, however, appears to have greatly exceeded her legal rights in the collection. I have found good evidence that she yielded to the temptation of parting with valuable specimens to other collectors for money. In the British Museum is W. Charleton's manuscript list of accessions to his collection.[3] It is written partly in Italian, partly in English, and is entitled 'Catalogo de Curiosità chi venirano alli miei mani nel anno 1666'. He purchased specimens from persons of the names of Hilyard and Bayley and from Mrs. Tradescant. The following items are noted.

May 1667.

Tredescant.	*s.*	*d.*
1 rostro d'un uccello	10	0
2 uuovi del soland goose	5	0

[1] Ashmole, *Diary*. We print in the Appendix, p. 436, a list of the Curiosities in the Museum from MS. Rawl. D. 864, fol. 189. It is in Ashmole's handwriting and may have been a first draft which was used in the preparation of the printed catalogue. The descriptions of the objects are very similar, but there are curious differences in the order of the items, and this list includes a few things that do not appear in the printed list.

[2] *N. & Q.*, Ser. I. v, 367.

[3] MS. Sloane 3988.

DR. ELIAS ASHMOLE, 'MERCURIOPHILUS'

From Mrs. Poole's 'Oxford Portraits'

Bayley.

Spleen stone

June 1667.

Tredescant.

[Soland goose eggs	2	6][1]
Sponge	1	0
Barbadoes cotton	1	0
Cristallo che rapresenta il diamante del Duca di Toscana	5	0
1 cosa d'ffuorio d. dal sorella	10	0
1 pittura in Ambra dal sorella data	10	0
carta d'India gialla	1	0
carta d'India rossa	1	0
characteri Indiani	1	0
Dalla sig^{ra} Tredescant.		
Testa d'un uccello di virginia	2	0
Virginia Woodpecker v.c di questi 3 colori bianco, rosso e nero	2	0
Jet box with small sheers	5	0
July.		
Ring tailes egge	0	6
Sparrow hawkes egge	0	0
Linnetts egge	0	0
7 bre		
La testa d'un Heron with its top	2	6
1 Ostrea impetrita	0	0

Doubtless other valuables were sold out of the collection in the same manner, and we can hardly be surprised that Ashmole was annoyed at finding his legacy dwindling away under his very eyes. He built a large brick house next door to Mrs. Tradescant's,[2] and evidently worried her to such purpose that on 26 November 1674 he can write in his diary, 'Mrs. Tredescant being willing to deliver up the rarities to me, I carried several of them to my house'. A few days later he removed the remainder. The collection was evidently seen and appreciated by Ashmole's friends. In 1676 Izaak Walton, for instance, saw the 'strange creatures collected by John Tradescant and others, and added to by my friend

[1] Erased.

[2] The two houses, afterwards known as Stamford House and Turret House, were demolished in 1881. Dr. Ducarel, the antiquary, lived in one of them, 1773–85.

Elias Ashmole, Esq., who now keeps them carefully and methodically at his house near to Lambeth near London',[1] Others somewhat irreverently referred to the Museum as a 'knicknackatory'.

Meanwhile Mrs. Tradescant appears to have been very outspoken in telling her friends what she thought of her neighbour, so much so that Ashmole thought it expedient to take steps which resulted in his extorting from her a paper that is still in existence,[2] known as the *Confession of Hester Tradescant*—a very human document.

Bee it knowne unto all Persons that I Hester Tradescant of South Lambeth in the County of Surrey widdow, doe acknowledge & Confess in the presence of Mr. Justice Dawling and other the wittnesses hereunder subscribed, that I have very much wronged Elias Ashmole of the same place Esq^r^: by severall fals scandalous & defamatory Speeches Reports & otherwise tending to the diminution and blemishing of his Reputation & good Name, more especially in these particulars following

First, I have reported to severall persons that the said Elias Ashmole had made a dore out of his Garden into my Orchard by w^ch^ he might come into my House as soon as the breath was out of my Body, & take away my Goods, whereas in truth there was not, nor yet is any such dore made by him.

Secondly that he had taken away 250 foote of my Ground when he built his Garden wall; whereas his said wall was set in the place where an old Pale stood immediately before he built his Wall, & was lyned out in the presence of my cosen Blake the Plummer whome my Landlord Mr. Bartholomew had impowered on his behalf so to doe.

Thirdly, I have reported to several Persons, as well strangers as others of my Acquaintance, that the said Mr. Ashmole had forced me to deliver up to him my Closet of Rarities, and that if I had not done [so] he would have cut my throat. And in the presence of divers Neighbours I falsely charged the said Mr. Ashmole that he had rob^d^ me of my Closet of Rarities, & cheated me of my Estate; whereas in truth I prest him to receive the said Rarities & when he intreated me to keepe them, and not only used many Arguments to persuade me to it, but set on other my friends & neighbours to persuade me likewise, I would not

[1] *Compleat Angler*, 5th edit., 1676.
[2] MS. Rawlinson, D 912, f. 668.

hearken to their advise, but forced him to take them away threatening that if he did not, I would throw them into the streete; & he having at last consented to receive them, I voluntarily helped to remove some of them myselfe.

Fourthly I reported that I had made him promise me to bestow the said Rarities on the University of Oxford; and that I would force him to send them thither; where as I never moved the said Mr. Ashmole to any such thing when I delivered them to him or at any time since.

Fiftly that I caused a great heape of Earth and Rubbish to layd against his Garden wall so high, that on the sixt day of August last in the night, by the help thereof it is strongly presumed that theives got over the same & rob[d] the said Mr. Ashmole of 32 cocks and hens; and notwithstanding he admonished me to take it away I told him it should lye there in spight of his Teeth, & soe it continued untaken away above six weeks after he was so robbed, whereby he lay in continual feare of having his house broken open every night.

All which, and many other like false and scandalous Reports and words as I have unadvisedly & rashly spoken against him, without any Provocation of his in words or deedes, so am I really and heartily sorry that I have so greatly wronged him therein; and have in the presence of the said Mr. Justice Dawling and the subscribed witnesses, acknowledged the said Wronge and Injuries so done unto the said Mr. Ashmole, and asked him publique forgiveness for the same: And doe hereby voluntarily & freely promise the said Mr. Ashmole that no manner of Rubish or Earth shalbe layd ag[t] his s[d] Garden Wall and that henceforth I will not say or doe anything ag[t] him or his wife, that may tend to the damage reproach or disreputation of them or either of them. In witness whereof I have hereunto set my hand the first day of September 1676

ESTER TREDUSCANT.

Subscribed in the presence of

Jo. Daulinge
Tho. Bedford
Rich. Kendall
Tho. de Critz
Tho. Murrey
Gartrud Sraugh
K. King
Geo. Worge

The last scene of this tragedy was enacted on 4 April 1678. Ashmole records:

'My wife told me that Mrs. Tradescant was found drowned in her pond. She was drowned the day before about noon, as appeared by some circumstance.' She was buried on the 6th. On the 22nd: 'I removed the pictures from Mrs. Tradescant's house to mine.'

The Ashmolean Museum.

In 1669 the University presented Elias Ashmole, 'curioso and virtuoso', with the diploma of a Doctor of Medicine. The original document is still preserved in the Bodleian Library to which it was doubtless removed when Ashmole's Museum was cleared out, and, so far as we are aware, it is the only example of such a diploma of the period. (See figure on p. 304.)

At the latter end of October 1677, or beginning of November, Dr. Ashmole 'proposed to give all the rarities belonging to Tredeskin to the University conditionally they would build a house for them. There is a book of Tredescin's rarities, vide *Catalogum librorum Bodl.* Also 150 MSS. to the library.'[1]

The offer was gratefully accepted, and a site for 'a room for Mr. Ashmole's rarities' was found in the angle between the Town Wall and Sir Christopher Wren's new boundary wall on the west side of the Sheldonian Theatre. The land was purchased partly from the City, partly from Exeter College. The name by which the building is designated in the Vice-Chancellor's accounts, at first as 'a room', later as 'the Musaeum', indicates a considerable enlargement of the original plan. Nor is this remarkable, when we consider that during the preceding two decades the prestige of the study of the Natural Sciences, the royal study, stood higher in Oxford than at any other period of her history; and yet there was no centre for scientific studies and meetings in the University, nor was there any University Laboratory for the performance of chemical and physical experiments.

We do not know who was responsible for the enlargement of the scheme. We know that Ashmole was

[1] Wood, *Life and Times.*

a chemist, and author of the *Theatrum Chemicum*: we do not know if he suggested a Chemical Laboratory: we do know that he founded our first Professorship of Chemistry.

Sir Christopher Wren, it has always been believed until a few months ago, was requested to draw out a plan for the building, and in this case there is no good cause for doubting the statement of the historians, for under the special circumstances of the site and of Wren's relation to Science and to Oxford, no other man could have been invited to engage on this work without Wren's being consulted. And as a matter of fact Wren had designed such a building for a scientific institution as long before as 1668. In October 1667, while Wren was engaged in building the Sheldonian Theatre, John Evelyn procured Henry Howard to give to the University the antiquities known as the Arundel Marbles. Wren was deputed to go up to London to deliver a letter of thanks to Howard, and the marbles were laid near the Divinity School till the Theatre should be finished. The need for providing suitable accommodation for these marbles doubtless suggested the appropriateness of a high wall along the west side of the Theatre yard. Wren designed the wall with niches and arranged the marbles upon it. And, in March 1681, Charles II 'was pleased to spend some time in viewing the *Marmora Oxoniensia* on the walls of the Theatre yard'. The Marbles are shown in the engraving facing the title-page of vol. iv.

Meanwhile, in London, Henry Howard granted to the Royal Society a piece of ground in Arundel Gardens, 100 feet long by 40 feet deep, for a College, of which the Society was then sorely in need. As was natural, Wren was consulted as to the building, and by good fortune his scheme is still preserved in the archives of the Royal Society. The details are specified in a letter to Oldenburg, dated Oxford, June 7, 1668.

'When I waited upon his Honour, Henry Howard of Norfolk, he took delight to shew me some designs he had thought of himself for your building, and commanded me to trace out to him what I had considered, the same in effect I shewed you at London. But this, at first appearance, seemed to him too chargeable a design, but afterwards he acquiesced in the reasons I gave him; and having taken the sketch with him, and delivered your letter with his own hand, he enjoyned me to give you an account of it.

'It contains in the foundations, first, a cellar and a fair laboratory; then a little shop or two, for forges and hammer-works, with a kitchen and little larder. In the first story it contains a vestibule, or passage-hall, leading through from both streets; a fair room for a library and repository, which may well be one room, placing the books after the modern way in glass presses; or, if you will divide the room with pillars, it will the better support the floor of the great room above it, and so place the presses for rarities in the other. Upon the same floor is a parlour for the housekeeper, and from the vestibule the great stairs lead you up to the ante-chamber of the great room, and not higher.

'The great room for the meeting is 40 feet long, and two stories high, divided from the ante-chamber by a skreen between columns, so that the whole length, in case of an entertainment, may be 55 feet. Upon the same floor is the Council-room, and a little closet for the Secretary. . . .

'If you think to have a model made, I will willingly take care to have it done. I have so folded the papers, as to shew you what part I would have at present built; together with an extempore staircase of deal boards and laths. The cupola may be left till the finishing.

'Sir,
'I am your humble servant,
'CHR. WREN.'

In consequence of difficulties about the conveyance of the land and the lack of funds, the College of Science projected by Howard and Wren was never built in London.

But ten years later, when a first home was required for the natural sciences in Oxford, not only was Wren's design followed, though in the reduced form suited to the local requirements, but the new building replaced a part of the wall which, garnished with Howard's marbles, had only recently been finished by Wren. The attribution to Wren of the Ashmolean building has been disputed. But the finding of Wren's own earlier design for such a building, his intimate connexion with all scientific projects and with Oxford, the correspondence of the plan of the Ashmolean Museum with that for Wren's London College of Science, and the fact that the end of the building replaced Henry Howard's marbles and Wren's wall, are all evidences of a striking nature in favour of the view that Wren was not only the author of the original design of the Ashmolean Museum, but may have even suggested the site for its erection.

It is inconceivable that any other architect, let alone an unknown builder, should have been permitted to touch this wall without Wren's having been consulted. When the Museum was being built Wren was at the height of his powers, and already so fully engaged with work on St. Paul's and half a dozen churches in London, that he had not much time for supervising the architectural work he was engaged on in Oxford. And in addition to this he was elected President of the Royal Society in 1680. The idea of Museums of Natural History was in the air. It may well have been due to the influence of Wren, as well as to the activity of Grew that

> the Royal Society have lately put their Repository into an excellent method, and it every day increases through the favour and benevolence of sundry benefactors, whose names are gratefully recorded. . . . The particulars they collect are animals and insects of all sorts, their skins and skeletons, fruits, stones, shells, swords, gums, minerals and whatever nature produces in her vast and comprehensive bosom.[1]

Ashmole and Wren were brother foundation-Fellows of the Royal Society. Wren would have been particularly interested in any scheme affecting the welfare of Science in Oxford. He was a friend of the Vice-Chancellor, Halton, Provost of Queen's College, with whom he was in correspondence about a design for the Chapel Roof. It is reasonable to suppose that he would have given the Vice-Chancellor a sketch of the main outlines of the Museum, and would have left the execution, and probably even the designing of details, to competent master-mason, master-carpenter, and master-blacksmith, among whom there still survived the high standard of good taste of the master craftsmen of an earlier age. Things were not as in the present degenerate days, when mongrel buildings are run up by architects who cannot execute and workmen who cannot design.

[1] Evelyn, *Letter* to W. London, 27 Sept. 1681.

Before proceeding to the description of the building we may observe that the collections in Ashmole's house remained open for inspection. On July 23, 1678, John Evelyn 'Went to see Mr. Elias Ashmole's library and curiosities at Lambeth. He has divers MSS., but most of them astrological, to which study he is addicted, though I believe not learned, but very industrious, as his history of the Order of the Garter shows. He showed me a toad included in amber. The prospect from a turret is very fine, it being so near London, and yet not discovering any house about the country.'

'On the 26th of Jan. 1678/9, a fire breaking out in the chamber next to his lodgings in the Middle Temple, his said lodgings were utterly consum'd. His losses were exceeding great, all his library of printed books, the collection of 33 years mostly from abroad, was consum'd . . . but all his chief manuscripts escaped, he having them at S. Lambeth: so likewise his gold coyns and gold medals; but those of silver were all melted and cost him as much as the worth of them in weight, in digging among the ruins, sifting the rubbish and hiring the silver-smiths to wash the dust. The copper coins were found but miserably defaced . . . Also a large collection of ancient evidences and seals of England from the conquest hitherto . . . He lost also there his observations upon history, coins, medals, heraldry, and some other subjects, being the effects of his studies for about 30 years, which lay there in his said chambers for improvement as he had leisure. And also divers valuable pieces of antiquity and sundry curiosities both of art and nature, a paper book containing pictures or faces of eminent persons of England, and another folio containing pictures of processions at coronations, marriages, interviews, funerals, etc., many subterranean antiquities, as rare stones, besides a chizel or axe framed from a flint stone before the framing or working of iron was invented. . . .[1] His losses are ours. The commoners concluded that it was burnt by the papists; but 'twas a maid or servant that lighted a fire with a lynck and went away.'[2]

[1] Wood, *Athenae Oxonienses.*

[2] 'A true narrative of a fire on 27 Jan. in Temple lane, London,' 1679, is in MS. Wood, D. 28 (26). See also Luttrell, i, pp. 7, 8.

The fire brought a change in Ashmole's life. Under date 1 Sept. 1680, Sir Th. Herbert in a letter to Ashmole, wrote:

'I find by your letter that you do not frequent the Court as you have formerly, having retyred yourself to your house in South Lambeth, a place I well know, having been several times at M. Tredescant (to whom I gave severall things I collected on my travels), and was much delighted with his gardens, so as you have sequestered yourself to a place of much pleasure as well as privacy.' [1]

The Ashmolean Building and its Builders

The forgetfulness of Oxford is extraordinary. Her historians are used to losing the origin of her institutions and even recent events soon get forgotten. For the greater part of three centuries few writers gave the date of the foundation of the Physic Garden correctly. And now, although we know the date of the building of the Ashmolean Museum, its period has been challenged, its architect forgotten, and readily verifiable facts confused in a web of heedless misrepresentation.

The building erected between 1679 and 1682 has been affirmed to be of two dates.[2] Though the names of the artizans are recorded in the building bills, the name of the designer nowhere occurs. Those who would deny the attribution of our Science Museum to our most distinguished man of science, favour an attribution to a practically unknown mason of the name of T. Wood.

It is therefore of interest to ascertain the facts as precisely as possible. The evidences include firstly the entries relating to the Museum in the Vice-Chancellor's Accounts, and secondly a bundle of unbound Bills paid by Dr. Halton, the Vice-Chancellor. And last but not least the entries in Wood's *Life and Times*, and the significant fact of his being absolutely silent with regard to the work of his namesake. This silence is unlike him. Had T. Wood designed a work so

[1] Tradescant includes the name of T. Herbert in his list of benefactors. See p. 435.

[2] Sir Reginald Blomfield, *Times*, 20 Feb. 1923. For photographs of the building, see *Country Life*, for May 9, 1925.

worthy of special mention, A. Wood would surely have said so, but he restricts his notes to the following,

'The foundation of the new house by the Theater, to containe Tredeskyn's rarities, was laid (i. e. the first stone) 15 May, Thursday, 1679.

No flood this spring, onlie gentle raines.

1679 May, the foundation of the house by the Theater to receive Tredeskin's rarities was digging, and the privy house of Exeter College breaking in on the foundation, 'twas said that it was laid *fundamentaliter* and not *formaliter*: so Dr. Lamphire'.[1]

The accounts and weekly bills show that the masons worked under a Thomas Wood, described as 'Mason', and were paid at the same rate as the other masons, viz. 10*s*. a week. In August 1679, sixteen masons and eight labourers were at work.

29 November 1769.	Joab Dew, ye Slatter, for worke done at ye Labrytary at ye towne wall	0	8	9½

In the winter the number of men engaged was reduced. In December there were only Wood and three masons; in March 79/80 there were Wood and five masons and two labourers; but in April 1680 the work was continued with vigour, twenty-two masons and twelve labourers being on the pay-sheets. In June the numbers were sixteen masons and seven labourers. The stones used are described as 'wall stones', 'free stone', and 'Burford stones', of which last seventy-one feet were procured in June.

So far Tho. Wood seems to have only been paid a weekly wage of 10*s*., like the other masons, but on July 26 and again on September 25 he received £10 for carving of stone about the Repository. So also on October 30 and November 27, but on January 1, 1680/1 he received £20, and signed for it

Tho. Woods,
his T marke.

His whole account for 1680 came to £1,006 0*s*. 4*d*. (see p. 301).

[1] Note in MS. Wood, E 32, f. 26.

On 9 April 1681 Wood received *nothing*, duly entered as £0 0 0. On 23 April he again received the ordinary mason's wage of 10*s*., and payments were being made to Bleydon quarrymen. The inference is clear that Thomas Wood was a master-mason, who was paid at the rate of £10 a month when he worked as a carver. He was certainly able to write; his mark, followed by no pay in April, would appear to indicate that he had met with some mishap and could therefore neither write nor work, and that he received nothing for supervision.

About March 10, 1681, the progress of the work was checked through the falling of 'some part of the vaulting built half an yeare since under that magnificent structure (not yet finished) distant at least thirty foot from the house of Commons, to receive Tredeskyn's rarities given to the Universitie by that eminent virtuoso Elias Ashmole Esq.' A London rumour applied the story to the Convocation House, then being fitted up for the House of Commons. The damage could not have been very serious:

1681 March 25 for worke and Timber about the new floure that was broken down 6*s*. 8*d*.

Two days later, on Palm Sunday, March 27, the King himself is reported to have strolled among the workmen, when he went to see whether the Sheldonian could not be adapted as a House of Commons. Ashmole would also have got to learn of the disaster, and perhaps felt apprehensive of some delay, and he knew the value of a 'refresher', so on April 4, Moses Pitt deducted from his bill paid on Sept. 28, 1681,

money given by Mr. Ashmole to the workmen at the Building for his Rarities £5 0 0

On May 14 there were nine masons and five labourers working for five days a week. On June 25 Wood again drew £10 for carving and 10*s*. as a mason. By October the greater part of the masonry work seems to have been finished, and six masons, Wood, and four labourers were laying £15 worth of Blaydon paving.

There is nothing in these full accounts to suggest that Thomas Wood was the architect of the building. The evidence is that he was not, for if he had been the architect, it would hardly have been necessary to have paid £40 to a separate overseer. He was a carver and monumental mason who had been previously employed by the University in 1675 to carve 'anticks and other worke about Adam Brome's chappell' and to lay marble given by Dr. Bathurst in St. Mary's Church, and on May 15, 1679, he was paid £20 for a monument to Francis Junius at Windsor. And certainly to him the admirable carved work on the eastern façade and round the north door of the Ashmolean Museum is to be ascribed.[1]

Further items of interest are—

1680	Oct. 6. John Ransford, Joyner, 123 foute of Boordes to make the mowldes for Cutting 63 mowldes for the Masunes in the Bilding By the Theatture	1	12	2
	Countersigned Tho. Wood			
	Oct. 4–25. W. Young, 20 Bars to the Windows waying 7 hundred and ½	8	18	0

[1] It is remarkable that there should be no mention of so excellent a craftsman in the writings of Anthony Wood. He was a contemporary of two of Anthony's nephews, of the same name: Thomas Wood, b. 1661, Fellow of New College, 1679, and Thomas Wood, b. 1660, an attorney who died in 1686. And then there were also Thomas Wood, the chirurgion, who in 1664 was granted a lease of the tower in the Town wall, in 1669 of the little printing house near the Theatre and northward of the Schools (Wood, *Life*, October 22, 1669, confirmed by the *City Records*); and Thomas Wood, tavern keeper and dancing master, who issued a token, and died in 1663 (*Surveys and Tokens*, p. 452).

And lastly Richard Wood, a stone cutter, also had a house near the Theatre in 1680 (Wood, l.c. 1680), which my friend Mr. Salter identifies with 45 Broad Street, opposite the Theatre. The lease was held on December 5, 1685, and renewed to him on December 6, 1699 (*Cart. Hosp. St. John*, ii. 316). In 1667 Richard Wood and Thomas Wood were journeymen working under William Bird, stonecutter; living with him and receiving £8 a year, high wages for a journeyman. Bird lived on the north side of New College Lane between Hell Passage and the Octagon Chapel (*Surveys and Tokens*, p. 296). Feb. 2, 1685, the City leased to Thomas Wood, stonecutter, a messuage, barn, and racket court, on the north side of New College Lane: 'The premises built since the lease was sealed.' As William Bird's house lay to the east, Thomas Wood came between Bird and the Octagon Chapel. On September 1, 1695, his house was leased to Alice Wood. Was Thomas Wood dead? We have already mentioned Bird on p. 26 of vol. i as a cunning stainer of marble. His invention had been mentioned to the Royal Society.

1680–1	Feb. 19. for the Cariage of 76 loads of Rubish & Dirt to Marling Bridge & ye Phisik Garden (£1 18 0) Cleansing the street before the Theater from Rubish & laying stones out of the way & for seting up Mr. Wheler's Marbles[1]	4	13	3

The cleaning-up was evidently suggested by the impending visits of the eldest son of the Duke of Hanover, afterwards our George I, and of the King.

Meanwhile the carpenters had been getting to work. Richard Frogley, the master-carpenter, seems to have worked independently of Wood, and his bills are countersigned by Davis.

1679	Sept. 6. Richard ffrogly boards for Moulds 9 days		15	0
	Nov. 7. 651 ft oke timber at 13^{d} a foot	£35	5	3
1680	Oct. 30. Use of the Inggin and ropes	1	0	0

Items Relating to the Ashmolean Museum

Extracted from the Vice-Chancellor's Accounts

1678	For the Lease of severall Tenemts near ye Theater purchased for the building a Roome for Dr. Ashmole's Rarities, and the Writings for it	326	9	6
1679	Spent in building Musaeum Ashmoleanum	467	10	3
1680	Davis for overseeing the Worke at Dr. Ashmole's Repository	30	0	0
	Mr. Wood several bills towards building same	1006	0	4
	Mr. Frogley „ „ upon the same acct.	216	12	8
	William Young for iron Work about the same	24	7	7
	John Dew Work at Elaboratory		8	9½
	Mr. Ransford for Worke about the Elaboratory	1	12	9
1681	Mr. Davys, Bayliffe of the University, for overseeing the worke at Dr. Ashmole's Repository	20	0	0
	John Dewe for work about the Repository	1	1	6
	Mr. Wood by severall bills	343	8	2

[1] Sir George Wheler, the traveller, who brought divers antiquities from the Eastern Mediterranean.

		£	s.	d.
	Young	13	7	6
	Frogley	71	8	1
	B. Rawlins leading the Repository	140	0	0
	Removing rubbish from the Repository	4	13	3
	Mr. Wood for Sawes & other Utinsells about the Repository	6	14	7
1682	Young the Smith for work about the Repository	53	3	1
	Mr. Wood by severall bills	440	5	6
	Richard Frogley & W. Longe, Carpenters	242	3	3
	Bernard Rawlins for lead to ye Repository	51	0	0
	Dew the Plaisterer for work there	62	0	7
	Bernard Rawlins for glazing the Repository	21	12	0
	Davis for Overseeing the Worke	20	0	0
	Wild the Joyner for Wainscott for Dr. Ashmole's Repository	60	0	0
	Hawkins for painting the Repository	4	16	8
	Dr. Bury for ground bought from Exeter College for Dr. Ashmole's Repository	80	0	0
	To City of Oxford for the purchase of ground whereon the Repository is built	150	0	0
	Mr. Sargeant Holloway for drawing up the Writings for purchasing the Fee-simple of ye ground, where the Repository is built	4	10	0
1683	Young ye Smith for Casements, the Iron Gate & other works	39	11	5
	Burrows ye Ironmonger for Locks & bolts for the Repository	5	10	0
	Mr. Wood ye Stone cutter	106	17	4
	Th. Robinson ye Mason for work done there	31	2	4
	Job Dew, the plaisterer "	1	16	0
	W. Longe & John White Carpenters	23	14	7
	John Wild Joyner for Wainscott	110	0	0
	B. Rawlins for Leading	150	4	8
	Davis, Bayliff for Overseeing	10	0	0
	Cully, Bargeman for carriage of the Goods in Ashmolean R.	9	6	0
	Lock & Keys bought by Dr. Plott	7	3	8
	Wood the stone cutter for the stained Marble Chimney piece, and for pitching work before the Repository	18	19	6

	Job Dew ye Plaisterer for more Work	1	4	7
	John Wild Wainscott	10	0	0
	B. Rawlins leading work	40	0	0
	J. White Carpentur for work	11	7	6
1684	B. Rawlins for Arrears for leading	23	2	6
	Minne Joyner for a Cabinett and other work	11	1	3

Before the end of 1681 the roof must have been on, for Bernard Rawlins was 'leading the Repository'. Next year the heavy bill of Frogley and W. Longe, the carpenters, for £242 3*s.* 3*d.* probably indicates work on the doors and staircase. Job Dew was plastering for £62, B. Rawlins was glazing for £21 12*s.* 4*d.*, Wild, the Joyner, was wainscotting for £60, Hawkins painting for £4 16*s.* 8*d.*, and Davis was Overseeing the Worke for £20.

Ashmole himself now takes up the story. '1682 Aug. 16. I went towards Oxford to see the building prepared to receive my rarities, where I arrived about seven o'clock in the evening. Aug. 17. Between 8 and 9, I first saw the said building. I was invited by the Vice Chancellor, and dined with him at Queen's College.'

In 1683 Locks and Bolts were provided by Burrows, ye Ironmonger, for £5 10*s.* and a special Lock and Keys were bought by Dr. Plott for £7 3*s.* 8*d.* Unfortunately we do not know who provided each lock. The work on the lock on the North Door is wholly admirable. The craftsman who made it deserves to be remembered, and we should like to consider it as a sample of Plot's taste in locks.

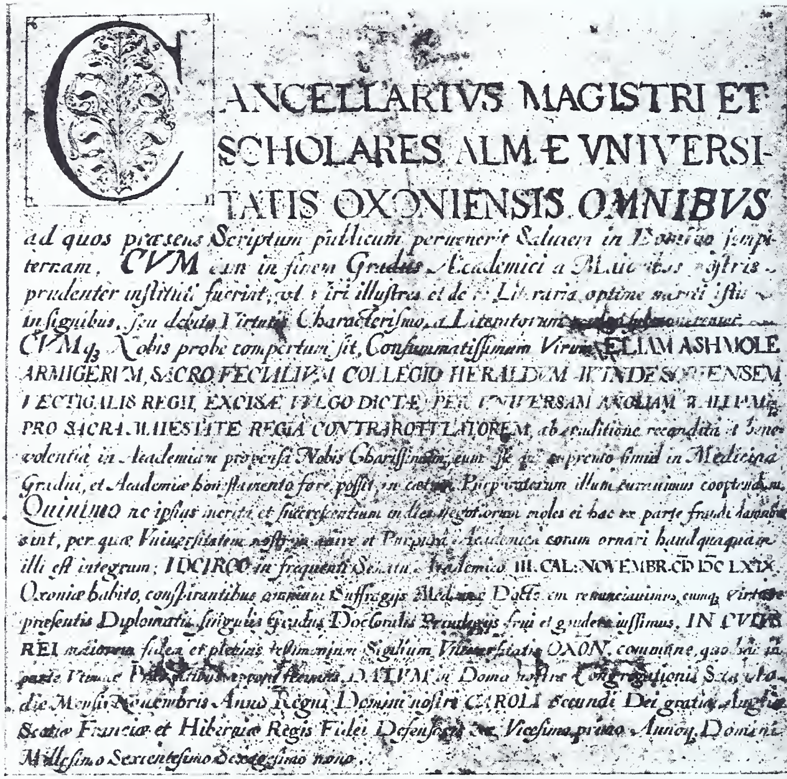
> In Sir John Glanville's house Evelyn was shown such a lock for a door, that for its filing and rare contrivances was a masterpiece, yet made by a country blacksmith . . . and not many years after, there was nothing more frequent than all sorts of iron-work more exquisitely wrought and polished than in any part of Europe, so as a door-lock of a tolerable price was esteemed a curiosity even among foreign princes.[1]

One of the results of Ashmole's dinner with the Vice-Chancellor on August 16, was that it set him thinking about the conditions that he wished to attach

[1] Evelyn, *Diary*, 16 July 1654.

to his gift. A draft endorsed in his own hand is still extant in MS. Rawlinson D 912, ff. 670–4.

'Propositions sent to my ld. bp. of Oxford (by Mr. Walker, M. of University College) from Mr. Ashmole

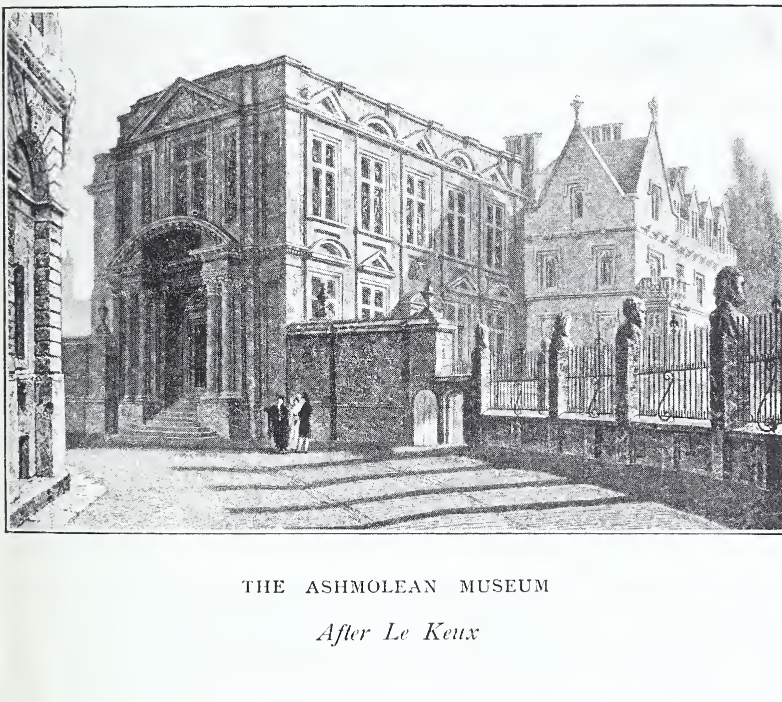

CANCELLARIUS MAGISTRI ET SCHOLARES ALMÆ UNIVERSITATIS OXONIENSIS OMNIBUS ad quos præsens Scriptum publicum pervenerit Salutem in Domino sempiternam. CUM eum in finem Gradus Academici a Maioribus nostris prudenter instituti fuerint, ut viri illustres et de re Literaria optime meriti istis insignibus, seu debito Virtutis Characterismo, a Literatorum [illegible]. CUMq; Nobis probe compertum sit, Consummatissimum Virum ELIAM ASHMOLE ARMIGERUM, SACRO FECIALIUM COLLEGIO HERALDUM WINDESORIENSEM, VECTIGALIS REGII, EXCISÆ VULGO DICTÆ, PER UNIVERSAM ANGLIAM [illegible] PRO SACRA MAIESTATE REGIA CONTRAROTULATOREM, ob eruditione recondita et benevolentia in Academiam præcipua Nobis Charissimum, eum [illegible] in Medicina Gradui, et Academiæ [illegible] fore, possit, in cœtum [illegible] illum [illegible] cooptandum. Quinimo ne ipsius merita et [illegible] moles ei hac ex parte fraudi [illegible] sint, per quæ Universitatem nostram [illegible] et Purpura Academica eorum ornari haudquaquam illi est integrum; IDCIRCO in frequenti Senatu Academico III. CAL: NOVEMBR. CIↃ IↃC LXIX. Oxoniæ habito, conspirantibus omnium Suffragijs [illegible] Doctorem renunciavimus, eumq; virtute præsentis Diplomatis singulis Gradus Doctoralis Privilegijs frui et gaudere iussimus. IN CUIUS REI [illegible] fidem et plenius testimonium Sigillum Universitatis OXON. commune, quo [illegible] parte [illegible] apposuimus. DATUM in Domo nostræ Congregationis [illegible] die Mensis Novembris Anno Regni Domini nostri CAROLI Secundi Dei gratia Angliæ Scotiæ Franciæ et Hiberniæ Regis Fidei Defensoris &c. Vicesimo primo, Annoq; Domini Millesimo Sexcentesimo Sexagesimo nono.

Oxford Medical Diploma given to Ashmole in 1669
MS. Ashmole 1000.

30 Sept 1682' respecting the care of his Museum and the establishment of a Professorship of Natural History and Chemistry.

1. To give the rarities without settling a Professor will not be so advantagious to learning & the University, nor so honorable for the Donor.

2. The Professor of Naturall History to be also of



THE ASHMOLEAN MUSEUM

After Le Keux

Chymistry tho it require a somewhat larger maintenance, or salary.

3. If Mr. Ashmole please to endow a Professor, yt he shall have all the honours & respects done to any other founder; or what now can be rationally proposed. In confirming wch I verily beleeve there will be no hesitancy in the University but rather great forwardnes; particularly

1. That ye Museum & Professor be called Ashmolean.

2. That ye rarities belonging to ye Universitie in ye Anatomy school (except what are necessary for ye Anatomy lecture) and all hereafter given to the University be there placed.

4. That Mr. Ashmole send down ye rarities to bee placed as speedily as his convenience shall permit, but shall not give any other maintenance to ye Professor till after his own & Ladies life.

5. That there be a Donation made according to law of what he shall please to bestow upon ye University, in some reasonable time; & the University by another deed or indenture oblige themselves to perform such things as shall be agreed upon; particularly

1. That he shall be acknowledged a Benefactor or founder of such a lecture; according to what hath been done to other such founders of lectures & Benefactors to ye University & learning.

2. That such statutes & oblijacons be put upon ye Professor, wch the University shall continually engage to be performed.

6. That a Professor be named from time to time by Mr. Ashmole during his life; who shall read according to his obligacon, contenting himself with the benefit wch will accrue by shewing the rarities, till the benefit by the settlement do actually commence. Also yt it shall be in Mr. Ashmoles power to remove an unworthy or faulty person.

7. That the Professor shall render to Mr. Ashmole a true account each yeare for 3 years successively of ye emoluments of ye place; as also what may be reasonably expected for the future. *This to be put into Dr. Plot's Grant.* [Added in A's hand].

8. That if it shall please God that civil war or like calamitie should happen, & Mr. Ashmole shall think it better to invest his money intended to the University in land yt the University shall use their diligence to procure a good bargain; wch lands shall be to ye Use of Mr. Ashmole and his wife as long as they shall live.

9. Bec: it may be yt Mr. Ashmole may have children,

that nothing be done for the present but the rarities onely bestowed.

The dates of the moving are entered by Ashmole in his *Diary*.

'1683. February 15, I began to put up my rarities in cases to send to Oxford. March 14, the last load of my rarities were sent to the barge. This afternoon I relapsed into the gout.'

Within a week Wood noted the arrival of the collection in Oxford.

March 20, T., twelve cart-loads of Tredeskyn's rarities came from Mr. Ashmole at London to his new elaboratory at Oxon. Dr. Plot soon after, or then, made Custos.

May 18, F., duke of York, his dutchess Maria Beatrice (or Josepha Maria), and the Lady Anne his daughter, with their retinew entred Oxford.

May 21, M., entertainment *At the Theater .... At Ashmole's musaeum*:—Afterwards the duke, dutchess, lady Anne and their retinue went thence (the organ playing while they departed) to Ashmole's Musaeum, where after they had heard an English speech spoken by Dr. Plot the curator, in the second upper roome, they were entertained first with the rarities in the upper room, and afterwards with a sumptuous banquet there (it cost 50 *li* or 60 *li*) at the charge of the Universitie. Then they went down to the Elaboratory, where they saw some experiments to their great satisfaction. After they had continued there neare an hour, they went on foot into Exeter College back-gate which joyns on the west side of the said musaeum.

May 23, W., yeomen bedells went to severall colleges and halls to give notice to all Doctors and Masters that the Musaeum Ashmoleanum would be open the next day.

May 24, Th., those Doctors and Masters that pleased retir'd to the Musaeum (which is the Upper Room) where they viewed from one till 5 of the clock what they pleased. Many that are delighted with new phil⟨osophy⟩ are taken with them; but some, for the old, look upon them as ba⟨u⟩bles. Ch.Ch. men not there. Math. Morgan his pref⟨ace⟩, quaere.

June 4, M., at Convocation in the afternoon, letters were read from Mr. E. Ashmole,[1] whereby he gives all his rarities to the Universitie,[2] notwithstanding he had been courted by others to bestow them elswhere, and that others had offered great sums for them. Whereupon Mr. James, the Deputy-Orator, read a letter of thanks in the Universitie name, which was consented to, to be sent to him, in Latine.[3]

Original letter of thanks from the University to Elias Ashmole.

Clarissime Ornatissimeque Vir,

Si iniquo hoc Academijs tempore, quo neglectae languent et ferè sordent Scientiae, vix reperiatur Literarum Patronus vel inter unius aetatis miracula, quibus nos decet Te honoribus prosequi? qui quamvis Ipse sis universis Artibus excultus, parium Tibi Ipsi profecisse videbaris nisi et universas invicem artes publico Patrocinio foveres. Qui literis Tuis at nos datis palam ostendisti quanta simus curarum Vestrarum pars, qualiaque erga nos mediteris, qui Beneficentia prorsus inaudita, in Academiae sinum pretiosissima Naturae κειμήλια laborum sumptuumque quasi prodigus, effudisti, quae longa licet annorum congesserit industria, nè saecula possint pro dignitate satis mirari. Quicquid enim aut curâ subtili Natura, aut laborioso opere absolverat Ars, id omne Vestro de fisco acceptum gratulamur, adeò ut idem jam sit in Musaeum Vestrum ac Naturae adytum admitti, plenoque intuitu ea stupere miracula, quae quamvis sibi soli destinata, arcana voluit Natura, Vestri judicij acris non passa est latere perspicacia.

Verum immensitatem muneris ipse superat conferendi modus, eoque Beneficum Te exhibes animo ut majora jubeas sperare cum maxima contuleris: Et certè Unica haec est Ashmoliana Beneficentia, quae cum in unum cumulatas Universas Orbis opes dederit, nondum delassata ulteriora possit promittere, et datorum se Praesidem et custodem praestare.

Quod itaque unicum potest Universitas Oxoniensis, tam egregiae Benevolentiae minimè par, gratissimum

[1] 'dated at South Lambeth S., 26 May'; MS. Bodl. 594, p. 105.
[2] 'which were sometimes Mr. Tredescants'.
[3] MS. Rawl. D 912, f. 664.

animum publicè testatur minusque muneribus quam Patrono superba, ea tantum admirabitur illum semper cultura: grataque in aeternum memoria vel futuris saeculis conabitur mereri quae hodie modum superant beneficii Cumque in posterum tam ample dotatam, ad altiorem Dignitatem sese senserit assurgere Academia, eos quotidie reportabis honores, quos insignissimae pietatis Filiis solet praestare, Tibique ex parte jam velit oblatos.

Clarissime Vir
Gratissima Mater
UNIVER: OXON.

Datum è domo nostrá
Convocationis
Junii 4° 1683.

A panegyric upon Ashmole was also drawn up officially apparently for entry in a book of benefactors.[1]

In the middle of September, 'when the elaboratorie was quite finisht certaine scholars went a course of chimistrie', as described in vol. i, p. 47. 'These had meetings in the large room over the elaboratory every Friday, in the afternoone to talke over chymicall matters, and were framed into a solemn meeting on Oct. 26—see ther.

The said meeting in September being noised about, others were added to them, and on Friday Oct. 26 they framed themselves into a solemn meeting, had discourses, and the discourses were registered down by Dr. Plot. The persons that met:

[Then follows the List printed on p. 47 of vol. i].

In Dec. following was such a *conventus* set up at Dublin.'

The first detailed description that appeared in print of Ashmole's Museum, built by the University of white hewn stone, and sash'd like our modern houses,[2] was published in Edward Chamberlayne's *Anglia Notitia*, 1684,[3] a work that must have been in print *before* 1684, because the election of proctors in April 1684 is included in the Errata. It is not unlikely that the account was supplied by Dr. Plot.

1 MS. Rawl. D 912, f. 670.
2 T. Salmon, *Present State of the Universities*, 1744.
3 Hope Adds. 183.

'Yet the newly erected *Musaeum* in *Oxford* cannot well be passed over, without some brief account thereof.

The *Musaeum*, a large and stately Pile of squared Stone, was built at the Charge of the University, who found such a building necessary, in order to the promoting, and carrying on with greater ease and success, several parts of useful and curious Learning, for which it is so well contrived and designed.

It Borders upon the West end of the Theatre, having a very magnificent Portal on that side sustained by Pillars of the Corinthian Order with several curious Frizes, and other Artificial Embellishments. The Front about sixty Feet is to the Street, northward, where is this inscription over the entrance in guilt Characters Musaeum Ashmoleanum, Schola Naturalis Historiae, Officina Chimica. The first foundation was laid on the 14th of April 1679, and it was happily finished on the 20th of March 1683, at which time a rich and noble Collection of Curiosities, was presented to the University by that excellent and publick-spirited Gentleman, *Elias Ashmole* Esquire, a person so well known in the world that he needs no further elogium in this short Narrative, and the same day there deposited, and afterwards digested, and put into a just series and order, by the great care and diligence of the Learned, *Robert Plott*, Doctor of Laws, who at the worthy Donors request is entrusted with the custody of the *Musaeum*. By the beginning of May following, the Rarities were all fixed in their distinct Cabinets and places, and the room furnisht in every part of it: But it was not opened publickly, till after the 21 day of that month. On which day their Royal Highnesses, the Duke and Dutchess of *Yorke*, and the Princess *Ann*, with a great number of Earls and Lords, and other Persons of quality, who either accompanied their Royal Highnesses to *Oxon*, or came to pay their Devoires to them, and shew the greatness and sincerity of their Zeal to the Royal Family, were first entertained in it, and at the Entrance were received with a sett speech by Dr. *Plott*: the Vice-Chancellour, the Lord Bishop of *Oxon*, the Doctors of all Faculties, and both Proctors, attending in their Formalities; which being ended, they proceeded to take a particular view of the chiefest Curiosities, and afterwards were pleased to accept of a Banquet, prepared for them at the Charge of the University.

A brief description of this Building is as follows.

It consists of ten Rooms, whereof the three principal and largest are public, being each in length about 56 feet and in breadth 25.

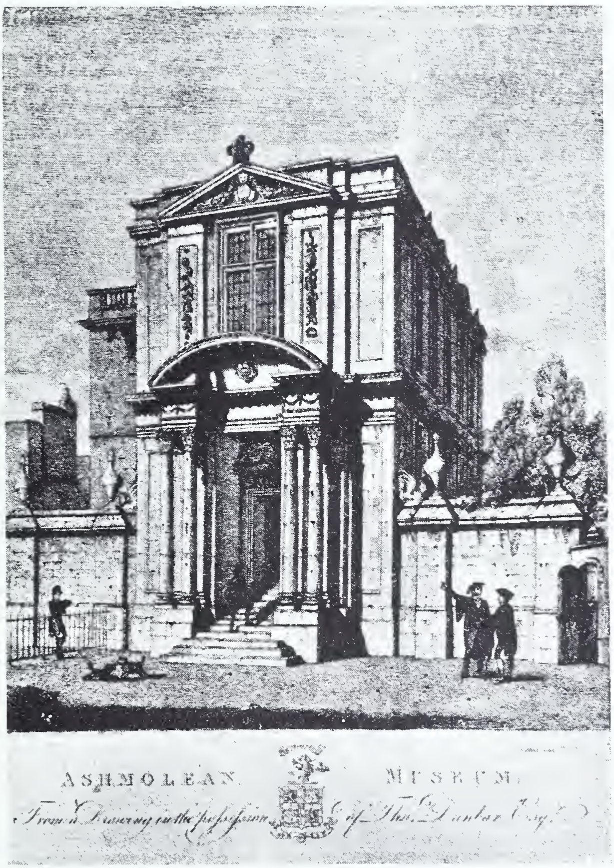
The uppermost is properly the *Musaeum Ashmoleanum*, where an inferior officer always attends to show the rarieties to strangers.

The middle room is the *School of Natural Historie*, where the professor of chymistry, who is at present Dr. *Plott*, reads three times a week, on Mondays, Wednesdays and Fridays, during the time of the chymical course, which continues an entire month, concerning all natural bodies relating to and made use of in chymical preparations, particularly as to the countries and places where they are produced, and found, their natures, their qualities and virtues, their effects, by what marks and characteristicks they are distinguished one from another, natural from artificial, true from sophisticated, with their several mixtures and preparations in trials and experiments, with the entire process of that noble art, verie necessary to the cure of diseases when carefully managed by learned and skilful persons.

The lower room, [a cellar] to which there is a descent by a double pair of stairs, is the *Laboratory*, perchance one of the most beautiful and useful in the world furnished with all sorts of furnaces and all other necessary materials in order to use and practice, which part is with very great satisfaction performed by Mr. *Christopher White*, the skilful and industrious operator of the University, who, by the direction of the professor, shows all sorts of experiments chiefly relating to that course, according to the limitation established by order of the Vice-Chancellor.

Neare adjoyning to the laboratory are two fair rooms, whereof one is designed for a *Chymical Librarie*, to which several books of that argument have been already presented.

The other is made use of as a *store roome for chymical preparations*, where such as stand in need of them are furnished at easie rates: the designe of this building being not onlie to advance the Studies of true and real Philosophy but also to conduce to the uses of Life and the improvement of Medicine.



Neare the *Musaeum*, [under the same roof,] is a handsome roome fitted for a *Library of Natural History and Philosophy*.

The other remaining rooms are the lodging chamber and studies of the keeper of the *Musaeum*, whereof one which is most convenient is sometimes employed and made use of for private courses of Anatomy.

Accessions are continually made to the *Musaeum* by several worthy Persons, as Dr. *Robert Huntington*, who hath given Hieroglyphicks and other Egyptian antiquities: Mr. *Aaron Goodyear* to whose generous favour they owe there an entire Mummy: and the eminently learned *Martin Lister*, Dr. of Physick, who has presented the University with a large Cabinet of Natural Rarities of his own collection, and several Roman antiquities, as altars, medals, lamps etc found here in England. So that it is justly believed, that in a few years it will be one of the most famous Repositories in *Europe*.

> With wonders fraught the bright Museum see,
> Itself the greatest curiosity!
> Where Nature's choicest treasure, all combin'd,
> Delight at once, and quite confound the mind;
> Ten thousand splendours strike the dazzled eye,
> And form on earth another galaxy.
>
> Tickell's *Oxford*.

For the first year and a half the Museum was conducted under the sole superintendence of Dr. Plot, but in Convocation on 19 Sept. 1684, the founder's Statutes and Rules, conveyed in a letter—'the letter is large'—dated at South Lambeth M. 1 Sept: were read 'for the right setling the Musaeum'.

The version printed below is in the final form approved by Ashmole in 1686.

Statutes, Orders and Rules for the ASHMOLEAN MUSEUM *in the University of Oxford.*

Because the knowledge of Nature is very necessarie to humaine life, health and the conveniences thereof, and because that knowledge cannot be soe well and usefully attain'd, except the history of Nature be knowne and considered; and to this, is requisite the inspection of particulars, especially those as are extraordinary in their Fabrick, or usefull in Medicine, or applyed to Manufacture or Trade. I Elias Ashmole, out of my affection to this sort of Learning, wherein myselfe have taken, and still doe take the greatest delight; for w^{ch} cause also, I have amass'd together great variety of naturall Concretes and Bodies, and bestowed them on the University of Oxford, wherein my selfe have been a student, and of w^{ch} I have the honor to be a Member. Lest there should be any misconstruction of my Intendment, or deteriorating of my donation, I have thought good, according to the Acts of Convocation bearing date Jun: 4: A^{o}: 1683 and Sept: 19: An^{o} 1684 to appoint, constitute and ordaine as follows.

1. I Ordaine that the Vicechancellor for the tyme being, the Deane of Christchurch, the Principal of Brazenose, the Kings prophessor in Phisick, and the two Proctors, or their deputies, be Visitors of the said Musaeum.

2. That there be a solemne Visitation of the said Musaeum yearly, upon the Munday next after Trinity Sunday, at eight of the clock in the morning, to be continued by adjournment, as it shall be found necessary; wherein shalbe examined the state of the said Musaeum, both in reference to the diligence and fidelity of its Custody, and the accessions made from tyme to tyme by new donations.

3. That the whole donation already given or to be given be distributed under certain heads; and a number to be fixed to every particular; and accordingly to be registered in the Catalogue of them.

4. That the said Catalogue be divided into parts, according to the number of the Visitors, soe that the work of Visitation may be expedited, each Visitor comparing his part and seeing that all particulars are safe and well conditioned, and answering to the catalogue, as is done in the Visitation of the Bodley Library.

5. That beside the Catalogue which is to remain in the Musaeum, another to be in the hands of the Vicechancellor, for the preventing of fraude or embezelement; into which at the tyme of the Visitation, all the additions made in the precedent year shall be enterd: and that every future Vicechancellor shall be obliged to deliver the same Catalogue over to his successor, when he delivers to him his bookes and keyes.

6. That whatsoever naturall Body that is very rare, whether Birds, Insects, Fishes or the like, apt to

putrefie and decay with tyme shall be painted in a faire Velom Folio Booke, either with water colors, or at least design'd in black and white, by some good Master, with reference to the description of the Body itselfe, and the Mention of the Donor in the Catalogue; w[ch] Booke shall be in the Custody of the Keeper of the Musaeum under Lock and Key.

7. That if there be in the Musaeum many particulars of one sort, it may be lawfull for the Keeper of the Musaeum aforesaid, with the consent of three of the Visitors, whereof the Vicechancellor to be one, to exchange it for somewhat wanting; or to make a present of it, to some person of extraordinary quality.

8. That as any particular grows old and perishing, the Keeper may remove it into one of the Closets, or other repository; and some other to be substituted.

9. That all manuscripts given to the Musaeum, shalbe kept by themselves in one of the Closets, which shalbe called the Library of the Musaeum, to the end the Curious, and such other as are desirous, may have the view of them, but noe person to use or transcribe them, or any part of them, but only such as the Keeper shall allow or appoint.

10. That the Musaeum shalbe open, and attended by the Keeper or the Under-Keeper in the same manner and at the same tymes, as the Bodley Library is; and at other tymes if a particular or especial occasion shall require.

11. That the rarities shall be shewed but to one Company at a tyme, and that upon their being entered into the Musaeum, the door shalbe shut; and if any more Company or Companies come before they be dispatcht, that they be desired to stay below, till that other come forth.

12. That no part of the Furniture of the Musaeum, nor books out of the Library or Closet be lent unto or carried abroad by any person or persons upon any occasion or pretence whatsoever; unless to be delineated or engraved, for the preservation of its memory, in case it be perishable.

13. That the custody of the Musaeum during my lyfe to be at my appointment, who have at present nam'd doctor Robert Plott thereto, under the Title of Keeper,

with an allowance or pension to him and his successors in the same employment, not exceeding the sum of Fifty pounds per annum, the same to commence at Michaelmas One thousand six hundred eighty six, and to be deteyned by him out of the perquisites of the Musaeum. And in case of vacancies after my decease that then the nomination and disposal of the Keepership shall be in my widdow during her lyfe, and after her decease in the aforesaid Visitors or the Maior part of them.

14. That the Nomination and Removal of the Under-keeper shalbe in me during my lyfe, and after my decease in my Widdow during hers, and after her decease in the aforesaid Keeper and his successors, and at all tymes he shalbe under his and their survey and correction. And the said Keeper shall allow unto him a sallary out of the perquisites also, not exceeding the sum of fifteen pounds per annum, the same to commence at Michaelmas 1686. And further the said Keeper shall allow a person to sweepe and clense the Musaeum and Closetts, with such other things therein preserved as he shall appoint, a reward not less than forty shillings a yeare out of the perquisites also.

15. That a third person shalbe chosen by the said Keeper to be in readiness to perform the office of the Underkeeper, when and at such tymes as sicknes or other allowable occasions shall cause his absence; And that the said Keeper shall allow unto him for his particular service out of the aforesaid perquisites, so much money as he shall think convenient, and not exceeding the sum of five pounds per annum.

16. That at the tyme of each Visitation the Keeper shall render to the Visitors, a true and perfect account of all the profitts and Emoluments, that have been made or received in the preceeding year, by showing the rarities; the same annual account to end at Michaelmas before.

17. That a Honorary of six half guineas be yearely paid by the said Keeper upon the aforesaid Munday next after Trinity Sunday, into the hands of the Vice-Chancellor for the use of the said Visitors; to be layd out either in an entertainment, as is done in the visitation of the Bodley Library, or in gloves as is done to

the Visitors of the Savilian Lecture, at the choise of the said visitors, or the major part of them; and that this Honorary be paid by the said Keeper out of the profits by him received.

18. That the overplus of the said profit after the aforesaid Honorary and pensions and the allowance for sweeping and making cleane the room be discharged, shalbe deposited in a box or chest, to remain in the Library of the said Musaeum, with two different locks and keys, the one key to remain with the Vice Chancellor for the tyme being, and the other with the Keeper of the Musaeum for the tyme being; the said money to be layd out in painting or drawing such naturall bodies, as are neere perishing, and in buying more Rarities or Manuscript books, or other incident charges, but not in anything that doth not relate to the said Musaeum.

21 June 1686
E. Ashmole.[1]

These Statutes, orders and rules formed the basis of the INSTITUTA ASHMOLEANA which were printed as a broadsheet in 1714 and were signed by

Bernardus Gardiner *Vice-Cancellarius.*
Geo. Bristol *Dec. Aed. Christi.*
Rob. Shippen *Coll. Aen. Nas. Princ.*
C. Tadlow *Reg. Med. Profess. Dep.*
Cha. Gardiner *Procurator Sen.*
Sam. Newte *Procurator Jun.*

Meanwhile the praises of the Museum had been described in Latin verse by John Dolben, Student of Christ Church, and under the title *Musaeum Ashmoleanum* were printed in volume ii of the *Musarum Anglicanarum Analecta.*

Anthony Wood, who appears to have paid but little attention to the finest building erected in Oxford in his day, now came into closer relations with Ashmole and his father-in-law Dugdale. On Oct. 17 1684 Wood

[1] MS. Rawlinson D 868 endorsed '20 April 1738, purchased amongst Capt. Hatton's papers who was nearly related to Mr. Ashmole's widow by me R. R⟨awlinson⟩'. A true copy of the Statutes by Cha: Harrison is in MS. Rawl. D 912, f. 666.

went to London and on Monday 20th 'din'd with Mr. Ashmole at Little Lambeth and in the afternoone saw his MSS and other things'; and a correspondence followed. In 1685 Sir W. Dugdale died, bequeathing all his MSS and collections to Ashmole's Museum. The books arrived on 29 June 1686.

On Nov. 12, 1689, Plot resigned his professorship and was succeeded by Hannes of Christ Church, who on 7 July 1690 'made his inauguration-speech in the Musaeum . . . loco Plot'. And in the same month Ashmole paid his last and somewhat pathetic visit to his Museum.

'1690, July 15, Tuesday at night between 7 and 8, Elias Ashmole, esq., and his wife, came from the Bathe where he had been 10 weeks; came in a week condition —so feeble that he could not goe without leading. July 16, W., Fast day, after sermon, vice-chancellor with his beadles went to wait on him and to invite him to dinner the next day in the Musaeum. July 17, Thursday, vice-chancellor, Heads of Houses, and others to the number of 30 or thereabouts dined in the upper house of the Musaeum where the rarities lay. Mr. Ashmole was carried in a chaire or sedan; was placed at the end of that place; and, the Doctors standing about him, Mr. Edward Hannes of Ch. Ch., chymical professor, spoke a speech to him. Afterwards they went to dinner. Mris Ashmole, Jack Cross, and Mr. Sheldon dined togeather in Dr. ⟨Robert⟩ Plot's study. July 18, Friday, Mr. Ashmole and his wife dined with the deane of Ch. Ch.; and after dinner ⟨he⟩ gave them an entertainment of musick in dean Massie's chapel. July 19, Sat., dined with his wife at the provicechancellor's Dr. ⟨John⟩ Meer of Brasn. Coll. July 20, Sunday, in the Musaeum with Dr. ⟨Robert⟩ Plot. July 21, Monday, departed.'

It is a remarkable fact that several of Oxford's chiefest benefactors, e.g. Ashmole, Dugdale, Martin Lister, Wood, John Aubrey, did not leave their books and manuscripts to the Bodleian Library. They distrusted the Bodleian librarians. Parts of the Library were in a neglected state, and many valuable books were disposed of,—a proceeding that would not commend itself to would-be benefactors. At the present day there is a similar disinclination to give, because it is known that in so vast a library small special collections get buried away in inaccessible places, and are thus unavailable to the very students to whom they would be of most use.

Anthony Wood preferred the Museum to the Bodleian as a repository for his manuscripts.

> 'Item, I give and bequeath unto the University of Oxford, to be deposited in the Musaeum Ashmolaeanum, all MSS. of my own collection and writing, excepting such as are otherwise disposed of by me to the Bodleian Library. Also I give and bequeath to the Museum before mentioned, all my other MSS. whatsoever, now in my possession. Item, I give to the said university all my printed books, pamphlets and papers, to be deposited in the Musaeum, excepting such as are already in the Musaeum.' *Will* of A. Wood, dated 24 Nov. 1695, proved 23 Jan. 1695/6.

The books and MSS. were kept in the uppermost room in the building. The following mutilated inscription was found over the entrance, when the walls were cleaned down in 1924:

> LIBRI IMPRESSI ET MANUSCRIPTI E DONIS CLARISS:
> VIRORUM D. ELIAE ASHMOLE ET MARTINI LISTER,
> QUIBUS NON PAUCOS ADDIDIT VIR INDUSTRIUS
> NEC [INFIME] DE RE ANTI[QUA MERITUS
> . . . .

The fourth line, restored by Prof. W. A. Craigie, and the remainder of the inscription were removed about 1910 when a new door was inserted and a useful room spoiled. The next line probably referred to ANTHONY WOOD, one of our foremost benefactors. The inscription may have been put up about 1700. It is a pity it could not have been permitted to remain.

The scientific reputation of Dr. ROBERT PLOT, who had taken the degree of D.C.L. in 1671, was made by his magnum opus, the *Natural History of Oxfordshire*, printed in 1677 at the Theatre in Oxford, with an imprimatur signed by the Vice-Chancellor Ra: Bathurst on April 13, 1676. It is the only work on the subject published by the University Press. Its influence was immediate and far-reaching. Not only was its author always referred to with deference as the 'learned Dr. Plot', but it may well have confirmed Ashmole in the belief that Oxford was the heaven-appointed place for his collections; the book certainly sharpened the perceptions of members of the University and conduced to the appreciation of natural objects. In a word, we see in Dr. Plot and his book, author and instrument, the probable determining factor in Ashmole's offer of his collections at that time, in their acceptance by the University, and in its handsome contribution for a comely building. Cause and effect, means and end, seed and fruit, cannot be disjoined; for the effect already blooms in the cause, 'the end pre-exists in the means, the fruit in the seed'.

Plot's reward soon followed the completion of the building. Honours, though not of a lucrative nature, were heaped on him. He was appointed Keeper[1] in 1683, but only held the post until 1690, when he retired. In 1683 he had been made Ashmolean Professor of Chemistry, and by reason of the pressure of new duties in Oxford he had felt it necessary to resign the Secretaryship of the Royal Society in London in November 1684, a post to which he had succeeded in 1682. W. Musgrave was appointed in his place. Plot, who was then forty-three years of age, may have found that he was not well able to attend both to secretarial duties and to work in Oxford after long days in the saddle. The journey to London and back in a public carriage consumed much time. Between 1660 and 1669 a diligence ran from Oxford to London in two days. The passengers slept at Beacónsfield. In 1669 a Flying Coach started from All Souls College at 6 a.m. and reached the capital at 7 p.m. The cost was about twopence-halfpenny a mile. At the very least, attendance by an Oxford man at a meeting of the Royal Society would consume a large slice of a working week. The cost and trouble of the journey was taken into consideration in the case of Oxford men proposed for admission to the Royal Society. During the earlier months of 1683 Dr. Plot made many presents of minerals to the Repository of the Royal Society,[2] and when he became Keeper of the Ashmolean Museum he wrote a letter to Dr. Huntington

[1] 'Custos primarius ac primus' he called himself in the Book of Benefactors of the Ashmolean.

[2] Birch, *Hist. Royal Soc.* iv, pp. 185, 189, 199, 200, 207, 208, 211, 224.

of the corresponding Philosophical Society of Dublin, promising to procure for the latter society all the duplicates that could be spared from among the rarities of the Museum Ashmoleanum. This he could do under Sect. 7 of the Founder's Statutes.

Other collections of scientific objects soon gathered round those which had been presented by the founder. The University could hardly have found a more enthusiastic custodian than its first Keeper, Dr. Plot, for although he seems to have been a man of somewhat unusual character,—Edward Lhwyd, his assistant and successor, credits him with as bad morals as ever characterized a Master of Arts,[1]—yet his energies all turned to the profit of the Museum. The jealous even declared that 'his acquisitiveness was such as to disgust some of his fellow antiquarians'. But he was one who gave ten-fold more than he received, and he had many friends, and was intimate with Pepys and Evelyn.

Many writings testify to the love with which he threw himself into his task. Among the manuscript books begun in his time, relating to the early history of the Museum, there are still extant

> Book of Benefactors 1683–1766.
> Visitors' Book 4 Aug. 1684–Michaelmas 1696.
> Catalogues i. 'Liber Dni. Decani Aedis Xti. 1684-90'.
> ii. Liber Dni Vice-Cancellarii, [before 1687.]
> [Both in Plot's holograph.

An important accession was received in 1685, when Martin Lister presented his collections of shells to the Museum, with the original drawings—over a thousand in number—made by his daughters Susannah and Mary for the *Historia Conchyliorum*. Lister (1638?–1712) had originally been at St. John's College, Cambridge, but was created an M.D. of Oxford in 1684.

Plot retired after seven years' service, in 1690, and added his own considerable collections of fossils in the following year. His friend Charlett, then Fellow of Trinity and afterwards Master of University College, tried to revive Plot's interest in Oxford science but in

[1] Nicholls, *Illustr. of Lit.* ix, 547.

vain. Plot replied to him from London on February 16, 1691/2.

Deare Friend!
Yors of the 9th instant was very welcome to me, tho' it brought proposalls never like to be answer'd by me, especially that of publishing a volume of MSS. out of the Museum, or a new Edition of Pliny's Nat. Hist. either of which would be works agreeable enough to me; but where can they possibly be well done but at Oxford, which I have now left & cannot returne without a family, which here is no charge to me but would be a great one there. . . .

R. Plot.

And on March 26, 1694, he intimates his intention of taking a country cottage in Kent

. . . and there spend the remainder of my life in planting etc, which I hope will be something better than sitting still and doeing *nothing for nothing*. I have little news to send you, but that I received this week a Letter from Dublin from Mr. Wm. Molyneux, bringing me the good news of their revivall of their weekly meetings of the Dublin Society; I most heartily wish I could hear the same from Oxford: I am sure Dr. Wallis and yourself might easily doe the thing, would you cordially get about it, and if so, you may be confident of a greater correspondence even from hense, than the R.⟨oyal⟩ S.⟨ociety⟩ itselfe. If you have occasion to write to me whilst in Kent, remember to direct to me at my house at Borden near Sittingbourne in Kent, and it will certainly come to the hand of Yr most faithfull Friend & humble servt. Rob. Plot.

He describes his cottage in a later letter of July 4, 1695, and projects a work on the natural history of the sea coast (f. 42). There are two portraits of Plot in Oxford: one a head in the New Ashmolean, the other a full-length in the Bodleian Library.

In 1690 Plot was succeeded by Edward Lhwyd (1660–1709), of Jesus College, 1682, who had served as Under-keeper to Plot from 1684 to 1690, and left libellous statements about him. At this time the policing of the Museum was inefficient, and a successful robbery occurred in the summer of 1691. Lhwyd appears to have been much distressed and to have endeavoured to catch the thief in London. In the hope of tracking him, he wrote to the well-known collector Charleton, who has already been mentioned as the buyer of specimens from Mrs. Tradescant.

Hon^{d}. S^{r}. Having lately had ye unfortunate mischance of being rob'd at ye Museum; I doubt not but you will pardon the boldnesse I take in troubling you with these papers, & also take upon you some trouble to enquire amoungst your acquaintance concerning the person suspected & ye things lost. I can say no more of ye gentleman I suspect than what ye papers inclosed contain. I am told one Mr. Alexander Brown in Gerard St is a person suspected of sometimes receiving such commodities.

Mr. Beverland also advises to enquire at Mr. Godfrey Knellers in Covent Garden, a painter. He says Dr. Pragertus at ye Latin Coffee house in Ave Mary lane knows most outlandish men. One Beaulieu, a French Bookseller, over against ye Church in St Martins lane,—he says may be like to give some intelligence. He allso gives me ye following names, persons he says well known to all curious men about London. Mr. Gibson, Mr. Gibbons, Mr. Cooper, Mr. Millington, Mr. Smith & Mr. Peet at ye Black boy in St. Pauls Churchyard. You may perhaps think of fitter places to send ye enclosed papers, or other means of Discovery. I suspect that (if this man took them) he'l convey ym beyond seas, as soon as possible. Mr. Beverland tells me Brown is a suspicious man & must not be made acquainted with what is lost. What payns you'l please to take herein, I shall not think myself able to retalliat, but shall assuredly endeavour it as long as I live. I am Hon^{d}. S^{r}.

Y^{r} most obliged servt.

Oxf. Sept 25 [1691] EDW LHWYD.

I writ a hasty letter abt this, yesterday to Dr. Lister, having but little time, and that full of confusion. I am afraid Mr. Ashmole will be implacable.

Since my last I am much confirmed in my suspicion of ye outlandish gentleman. He lay at ye best Inne in Oxfd five nights; from whence he took Abingdon Road for Lond. last Monday morning. . . . Every valuable small curiosity yt he saw & commended is gone . . . He calls himself a Dutchman.

He was supposed by his speech to be a German, but speaks tolerable good English & Latine, between 40 & 50 years of age, a pretty corpulent man with a red full face, a long periwig, a white coat pretty much worn, he hand[ed] a G. woman at Oxon about 3 or 4 months agoe, & saw & commended the things then which are now lost. . . .

(Lhwyd's letters to Wm Charleton.)

The fees received from visitors to the Museum were entered in an Account book which is an important source of information as to the early management of the institution during the keeperships of Plot and Lhwyd. The following are a few of the entries selected as samples:

Money received for shewing the Repository per Obad. Higgins.

		s. d.
August ye 4th 1684	a Company paid	00 00 06
5th	a Gentellman paid	00 01 00
	at 7 clock a com⟨pany⟩	00 02 00

1684/5 of the Lord Gray 4*s.*
of some outlandish man 3*s.*
of a gentle woman 2*s.*
of My Lord of Abingdon 5*s.*
of a gentleman commoner with Mr. Bateman 6*d.*
of some Lady with Mr. Charlet at 4 5*s.*

1687 Aug. 5. 2 h. Of one Mr. King yt belongs to ye Heralds Office who sayd he came from London purposely to consult Sr Wm Dugdale's Books 1*s.*
Some lady with the Warden of New College 5*s.*

Sept. 24. Some lady with Dr. Aldridge at 9 10*s.*

Ladies generally paid at a higher rate than 'companies', and the charge varied with the time of day at which the visit was made. At Michaelmas the account was balanced and the profits divided, as on 'Sept. ult. 1687. Memorandum that the Monies recd in ye Museum fro Michs 1686 to Mich 1687 was divided according to Statute by us Rob: Plot, Obad: Higgins.' Sometimes a visitor was admitted free.

Apr. 16. 1691. Of the Earl of Anglesey with 3 other Gentlemen 0 0 0

In that year the total perquisites came to £38 2*s.* 6*d.*

On the other side of the account we find the disbursements.

An accompt of money laid out for my Master beg. the 2 March 1685 candles 6*d.*, bread 2*d.*, prunnes 6*d.*, meat 3*d.*, cook 10*d.*, loaf 2*d.*, smal bear 2*d.*, milk twice 4*d.*, etc etc.

Recd. Obad: Higgins.

'Mending your gloves 2*d.*' and 'chimney money' 5*s.* and other items all illustrate the services rendered by Obadiah to Dr. Plot. After the advent of Edward Lhwyd, we find 'for sweeping ye Romes one shilling', 'for sweeping 0*s.* 8*d.*', 'for mending ye Italian lock 1*s.*' In 1692 they paid for the Carriage of Lister's Map of Muscovy and Book of Shells 1*s.* and for Canvas and Pasting ye same map 5*s.* 'Ye scrivner for entring names of benefactors' received 5*s.*, and payment was also made to 'ye painter for Mr. Aubry's Arms', but where he painted them is not stated. 'Graveing ye large Cocklestone', presumably in the Lister collection, cost 1*s.* In 1694 we find 'Porter for Mr. Aubry's box 6*d.*', 'Carriage of Dr. Lister's books 9*s.* 6*d.*', 'Scrivner 5*s.*', 'For Sweeping ye Room £1', Visitors fees £3 6*s.*

After five years' residence at the Ashmolean, Lhwyd discovered the keepership of the University Museum to be 'a mean place, seeing there is no salary', and all along he had to depend for his subsistence on the fees paid by visitors for seeing the curiosities. In 1695 he planned a tour in Wales to collect specimens for the Museum. To this end he issued a circular inviting subscriptions for a five years' antiquarian and scientific tour; and, following Plot's example, issued a questionnaire entitled 'Parochial Queries in order to a Geographical Dictionary and Natural History of Wales by the Undertaker, Edward Lhwyd'.

Lhwyd was a geologist; his first and most important work, *Lithophylacii Britannici ichnographia*, see p. 222, was published in 1699. It is a methodical catalogue of the figured fossils in the Ashmolean Museum. Lhwyd expected that the University would have borne the charges for printing, but they did not, and eventually 120 copies only were produced at the cost of Sir Isaac Newton, Sir Hans Sloane, and a few other learned friends. It was a hurried and inaccurate production, which is hardly surprising seeing that he prepared the work in Montgomery and not in the Ashmolean. His five years in Wales were doubtless laborious, but Oxford did not love those who remained away overlong from her repositories of stagnant learning, even though she did not pay them to stay. And in this case the Vice-Chancellor's accounts appear to have been debited with sums that the Keeper of the Ashmolean Museum might have either earned or saved.[1] Lhwyd's services

[1] *Notes from V.C.'s Account Books kept in the Archives.*

1696	To Francis Clarke, Scrivener for transcribing several Papers	£2 2 0
1697	For transcribing a Catalogue of Rarities deposited in the Musaeum for the use of the Vice Chancellor	£3 0 0

were evidently required in Oxford. James Sutherland, writing to Richardson from Edinburgh on Nov. 9, 1700, said

> I am beginning to collect Naturall Curiosities and am promised Mr. Lhwyds Bounty and Assistance when he returns to Oxford: there are also severall young Scotch Surgeons that have been my Scholars at the Physick Garden and are now imployed in Ships tradeing to many forrain Countrys, that assure me of their help as to Seeds, Shels, and what else they meet with that is rare.[1]

On his return Lhwyd appears to have introduced a badly conducted, raw Scottish serving lad of the name of William Maccullum, who seems to have been so incorrigibly lazy or disobedient that Lhwyd imposed a tariff of sconces or forfeits. It would take too much space to transcribe all the crimes recorded against the poor Scot, and in some years the fines must have totted up to more than his wages. The following are perhaps a fiftieth of the entries between 1703 and 1708.

For not coming to his work til eight a clock in the morning	4*d.*
For absence from writing in his Latin Bible	6*d.*
For leaving the doors of the Laboratory & Bedroom open, not lighting a candle nor coming in til past ten at night	1*s.*
For neglecting to make the Bed	6*d.*

The sconces for 1707 came to £9 2*s.* 0*d.* Clearly a fiery little Welshman, as Lhwyd seems to have been, was no fit mentor for a raw lad from the Highlands.

Lhwyd returned to duty in 1701, when the University gave him the degree of Honorary M.A.; and, to secure his residence in Oxford, made a condition that he should read six solemn 'lectures' upon natural history, one every year, during the space of six years. He described himself as *Cimeliarcha*. In 1708 he was elected a Fellow of the Royal Society, but only lived into the following year. He supplied materials for the works of others. Ray's *Synopsis Stirpium*, Lister's *Conchyliorum*, and Baxter's *Glossary* all benefited by his labours: the last-named included his posthumous tract *De Fluviorum, Montium, Urbium* etc. *in Britannia nominibus.*

[1] *Richardson Correspondence* in the Bodleian.

During Lhwyd's absence the Museum was visited by Benthem in 1694, an intelligent traveller whose impressions are always worthy of record, but in this case they were evidently based on Chamberlayne's account, already quoted.

To the West of the Sheldonian Theatre is the beautiful Musaeum. It was built at the cost of the University in 1683 and has a very 'magnific portal' facing east. The front towards the street faces north and bears over the door a superscription in letters of gold: Musaeum Ashmoleanum, Schola Naturalis Historiae, Officina Chymica. For though it was built out of the common Fund of the University, it is called the Ashmolean because the noble and celebrated Mr. Elias Ashmole gave many *curieuse* and rare things. The Upper Room is the Musaeum Ashmoleanum proper, where there is always some one about to show the rarities to strangers. Among other things shown are the picture of a man who lived to be 152 years old; Henry VI's iron cradle; Anne Bullen's straw-hat;[1] the episcopal mace of Augustine the Monk; many *Hieroglyphica* and other Egyptian antiquities presented by Dr. Robert Huntington; a whole mummy; and all kinds of rarities such as Roman altars, Money, lamps etc, found in England, and collected by Martin Lister, a doctor of medicine.

The Middle Room is the Schola Naturalis Historiae, where the Professor of Chemistry Dr. Robert Plot, holds forth thrice a week, on Mondays, Wednesdays, and Fridays, for a whole month on chemical matters.

Below is the Laboratory where Mr. Christopher White shows all manner of *Experimenta* on request. Next door is a library of chemical books, and a large quantity of prepared chemicals which may be purchased for money.

And again a Saxon physician, Christian Heinrich Erndtel, reported on the Museum in 1706.[2]

I had letters also to Mr. Edward Lluyds, Keeper or Inspector of the Ashmolean Museum, and though he was absent, his Servant show'd me all the rarities . . . it received

[1] Also noted by Zedler in 1739.

[2] Ch. Ed. (= C. H. Erndtel), *The Relation of a Journey into England in 1706*. London 1711. Erndtel had previously been in London and had seen the large and curious collections of Animals, Plants, and Fossils in the Hands of Mr. James Petiver, Mr. Dandridge, Mr. Dubois, Mr. Stonestreet, Mr. Buddle, Mr. Parry, and at the Royal Society.

a considerable Augmentation from the gift of my Lord (*sic*) *Huntington* who was Master of many *Egyptian Antiquities*; likewise Dr. *Martin Lister*, adorn'd this Musaeum with a large Collection of Natural Rarities, but what is most worth your Sight, is an entire *Egyptian Mummy* which Mr. *Goodyear* lately gave to this Treasury of Nature.

A further appreciation was printed in 1714 by J. Ayliffe of New College, in *The Antient and Present State of the University of Oxford*, which was publickly burnt by the order of V.-Chancellor Gardener, and on Feb. 4, 1715, Ayliffe was expelled the University.

This Museum is a large and stately pile of squared Stone Building, erected at the Charge of the University, which found such a building necessary for the promoting and carrying on with greater Ease and Success, several Parts of useful and curious Learning in Physick and Natural Philosophy, for which it is excellently well contrived and designed.

It borders upon the West End of the Theatre, having a very magnificent portal on that side, sustained by Pillars of the Corinthian Order, with several Frizes and other artificial Embellishments. The front Northward to the Street is about 60 feet in length.

Then follows the paragraph already printed on p. 312, beginning 'Accessions' and ending 'Europe', to which Ayliffe adds,

The Rev. Dr. Pound has also given hereunto many excellent collections of Plants and Animals brought with him from China, and preserved in Spirits of Wine, etc. The present Keeper hereof is Mr. David Parry of Jesus College, appointed thereunto by the Vice-Chancellor.

During the eighteenth century the Keepers of the Museum slept, and their charge fell into the condition of a dusty and neglected curiosity shop, which 'seldom seemed to occupy the time or thoughts of the Curators'. In 1714 David Parry was succeeded by John Whiteside of Brasenose College.

About 1726 Thoresby was much pressed to give a part of his collections to the Ashmolean, but he refrained from promising it till he saw 'how it please God to dispose of me as to marriage, posterity etc.', and Hearne thought it proper that the Thoresby collection should be joined with Sir Hans Sloane's, rather than come to 'Ashmole's Baby-house', as Young[1] termed it, in Oxford.

The Museum was evidently in a thoroughly degraded state, and the natural history specimens were not the only objects to be neglected. The collection, wrote Hearne, 'is not equal to what might be expected from such a Repository. Many years ago a catalogue of the medals, drawn up first by Mr. Ashmole, and afterwards continued by myself, was proposed to be printed, but 'twas judged after all better not to print it.'

When in 1730 G. HUDDESFORD, President of Trinity, was elected Keeper of the Museum at a salary of £50 a year, 'whether he do any thing there or not', Sir Hans Sloane was greatly annoyed, and determined against giving the University £20,000 which he had intended for it. Hearne, from whom this statement has been taken,[2] is to be regarded as a benefactor, for by communicating his vexations he may have put it into the mind of his friend Rawlinson to endow the Keepership with an extra stipend of £75 per annum (1755).

Feb. 22, 1731/2. Tho' Mr. John Andrews, Fellow of Magd., who is now Bach. of Div., was elected keeper of the Ashmolean Museum on Wed. April 14 last, and put in possession of his Place by the V.-Chancellor on Saturday following, being April 17, yet Mr. George Hudsford, now President of Trin. College, having got three of the Hands of the Electors (there being but six in all) Dr. Shippen, Principal of Brazen nose, who was one of those three, the Bp of Bristol (Dr. Bradshaw) and the Professor of Physick (Dr. Woodford), being the other two, was all along so restless, that he did all that possible [*sic*] he could to get Andrews out, and accordingly he (by a most roguish Trick) prevailed with Mr. Battely of Xt Church & with Mr. Foxley the two Proctors at present, to put their hands to Hudsford's Paper, who by this means had now five Votes, tho' certainly in equity the present Proctors' votes in this Case ought not to be regarded in opposition to those of the former Proctors, when the Election was made. This matter so frightened Andrews and indeed the Vice-Chancellor himself, Dr. Butler, did not stick by him (being, without doubt, of Dr. Shippen's mind, whatever outside is put upon it)

[1] E. Young. *Love of Fame,* Satire iv.
[2] Hearne, *Collections,* Oct. 2, 1733.

that on Monday the 14th of this instant Feb. he went to the President of Trin. Coll. with Dr. Shippen, then Pro-Vice-Chanc. (the Vice-Chanc. himself being absent at London, tho' without dispute he had as a blind left this to Shippen's management) and surrendered the Keys to him, & on Saturday last, being the 19th inst. the President paid Andrews fifty pounds on that account, a plain argument that he allowed Andrews to be the rightfull keeper, tho' the Invalidity of his Election had been questioned, as having but three votes, it being pretended that the V.-Chanc. hath no power of calling a meeting, nor of doing more on the occasion than either of the other Electors. This is an astonishing affair that the University rings of & 'tis supposed 'twill be of very pernicious Consequence. For tho' Andrews be not qualifyed with respect to Skill, yet as he was elected, he was so far the statutable keeper, and the V.-Chanc. should have stood by him, and not have so tamely agreed with Shippen (commonly called Ferguson) to bring in an Head of an House. But fifty libs. a year being, since Mr. Whiteside's death, settled upon the Keeper, be he where he will, 'tis designed to be a perfect Sine-Cure, & nothing is to be done by the Keeper for the honour of Learning, unless he have a strange inclination to Learning, & will follow it himself of his own natural Genius. As for Dr. Shippen, as he is a strange lover of Women, he used, & does still use, to go often to Huddesford's wife, a very pretty Woman, and 'tis on that account partly that he was so zealous for Hudsford, who is a man reputed to be tinged with ill principles both in Religion as well as Policy, being known to be a Whig, & they say one of the Promoters of those vile opinions, that are propagated in Trin. Coll. for wch one Stephens was lately expelled there.[1]

Years passed by without any accessions of scientific importance, but in 1749 'The Orders and Statutes of the Ashmolean Museum', referred to on p. 312, were printed and hung up in the Museum, and in Mr. Ashmole's and Wood's libraries. Among the names of donors given in the Benefactor's Book is that of Thomas Shaw, the eastern traveller, who gave a collection of local insects in 1716, and in 1751 bequeathed his collection of natural curiosities.

Oxford was not the only centre to neglect the study of nature. Edinburgh in 1772 was in even a worse state, for Pennant reports that the museum there was 'totally

[1] Hearne, *Collections* xi, *Oxford Hist. Soc.* lxxii, p. 31.

empty', the noble collections of Sir Andrew Balfour and of Sir Robert Sibbald (1697) having been made away with. At Oxford, according to another authority,

'Nothing can equal the negligence with which the Ashmolean Museum was kept. The librarian being one of the Heads put in a scholar for 5*l.* who made a perquisite of shewing the curiosities, which lay in the utmost confusion. Lhwyd's fossils were tumbled out of their papers, and nobody regarded or understood them till his catalogue of them was republished by Mr. Huddesford the late librarian, son of Dr. Huddesford.'[1]

William Huddesford certainly took a certain amount of trouble about the collections, and several important gifts were received during his term of office. His official correspondence is preserved in MS. Ashmole 1822 from which the two following extracts are taken:

'I cannot help expressing the pleasure I have in hearing yt you earnestly apply yourself to the Digesting into some order the confus'd heap of natural Bodies which are under your care in the Musaeum. You are no stranger to my having long wish'd to see that Repository in order.'
Smart Lethieullier to W. Huddesford, Dec. 29, 1755.

'I cannot conclude this letter without acquainting you with the infinite satisfaction I lately had in seeing the great improvements you have made in the Museum since it has been under your care.'
A. C. Ducarel to W. H., May 18, 1768.

We have no record of any doings of importance by William Sheffield, the Provost of Worcester, who succeeded the second Huddesford in the keepership in 1772. And William Lloyd, B.C.L. of Wadham, is said to have been a retired, quiet (not to say idle) gentleman having no pretensions to science or scholarship; seldom, indeed, coming out of his lodgings in Holywell, where he amused himself in what his neighbours called 'strumming' on his harp. Dunbar 'held to' the place for seven years, but made no effort to improve what he found in so neglected a state.

Philipps, mathematical tutor of Magdalen, had not 'the heart to cleanse the Augean institution, nor face enough

[1] Gough, *British Topography*, 1780, p. 134, note. For a rather later mention see Wendeborn, *Zustand des Staat*, 1788.

to keep so unsatisfactory an office', and relinquished it at the end of a year. But then the golden age of the Institution commenced under the auspices and through the taste, care, and liberality of the brothers Duncan.

After all these years of neglect, a Fellow of New College, JOHN SHUTE DUNCAN, was made Keeper in 1823. His beneficent activities have been described by one who knew him. 'He found that the skins of animals collected by the Tradescants had fallen into total decay, that cabinets for those objects which were liable to injury from time were wholly wanting, and that the apartment dedicated to the exhibition of them had become much dilapidated. Happily at this time a taste for the study of Natural History had been excited in the University by Dr. Paley's work on Natural Theology, the popular lectures of Dr. Kidd on Comparative Anatomy, and those of Dr. Buckland on Geology. Availing himself of this spirit, the curator induced the trustees to sanction an application for a general repair of the Museum. Their wish was seconded by the liberality of Convocation. When the upper room had been thus repaired, and put in its present condition, the next step of the new curator was to fit it up with cabinets; in which he might arrange in proper order what he found in a very confused state in the Museum, and might place therein such objects of natural history, or curiosities, as were purchased by himself, or which might be given by future benefactors.'

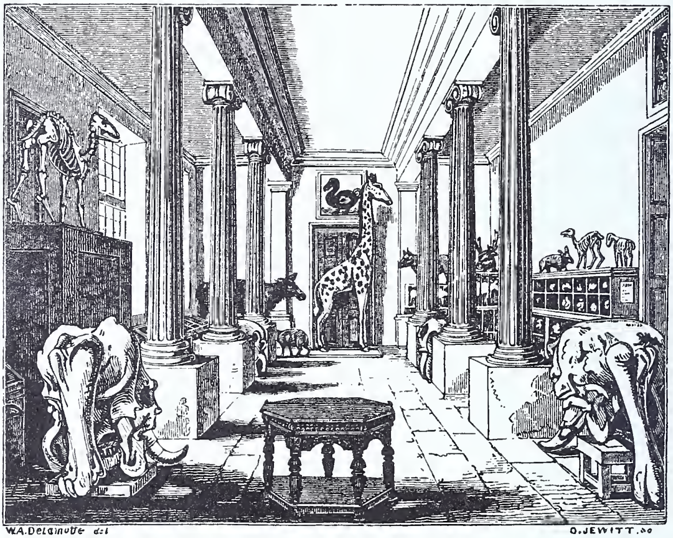
And right generously did he continue to add to the collection of specimens, spurred on by the hope 'of continually exciting a remembrance of the pious works of Derham and Paley'.[1] He was the author of ephemeral works, *Botano-theology*, 1825, and *Analogies of Organised Beings*, 1831. Dr. and Mrs. Vernon have justly pointed out that at this period in Oxford, zoology was for 'instruction and amusement', mainly for the latter, and for the former so far only as it subserved a theological purpose.[2]

On John Duncan's retirement in 1829, he was succeeded by his brother, PHILIP B. DUNCAN, who may be described as the last of the real Keepers of the Scientific

[1] J. S. Duncan, *Introduction to the Catalogue of the Ashmolean Museum* [Oxford 1826]. No more was published.
[2] Vernon, *A History of the Oxford Museum*, p. 37.

Collections of the University. Even during his tenure of the office some of the collections became detached from his charge, and by their passing into that of the teaching professors of the respective Sciences, a system began that has proved very costly to the University, as well as detrimental to the collections.

In December 1830 it was agreed that when the geological and physical collections and apparatus should be



W.A. Delamotte del. O. JEWITT sc.

The School of Natural History in 1836.
From Ingram, *Memorials of Oxford.*

moved to the Clarendon Building, the rooms vacated should be left for the more convenient display of various articles belonging to the Ashmolean Collection. In 1832 the newly vacated rooms on the middle floor of the Ashmolean were thrown into one large room, and the floor above was propped by some Ionic pillars. Here the indefatigable Duncan set out part of the Zoological Collections of the University, the rest being arranged systematically in the upper room, with the ethnographic collections of Reinhold Forster, Capt. Lyon, Capt. Beechey, Lieut. Harding, Lieut. Cole, W. Burchell, and

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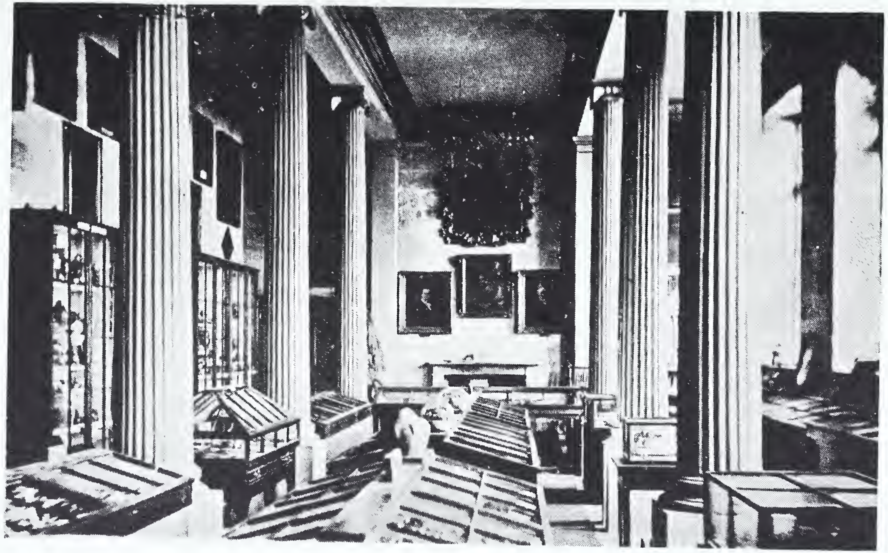


THE SCHOOL OF NATURAL HISTORY *c.* 1860–70

The arrows mark the Borlase Cabinet for Minerals

other travellers. It was during the early years of Philip Duncan's Keepership that Darwin was an undergraduate at Cambridge.

The régime of the Duncans was marked by their generosity. Even after his resignation of the Keepership John Duncan continued to give specimens and cabinets to the Museum. The new catalogue printed in 1836 shows how greatly the University benefited 'from the grateful affection and attachment of the most devoted of her sons'.

In January 1840 the practice of charging admission fees was discontinued, and the University made a grant of £80 per annum, ordering that members of the University were to have free admission. In June 1849 Baden Powell asked for rooms under the Ashmolean.

Philip Duncan's long tenure of the Keepership—nearly twenty-eight years—came to an end in 1854,[1] and JOHN PHILLIPS, Professor of Geology, then became Keeper.

X

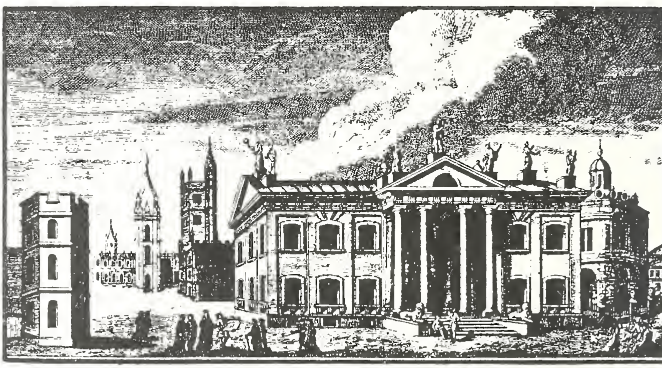
THE CLARENDON SCIENCE MUSEUM

The New Printing House, as it was first called, took the place of an earlier Printing House (see p. 300, note) and was erected by the University out of profits arising from the sale of Lord Clarendon's *History of the Rebellion*. Building operations began in 1711, W. Townsend being the architect. In 1712 the workmen began to remove their cases of type and utensils from the old Printing House to the Sheldonian Theatre, where they continued to work until their new office was ready. The University Press was again moved to new quarters in Walton Street in 1830, and in December of that year it was agreed that the Geological Collections and the Physical Apparatus should be moved from the Ashmolean Museum into recently vacated rooms in the Old Claren-

[1] Two years before the end of Duncan's long tenure of the Keepership, he served on a committee, headed by Sir W. Hooker, to invite subscriptions to restore the tomb of the Tradescants, previously repaired in 1773. The original circular may be consulted in the Bodleian, Oxon. c. 68.

don Building. In June 1831 Rigaud and Buckland both wrote to the Vice-Chancellor about furnishing the rooms, and in 1832 the former moved the apparatus for Experimental Philosophy from his lecture room in the Ashmolean and continued his lectures in more ample quarters in the Clarendon Building.

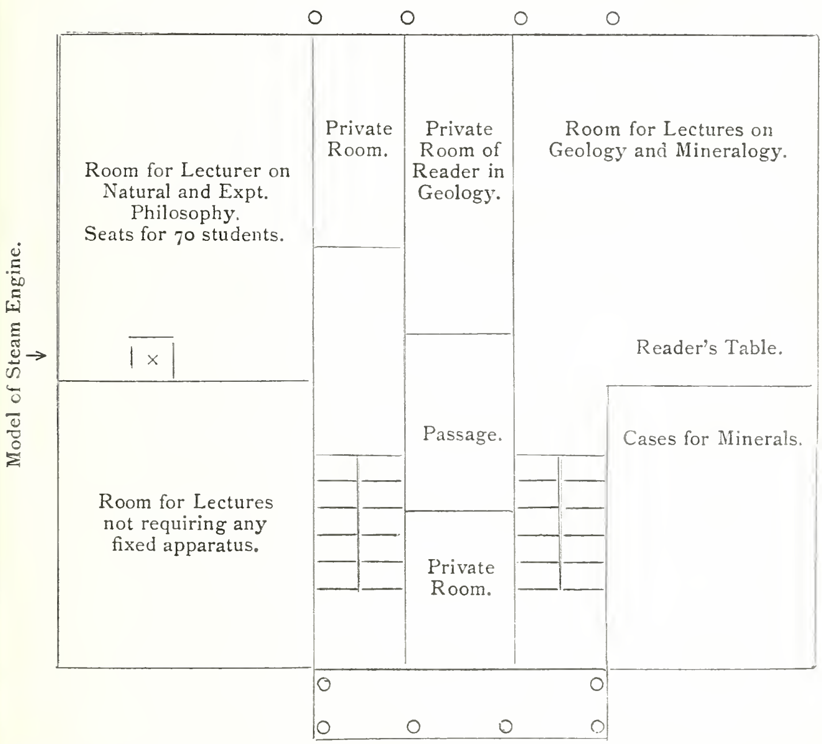
Thanks to the income from a Fund left by Lord Leigh for the purchase of models and proper apparatus for exemplifying and illustrating the mathematical lectures and experiments formerly read and explained in the



The Clarendon Science Museum.

⟨Ashmolean⟩ Museum by Doctor Bradley and Mr. Bliss, there was no lack of apparatus in Rigaud's department. And this apparatus enabled his successor, Robert Walker, 'a cheery person', to give lively demonstrations 'with air-guns, magic lanterns, galvanic batteries, and so forth'. With such equipment the Physics lectures became 'popular, i.e. calculated to give some interesting instruction to the undergraduates, who came to them in fair numbers' (Storey-Maskelyne). The Physical apparatus was housed on the first floor of the Clarendon Building.

The upper floor and two attics were allotted to Professor Buckland, the north room facing Broad Street in the western half of the building being devoted to Mineralogy, and the adjoining room was used for the Geological lectures. The geological collection in his keeping was one of the best in the kingdom, and worthy of much better quarters than those allotted in the Clarendon Building. Buckland's disposal of the space has been described above on p. 240.



Plan of the Clarendon Science Museum, by Sir Robert Smirke, Archt.

XI

THE COLLECTIONS OF THE COLLEGES

Scattered about among the Colleges there have always been a few natural curiosities kept among the instruments, and doubtless from the earliest times Chapels and Libraries have served as repositories for such objects. The astronomical treasures in the Library of Merton College, the home of the Linacre readers, have already been enumerated, and with their instruments, anatomical, botanical, or other specimens of natural history would probably have been associated. Certainly Merton could boast a skeleton as well as globes. Few Colleges were richer; but St. John's in the seventeenth century was a notable exception, and a visit to their Library was a liberal education in *naturalia*.

St. John's College.

In the Library of St. John's visitors were shown fossils, or 'formed stones' as they were then called; a sheep with two heads and eight feet; a crocodile skin; two skeletons, one of a woman who had had seventeen husbands[1]; thirty-two fairly large stones found all together in an ox; and other things.

The chief curiosity was a gall-stone as large as a hen's egg, but thicker and rounder, and of peculiar texture and yellowish-brown colour. The surface was covered with hard swellings, of the colour and shape of lentils, closely

[1] Evelyn saw them, the skeletons not the husbands, in 1654. By the time of Uffenbach's visit, St. John's had parted with this rarity to the University, and it was shown as one of the great attractions in the Anatomy School. Tradition had in the meantime added an *eighteenth husband* to the seventeen mentioned by Benthem. *Engeländischen Kirch und Schulen-Staat*, 1694.

set and quite smooth. The stone looked as if it were a ball of plaster beset with nothing but lentil seeds. It was kept in a well-made gold box, with a crystal top, like a clock-case, which could be opened to take the stone out. It bore the following engraved inscription: '*This stone was taken out of the body of Doctor John King, Lord Bishop of London descended from the ancient Kings of Devonshire, who deceased London 1621.*' Below are his arms, or perhaps those of his see, a lion and three crosses.

When Uffenbach visited the College in 1710 he was adversely impressed by a Librarian who showed the things in hot haste, 'mit rechter Furie', and jumbled them together on the table.

In 1695 Mistress Celia Fiennes wrote:

> The Library is two walks, one of the other; the inner one has severall Anatomy's in cases and some other Curiosity of Shells, stone bristol Diamonds, skins of ffish and beasts.

Many of the rarities were still shown in the inner room of the Library after the middle of the eighteenth century, when the following were considered as among the more remarkable specimens:

> St. John the Baptist's thigh-bone.
> The skin of a lamb, which was yean'd in Port Meadow (just by Oxford) with six legs, stuff'd.
> A Staffordshire almanack in wood.
> An old-fashion'd high-crown'd hat, worn by one of the antient family of the Symes, and given to the college by widow Symes of Oxford.
> A bird of Paradise, dead.
> Several large stones taken out of a bullock's maw.
> Another large stone, taken from bishop King, in a golden case, with a crystal on the top of it, given by the reverend Dr. Delaune.
> Several manuscripts . . . fine mass-books . . .
> A system of the Chinese religion, written upon the bark of a tree in unintelligible characters.
> A fine picture (exactly to the life) of king Charles the first, done with a pen, containing all the psalms in a legible hand. . . .
> The genealogical pedigree of the Stuarts . . .

N. Amhurst, *Terrae-Filius*, May 11, 1721, 3rd edit. 1754.

A later list printed in 1749 comprises the following:

CURIOSITIES in a Room adjacent to the Library, some of which are,

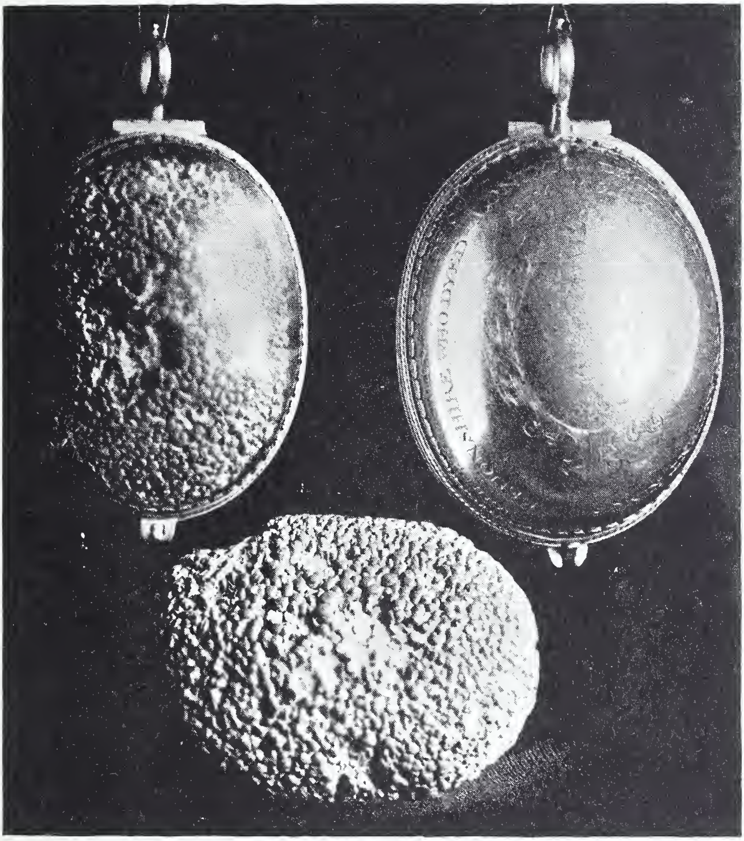
1. A Written Picture of King Charles I. taking up the whole Book of Psalms.
2. Several curious Works of the Nuns of Gedding.
3. Two very large Globes, Cœlestial and Terrestrial.
4. A Stone taken out of a Man's Bladder, of a large Size, with a rough Cast all over it like little Seeds. This Gentleman was Dr King, Bishop of London, who liv'd 16 Years after.
5. A Collection of above 30 Pebble Stones, worn smooth by the Coats of the Stomach, taken out of a Cow's Maw at Whiteham near Oxford.
6. A Monster of a Lamb with two Heads, 7 Feet, and one Body.
7. A Bird of Paradise.
8. A Hat made of Cloves.
9. Several Coats of Arms in the East Window of the outward Library, extremely nice, with the Inscriptions under em, being the Arms of the Benefactors to this Library, &c.

Scholars began to realize the importance of preserving rarities and natural curiosities for future reference.[1] 'Cabinets' of collectors were often the subject of the most interesting part of the discourses of the seventeenth century. It became recognized that the actual specimens had a value that was far greater than that of any written description, that if properly conserved they were available in case of doubt, or if required for comparison with cognate objects. The existence of rarities in St. John's College established a tradition which bore fruit in the notable accession of the collection[2] formed by John Pointer of Merton College. In his own words

There being such a Collection of Curiosities in this College already, has induc'd me to bequeath my own Collection to be

[1] As an example of a private collection of the seventeenth century, see *A Catalogue of part of those rarities collected in thirty years time with a great deal of pains and industry by one of his Majesties sworn servants* R. H. *alias* Forges *gentleman.* And somewhat later in date was *A Catalogue of the curious Musaeum of the ingenious* Edward Barnard, *surgeon (deceased) consisting of a great variety of rarities, natural and artificial.* 8vo. London 1737.

[2] Cf. John Pointer, *Oxoniensis Academia*, 1749.



BISHOP KING'S GALL STONE

St. John's College

added to it, hoping it may be a Maintenance (or at least a Help towards one) for some young Scholar in shewing 'em; a Scholar to be appointed by the President, to whom he shall administer an Oath to keep all Things safe. A Short Specimen of which is as follows,

Five hundred Coins and Medals of all Sorts, amongst which is a genuine Otho, brought from Italy by Bishop Huntington.

Above 100 curious Sea Shells.

Specimens of Ores and Minerals of all Sorts.

Part of a Tessellated Roman Pavement.

Lares and *Penates*.

Large Tape Worms out of Human and other Bodies.

A Stone out of a Man's Stomach, 1 Inch 3 Quarters Diameter.

A large Stone out of one of the Kidnies.

Lapis Lydius.

Stones out of the Ashes of Hay and Pease Ricks calcin'd.

A Fragment of Troy.

A Tea-Pot made of Culm.

Annular Tooth of a Rabbet.

A Flea chain'd, a Silver Chain of 30 Links, and but one Inch long.

A Mole-Cricket.

A Piece of a Coat of Mail, such as the old Romans us'd.

Turkish Tobacco Pipes of Leather and Wood.

Head of an old British Pole-Ax.

Burnt Stick and Paper from a burning Well.

A large Flying Fish.

An Urchin Fish, with sharp Prickles all over.

Piece of a Unicorn's Horn, very curiously turbinated.

A Sea-Cow's Horn.

Spun Glass.

Cast-Skin of a large Snake, entire.

Fœtus of a Snake.

Cocoa Nut, that is Meat, Drink, and Cloth.

Virginian Spiders, with Bodies as big as Nutmegs.

A Virginian Candle, made of Wax and Myrtle-Berries.

A Maggot out of a Sheep's Head.

Earth or Dust rain'd upon the Archipelago, in 1631.

Figure of a stabbing Knife us'd in the Irish Massacre, 1642.

An Indian Pagod.

A large Indian Bag made of Straw.

A written Picture of the King of Poland.

A large Chronological Table in Vellum of all the Kings and Princes, &c. from Adam to King Henry VII.

The New Testament and Psalms, in a very small Vol. of Short-hand Writing.

A Letter from the late Czar of Muscovy to King Charles II. in the Sclavonian Language.

Another Letter from the Sophi of Persia to King Charles I.

Patriarch of Alexandria's Letter in Modern Greek.

Prince Rupert's Letter, shewing the Origin of the late Civil Wars. Oliver Cromwell's Prayer when dying.

Apostles Creed in the Malabar Language.

A Deed of Conveyance of Lands to the Founder of Merton College, in Hebrew. A China MS. and Map.

A Letter from a Deaf and Dumb Lady.

Archbishop Laud's Letter to the University of Oxon, a little before his Decollation.

A Short Lease in King Henry IIId's Time.

Pope Clement VIIth's Pardon of Sins granted for 500 Years.

Hand-writing of several Kings and Queens, and great Persons. Mouth-writing, Toe-writing, and Elbow-writing.

Mr Parry's Writing like Printing.

Double Hen's Eggs.

Large Yolk of an Egg, nine Inches in Circumference.

A Chain of six Links, made of one entire Piece of Box.

Skeleton of the Humming Bird, but one Inch and a Half long. Skeleton of a Bat or Flying-Mouse.

Monster of a Chicken with four Legs.

Hortus Siccus, or a Collection of five Hundred Physical Plants.

For a century the bulk of the Pointer Collection reposed under the New Library in a passage dignified by the name of Otranto. There, unwarmed and uncared for, many of the specimens have perished. The smaller objects were originally arranged in a chest of at least twelve shallow drawers divided into many numbered compartments, but they are now in a sorry state. A cursory inspection made last autumn showed that with care an interesting series might still be rescued.

Drawer 1. 'No. 2. Curled horns.' 'No. 4. Sea- . . .' 'No. 9. Aures marini.' 'Belemnites.'
2. Nos. 16-30. Including '13. Pike Jaws' and 'See Needle-Fish' (Nos. 6 and 13 on page 467).
3. A hundred Birds' Eggs (all broken).
4. 'Nos. 156-255.' A hundred Vegetable Materia Medica.

5. 'Nos. 256-355.' A hundred Mineral Materia Medica.
6. 'Nos. 356-455.' A hundred Petrifactions.
7. 'Nos. 456-545' (11 blank). A hundred Minerals.
8. 'Nos. 556-655.' A hundred Minerals.
9. 'Nos. 656-756.' Empty.
10. A hundred Fossils.
11. Recent Shells.
12. A hundred Gums, Nuts and Seeds, &c.

Lying loose or in two boxes are the Saw of the Saw-fish, No. 11, p. 467; the Head of a Green Turtle, No. 3, p. 462; the *Elephanti Nervi pars*, No. 19, p. 463, and several other bones, shells and nuts that are probably included in the MS. catalogue and could be readily identified.

But the Catalogue of the Musaeum Pointerianum tells its own tale. See p. 454.

Plot's Collections.

The first local collection of objects of natural history collected in the county of Oxfordshire was made by Dr. Plot, and was probably kept in his rooms in Magdalen Hall. Evelyn, on seeing this rare collection, remarked that it was 'indeed extraordinary that in one county there should be found such variety of plants, shells, stones, minerals, marcasites, fowls, insects, models of works, crystals, agates and marbles'. No doubt the greater part are described in *Natural History of Oxfordshire*, of which Plot's presentation copy to John Aubrey, Secretary of the Royal Society, is now a valued possession of the author. Plot seems to have begun collecting at least as early as 1658, when Wood gave him some Roman antiquities found at Steeple Aston; and he naturally gave his rarities for incorporation in the Ashmolean Museum when he resigned the Keepership in 1690.

Jesus College.

Among specimens recently acquired may be mentioned the antelope horns, *Strepsiceros kudu*, in the Common Room of Jesus College. They were given about 1860-2 by Canon Jenkins, who had been in Africa with Bishop Colenso.

Queen's College.

In the Library of Queen's College may be noticed a few zoological specimens, the last remains of a more extensive collection. The name of the donor has been forgotten, but as both Pennant and Shaw were members of the College, it is just possible that either may have given zoological specimens. The collection comprises the following horns:

Koodoo, *Strepsiceros kudu.*
Waterbuck, *Cobus ellipsiprymnus.*
Bushbuck, *Tragelephus sylvaticus.*
Wildebeest, *Connochaetes gnu.* Two pairs of horns.
Reedbuck, *Cervicapra arundinum.*
Springbuck, *Gazella euchore.*

There are also a tusk of the Wart Hog (*Phacochoerus aethiopicus*), the stuffed skin of an *Iguana*, a brain coral, some shells (*Murex* sp.), and a piece of wood bored by *Teredo.*

New College.

The Oglander Collection of Materia Medica. c. 1750.

The previous pages of this book were already in type, when my friend Prof. J. L. Myres invited me to visit the muniment rooms at New College. There he showed me a cabinet containing in six drawers a complete collection of such objects of natural history as were supposed to be useful in medicine during the first half of the eighteenth century. The drawers had rarely been opened since the death of the owner.

The collection was given to the College by Dr. John Oglander, Warden of New College from 1768 till his death in 1794. In its general scope it recalls the more extensive Pointer collection at St. John's College. Oglander had been an undergraduate at that College, and I cannot but think that this collection shows the influence of Pointer, or at least that it was inspired by the same 'zeitgeist'. It is in any case a most precious memorial of its time, and deserves thorough examination.

In 1770 Oglander was the donor of the pair of Globes by G. Adams described in vol. ii, page 259.

XII

THE OLDEST MUSEUM SPECIMENS

I. *ZOOLOGICAL COLLECTIONS*

The heading of this chapter is taken from the title of a short article on 'The Oldest Museum Specimens' which appeared in the *Field* for Feb. 23, 1907. The author of the article writes that the oldest natural history specimens preserved in any collection in this country are probably the head and foot of the Dodo in the University Museum at Oxford. Next in point of antiquity would seem to be the Dodo's foot preserved in the British Museum which it is thought can be identified with an entry in a *Catalogue of Many Natural Rarities* published in London in 1665, or perhaps more certainly with the Dodo's foot mentioned in Nehemiah Grew's *Catalogue of the Rarities in the Collection of the Royal Society at Gresham College*, published in 1681. The Royal Society's Museum was transferred to the trustees of the British Museum in 1781.

Very few of the specimens included in Grew's *Catalogue* of 1681 can be traced at the present day, but we are glad to think that the great interest of such survivals is now recognized, that several of them have had their history recorded on labels, and that they are less likely now than formerly to be weeded out of the National Collection. The following Grew *Catalogue* specimens have been identified:

Molar teeth of the extinct Woolly Rhinoceros discovered at Chatham, Kent, in 1668 and described in 1669 as the remains of a sea monster.

Horns of the dwarf West African Buffalo. The type of *Bos nanus* and *Bos pumilus*.

Antlers of a white-tailed deer, figured by Pennant. The type of *Cervus mexicanus*.

We are further reminded of the rarity of early Museum specimens by the fact that 'in the recent mammal series the original nucleus of the British Museum, namely the collection of Sir Hans Sloane, which was purchased by the nation in 1753, appears to be represented only by the "record" horns of the Indian buffalo (given to the great surgeon apparently in lieu of a fee) and a front horn of the white rhinoceros'.

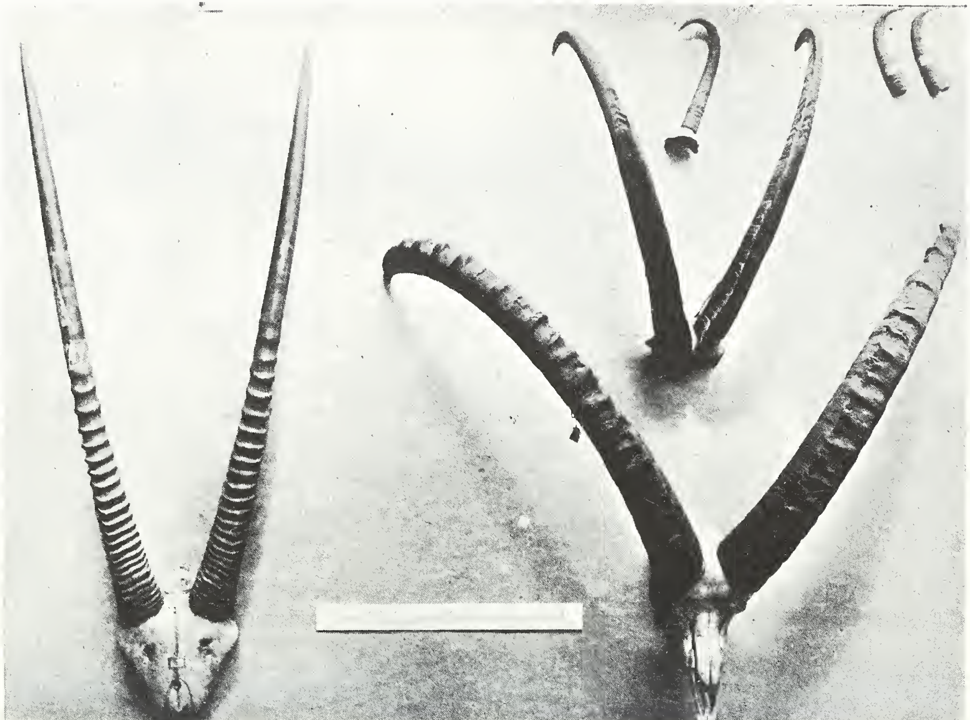
It is therefore with some satisfaction that we were able, on the celebration of the tercentenary of the founder of the Ashmolean Museum on May 23, 1917, to put on record that although the losses by the ravages of time, indifferent curating, and weedings-out by modern scientists, have been great, yet a considerable remnant of the old Tradescant, Ashmolean, and University specimens still survive in the University collections. These specimens, which naturally consist almost exclusively of the tougher parts of animals, such as bones, horns, and shells, all date from the seventeenth century. They comprise some forty species of animals, representing most classes of the animal kingdom as then known. The majority of these relics of the past bear ample evidence of great antiquity on their rough, cracked, or rubbed surfaces. Others, remounted at some recent date, show signs of having been newly prepared and of having been given a fresher surface by remaceration, which has removed the old protecting layers of dried skin and connective tissue. A common characteristic are roughly-made holes for purposes of suspension.

The identification marks upon the specimens afford a valuable clue to their antiquity. They are of several kinds, and are, taken in order of age:

1. Early inscriptions in ink, mostly illegible. Of especial interest are the ✡ on No. 164 and the graffiti on Nos. 42, 144, and 169.
2. Paper labels with written numbers in an early hand. e. g. '4' on No. 111.
3. Paper labels with large printed numbers.
4. " " small " " .
5. Large written numbers. These correspond with the numbers in Duncan's Catalogue of 1836 and were evidently affixed to horns which, being hung on

NO. 67. TRADESCANT'S 'SEA HORSES HEAD'

Seen from in front and from below



NO. 151. GEMSBOK. NOS. 163–4. CAPRA SIBIRICA

At the top are three horns of the CHAMOIS

NO. 166. ‘HORNS OF THE RAM’

NO. 165 ‘HEAD AND HORNS OF THE MUSCOVY RAM’ walls at some height above the floor, could not have been readily identified by numbers of smaller size.

6. Small pendant iron labels with numbers scratched on them. These appear to have been exclusively used to indicate Tradescant specimens given by the Founder.
7. Printed labels bearing words 'Ashmolean Museum' or 'A. M.'. Probably affixed after the transference of the collections to the New Museum in the Parks.

The exact date of the Tradescant specimens is naturally open to question. If they formed part of the collection of John Tradescant, the elder, they may be assigned to the period 1620–38. If they are mentioned in the printed catalogue, the '*Musaeum Tradescantianum: or, a Collection of Rarities, preserved at South Lambeth near London*, they are older than 1656. Other fixed dates are the dates of the death of John Tradescant, the younger, 1662; of the removal of the collection from Mrs. Tradescant's to Ashmole's house, Nov.–Dec. 1674; and of the installation of the collection at the Ashmolean Museum in Oxford in 1683, and of its being catalogued by Duncan in 1836. In any case it follows as a consequence that any specimen which can be referred to the Tradescant period is to be valued as being the oldest type-specimen of its kind now extant in any Museum. It is greatly to be desired that the transcendant historic importance of these specimens of the seventeeth century may lead to their being removed from the general collection, in which replacement of old specimens by new ones is continually taking place, and to their being preserved under conditions of greater security by themselves.

CATALOGUE OF ORIGINAL TRADESCANT AND ASHMOLE SPECIMENS STILL OR RECENTLY EXTANT IN OXFORD.

MAMMALIA

CARNIVORA

Trichechus rosmarus.

Walrus.

a. 'Sea Horses Head.' T. 1656.
'67. Upper jaw of the Walrus. (Mus. Tradesc.).'
b. 'Pissle' bone. Uncatalogued except by Tradescant.

a. No. 1710: printed no. 173. The canine teeth had a girth of about 5 inches, but are now lost. Molars, right, (1) 2 3 (4); left, 1 2 (3). Width across the maxillary bones $5\frac{1}{2}$ inches, indicating a walrus of under nine feet in length. It is a specimen of undoubted antiquity, which has never been scraped clean. *b.* The 'pissle' bone has not been noted in any of the University Catalogues, but with the upper jaw it was mentioned in the Tradescant Catalogue of 1656.

$$\text{`Sea Horses} \begin{cases} \text{Head} \\ \text{teeth} \\ \text{pissle.} \end{cases}$$

UNGULATA

Bos Americanus.

North American Buffalo.

'Bisons head and horns.' T. 1656.
'177–179. Horns of the Bison. *Bos Americanus.* N. America. Mus. Trad.'

Not now extant.

These horns would have been taken from members of the herds that lived in the Eastern states before they were driven west by the warfare of 1730. Previous to 1870 there were buffaloes innumerable. Col. Dodge estimated that in Arkansas there were from fifteen to twenty individuals on every acre over an area of 25 by 50 miles. This was the last of the great herds, probably numbering 4,000,000 head.

Ovis nahura.

Barwhal Sheep?

'166. Horns of the Ram. Ovies aries. Mus. Trad.'

Ovis aries.

Four-horned Sheep.

'165. Head and Horns of the Muscovy Ram. Hircus cotelardicus *Jonst.* Mus. Trad.' (= No. 557 g in Robertson's Catalogue.)

There was also a specimen of the head of a Muscovy Ram in the Royal Society's Museum. The larger horns were 12 inches, and the smaller horns 7 inches in length, Grew, *Catalogue* 1683. The Oxford specimen has preserved its hair, owing to the complete protection that the dust of ages affords against moth.

Capra sibirica.

Siberian Ibex.

'An Indian Goats Horne.' (?) T. 1656.
'163. Head and Horns of the Ibex. Capra Ibex.'
'164. Horns of the Persian Goat. Capra Aegagrus *Desm.* Mus. Trad.' (= No. 558 a of Robertson.)

No. 164. Length on front curve 25¾ in.; string 15½ in.; curvature 6 in.; girth at base 7½ in.; tip to tip 13½ in. One of the horns is marked with a pentacle, a magical diagram that would have had real significance to Ashmole. The Bezoar stone was found in the stomach of this species.

Rupicapra tragus.

Alpine Chamois.

'159–161. Horns of the Chamois. A. Rupicapra. Switzerland.'

It is impossible to say definitely whether these three specimens are the original Tradescant horns or substitutes. The original specimens were still extant in Robertson's time and were entered as No. 595 e in his Catalogue.

a. Pair: height 4¾ in.; length in front of curve 7 in.; circumference 2¾ in.

b. Right horn, with core: height 6¼ in.; length in front of curve 8¾ in.

Large specimens measure 9 to 12 inches in length.

Taurotragus oryx or **Oreas canna.**

Eland.

'169. Single Horn of the Impoofo. Damalis Oreas. Mus. Trad.'[1]

No. 104 on printed paper label.

Left single horn and core, illegibly inscribed in ink on the frontal bone with a word that looks like 'Chamois'.

Length $25\frac{1}{2}$ in.; girth at base 10 in. The ridges make a spiral of $1\frac{1}{2}$ turns. Horns of over 30 inches in length are not uncommon in collections.

The Eland is now extinct in the Cape Town Mountains, whence this specimen was probably procured. An early reference to the species is one by Peter Kolben in 1719.

Oryx Gazella.

Gemsbok.

'151–155. Horns of the Oryx. Antilope Oryx Pall. S. Africa.'

These horns are not catalogued 'Mus. Trad.', only as presented by 'the Founder'. So we may either assume an error of omission, or that they were added to the collection by Ashmole himself *c.* 1674–1683. All six horns can be accounted for, if we assume that 155 has been wrongly labelled '149'. An early name for the Gemsbok was *Gaz. indica cornibus rectis longissimis nigris.* Ray, *Quadr.*, p. 79, 1693.

No. 151. Horns and mask of 'Oryx capensis' ♂.

Length $31\frac{1}{2}$ in.; girth at base 7 in.; tip to tip $15\frac{3}{4}$ in.; curvature 1 in. Annuli 25 in number, $17\frac{1}{2}$ inches of horn being free of annuli.

Nos. 152 and 153 probably = Ashm. 1415.

a. Length 27 in.; girth $6\frac{7}{8}$ in.; 24 annuli.

b. Length 25 in.; girth 4 in.; 31 annuli extending along sixteen inches, the terminal nine inches being plain. It is a much-rubbed specimen labelled 'Oryx leucoryx', but horn is straight.

[1] Tradescant's 1656 Catalogue has a comprehensive entry 'Divers Horns answering to those, by Authors attributed to the Ibex, Gazella, Hippelephus, Tragelaphus, Cervus palmatus, Camelopardalis, etc.'

153 152 GEMSBOK — 149 LEUCORYX — 158 BLACKBUCK — 169 ELAND — 150 DEFASSA WATERBUCK

Hippotragus leucophaeus.

Bluebuck. Cape Colony.

'149. Horn of the Blue Antelope. Antilope leucophaea, Auctorum. S. Africa.'

Presented by Ashmole. Lost: if extant, it would be one of the greatest treasures of the Oxford collection. The Blue Antelope was described by Pallas in 1766, but was exterminated in Cape Colony about 1800, and is now as extinct as the Dodo.

PENNANT of Queen's College was the third person to give an original description of the species in 1781.

Oryx algazel.

Scimitar Oryx or Leucoryx. Gold Coast.

'149. Horn of the blue Antelope. Antilope Leucophaea, *Auctorum.* S. Africa.'

The labels of nos. 149 and 155 seem to have been exchanged, and this horn is labelled 'Blue Antelope' in error. It is the slender horn of a female Leucoryx, half annulated.

Dimensions: length 37½ in.; string 30 in.; girth 4⅜ in.; curvature 8½ in.

Antilope cervicapra.

Blackbuck. India.

'Antilops horn.' T. 1656.
'158. Horns of the common Antelope. A. cervicapra, *Auctor.* Mus. Trad. India.' Ray 1693.

A pair of loose horns, with holes near the base for suspension.

Cobus defassa.

Defassa Waterbuck. S. Africa.

'150, Horn of the roan Antelope. Antilope Equina Geoff. S. Africa.'

There is every reason to believe that this left horn and core of a Defassa Waterbuck is the original specimen from the Tradescant Collection which has been wrongly identified by Duncan as a Roan Antelope. It is labelled 'Adenotus defassa Rüppell' in Rolleston's handwriting.

It shows 19 ridges in front, intercalated ridges after the first six, $26+6=32$ in all. The tip and base of the horn are mutilated.

Dimensions: length originally about 21 in., now $19\frac{1}{2}$ in.; girth at base $7\frac{3}{4}$ in.; curvature $3\frac{1}{4}$ in.

Cobus kob.

'157. Horns of the Kob. Antilope adenota. Mus. Trad. Central Africa.'

Missing, unless wrongly numbered as '150' q.v.

Cariacus virginianus or Dorcelaphus americanus.

White Tailed Deer. N. America.

'140–144. Horns of the Stag, varieties. Cervus Elaphus Linn. Mus. Trad.'

One of these may represent the 'Deeres horn, from *Greenland*' (*Mus. Trad.*, p. 7), and it is possible that the 'Greenland Stag' or the 'Greenland Roebuck' in the Royal Society's Museum described by Grew may have belonged to this species. The Tradescant entry may, however, have referred to the horn of a Reindeer.

No. 140. Sub-basal snag of left antler broken off: anterior tine of anterior prong flattened on right antler. Surface of bone cracked. Printed label 'No. 7. Ashm. Mus.'

No. 141. The posterior prong of the left antler is partly fractured by a lead bullet, and that of the right antler is broken. There is a second sub-basal snag on the right antler. It may not be from the Tradescant collection.

No. 142. This is not an old specimen. There are two sub-basal snags. The posterior prongs exhibit a tendency to develop small lateral tines.

No. 144. A single right antler. Inscribed in ink (almost illegible):

Horn of Cluth (?)
(*Mountain sheep*)

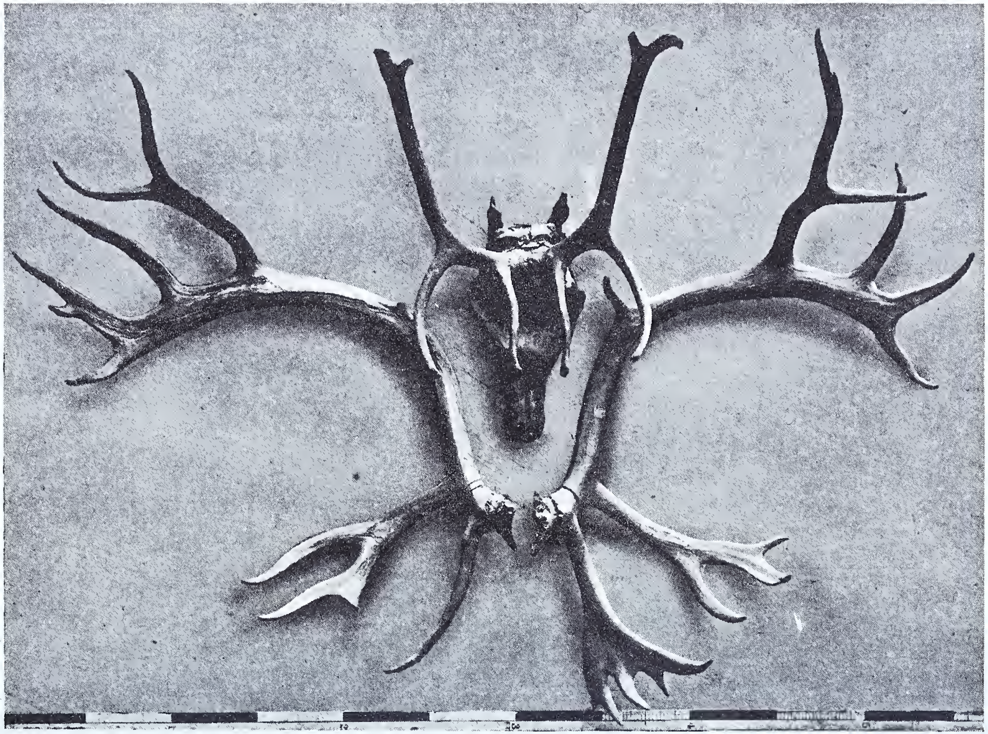
In its great number of points this superb specimen is only surpassed by four examples, all in American collec-

144

140

142

NOS. 140, 142, 144 ANTLERS OF WHITE-TAILED DEER



NO. 135. NO. 132 NO. 131

SCANDINAVIAN REINDEER

tions (cf. Ward's *Records of Big Game*). The largest sub-basal snag has been sawn off, but 3 subsidiary ones remain. The beam is palmated. The posterior prong, triangular in section, bears a small secondary tine; the anterior prong ends in a crown with 8 tines, while the anterior end of the beam forms a much recurved 4-tined antler.

Dimensions of White-tailed Stag Horns in inches.

	Length on outside curve.	Circum-ference.	Tip to tip.	Widest inside.	Points.
No. 140	20	$3\frac{3}{4}$	14	? 20	4+4
,, 141	26	$5\frac{1}{8}$	16	? $19\frac{1}{2}$	6+5
,, 142	$26\frac{1}{2}$	$5\frac{1}{2}$	18	? 23	6+6
,, 144	23	$6\frac{1}{4}$			17+?

Cervus capreolus.

Roe deer. ? British.

'A Roe bucks horn, from Cape de Verde.' T. 1656.
'A Roe bucks head.' T. 1656.
'146–148. Horns of the Roe-buck. Cervus Capreolus Linn. Mus. Trad.'

Missing.

Rangifer tarandus arcticus.

Barren Ground Reindeer. Scandinavia.

'131, 133, 135. Horns of the Rein-Deer. Cervus Tarandus L. Mus. Trad.'

No. 131 (iron label). A single large horn of undoubted antiquity. Surface of bone is much cracked, notches between tines rubbed (? by fighting). It has been mounted with another horn of more recent-looking appearance, which forms so good a 'pair' to it as to lead one to believe that it had been preserved in a cupboard while the other horn has been exposed.

No. 133. A pair on a mask.

No. 135 (= '141' printed paper label). This horn forms an admirable pair to No. 131, but has not been exposed to the weather to the same extent.

Rangifer tarandus caribou.

Woodland Reindeer (Young).

'A Deeres horn, from Greenland.' T. 1656.
'132. 134. Horns of the Rein-Deer. Cervus Tarandus L.' Mus. Trad.'

No. 132 (iron label). Pair of horns in the velvet, which is much perished. Skin on the face hairless.

No. 134 (= 128 iron label = 107 printed paper label). A single, stoutly-built horn.

Dimensions of Reindeer Horns in inches.

	Length on outer curve.	Circumference above bez-tine.	Breadth of brow tine on ant. margin from base to top front point.	Widest inside.	Points.
No. 131	41	6	? 13		(15+)
,, 135	44	$5\frac{3}{4}$	(? $11\frac{1}{2}$)	? $26\frac{1}{2}$	(10+1)
,, 133	$27\frac{1}{4}$	$3\frac{1}{4}$	9		11+11
,, 132	20	$3\frac{5}{8}$			4+4
,, 134	34	$5\frac{3}{4}$	14	? $21\frac{1}{2}$	16+

These horns are Nos. 572 c—g in Robertson's Catalogue.

Alces machlis.

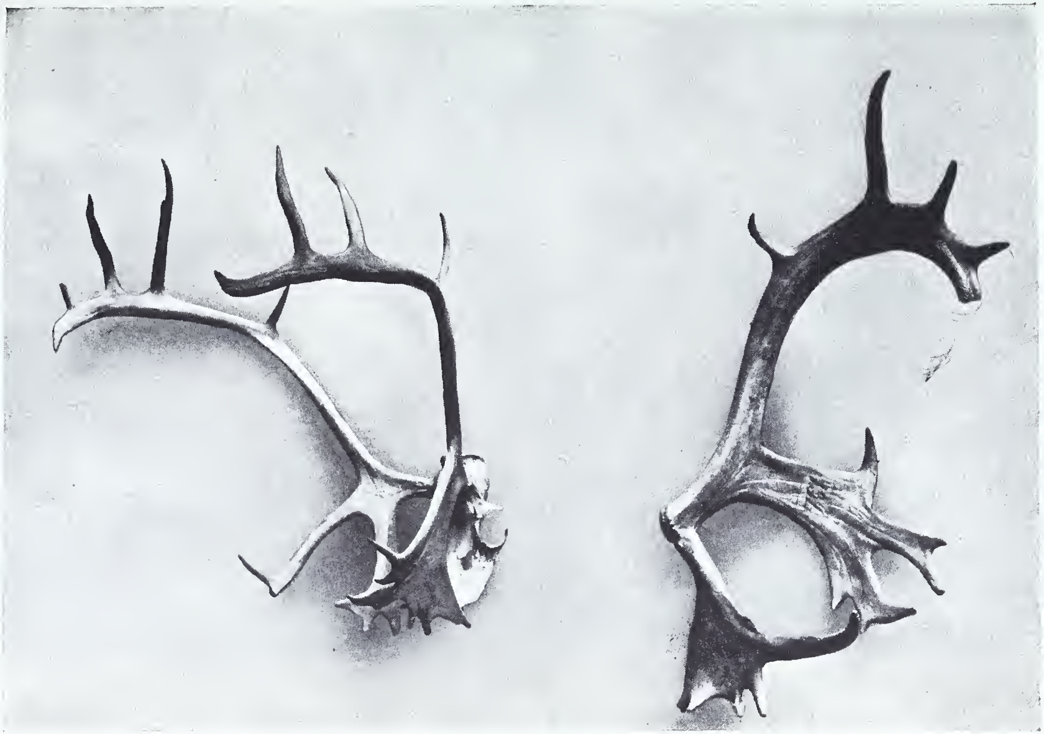
Scandinavian Elk.

'An elks hoof with three claws.' Stirn, 1638.
'Elkes hoofes.' T. 1656.
'127, 128, 129. Horns of the Elk. Cervus Alces L. Mus. Trad.'
'141, 142. Legs of the Elk. Mus. Trad.'

The three single horns are of the following dimensions in inches:

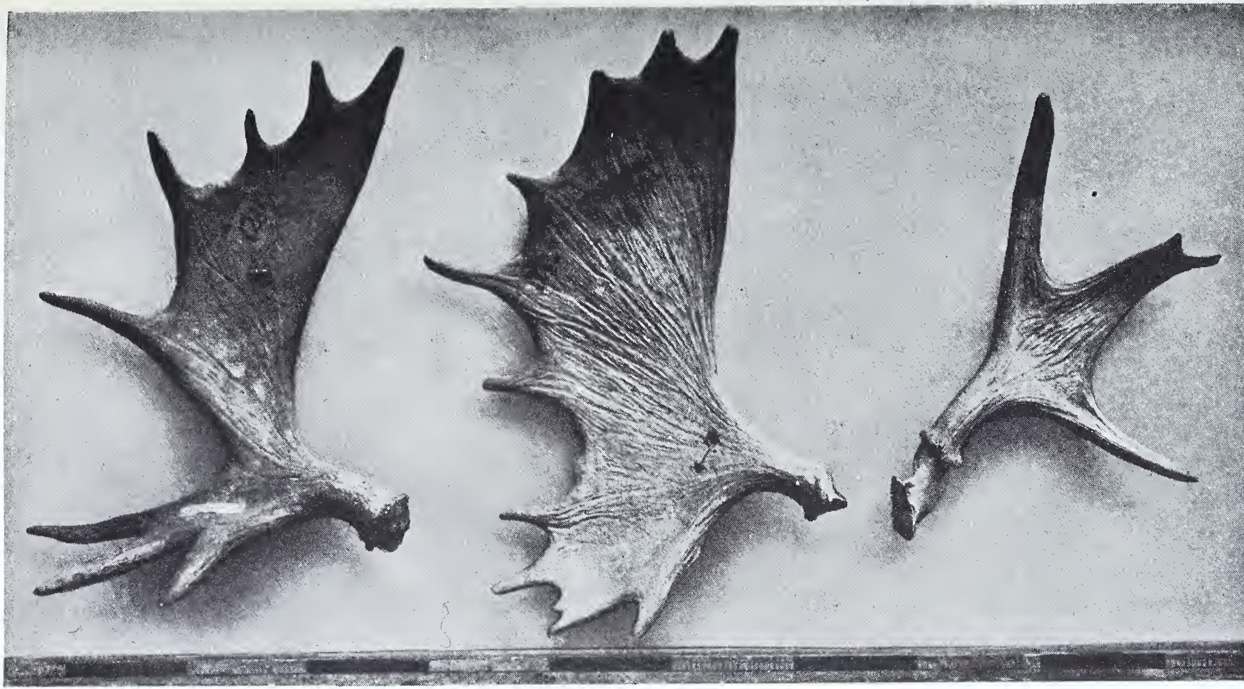
	Length.	Width over curve.	Width in a straight line.	Width of lamina.
No. 127	22	36	28	$9\frac{1}{2}$
,, 128	$17\frac{1}{2}$	25	$19\frac{1}{2}$	—
,, 129	—	$37\frac{1}{2}$	$27\frac{1}{2}$	$6\frac{1}{2}$
,, 130 (see below)	$35\frac{1}{2}$ or 41 over curve.			$19\frac{1}{2}$ over curve.

Nos. 141, 142. One Tradescant specimen, a dried three-toed foot of an Elk is still extant in its original state. The other has been prepared as an osteological specimen. The left hind foot of an Elk was much esteemed as a medicine.



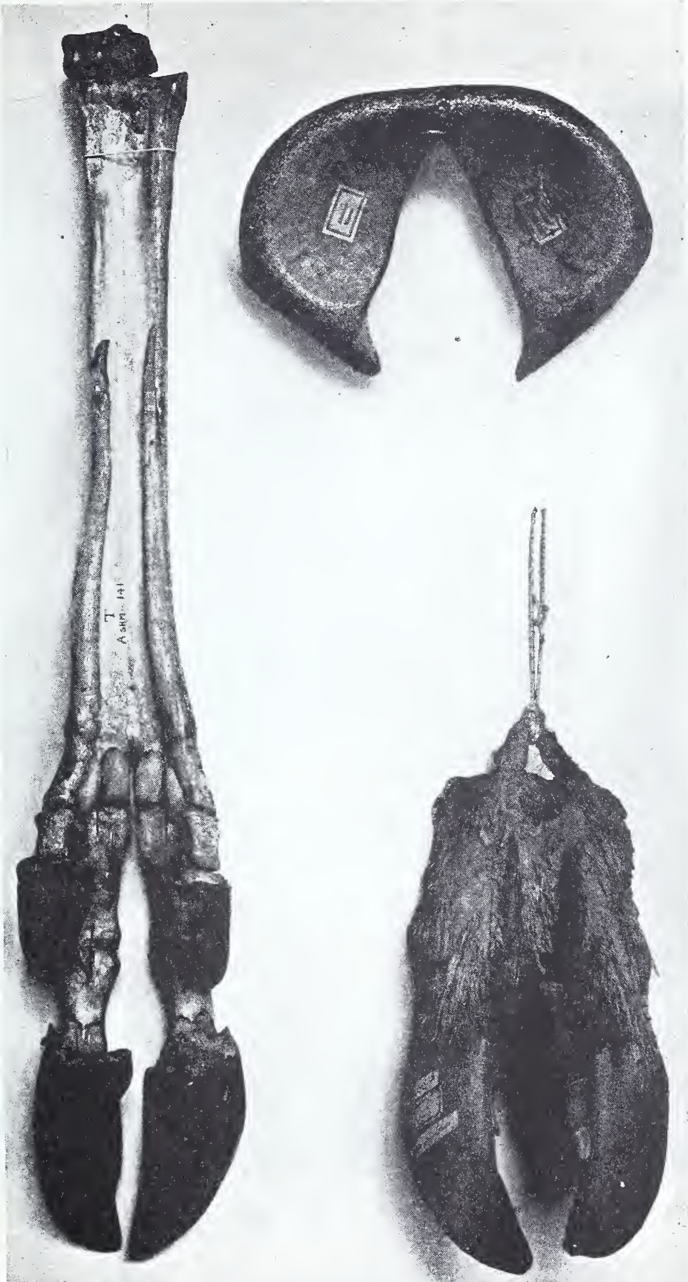
NO. 133 NO. 134

WOODLAND REINDEER



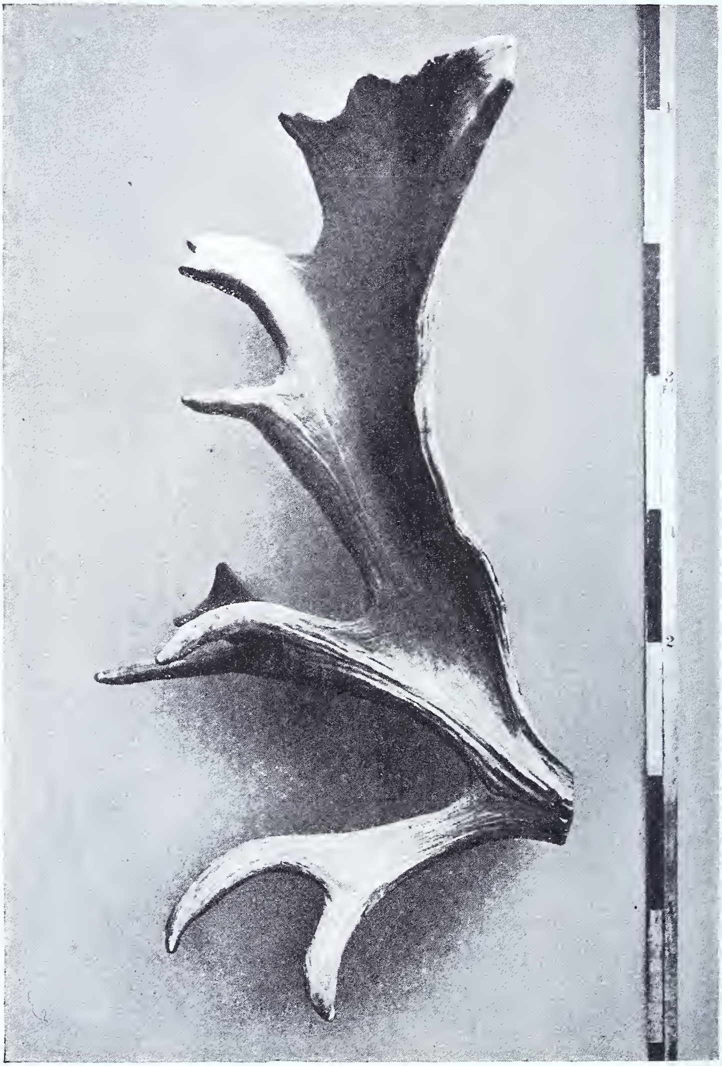
NO. 129 NO. 127 NO. 128

SCANDINAVIAN ELK



NO '199' (? = 169). CERVICAL VERTEBRA OF GRAMPUS

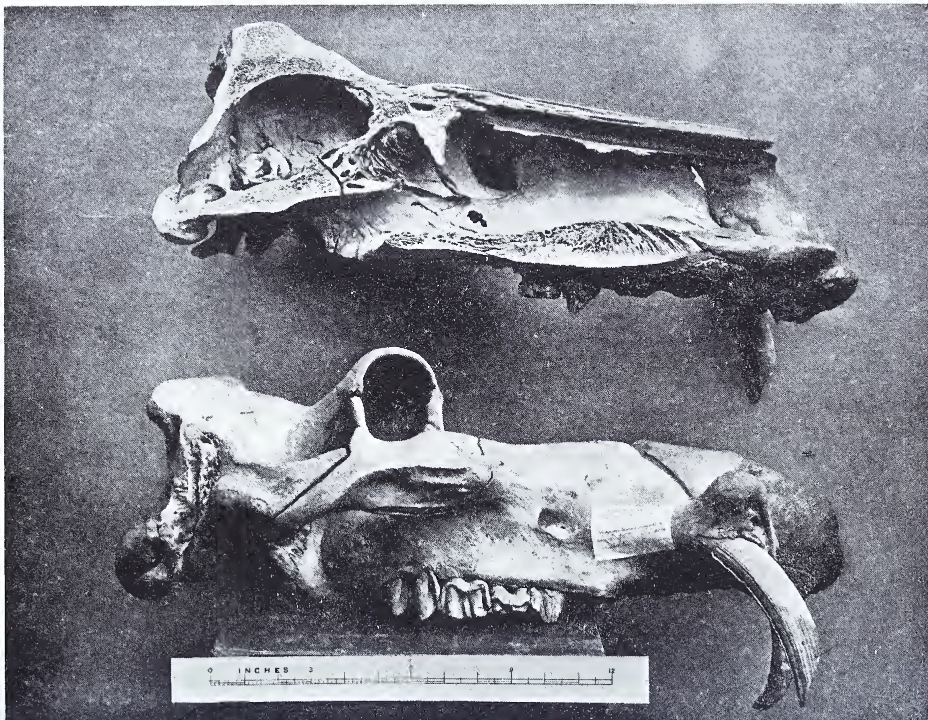
NOS. 141, 142. FEET OF ELK



NO. 130. AMERICAN MOOSE

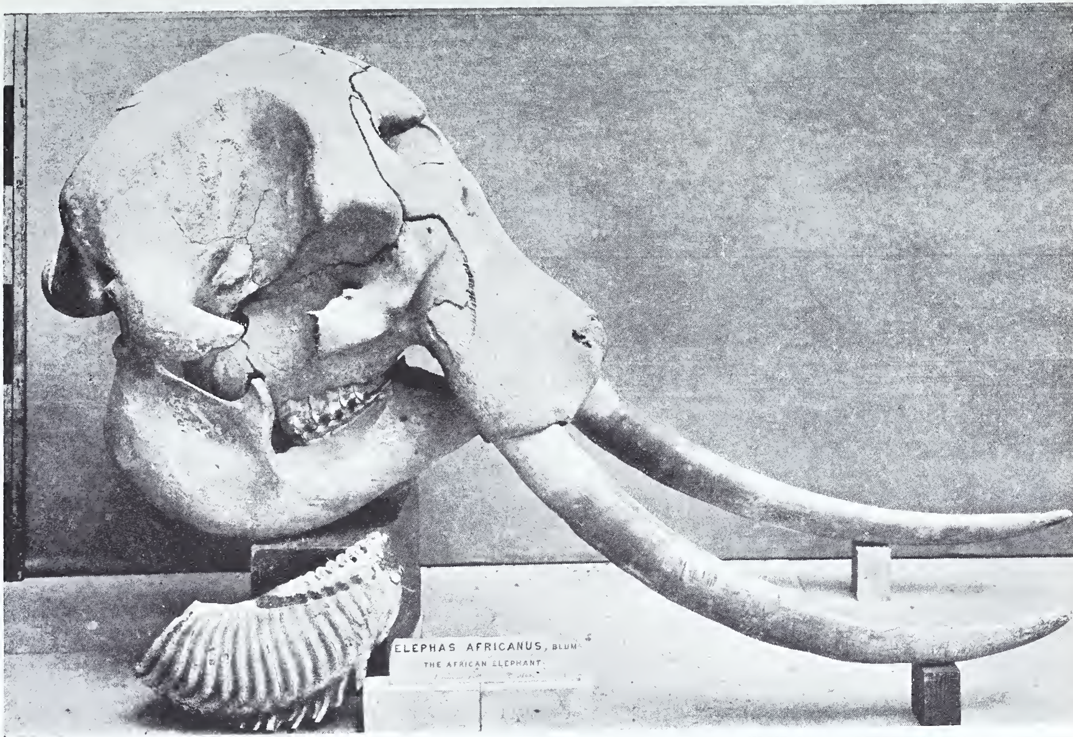
NO. 130. AMERICAN MOOSE (SECOND VIEW)

NO. 124. PALLAS'S WART HOG



NO. 113. HIPPOPOTAMUS AMPHIBIUS

NO. 106. SKULL OF AFRICAN ELEPHANT BISECTED TO SHOW THE BRAIN CAVITY



NO. 105. SKULL OF AFRICAN ELEPHANT

NO. 110. HUMERUS OF AFRICAN ELEPHANT

NO. III. TAIL OF AFRICAN ELEPHANT

Alces machlis americanus.

American Moose.

'130. Horns of the Elk. Cervus Alces L. Mus. Trad.'

Dimensions are given in the table above. It is included under No. 578 a in Robertson's Catalogue.

A most remarkable example with a folded lamina from the back of which spring four branches, two of which terminate in two lobes or tines apiece. The fold is six inches in depth. We counted 12 tines and 6 small lobes at the end of the lamina. The weight of this specimen is 17 lb. Ray alludes to one of 25 lb. in weight in the shop of Mr. Holney, apothecary in Lewes.

Phacochoerus aethiopicus.

Pallas's Wart-Hog. SE. Africa.

'124. Skull of the Aethiopian Boar. Sus Œthiopicus Gmel. (Mus. Trad.).' Robertson's numbers are 1521 and 596[b].

Babyrusa alfurus.

Celebes and Buru.

'A sowes head from Surat.' T. 1656.
'123. Skull of the Babyroussa or horned Hog. Sus Babyrussa L. (Mus. Trad.).'

Missing, but listed by C. Robertson as No. 1516 or 1517 or 598[b]. No. 1517 is missing, and 1516 looks recent, and has no upper tusks.

Hippopotamus amphibius.

'Hippopotamus.' T. 1656.
'112. Skull of the Hippopotamus or River Horse. Hippopotamus amphibius L. (Mus. Tradesc.).'
'113. Section of the same exhibiting the cerebral cavity, etc. (Mus. Tradesc.).'

Neither Nos. 1526 nor 1527, which are supposed to represent these, has the appearance of great antiquity. It is of course possible that the Tradescant specimens were well cared for, and may have been cleaned fairly recently. The section measures 23 in. long and 14½ in. in width.

Elephas indicus.

'103. Molar tooth of the Indian Elephant. (Mus. Trad.).'

Not now distinguishable with certainty from others in the University collection.

Elephas africanus. Cuv.

'An elephant's head.' Stirn, 1638.
'Elephants head and tayle.' T. 1656.
'105. Skull of the African Elephant. Elephas Africanus Cuv. (Mus. Tradesc.).' = No. 1628.
'106. Section of the same, showing the cerebral cavity, etc. (Mus. Tradesc.).' = No. 1627.
'107, 108. Small tusks of the same.' ? = No. 1634.
'109. Femur or thigh bone of an Elephant. (Mus. Trad.).' ? = No. 1610.
'110. The Humerus or shoulder bone of the same. (Mus. Trad.).' = No. 1611.
'111. The tail of an African Elephant. (Mus. Trad.).'

The Section of the skull bears an old 'No. 54', and is entered as No. 611 c in Robertson's Catalogue.

The Humerus is 3 ft. 6 in. in length. Old number '42'.

The Tail, marked with an old written label, 'No. 4', is 16 inches in length. The flat extremity is beset with some 80 hairs of about 30 inches in length. The great length of the hairs indicates a wild individual. No elephant that has been kept in captivity keeps intact a caudal fly-whisk of such length: the hairs of menagerie specimens get broken off by being flicked against the bars of their cage, &c.

Rhinoceros simus.

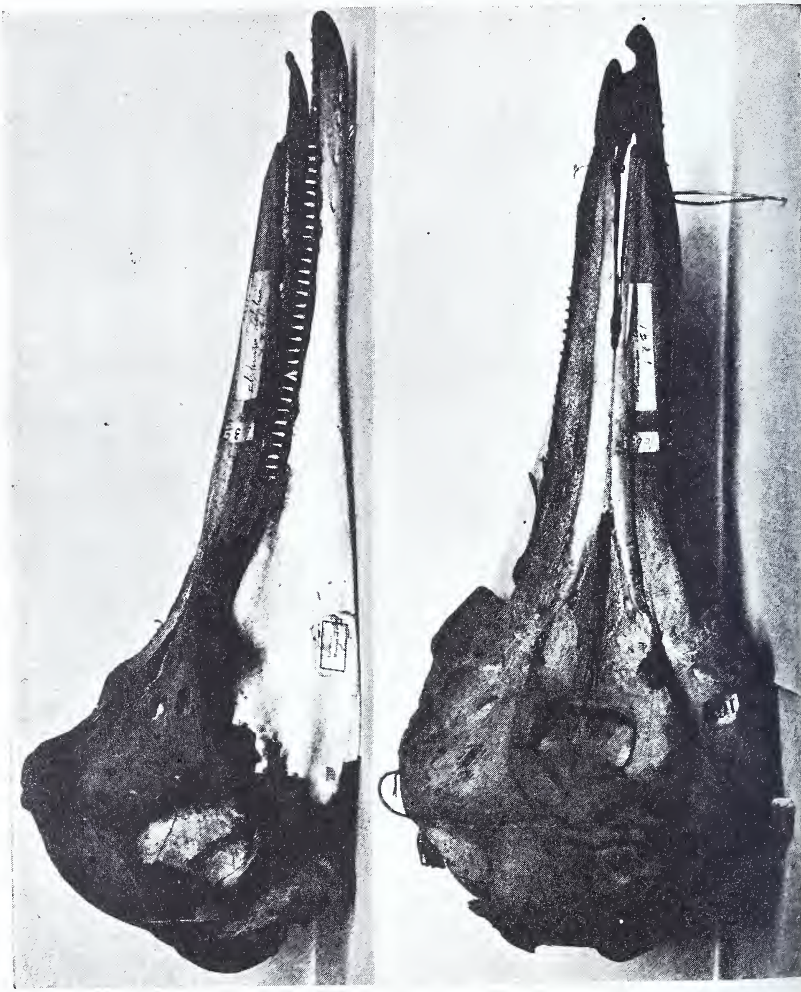
'The Rhinoceros horn.' T. 1656.
'127–129. Horns of the Rhinoceros of various magnitudes, the largest measuring in length on the outer curve 3 feet 2½ inches, and in circumference at the base 1 foot 8 inches. (Mus. Trad.).'
'130. Probably the smaller horn of the double horned Rhinoceros. (Mus. Trad.).'

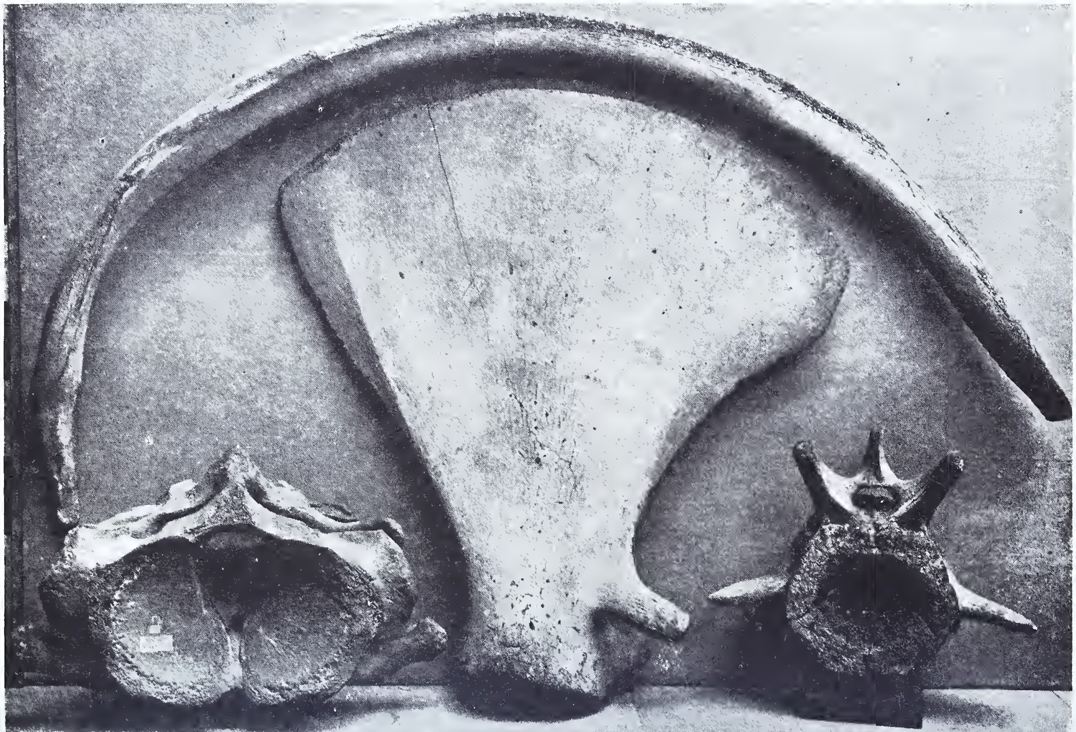
One old horn *a*, corresponding in dimensions to those given in Duncan's catalogue, was fitted with two brass bands, one of which has been removed. The horn is decorated with a circlet of painted or gilt spots below the band. In the base is a cavity 3½ in. deep.

Three of these horns, *b*, *c*, *d*, are mounted on one board.

a *b* *c* *d*

HORNS OF RHINOCEROS SIMUS





NOS. 176-9. RIB, SCAPULA, AND VERTEBRAE OF THE RIGHT WHALE

Mr. Dollman suggests that they are probably a series of Burchell's Rhinoceros.

New number '1572'.

Dimensions:	Length.	Circumference at base.
a.	2 ft. 3½ in.	1 ft. 10¾ in.
b.	2 ft. 8 in.	2 ft. 2 in. (squarish, with 7½ in. sides)
c.	2 ft. 8¼ in.	1 ft. 6 in.
d. 'No. 587 *a*'	3 ft. 8 in.	1 ft. 3½ in. (cut down).

CETACEA

Delphinus delphis.

Common Dolphin.

'A Dolphins head.' T. 1656.
'163, 164. Skulls of the Dolphin (Mus. Trad.).'

No. 163 *missing*.
No. 164 is also numbered '160'. Its length is 17 inches.

Orca gladiator (?).

Killer Whale or Grampus. Atlantic Ocean.

Perhaps 'A Phocaena's head given by T. W.' T. 1656.
'167. Skull of the Grampus (Mus. Trad.).'
'168. Portion of the lower jaw bone of the same.'
'169. Cervical and Lumber vertebra of the Grampus.'

Not now identifiable, except the Cervical vertebra marked with a printed label 'No. 199' which may have been intended for No. 169. It measures 8 inches across.

Monodon.

Narwhal.

'Monoceros horne.'
'Unicornu marinum.' T. 1656.

? *Missing*.

Balaena mysticetus.

Right Whale.

'A Whales skin, tayle, jawes, ribs, back-bone, bladder, eare-bone, pupilla, as big as a pease.' T. 1656.

'175. Lower portion of the jaw bone of a Whale, showing its articulating surface.
176. Rib of the same. Mus. Trad.
177. The Scapula or blade bone of a Whale.
178. Cervical vertebrae of a Whale.
179. Lumbar vertebrae of the same.'

The Jaw bone is not now extant.

The Rib (No. 1701 and 616[a]) measures 10 feet in length round the bow.

The Scapula (No. 1657) measures 4 feet in radius, and 3 ft. 6 in. across the blade. A small hole drilled through the bone probably indicates that the bone was formerly hung up on a wall.

The Cervical vertebrae (No. 1698).

The Lumbar vertebra (No. 1699, printed 'No. 179'). Max. diam. 13 in.: width across transverse processes 23 in.

EDENTATA

Tatusia novemcincta.

Nine-banded Armadillo. S. America.

'99. Cachicames novemcinctus. *Dasypus 9-cinctus*, Linn. The nine-banded Armadillo. (Mus. Trad.).'

Obviously an old specimen, perforated with two holes for suspension.

Length from neck to tail-notch 17 inches; curvature of saddle 16 inches.

Another specimen, No. 100, was received from the Zoological Society of London about 1820.

Tolypeutes tricinctus.

Apar or Three-banded Armadillo.

'Armadilla, or Encubartado, two sorts:
{ Tatu Apara
{ Tatu Tatu peba.' T. 1656.

'101. *Apara tricinctus*. Back plates of the three-banded Armadillo (Mus. Trad.).'

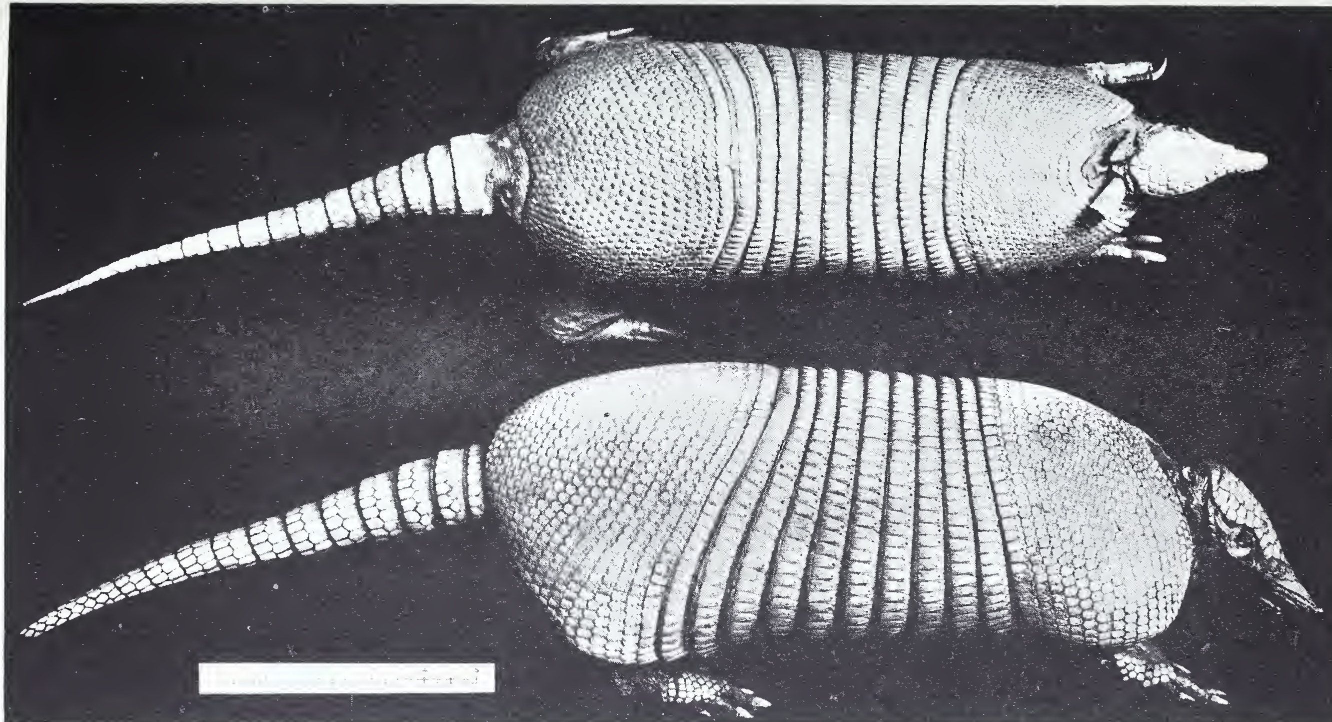
No. 1310, measuring neck to tail 9¼ inches, curvature of saddle 8 inches, seems to be a specimen that has been substituted for the original Tradescant specimen.

Dasypus sexcinctus.

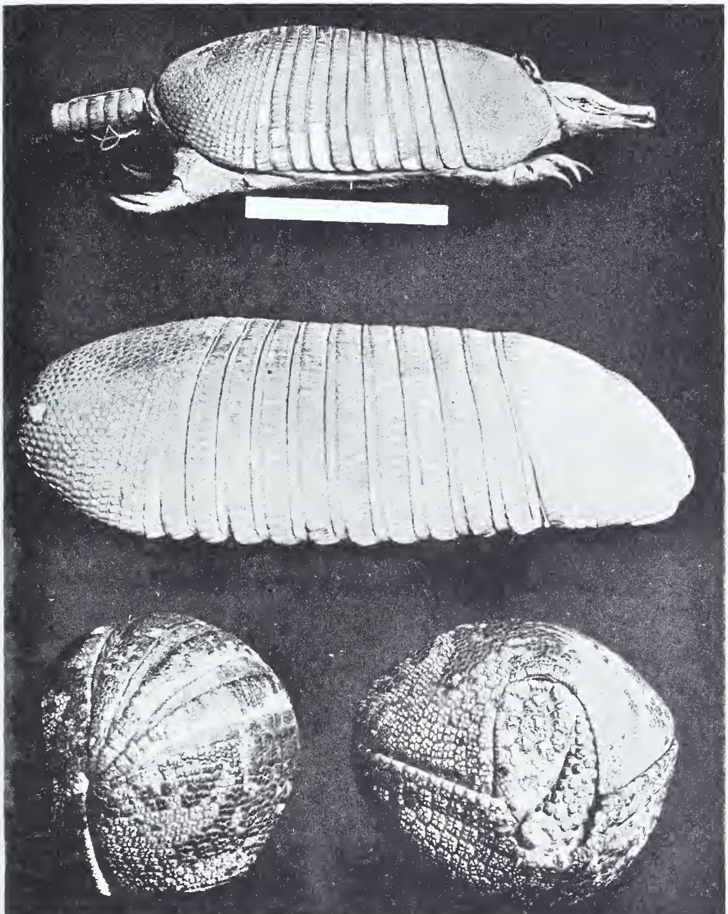
'102. 'Dasypus sexcinctus, *Linn.* Le Tatou encoubert *Buff.*—The six-banded Armadillo.'

The Fóunder's specimen seems to have disappeared since 1860.

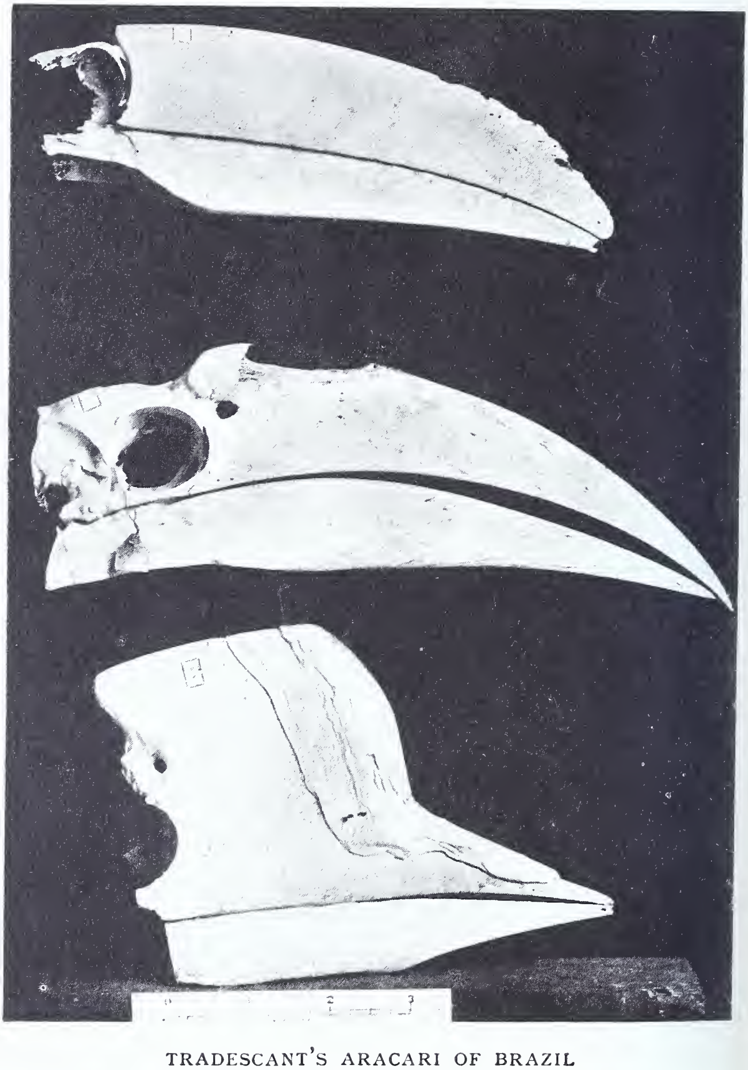
'93. Foot of an Armadillo (Mus. Tradesc.).'
Now missing.



NINE-BANDED ARMADILLO



NINE-BANDED AND THREE-BANDED ARMADILLOES



TRADESCANT'S ARACARI OF BRAZIL
NO. 61. BUCEROS MALABARICUS
NO. 63. BUCEROS GALEATUS

AVES

RATITAE

Struthio camelus.

Ostrich. S. Africa.

'177. Foot of the Black Ostrich. Mus. Tradesc.'

CARINATAE

ACCIPITRES.

'129. Foot of the golden Eagle. Mus. Tradesc.'
'130–132. Feet of Rapacious birds. Mus. Tradesc.'

These evidently represented in 1830 the 'Eagles clawes' and the 'Twenty severall sorts of clawes of other strange birds, not found described by Authors' that were in the Tradescant collection in 1656.

None are now extant.

PASSERES.

Rhamphastes toco.

Toucan. Brazil.

'Aracari of Brazil.' Trad. 1656.
'71. Head of the Toco Toucan—Rhamphastos Toco.'

Length 6½ inches. The bird was first described by Oviedo in 1527, but was not given its current English name before the publication of Charleton's *Onomasticon* in 1668. A Toucan was found within two miles of Oxford in 1644, see p. 260.

Buceros malabaricus.

Pied Hornbill. India.

'61. Head of the Pied Hornbill. Biceros malabaricus.'

No. 1042. Also marked 'No. 61' on an iron label, as used for Tradescant specimens.

Although the existence of the Hornbill was known to Pliny who calls it *Tragopan* (*Hist. Nat.* x. 49), no author appears to have figured one before 1599, when Aldrovandus described his '*Rhinoceros Avis*' from a head. The Tradescant specimen must therefore have been one of the first examples to be seen in England.

Buceros galeatus.

Helmet Hornbill. Sumatra.

'63. Head of . . . . ?

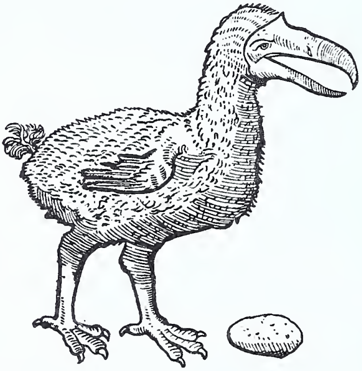
No. 1047. Also marked 'No. 63' on an iron label, as used for Tradescant specimens.

The substance of the horny helmet of this bird is so hard that it is frequently carved by Chinese artists. When cut transversely the slices, of a bright yellow colour with a scarlet rim, are made into ornaments. The head of the bird was first figured by Edwards in 1756,—more than a century after this head probably reached the Tradescant collection. The helmet in this specimen is $3\frac{1}{2}$ inches in height.

Didus ineptus.

Dodo. Mauritius.

'Dodar, from the Island Mauritius.' T. 1656.
'81. Head and Leg of the Dodo.'
'The Head and Foot of the last living Dodo seen in Europe.' Printed Label in Univ. Museum.

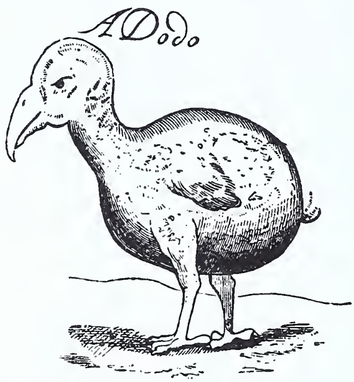


The Gallus peregrinus of Clusius, 1598.
Exotica, 1605.

The island home of the Dodo was discovered by the Portuguese about 1507, and it was by them called Cerne. They found it well stocked with great, unwieldy birds, unable to fly, which they called in their tongue 'simpletons', or *Doudo*. In 1598 the Dutch under Van Neck

Comment nous avons tenu mesnage (sur l'Isle Maurice).
Illustration to Van Neck's Voyage by De Bry, 1601.

renamed the island Mauritius, and the birds *Walghvogels*, or 'nauseous birds', because they said that no cooking could make them palatable. They brought a live example back to Holland, and the bird appears in a print by De Bry. Several artists depicted the captive birds they had seen in Holland about 1626–8, and in 1628 the first English observer described one. An Emanuel Altham, writing to his brother at home, said, 'You shall receue . . . a strange fowle: which I had at the Iland Mauritius called by ye portingalls a Do Do: which for the rareness



SIR THOMAS HERBERT'S DODO, 1627.
T. H., Relation of some yeares' Travaile, 1634.

thereof I hope wilbe welcome to you'. We do not know whether the bird arrived alive. In any case, Oxford was not long behind, for in or before 1634 a 'Dodar (a blacke Indian bird)' had been 'bestowed vpon ye Anatomy School'.[1] About 1638 a picture of one was to be seen hanging out in a London street. The original was shown to Sir Hamon Lestrange, who described it as 'somewhat bigger than the largest Turkey cock, and so legged and footed, but shorter and thicker'. It swallowed 'large pebble stones . . . as bigge as nutmegs'. Its keeper called it a Dodo; and it may well have been that when it died its body was embalmed and acquired by Tradescant for his Museum at South Lambeth. A 'Dodar from the Island *Mauritius*; it is not able to flie being so big',

[1] T. Crossfield of Queen's Coll. *MS. Diary*, 1626–40.

duly appeared among the 'Whole Birds' in the Catalogue of the Rarities preserved at South Lambeth in 1656. In 1674 it passed into the possession of Ashmole, and doubtless with the rest of his collections arrived in Oxford by barge, and was set up in the Ashmolean Museum in 1683.

The stuffed Dodo remained in an entire, if not a very perfect, state till 1755 when the Vice-Chancellor and the other Trustees, to whose guardianship the worthy Ashmole had confided his treasures, came in an unlucky hour to make their annual visitation of the Museum. In those days Oxford presented the anomaly (that existed until 1849) of a University in which Zoology was not publicly taught as a science. The literary and scientific ardour which Lister, Plot, Aubrey, Ashmole, Wood, Lhwyd, and others had awakened in the seventeenth century had now subsided, and the University seems to have relapsed into the scholastic torpor of the Middle Ages. We need not therefore wonder at the fate which befell the LAST OF THE DODOS. This unhappy specimen, then at least a century old, had, it appears, become decayed by time and neglect; and according to a record now extant, was, with many others, 'ordered to be removed at a meeting of a majority of the visitors'. On this fatal decree, Mr. Lyell appropriately remarks:

> 'Some have complained that inscriptions on tombstones convey no general information except that individuals were born and died—accidents which happen alike to all men. But the death of a *species* is so remarkable an event in natural history, that it deserves commemoration; and it is with no small interest that we learn from the Archives of the University of Oxford the exact day and year when the remains of the last specimen of the Dodo, which had been permitted to rot in the Ashmolean Museum, were cast away. The relics we are told were "a Museo subducta, annuentibus Vice-cancellario aliisque Curatoribus, ad ea lustranda convocatio, die Januarii 8vo, A.D. 1755".'

By a lucky accident, however, a small portion of this last descendant of an ancient race escaped the clutches of the destroyer. The head and one of the feet were saved from the flames, and were preserved in the Ashmolean Museum until the transference of the natural history collections to the New Museum in the Parks.

The integument covering the bones of the foot was removed by Dr. Kidd about 1846, and the skin from one side of the skull was taken away by Dr. Acland in the following year.

The remaining bones were set up in a glazed iron case, and a few of the missing bones being replaced by the corresponding bones from another dodo, a fair representation of the skeleton of a complete and entire Dodo was exhibited to the public. Near the end of the nineteenth century, however, this skeleton was again dismounted and the individual bones were mounted separately in the manner shown in the figure. We cannot, however, endorse the expression used by the authors of the *History of the Oxford Museum*, that in their present position they 'afford most valuable assistance to the students of zoology'.

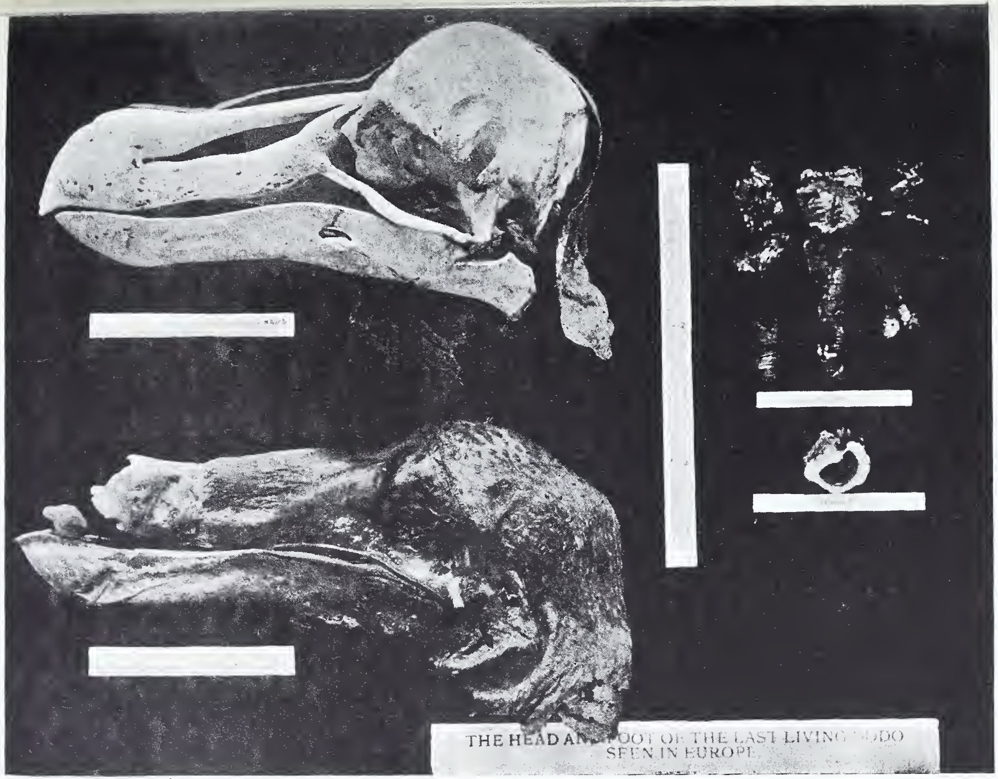
The particular Vice-Chancellor who earned distinction as the dodo-burner was George Huddesford, President of Trinity. The other visitors were John Conybeare, Dean of Christ Church; Francis Yarborough of B.N.C.; Professor Woodford of New; and the Proctors from All Souls and Lincoln.

A left foot from another bird is mentioned in 1665 in a *Catalogue of many Natural Rarities, etc.*, collected by one Hubert *alias* Forbes in the Music House near the West End of St. Paul's Church. This relic, described as 'a legge of a Dodo, a great heavy bird that cannot fly; it is a Bird of the Mauricius Island', is supposed to have passed into the possession of the Royal Society. At any rate it is included in Grew's catalogue of their Museum in 1681, and was afterwards transferred to the British Museum.

The head of yet another *Walghvogel* was described in 1666,[1] and this specimen is now in the Museum at Copenhagen.

According to the evidence of Benj. Harry's journal, at least one tough old bird survived in the Mauritius until 1681; but the writer's sole remark is that its 'fflesh is very hard'. The intrusion of 'civilization' not only destroyed the entire race, but also every tradition relating to it, and doubts began to arise as to whether such a creature could ever have existed.

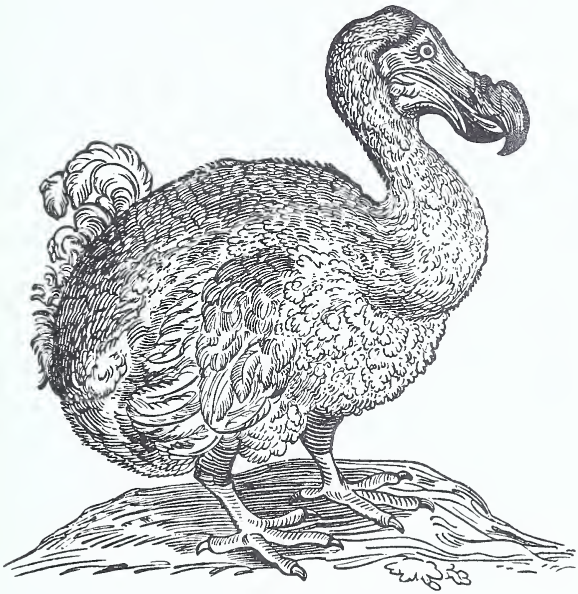
[1] Olearius, *Gottorffisches Kunst Kammer*, 1666.



HEAD OF THE TRADESCANT 'DODAR FROM THE ILAND MAURITIUS'

On the right is part of the scaly covering of a foot and the sclerotic of an eye of the same bird

J. S. Duncan,[1] the Keeper of the Ashmolean Museum in 1828, having in his custody the relics of the last living Dodo seen in Europe, was able to prove how ill-founded these doubts were. And the case was again taken up by Broderip[2] and by Strickland,[3] both of Oriel College.



Roland Savery's Dodo.
After Piso 1658.

REPTILIA

CHELONIA

Emys vulgaris.

Fresh-water Tortoise. S. Europe.

'8. Emys vulgaris. Test. lutaria *Linn.* Mud Tortoise (shell). South of Europe. Mus. Tradesc.'

[1] J. S. Duncan, *A summary review of the authorities on which naturalists are justified in believing that the Dodo Didus ineptus* L. *was a bird existing in the Isle of France, or neighbouring islands, until a recent period. Zoological Journal*, iii, p. 554. 1828.

[2] W. J. Broderip, *Dodo. Penny Cyclopaedia*, 1837.

[3] H. E. Strickland and A. G. Melville, *The Dodo and its Kindred.* 4to London, 1848. This work contains a complete bibliography.

Chelone Caretta.

Loggerhead Turtle.

'10. Chelone Caretta. Test. Caretta *Linn.* The Loggerhead Turtle. Mediterranean and other seas. Mus. Tradesc.'

'11. Chelone Caretta (young) showing the bones of the feet. Mus. Tradesc.'

CROCODILIA

Crocodilus vulgaris.

Common Crocodile. Egypt.

'Alegator or Crocodile from Aegypt.'

'18. Croc. vulgaris. Lacerta Crocodilus *Linn.* The common Crocodile. Mus. Tradesc.'

'19. Croc. vulgaris. The same. Mus. Tradesc.'

'26. Portion of back of a large species of Crocodile. Mus. Trad.'

Crocodilus acutus.

West Indian Crocodile. W. Indies.

'22. Crocodilus acutus *Cuv.* West Indian Crocodile. Mus. Trad.'

LACERTILIA

Iguana.

'46. Lac. iguana Linn. Common American Iguana. Mus. Trad.'

Now missing.

PISCES

GANOIDEI

Lepidosteus osseus.

Gar-pike. N. America.

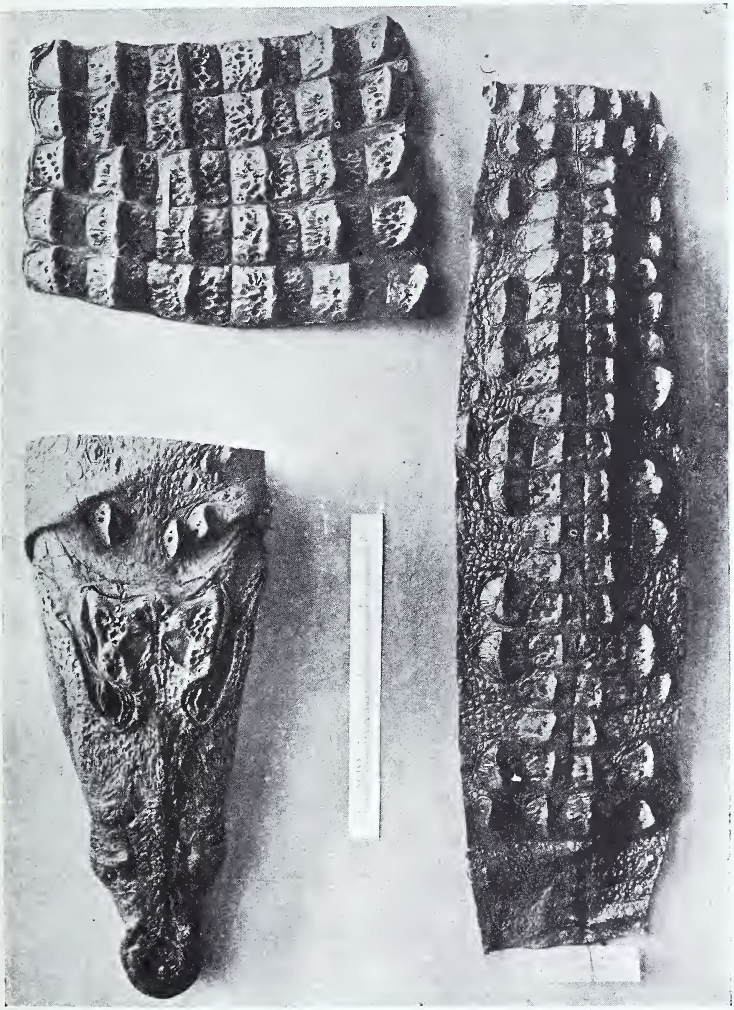
'72. Esox osseus *Linn.* Lepidosteus *Lacep.* Greater Garfish (head of). Mus. Tradesc.'

'111. Accipenser ......? The Sturgeon. Mus. Trad.'

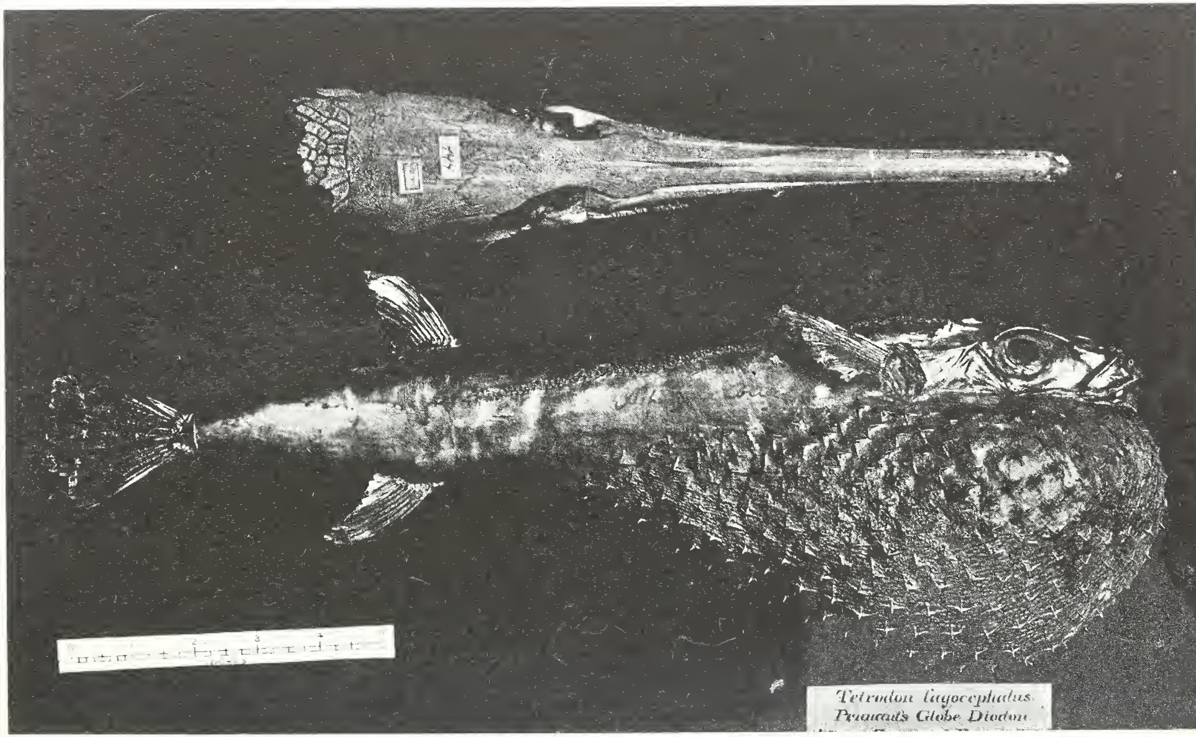
ELASMOBRANCHII

'116–118. Squalus Carcharias *L.* Jaws of the white Shark. Mus. Trad.'

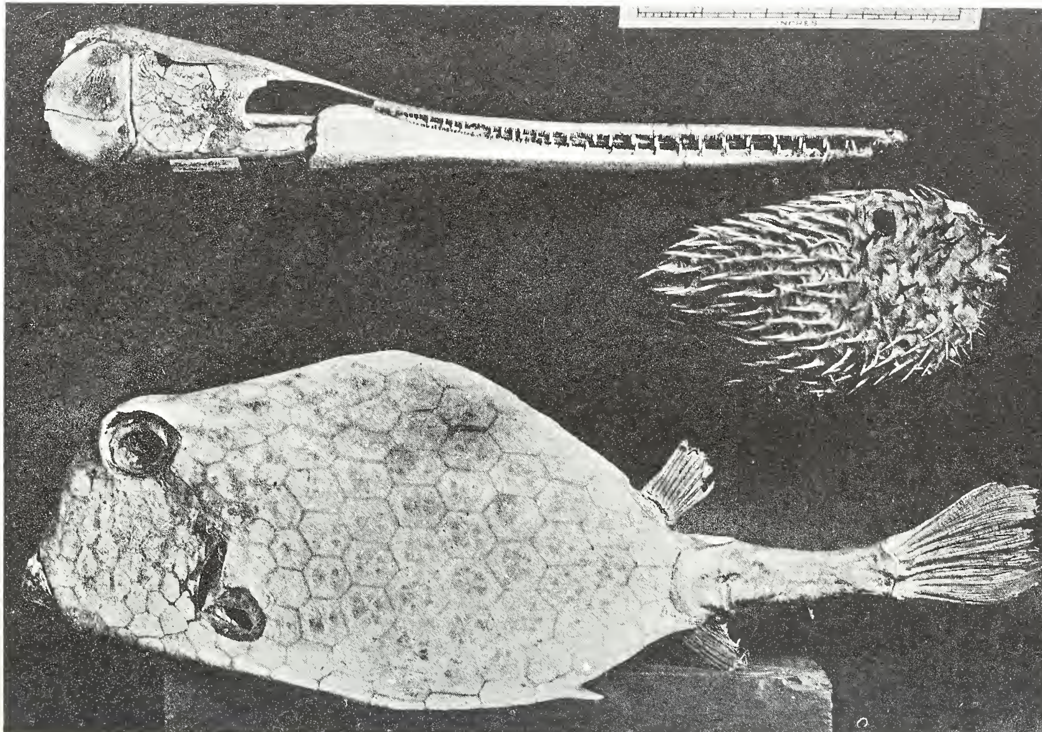
'119. Squalus glaucus *L.* Head of the Blue Shark. Mus. Trad.'



HEAD AND PARTS OF THE BACK OF TWO OF TRADESCANT'S CROCODILES



NO. 72. TRADESCANT'S LEPIDOSTEUS OSSEUS (HEAD)
PENNANT'S TETRODON LAGOCEPHALUS



NO 72. LEPIDOSTEUS OSSEUS NO. 89. DIODON SP.
NO. 107. OSTRACION TRIGONUS

'121–124. Squalus vulpes *Rond.* Jaws of the Fox Shark. Mus. Trad.'

'127. Squalus mustelus *L.* Jaws of the smooth Hound. Mus. Trad.'

Pristis antiquorum.

'Sword fishes, with severall swords.' T. 1656.

'131. Pristis antiquorum *Lath.* Saw-fish. Mus. Trad.'

'132–136. Beaks of the Saw-fish, of various magnitudes. Mus. Trad.'

TELEOSTEI

'13. Trigla volitans *Linn.* Flying Gurnard. (Imperf. Mus. Tradesc.).'

'27. Chaetodon Imperator *Linn.* Holocanthus *Lacep.* Imperial Chaetodon. Mus. Tradesc.'

'32. Xiphias. Beak of round-snouted Sword Fish, *Shaw.* Mus. Tradesc.'

'33. Coryphaena equiselis *Linn.* Head of Brasilian Coryphene. Mus. Tradesc.'

'35. Naseus fronticornis *Cuv.* Unicorn Acanthurus *Shaw.* Mus. Tradesc.'

Synodontis sp.

Spine of pectoral fin.

Hippocampus sp. (? antiquorum).

'84-87. Syngnathus hippocampus *L.* Seahorse Pipe-fish.'

Diodon sp. (? D. hystrix).

Fish 'with prickles'. Guamajaca guara. T. 1656.
'89–94. Diodon attinga *L.* Porcupine Diodon. Spring Globe-fish. Indian Seas. Mus. Trad.'

Length 5½ inches to base of tail; girth 10½ inches.

Pectoral with about 21 rays; spiny scutes $\frac{3}{4}$ inch long, arranged in 19 rows from the mouth to the base of the tail. A very old specimen.

Chilomycterus reticulatus.

'93. Mus. Trad.'

The specimen is inscribed 'Bladder Fish', and has been suspended by its upper lip.

Length 27 in.; girth 37 in.; large triradiate scutes with roots 2 in. long; a few quadriradiate scutes on dorsal surface. Numbers of fin-rays: 20 pectoral, 12 dorsal, 12 anal, 10 caudal.

'97, 98. Tetraodon lagocephalus *Bloch*. Globe Diodon, Pennant Mus. Trad.'

'100, 101. Balistes vetula *Bloch*. Ancient File-fish. Indian Seas. Mus. Trad.'

'102. Balistes capriscus *L*. Mediterranean File-fish. Mus. Trad.'

Ostracion concatenatus.

'104, 105. Ostracion triqueter *Bloch*. Triangular Trunk-fish. Mus. Trad.'

'106. Ostracion bicaudalis *Bloch*. Biaculated Trunk-fish. Mus. Trad.'

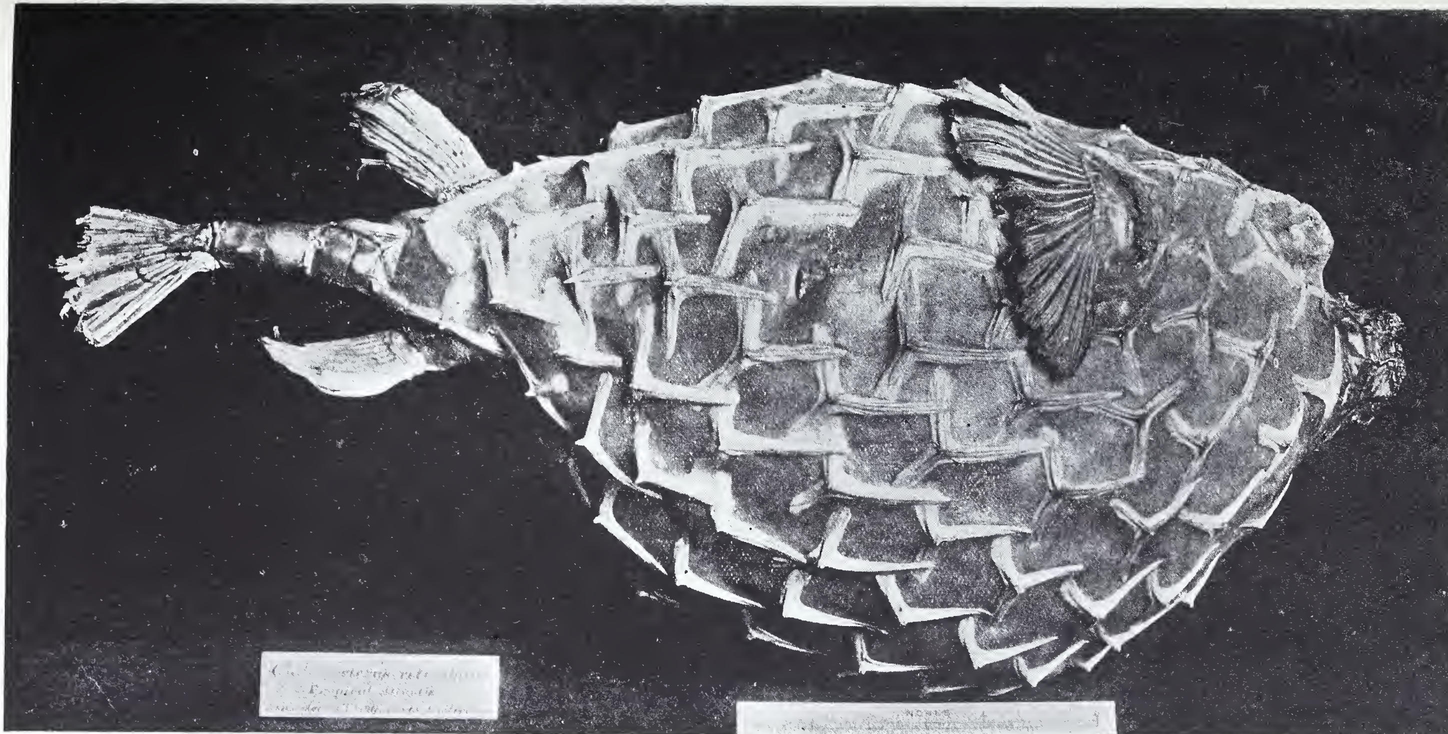
Ostracion trigonus.

'Guamajacu ape.' T. 1656.

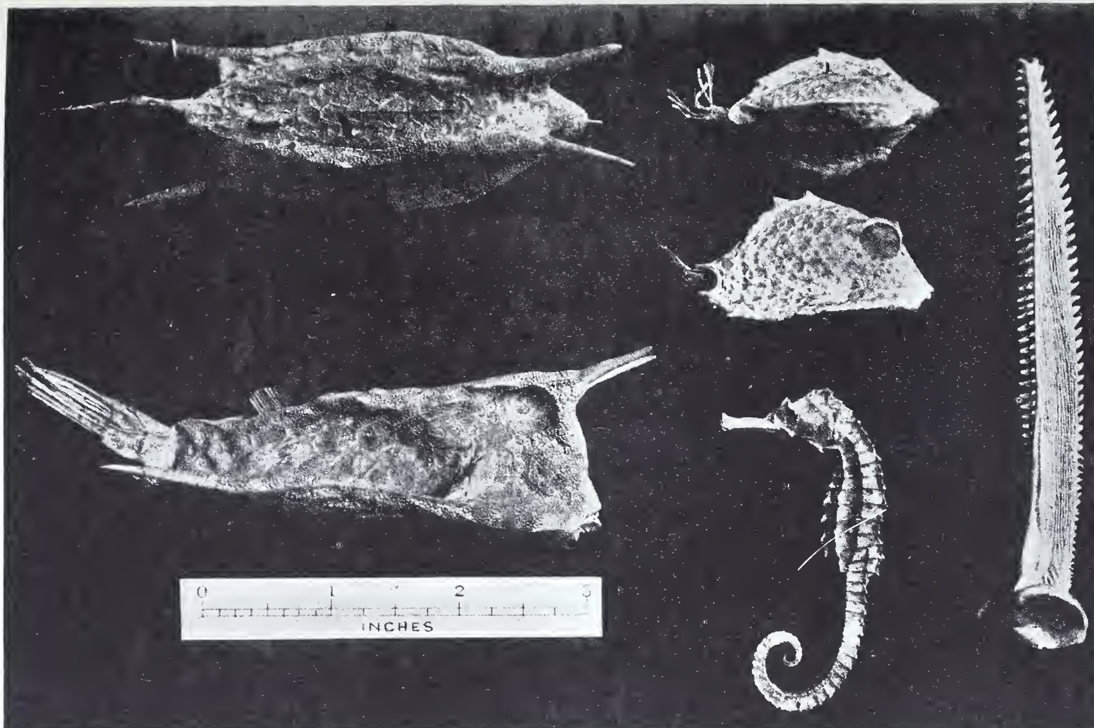
'107. Ostracion trigonus *Bloch*. Trigonal Trunk-fish. Mus. Trad.'

Ostracion cornutus.

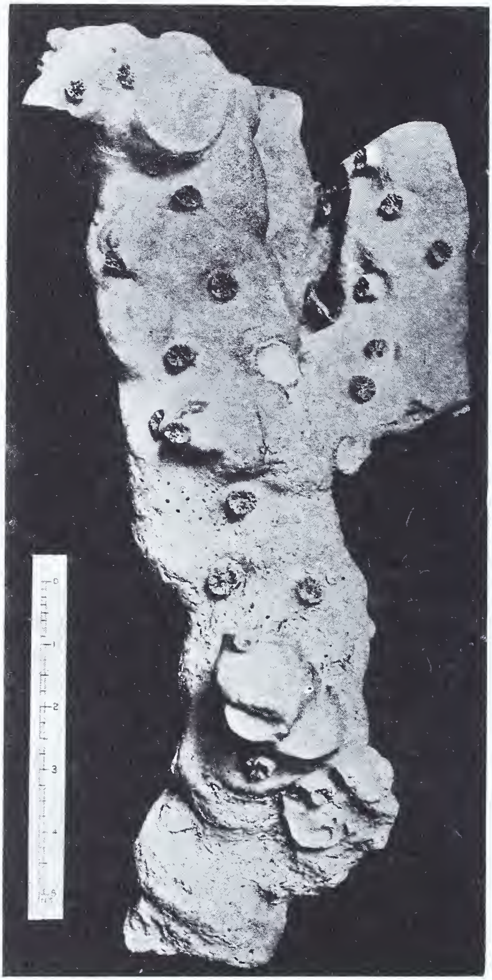
'108, 109. Ostracion quadricornis *Bloch*. Four-horned Trunk-fish. Mus. Trad.'



NO. 93. CHILOMYCTERUS RETICULATUS



NOS. 108-9. OSTRACION CORNUTUS 104-5. OSTRACION CONCATENATUS, SYNODONTIS SPINE
HIPPOCAMPUS SP.



DENDROPHYLLIA SP.

Zoological Specimens added to the Ashmolean Collections in the Eighteenth Century

Mammals.

Os monstrosum (forsan) humani capitis.
L. Horner, c. 1757.

Cadaver infantis Balsamo conditum.
Isaac Hughes, merchant,
of London, de Crutched Fryars, 1766.

Lutra *anglicè* Otter.
1763.
— Phelps, from the Earl of Macclesfield, Shirburn,

Vulpes aureus *Linn.* Jackall. Wm. Huddesford, 1762.

Porci pedes monstrosi. — Corne, c. 1757-9.

173. Horns of the Koodoo, Cape Colony.
Th. Pennant of Queen's Coll., 1768.

'The horns I sent were belonging to the condoma of de Buffon xii. 301, tab. xxxix & Vol. xv. 142, and the striped Antelope Pennant synopsis Madr. No. 24, p. 31. They are fine of their kind, and I hope grace the Museum.'

Letter from Pennant to Huddesford dated Downing, Jan. 11, 1771. MS. Ashmole 1822, f. 364.

Birds.

Avis mellivora curvirostris. Edvardi Tab. 226 Nat. Hist.
Aldersey Bridgeman of Liverpool, 1762.

2 unfledged Humming birds in their proper nest.
Capt. W. Burnaby of Broughton Pogis, Oxon., 17—.

Fish.

Albacore's head and backbone, taken at Colchester, weight 300 lb. Tail measured 18 in.
Philip Griffin, 175-.

Caput Umblae e Lacu Lemani.
Aldrov. *de Pisc.* v, p. 650. Dr. Cooper, 1758.

Acus Aristotelis.
Johnson, Tab. xv, fig. 54. Isaac Parsons, 1758.

Acarid.

Cancrum minutissimum ex stomacho Musculi fluviatilis excerptum. 1758.

Aldrov. *de Insectis* v, p. 571.

Pres. by Dr. Cooper.

'Oliver Cromwell's' Skull.

'2. A cranium said to be Oliver Cromwell's.' 175-.

Now No. 561 in the collection of skulls in the University Museum. Cromwell had been Chancellor of the University from 1651–6.

'In the year 1672 Oliver's skull was blown off the north end of Westminster Hall down into the leads of the same, and taken from thence by Mr. John Moore, a clerk then in the old Petts; and sometime after this he gave it to Mr. Warner, apothecary, living in King street, Westminster; and then Mr. Warner sold it for twenty broad pieces of gold to Humphrey Dove, esq. then deputy paymaster to the treasurer of the chamber; but had been secretary to Fines when keeper of the seals to Oliver. This skull was taken out of Mr. Dove's iron chest at his death in December 1687, by his daughter Mrs. Mary Fisher, of Westminster, with which family it hath remained untill given to Mr. Edw. Smattrell. *Westmr.* Octr. 10th, 1720.'

The record of another, and a spurious Cromwell head is contained in Uffenbach's travel book of 1710.

Claudius du Puy, a French Swiss cotton printer who had four rooms full of curiosities in natural history showed Uffenbach as one of his most remarkable specimens, the head of Cromwell, just as it had fallen down, with the broken pole, unless indeed someone had deceived Mr. du Puy with some other skull. For it seems very suspicious that a bit of wood should be sticking in it, although it is stated to have fallen down; for heads of malefactors are usually stuck on iron and not on wooden spikes. However he asserted that he could sell it for 60 guineas. I was surprised that this monstrous head should be so cherished and valued by the English; nevertheless there are many other such heads in England, and there are said to be many which would like to be similarly exalted 'die damit eben so oben hinaus wollten'. With this head of Cromwell was also one of a mummy which I should have preferred to have had.[1]

[1] Uffenbach, 1710.

NO. 561. 'OLIVER CROMWELL.'

NO. 672. EGYPTIAN MUMMY

1. Skull of a Mummy from Dr. Woodward's collection.
2. " " " " "
3. Hand "} Pitt Lethieullier.
4. Foot "
Noted in Lethiullier's Catalogue of 1759. MS. Ashmole 1821, f. 34.

Important Accessions during the Nineteenth Century

The Duncan Collections. 1823-1854.

The gifts of the brothers Duncan (page 333) were valuable and incessant. Without much exaggeration one may say that nearly one half of the entire zoological contents of the Ashmolean Museum during the early thirties were due to their generosity. And a cursory glance at their catalogue suffices to show that Oxford even owed the greater part of the other benefactors during the period of the Duncans' tenure of office to their intervention and activity.

African Mammals. 1824.

W. Burchell.

Camelopardalis Giraffa.

Ashmolean Society.

The race of large giraffes to which this example belonged was restricted to the Cape Colony territories, where they are now extinct. The Ashmolean specimen has been unstuffed: it is earnestly to be desired that what remains of it may be piously preserved, as a relic of a race of fine animals which has been exterminated by man.

Brazilian Birds. 1824.

J. Parkinson, British Consul at Pernambuco.

East Indian Birds. 1824.

Dr. Prattinton Bewdley of Worcester.

Perceval Collection of British Birds. 1824-5.

Hon. and Rev. C. Perceval, of Calverton, Bucks.

Humming Birds. 1825.

Rev. C. Ranken, Christ Church.

East Indian Birds. *c.* 1825.

The Hon. the East Indian Company.

Birdskins from the Cape of Good Hope. **1826.**
Miss Bishop of Holywell.

Various skins of Rare East Indian Birds. **1827.**
Robert Barclay of Bury Hill.

African Birdskins. **1827.**
J. Murray of Albemarle St.

Collection of Shells.
Presented by Lady and Miss Harvey.

Collection of British Shells.
Presented by Sir Walter C. Trevelyan, Bart.

Collection of British Shells. 1861.
Bequeathed by George Barlee of Exmouth.

Collection of Insects and of other Invertebrate Animals.
Presented by the Rev. F. W. Hope.

Collections of Human Skulls.

The foundations of the fine collection of human skulls were laid by many contributors whose names are well deserving of record. Among those noted in the Osteological Catalogue, vol. xv, comprising the Varieties of Man, and containing the book-plate of the Anatomical Museum of Christ Church, are:

Nos. 770 a–k. Eleven skulls dug up at Long Wittenham in 1859.
No. 773 a. Ceylonese skull, presented by Dyce-Duckworth.
Roman skulls, presented by J. Thomson, Rev. J. C. Clutterbuck, Rev. F. C. Plumtre, W. G. Church, Benj. Bagshaw.
Bushmen, presented by Dr. W. H. Black, Ph.D., and Frank Oates.
Zulus, presented by Hon. C. Ellis 1866, Evan Hare of St. John's 1879, T. Spencer Wills, F.R.C.S., and from the Burchell collection 1813.
Kaffirs, presented by J. South and Col. Rigaud.
Javanese. James Hunt, Ph.D.
Polynesian. Capt. Cook, No. 809 a.
Darnley Islander. Prof. Huxley, No. 819.
Australian. C. Jamrach. Capt. Moresby, R.N. R. Davenport. Capt. Prevost.
Chitanache Indian. C. Daubeny.
Skeleton of a male Australian of the Tomki tribe of Richmond River blacks, N.S.W., was prepared and presented by Arthur Bateman of Magdalen College in 1870.

II. *PATHOLOGICAL COLLECTIONS*

Bladder Stones. **7 May, 1593.**

Catalogued as a manuscript, No. 36601 MS. Engl. 1593, now MS. Engl. misc. d. 80 (R) in the Bodleian Library.

The stone was extracted 'from Beatrice Shrove without incision or cuttinge any parte of her body by John Hubbert', and is accompanied by a Certificate attested by Thomas Glenne, mayor [of Norwich] May 7, 1593, with the official seal of his mayoralty.

In the same box is a second bladder stone and a fragment of a third.

Operation for the Stone, 1491.
The millstones suggest the prowess of the physician.

Bladder Stones. Bodleian Collection.

Nos. 93, 94, 96, 97, 98, 123, and 388 in Th. Hearne's list (MS. Rawl. B 399 b) are all bladder stones.

Bladder Stone. **xvii Cent.**

Now missing. No. 93 in the Anatomy School.

'A large stone taken out of the bladder of one *Skingley* of Oxford, weighing aboue 2 pound, and being ten inches round one way *ferè*, and full eleven the other; preserved, and now to be seen in the *Medicin School.*' (Plot.)

Bladder Stone. **1683.**

Ashmolean Museum.

Extracted from a girl aged eight years after an operation by the donor, Dr. J. Eliot of Exeter.

Now missing.

Large Bladder Stone. **1683.**

Presented by J. Colvil to the Ashmolean Museum.

Extracted from Beatrice Shrewe of Tunsted co. Norfolk without any incision by the art of the skilful surgeon John Hubbert of Norwich.

Evidently the above-mentioned stone in the Bodleian Collection.

Incrustations from the Stomach of a Horse. **1748.**

Presented by — Dudley, the Southampton Carrier, to the Ashmolean Museum.

Corn. **1655.**

Now missing.

'A *Corn* that grew on the toe of one *Sarney* a *Wheelwright*, of *St. Aldates* Parish in the City of Oxford, Anno 1665 two inches long, which for the unusual figure and bigness of it, I have caused to be ingraven of its just magnitude *Tab.* 10, *Fig.* 16, which is also to to be seen in the *Medicin School*.' (Plot.) Cf. p. 265.

A Human Horn. **1668.**

' 10. A small horn (resembling in form the horn of a sheep) from the head of Mary Davis.'

Among the pictures in the Museum which belonged to Ashmole is a portrait of Mary Davis, representing the horn that grew on her head, and recording the history of the fact, viz.: 'Mary Davis of Great Saugthall, near Chester; taken anno 1668, aetatis 72. At twenty-eight years old an excrescence rose upon her head which continued thirty years, like to a wen, then grew into two horns; after five years she cast these; then grew two more; after four years she cast them; these upon her head have grown four years, and are loose.'

Stones and Hairballs.

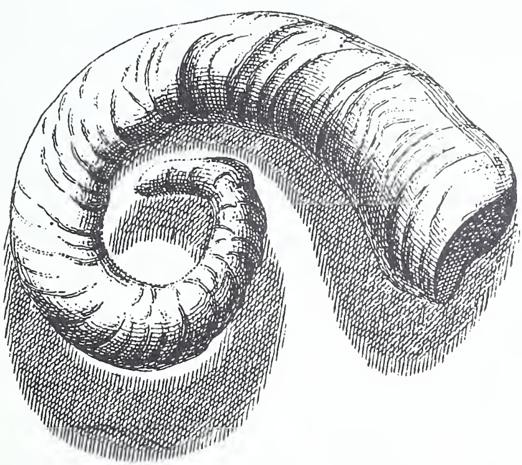
'5-8, 10-12. Stones and Hair balls.'

Mr. Lethiulliers Catalogue 1759. In MS. Ashmole 1821, f. 34.

Cyst of Coenurus cerebralis (probably).

'9. A piece of the upper Cranium of a Cow taken off in order to come at a Bag of small Worms which lies between the Skul and the dura mater and by pressing of it causes a humor in the eyes and a dissines in the head, upon removing of which the Creature recovers, the Gentleman who gave me this piece saw the operation performed and afterwards saw the same Cow with calf in Aug. 1724. This is a common practise in Norfolk and performed by ordinary country fellows.'

Mr. Lethiulliers Catalogue 1759. In MS. Ashmole 1821, f. 34.



THE HORN THAT GREW ON THE HEAD OF MARY DAVIS 1668.

III. *GEOLOGICAL COLLECTIONS*

Founded upon the collections of Lister and Plot, and enriched by the addition of the fossils of Lhwyd, the Ashmolean Geological Collections comprised no less than 1,766 specimens, many of which had the special value of type-specimens. My friend Professor Sollas, in whose charge these historic collections should now be, assures me that of all the 1,766 specimens dating from the seventeenth century, only *two* now remain in the University Museum.

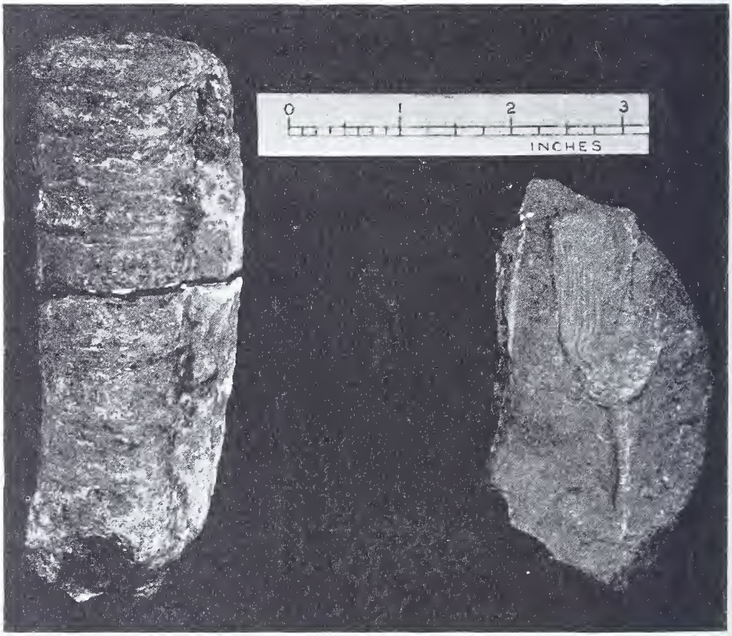
One of these is a somewhat battered specimen of *Orthoceras* sp. from Bristol limestone; the other, a fossil sea-lily, was described and figured by Lhwyd,[1] and afterwards in a letter to Dr. Lister,[2] and again nearer our own day by Miller as the type of his species *Actinocrinus polydactylus*.[3]

Lhwyd, in a letter written in 1698 to Dr. Lister, clearly recognizes the relationship of fossil sea-lilies, or encrinites as they are now called, to living starfish or Asteroidea.

> 'The rest are *Modioli* or *Vertebrae* of Sea-stars; for I have long since been fully satisfied that all sorts of *Entrochi* and *Asteriae* must be refer'd thither; not that I conclude either these, or any other Marine terrestrial Bodies, were ever really either Parts or *Exuviae* of Animals; but that they bear the same relation to the Sea-stars that *Glossopetrae* do to the teeth of Sharks; the Fossil Shells to the Marine ones, &c.'

Herein Lhwyd clearly suggests the association of at least two of the great classes of the Echinodermata, and we gather from the classification which he adopted in his *Ichnographia*, that such was his intention. But unfortunately Lhwyd did not perceive the true meaning of his fossils. Although he was acquainted with the earlier views expressed in 1669 by Steno, that fossils are the actual life-size vestiges of parts of living creatures, he preferred to teach that they grew where they are found, that they are due to a formative force acting within the rocks upon the seeds of organisms brought by rain from the sea.

[1] Lhwyd, *Lithophylacii Britannici Ichnographia*, p. 104, pl. xxii, fig. 4.
[2] *Phil. Trans.*, 1698, vol. xx, p. 279, fig. 14.
[3] *Crinoidea*, pl. i, fig. 2, 1821.



ORTHOCERAS ACTINOCRINUS POLYDACTYLUS

THE SOLE SURVIVORS OF THE LHWYD COLLECTION

Early Geological Specimens and Minerals of Historic Importance

Two Ammonites. 1683.

Presented by Dr. J. Eliot of Exeter.

Missing.

The Plot Collection of Fossils. 1691.

See p. 216, and p. 341.

All lost.

Tin and Copper Ores. 1694.

Presented by John Sowter.

From Devon and Cornish mines that are no longer being worked.

All lost.

The Lhwyd Collection of Naturalia. 1714.

See p. 222.

All lost with the exception of the two following specimens.

Orthoceras *sp.* **xvii century.**

Now in University Museum.

This specimen was obtained from the Carboniferous Limestone at Bristol. It is figured by Lhwyd, who describes it as

1661. Cylindrus geniculatus. An fortè Ichthyospondylus aliquis è majoribus, multijugus; an potius Alveolaria quaedam maxima? Ibid. Vide Num. 1737*.

Actinocrinus polydactylus Miller. **xvii century.**

Now in University Museum.

This type specimen is from the Carboniferous Limestone of Caldy Island. It is figured by Lhwyd, *Ichnographia*, pl. 22, fig. 4, and in the *Phil. Trans.* for 1698. The passage quoted above sums up Lhwyd's views on such fossil remains.

The Angerstein Collection of Minerals. xviii century.

Removed from 'Mr. Lhwyds cabinet below stairs and in 1760, were put in the windows'. MS. Ashmole 1821.

Fossils and relics of the Great Flood. 1716.

Presented by Prof. J. Woodward.

All lost.

W. Francombe Collection of British Stones. 25 Oct. 1756.

Letter to W. Huddesford, 26 Oct. 1756, in MS. Ashmole 1822.

J. S. Grouner Collection of Swiss Petrifactions. 1758.

According to a letter dated 12 April 1758, Grouner was Avocat au Conseil Souverain at Berne, and the correspondence implies that Huddesford exchanged specimens with him. MS. Ashmole 1822.

The Borlase Collection of Cornish Minerals. 1758.

All lost.

This collection included all the type specimens that are figured by Dr. Borlase, of Exeter College, in his classic work on the *Natural History of Cornwall*. His gift was accompanied by a volume of original drawings of his minerals, now transferred from the vicinity of the Mineral Collections to the Bodleian (MS. Ashmole 1824), and by a cabinet shown on the left hand side of the Natural History School in the Ashmolean Building in the figure facing page 332.

The circumstances of the moving of the Borlase collection to Oxford are recorded in his letters.

Dear Sir,

According to my promise I have sent directed to you to be further'd by our friend Mr. Platt's nephew at London by the Turnpenny Tinship which saild from hence a fortnight since, all the Fossils of Cornish growth describ'd in my Nat: Histy, except a few which are misplac'd in my drawers and cannot at present be found, and one or two which are the property of others and consequently not at my command. I have also consider'd according to my ability your scarcity of Metallic fossils in the Musaeum and added (I may say) all the best specimens of Metals wch have fallen in my reach. I design'd at first, (as I told you) to range these in a cabinet, but knowing how much more suitably to the rest of your Cabinets, and in how much better order for the inspection of the Curious they would be dispos'd by Mr. Huddesford, I have inclos'd them paper'd and number'd in a large box. You will be so good as to contrive that they may have some tendency to illustrate what is said of them in my work.

My respects to all friends, and a line when the box arrives.

I remain, Dear Sir,
Your most obedt servt.

Ludgvan 8[ber] 4. 1758. Wm: Borlase.

[MS. Ashmole 1822, f. 14.

Extract from a letter by Dr. Borlase, dated Ludgvan, Mar. 9, 1765.

I am much concerned to hear by your last that the Mundics tend so soon to dissolution; tis the Vitriolic salt that is in them which imbibes the damp, flowers in a pretty kind of downy icicles, and leaving one mass unconnected, pass away to form other combinations—there is no help for it; tis the common train of nature.

[MS. Ashmole 1823.

The illustrated catalogue of the Borlase Collection, written by himself and dated 1759, is now in the Bodleian, MS. Ashmole 1824. It is accompanied by a short descriptive catalogue of six 'parcels' of 'Native fossils, describ'd in the *Natural History of Cornwall*' 'together with other supplementary and explanatory metallic products of the Cornish Mines, with great respect presented to the Ashmolean Museum at Oxford in the year 1758'.

In a later letter to Huddesford, Borlase describes specimens of native tin and native gold given to the Museum, 4 Nov. 1765.

The Pennant collection of Metals, Minerals, and Naturalia. 1758.

All lost.

The catalogue of the Pennant collection, dated 1759, is contained in a letter addressed to the Rev. Wm. Huddesford at Trinity and franked by R. Mostyn, preserved in MS. Ashmole 1821, f. 36. It comprised 28 varieties of minerals and rock specimens and eleven 'foreign fossils', numbered '29 to 39'.

1. Various sorts of lapis calaminaris found in Flintshire.

. . . .

28. Fine white clay, Holyhead.
29. Osteocolla, Sicily.
35. Pot of bitumen, Sicily.

Massa concharum lapidea a Pago Brill allata.

c. **1757–9.**

Presented by — Platt.

Lost.

The Lethieullier collection of Fossils and of Drawings of Fossils. **1759.**

All lost.

Smart Lethieullier (1701–60) was a member of Trinity College. (*D.N.B.*)

The Brymer collection of Yorkshire Minerals, etc.

c. **1760.**

Given by the Rev. D. Brymer of Wadham College.

A small collection mentioned in MS. Ashmole 1824.

All lost.

Cidaris spine and two **Gasteropod Shells.**

In Charter Case, Drawer 58. Bodleian Library.

Collection of Oxfordshire and other Fossils. **?1733.**

Oriel College.

In an oaken cabinet of 35 drawers, with numbers and descriptive labels. The date '1733' is that of a newspaper in which one of the specimens was wrapped.

57. Stalagmite.
873. Brachiopod 'Sacculus . . . vulgaris'. Witney.
1173. Crinoid joint 'Asteria minor subl. . . . vulgati'. Adderbury in agro Oxon.
1369. Fish Teeth 'Variis coloris, nigri, scil. fusci, hepatici, pallidi et variegati exemplaria'. Marcham.

The Queen's College Minerals.

Donor unknown. The Library, Queen's College.

Ammonite.
Fluor Spar.

Collection of Moss Agates and **Fossils.**

Exhibited until 1919 in a show case in the Picture Gallery, Bodleian Library.

Atacama Meteorite. 1822.

Presented by Woodbine Parish in 1829 to Ashmolean Museum.

Basalt Column. *c.* 1830.

Botanic Garden.

Brought by Dr. C. Daubeny from the Giant's Causeway, and used as a pedestal for a Sundial.

Collection of Mammalian Jaws from Stonesfield.

Now in the University Museum.

Amphitherium Prevostii. 1812 & 1830.

Presented by Dr. Buckland to the Ashmolean Museum.

Amphitherium Oweni. 1854.

Buckland Collection.

Amphilestes Broderipii Owen. 1875.

James Parker Collection.

Described by Phillips in 1871.[1]

Phascolotherium Bucklandi Brod.

Described by Phillips in 1871.

A second specimen, figured by Phillips, and safely preserved for many years in the collection of James Parker in the Turl, was acquired by the Geological Department in 1913. It was destroyed in 1919 through a mistaken notion that its value would be enhanced if it were cut into thin sections.

Streptospondylus Cuvieri. xixth cent.

Obtained by James Parker from St. Giles Pit, Summertown near Oxford. Described by Phillips, p. 319, and in the *Geological Magazine*, July 1905. Purchased and presented to the University by W. Balston in 1913. Mounted in the Court of the Museum in 1924.

[1] Phillips, *Geology of Oxford*, fig. 236.

XIII

AIDS TO STUDY

History has often shown that times of trouble have also proved times of great productivity, and this was markedly the case in Oxford when the Puritans upset the existing order of things in the seventeenth century.

The great success of the Puritan reforms in Oxford has been acknowledged by Charles II's own High Chancellor, Clarendon, originally Edward Hyde of Magdalen Hall, 1622. Though prejudiced on the other side he wrote:

'It might reasonably be concluded that this wild and barbarous depopulation would even exterminate all that learning, religion, and loyalty which had so eminently flourished there; and that the succeeding ill husbandry and unskilful cultivation would have made it fruitful only in ignorance, profanation, atheism, and rebellion, but by God's wonderful blessing the goodness and richness of that soil could not be made barren by all that stupidity and ignorance. . . . *It yielded a harvest of extraordinary good and sound knowledge in all parts of learning.*' In no part of learning was this harvest more abundant than in the natural Sciences.

A clear idea of Oxford life in the days of 'Puritan Desolation' is conveyed by John Evelyn's account of his visit in 1654. Speeches and disputations, music and banquets all indicated a busy intellectual life. At Wadham, he was shown the large collection of interesting things belonging to the Warden Dr. Wilkins, and in the Anatomy School he took note of the natural objects: it served as the natural history museum of that day.

Methods of study are endless in their variety: *quot homines tot sententiae.* Volumes could be compiled upon the idiosyncrasies of men of science as to their habits and ways of living, but the chief requirements of the greater number appear to be adequate warmth and simple food. Of many it could be written, as of William Hunter, 'His habits were of the most frugal kind. Two eggs boiled out of the shell was his dinner'.[1]

The manner of study of William Prynne of Oriel (1600–69) was thus: 'he wore a long quilt cap, which came, 2 or 3, at least, inches over his eies, which served him as an umbrella to defend his eies from the light. About every 3 houres his man was to bring him a roll and a pott of ale to refocillate his wasted spirits. So he studied and dranke, and munched some bread; and this maintained him till night; and then he made a good supper. Now he did well not to dine, which breakes off one's fancy, which will not presently be regained: and 'tis with invention as a flux—when once it is flowing, it runnes amaine; if it is checked, flowes but *guttim*: and the like for perspiration—check it, and 'tis spoyled.'[2]

As an old man Thomas Hobbes of Magdalen Hall used to rise 'about seaven, had his breakfast of bread and butter, and tooke his walke, meditating till ten, then he did put downe the minutes of his thoughts. His dinner was provided for him exactly by eleaven, for he could not now stay till his Lord's houre,—sc. about two. After dinner he tooke a pipe of tobacco, and then threw himself immediately on his bed, with his band off, and slept about halfe an houre; in the afternoon he penned his morning thoughts'.[3] Sound sleep is as important to a student as wholesome diet.

William Harvey is stated by Aubrey to have been

> hott-headed, and his thoughts working would many times keep him from sleeping; he told me, that then his way was to rise out of his bed, and walke about his chamber in his shirt, till he was pretty coole, i. e. till he began to have a horror, and then returne to his bed, and sleep very comfortably.

Concerning the antiquity of certain modern aids to study, John Aubrey informs us that tobacco was first

[1] Manuscript marginal note in Sir Everard Home's copy of Brodie's *Hunterian Oration for 1837* in Magdalen College Library.
[2] Clark's *Aubrey's Brief Lives*. [3] Aubrey, *Life of Hobbes*.

brought to England in 1583, and that spectacles were introduced about 1480, and were sold, when first invented, for £3 or £5 a pair.[1]

But although diet may be varied, a student is a warm-blooded animal, and an optimum temperature, as the physicists call it, is absolutely essential if he is to do his best work.

The Oxford Climate has much to answer for. Early writers praise the situation of the University, but then they were for the most part summer visitors who see the town at its best. Such a one was Hentzner in 1598. He praised the beauty and wholesomeness of the situation, which is on a plain, 'encompassed in such a manner with hills, shaded with wood, so as to be sheltered on the one hand from the sickly South, and on the other from the blustering West, but open to the East that blows serene weather, and to the North, the preventer of corruption'.

The very thought of the cold in the unwarmed libraries of older days makes a modern student shiver. It is wonderful to us, that work in them should have been possible. Yet some brave or hardy scholars with constitutions impervious to chill braved out the cold. Hyde, for instance, in the preface to his Bodleian Catalogue of 1674, tells how his very hours for refreshment had been spent alone among the books, and how he actually had not shrunk even from the inclemency of winter.

Four years later at the 'Beginning of this month [Jan. 1678] colds became very frequent, many sick and keep up, colds without coughing or running at the nose, only a languidness, and faintness. Certainly Oxford 's no good air.'[2]

And again a third writer, a member of Queen's College, remarks on February 24, 1683-4: 'Now that the severe weather is gone, and studying weather begins to come in, I was in good hope to have done some thing in my studies.'

It is recorded that during the eighteenth century in the Oxford library, the severity of cold in winter 'had power to dishearten even the enthusiastic Thomas Baker

[1] Clark's *Aubrey*, ii, p. 319.
[2] Wood, *Life*, 1678.

whose health was not good'.[1] Marshall the library-keeper became perfectly crippled with rheumatism, and his assistants could not stay above three years in the library, which 'was so extremely damp that few persons could pass any length of time in it with impunity'.[2] Nor were things much better at Cambridge. Indeed, being nearer the source of the north-east wind, they may have been somewhat worse. Dr. Caius, for instance, in one of his works[3] makes allusion to the benefits of a residence in Italy, when he had exchanged the chill climate of Cambridge and his course of study there for the summer skies and wider learning of Padua.

And so it has always been. Doubtless also a lower standard of learning was the penalty paid in the Middle Ages by those undergraduates who had to run about after supper to get warm. The fur-lined hood of the bachelor of arts and the fur-trimmed gown, such as is represented in portraits of Erasmus and of other early learned men, tell an eloquent story of the material needs of students during the English winter. Those could accomplish most who either sought a warmer clime or did like Sir Thomas Browne, who 'kept himself always very warm, and thought it most safe so to do, though he never loaded himself with such a multitude of garments, as Suetonius reports of Augustus, enough to clothe a good family'. About 1650 President Goodwin of Magdalen was called 'Nine-Caps' on account of the many head-coverings which he wore as protectives against colds. Goodwin doubtless did as he liked, but in an earlier day a dispensation from the Pope might have had to be obtained for such luxury. In the year 1258, the Pope granted a faculty to the prior and Augustinian Convent of St. Frideswide to wear caps suited to their order at the divine offices, 'so great in your parts is the vehemence of the cold'.[4]

In the modern arrangement of the rooms of undergraduates, the larger room is usually the sitting-room, and the smaller, the bedroom. In the early days of the Colleges, the larger room or 'chamber' was the living

[1] Wordsworth, *Schol. Acad.*
[2] Gunning, *Reminisc.* ii, quoted from Wordsworth.
[3] *De Ephemera Brittanica.*
[4] S. A. Warner, *Oxford Cathedral*, 1924, p. 200.

and sleeping room with several beds for the 'chamber-fellows', while the tiny rooms adjoining were used as 'studies' in which several students could by getting together raise the temperature sufficiently for work in winter. Fire-places with chimneys are, of course, a modern invention.

'The antient manner of building was to set up hearths in the midst of rooms for chimneys which vented the smoke at a louver in the top.'[1] The louver may be seen in the hall of New College, and the arched sub-structure for a central hearth under the hall of Magdalen. In 1709 the lantern of Pembroke Hall was destroyed. 'A grate for sea-coals' and 'an iron chafing dish' are enumerated in an inventory of the President of Corpus of 1610–23 (Fowler). After the middle of the seventeenth century references to coal become frequent: the following from the Pembroke College Accounts are suggestive:

1652. Jan. 1. Rec. of Dr. Langley Mast^r of Pemb. Coll. the sume of eight pounds five shillings in full satisfaction for all coales served in for the use of the Coll. from the beginging of the world to the date hereof. In witness hereof I have put my marke

Hen. Kibble his — marke.

1657. Apr. 24. Coales supplied to Coll. for ½ year.

£17 10*s.* 0*d.*

The Bodleian Library was not warmed before 1821; hot water was introduced in 1861. Macray[2] speaks as feelingly as Hyde of the *hyemis inclementia*, of a time in one winter (1868) when, in consequence of the roof being under repair, the thermometer fell 11° below freezing-point. 'And readers, naturally were few and far between.'

Again, when the ineffectual system of 'warming by hot air' was introduced (1821), the studies still remained so cold that Prof. Reay, the aged sub-librarian, 'would stand for half-hours together over the gratings, in but half-successful endeavours to free himself from the chills incurred at the further end of the Library'.

The power of sustained mental effort in a nation is without doubt closely connected with the comforts of

[1] Carew, *Cornwall.* [2] *Annals of the Bodleian.*

material life, and Northern countries, England among them, did not take the lead in matters scientific till the general use of coal gave amenity to a sedentary life.

An alternative is well suggested by a stanza in an almost forgotten *Lay of Merton College*:

> And how can Don die better
> Than fighting fearful odds,
> And catching dire rheumatics
> On the cold stones of Quads?

The supreme importance of coal and its derivatives to the scientific and intellectual advance of Oxford cannot be over-estimated, and it is in the firm conviction of this that we here call to mind a passage from a letter by our present Professor of Geology to *The Times* of Dec. 12, 1918, on the German Coalfields.

Our coal is the only great source of energy which we possess; its quantity is strictly limited, and what is consumed can never be replaced. Unfortunately, these islands are far less bountifully provided with this precious material than some other territories, notably Germany. Germany, as Fritz Fech, one of the leading German geologists, points out, contains the richest deposits of coal in Europe, and it is estimated by this authority that the coalfields of Saarbrück, Aix-la-Chapelle, and Westphalia will outlast our own by some 400 or 500 years, and that of Upper Silesia, now in the possession of Prussia, by over 700 or 800 years. Though our store of coal is thus comparatively small, our annual output, on the other hand, is the largest in the world. If production is to be speeded up, the output must be increased, and exhaustion will be approached at an accelerated pace. Thus the paralysis of our industries and the decay of our ocean trade, which the Germans, as well as ourselves, foresee as inevitable at no very distant date, will be rapidly brought a step nearer. . . .

Germany, with the richest coalfields in Europe, has helped herself during the war to the coal of France and Belgium, and has made it necessary for us to supply our friends, as well as ourselves, from our rapidly diminishing stores. It would be only just that the whole of the coal which the Allies have lost or consumed in consequence of the German attack should be restored to them in kind.'

Systems of Scientific Education in the Eighteenth Century

Courses of instruction at a University depend so much upon the ever-changing human factor in the teaching staff, that they must always be in a state of flux. It is of interest to compare the contents of a modern syllabus, forced upon the students by the examination statutes at present in force, with the systems proposed two centuries ago. It will, I think, be generally conceded that the modern education, which is held to be sufficient to qualify certain classes of students of science, e. g. chemists and physicists, for the degree of Master of 'Arts', is framed on far narrower lines than the education of the beginning of the eighteenth century. But the modern student is given what his predecessor could not have—a complete course of Practical Instruction in a Laboratory—he is brought into direct contact with the material facts of his science. We smile when we are reminded that in 1667 Thomas Sprat of Wadham College found it necessary to argue that *Experiments are not dangerous to the universities.*

A good idea of the notions that prevailed early in the eighteenth century on the subject of the most profitable course of study for a reading man at Cambridge may be gathered from a Student's Guide that was drawn up by Daniel Waterland, Dean and Tutor of Magdalene College, who incorporated as M.A. at Oxford in 1724. *Advice to a young Student. With a Method of Study for the Four first Years,* 1706. We regret that we cannot give Wordsworth's summary of this interesting document *in extenso*: space constrains us to omit Waterland's advice as Dean, and to confine ourselves to his advice about the sciences that should be studied in addition to mathematics, history, many classical authors, and innumerable sermons.

II. *A Method of Study.*

The generality of Students are intended for Clergymen, and as such must take the Arts in their way.

Philosophy (including *mathematics, geography, astronomy, chronology,* and other parts of *physics*; besides *logic, ethics,* and *metaphysics*), CLASSICAL learning and DIVINITY, are the three heads.

Intending students of LAW and PHYSIC are referred to their tutors for special advice.

III. *Directions for the Study of Philosophy.*

'Begin not with Philosophy till your Tutor reads lectures to you on it.'

For the first half year at least, attempt nothing beyond the text-book of your lectures.

Devote mornings and evenings to Philosophy: afternoons to Classics, as requiring less coolness.

The following philosophical works are prescribed:

1st year. *Wells's* Geography.

2nd year. *Wells's* Astronomy. (Later were substituted *Harris's* Astronomical Dialogues and *Keill's* Astronomy.
Whiston's Astronomy.)
Rohaulti Physica and *Bartholin's* Physics.

3rd year. *Burnet's* Theory with Keill's Remarks.
Whiston's Theory with Keill's Remarks.

4th year. *Newton's* Opticks.
Whiston's Praelect. Phys. Math.
Gregory's Astronomy.

Green's *Scheme of Study*, printed in 1707, recommended:

1st year. Geography.

2nd year. Corpuscular Philosophy—*Cartes, Rohault, Vareñius, LeClerk, Boyle.*

3rd year. Experimental Philosophy and Chymistry of Minerals, Plants, and Animals—*Philosophical Transactions, Leipsick Acts, Boyle, Lemmery, Collegium Curiosum.*

Anatomy and Philosophy

1. Of Animals—*Keill, Gibson, Blankard, Drake, Cowper, Harvey, Borellus* de motu animalium.
2. Plants and Vegetables—*Grew, Phil. Trans., Miscell. Curios.*
3. Minerals, their minute parts—*Hook's* Micrographia, *Lewenhoek.*

Opticks, Dioptricks, Catoptricks, Colours, Iris—*Gregory, Rohault, Dechales, Barrow's* Lectures.
Conick Sections and the nature of Curves—*Newton, Cartes, Hugens, Kepler, Molyneux's* Dioptricks.

4th year. Mechanical Philosophy, Staticks, Hydrostaticks, Flux and Reflux, Percussion, Gravitation—*Marriot, Keill, Hugens, Sturmius, Boyl, Newton, Ditton, Wallis* de Motu, *Borellus, Halley's* Miscell. Curiosa.

Astronomy	Spherical Hypothetical Practical Physical	*Gassendus, Mercator, Bullialdus, Horoccius, Flamstead, Newton, Gregory, Whiston's* Praelections and *Kepler.*

The schemes proved satisfactory, and ten years later Whiston[1] made the significant note:

26. 'No uncertain systems of Philosophy to be recommended; but Mathematicks and Experiments to be prefer'd.'

showing a distrust of the proceedings of some philosophers, which was again expressed in the case of the Free cynics in 1737 who were 'a kind of Philosophical Club . . . who . . . have a set of symbolical words and grimaces, unintelligible to any but those of their own society'.[2]

The times when the Professors were to read are stated to have been

Monday at 8 in the Morn		.	Astronomy.
Tuesday	,, ,,	.	Physic.
Saturday	,, ,,	.	Natural Philosophy.[3]

In 1759 there appeared a very clear-sighted Epistle by Ri. Davies on 'the General State of Education in the Universities, with a particular view to the Philosophic and Medical Education, being introductory to Essays on the Blood'. It made a great impression at the time, and many of his suggestions were carried out. Among other recommendations, he desired to

[1] Whiston, *Emendanda*, 1717.
[2] *Oxoniana*, iv. 246.
[3] J. Pointer, *Oxon. Acad.* 1749.

encourage Colleges to devote themselves to some particular science or line of study. He urged the need of *instruments*, as well as books, for carrying on experimental knowledge in mechanics, optics, practical astronomy, &c.; for books will not supersede Nature, since they are conservative rather than acquisitive, being useful to record past inventions, rather than to forward fresh discoveries. The Arts subservient to Medicine have no appointments to encourage Teachers in them. Anatomy, Botany, Chemistry, and Pharmacy have been but occasionally taught, when some person of superior talents has sprung up and has honoured the University by his first display of them there, before his passage into the world. No place is so well fitted for the early training of Physicians, as the English Universities, on account of their discipline:—if only the lectures of the Professors had not become a farce.[1]

How rapidly the habits, even of serious students, change is well exemplified by a quotation made in an article in *The Times*, written by the 'University Correspondent' of that paper. Internal evidence suggests that he was the Cambridge correspondent. On October 6, 1924, he recalled a time, only a few years ago, when the Head of a College exclaimed when a Junior Fellow, greatly daring, suggested their introduction: 'Baths! Baths! Why the young men are only up *eight* weeks!!'

[1] Wordsworth, *Scholae Academicae*, p. 178.

Musæum Tradescantianum:

OR,

A COLLECTION OF RARITIES

PRESERVED

At *South-Lambeth* neer *London*

By

JOHN TRADESCANT.

LONDON,

Printed by *John Grismond*, and are to be sold by *Nathanael Brooke* at the Angel in Cornhill,

M. DC. LVI.

TITLE-PAGE OF TRADESCANT'S *Musæum*, 1656.

JOHN TRADESCANT JUNIOR IN HIS GARDEN

From the Portrait formerly in the Old Ashmolean Museum

APPENDIX A.

CATALOGUE OF TRADESCANT'S MUSEUM AT SOUTH LAMBETH

Reprinted from the Musæum Tradescantianum 1656.

A list of the principal Localities whence Tradescant's Rarities were obtained is printed in the Index, under Tradescant.

In introducing his catalogue to the Ingenious Reader, Tradescant writes:

About three years agoe,[1] (by the perſwaſion of ſome *friends*) I was reſolved to take a *Catalogue* of thoſe *Rarities* and *Curioſities* which my *Father* had ſcedulouſly *collected*, and my *ſelfe* with continued diligence have *augmented*, & hitherto *preſerved* together: They then preſſed me with that Argument, *That the enumeration of theſe Rarities, (being more for*

[1] About 1653.

variety than any one place known in Europe *could afford) would be an honour to our Nation, and a benefit to ſuch ingenious perſons as would become further enquirers into the various modes of Natures admirable workes, and the curious Imitators thereof*: I readily yeilded to the *thing* ſo urged, and with the aſſiſtance of two worthy *friends* (well acquainted with my deſign,) we then began it, and many *examinations* of the *materialls* themſelves, & their *agreements* with ſeverall Authors *compared*, a *Draught* was made, which they gave into my hands to examine over. Preſently thereupon my *onely Sonne dyed*, one of *my Friends*[1] fell very *ſick* for

[1] T. Wharton.

about *a yeare*, and my *other Friend*[1] by unhappy *Law-ſuits* much diſturbed. Upon theſe accidents that *firſt Draught* lay neglected in *my hands* another year. Afterwards my ſaid Friends call again upon me, and the deſigne of *Printing*, a-new *contrived*.

Now for the *materialls* themſelves I reduce them unto two ſorts; one *Naturall*, of which ſome are more familiarly known & named amongſt us, as divers ſorts of Birds, fourefooted Beaſts and Fiſhes, to whom I have given uſual *Engliſh* names. Others are leſſe familiar, and as yet unfitted with apt *Engliſh* termes, as the ſhell-Creatures, Inſects, Mineralls,

[1] Elias Ashmole.

Outlandiſh-Fruits, and the like, which are part of the *Materia Medica;* (Encroachers upon that faculty, may try how they can crack ſuch ſhels.) The other ſort is *Artificialls*, as Vtenſills, Houſeholdſtuffe, Habits, Inſtruments of VVarre uſed by ſeverall Nations, rare curioſities of Art, &c. Theſe are alſo expreſſed in *Engliſh*, for the ready ſatisfying whomſoever may deſire a view thereof. The *Catalogue* of my *Garden* I have alſo added in the Concluſion (and given the names of the *Plants* both in *Latine* and *Engliſh*) that nothing may be wanting which at preſent comes within view, and might bee expected from *Your ready friend*

JOHN TRADESCANT.

A view of the whole.

Hortus Tradeſcantianus.

Musæum

Tradescantianum.

Some kindes of Birds *their Egges, Beaks, Feathers, Clawes, and Spurres.*

1. *EGGES.*

CAssawary, or Emeu, *vide Aldrov*: *p.*542. *Harveum*, *G.A.p.*61.
Crocodiles,
Estridges,
Soland-goose } from *Scotland.*
Squeedes }
Divers sorts of Egges from *Turkie:* one given for a Dragons egge.
Easter Egges of the Patriarchs of *Jerusalem.*

2. *BEAKS, or HEADS.*

Cassawary, or Emeu,
Griffin,
Pellican,
Shoveler, and thirty other severall forrain sorts, not found in any Author.

Aracari of *Brasil*, his beak four inches long, almost two thick, like a Turkes sword.

Ardeola *Brasil*: his beak three inches long, described, *Margrav:* 5. 13.

Guara of *Marahoon Brasil:* his beak like a *Poland* sword.

Jabira, *Brasil:* beak eleven inches long.

Macucagua, *Brasil: Margrav:* 5. 13.

Soco, Brasil: Margrav. 5. 5.

Tamatia, *Brasil: Margrav*: 5.10.

Sixteen severall strange beaks of Birds from the East India's.

3. *FEATHERS*

Divers curious and beautifully coloured feathers of Birds from the Weſt India's.

The breaſt of a Peacock from the Weſt India's.

A white Plume.

Two feathers of the Phœnix tayle.

Tops of the { white and black Herne.
black and milke-white Herne.

Feathers of divers curious and ſtrange forraign Birds.

Many ſeverall ſorts of Hernes and Eſtridges feathers.

4. *CLAWES.*

The claw of the bird Rock; who, as Authors report, is able to truſſe an Elephant.

Eagles clawes.

Cock ſpurrs three inches long.

A legge and claw of the Caſſawary or Emeu that dyed at S. *James*'s, *Weſtminſter.*

Twenty ſeverall ſorts of clawes of other ſtrange birds, not found deſcribed by Authors.

5. *Whole BIRDS.*

Kings-fiſher from the *Weſt India's.*

Divers Humming Birds, three ſorts whereof are from *Virginia.*

A black bird with red ſhoulders and pinions, from *Virginia.*

Matuitui, the bigneſs of a Thruſh, ſhort neck and legges.

Bitterns two ſorts
Batts—
Red and blew Bird } from *Virginia.*

Penguin, which never flies for want of wings.

Puffin.

Pellican.

Shoveler.

Tropick bird.
Apous.
Fulica.

Dodar, from the Iſland *Mauritius*; it is not able to flie being ſo big.

White Partridge.

Spaniſh Partridge.

Wood-Pecker from the *West India's.*

Birds of Paradiſe, or Manucodiata; whereof divers ſorts, ſome with, ſome without leggs.

Birds of Paradiſe from the Mount of *Moret*, deſcribed by *Hacluite.*

A ſmall Grayiſh bird from the *Eaſt India's.*

A white Ouſle, or white Black-bird.

The Gorara or Colymbus from *Muſcovy*: And another taken upon the *Thames* and given by *Elias Aſhmole*, Eſq.

Many rare and beautifull Indian birds, not found deſcribed in Authors.

Barnacles, four ſorts.

Solon Gooſe.

Squeede from the Baſſe in *Scotland.*

The Buſtard as big as a Turky, uſually taken by Greyhounds on *Newmarket-heath.*

Divers ſorts of Birds-neſts of various forms.

II.

Fourfooted Beaſts, with ſome Hides, Hornes, Hoofs.

Animalia quadrup. 1. digit. vivipera. 1. fera.

Lions head and teeth.
Lynxe's head.
Beares head, clawes, and skin.
Wolfes teeth.
Parde, Leopard's teeth.
Tygers head.
Gulo's legge.

2. ſemiferæ. Hippopotamus.

Ai, Ignavus, Sloath, defcribed by *Mar. p.* 221.
Fox, from *Virginia.*
Munkyes fceleton.
Brocks skin.
Beavers skin, teeth, tefticles.
Otters skin, and head.
Musk Ratts, from *Virginia.*
Wilde Catt, from *Virginia.*
Cagui *Brafil:* defcribed by *Margrav: pag*,227.
Cat-a-mountaine.
Flying Squirrel.
Flinder moufe, from *Weft India.*
Rabbits, from *Ginny.*
Land Porcupine.
Foot of a *Ginny* Dogge.
Martin skin.
Civit-Catts-head and bones given by *T W.*
Dormoufe.
Hares head, with rough horns three inches long.
Tatus, *Echinus Brafilienfis,* defcribed by *Aldrovand:* p.480. *Digitata. ovipara.*
Armadilla, or Encubartado, two forts:
{ Tatu Apara.
{ Tatu Tatupeba.
Alegator or Crocodile, from *Ægypt.*
Chamælion.
Gujana's or Lizards, feven forts.
Lizards, from *Ireland.*
Snakes, feven or eight forts.
Rattle Snakes.
Tajuguacu & Tamapara of *Tapanambis.*
Cloven and hairy-tongued Lizards, defcribed by *Margr:* p.237.
Lanhado.
Lacertus peregrinus Arabicus.
Ibyara, *Brafil: Margr: p.*239.
Salamander.

Scincus.
Aſpis.
Senembi, Iguana, *Margr. p.* 236.
Diverſe Tortles or Tortouſes.
A natural Dragon, above two inches long.
Quadrup. Elephants head and tayle.
ſoliped. Onagrus head with horns.
Zebra's skin.
Monoceros horne.
Caput Equinum petrificatum.
Quadrup. Half of a Stags horn weighing 50 ℔.
biſulca. A Roe bucks horn, from *Cape de Verde.*
A Roe bucks head.
A Deeres horn, from *Greenland.*
A Bucks head with one horn double branched.
A Does head and horns, from Saint *James*'s Parke neer *London.*

The Rhinoceros horn.
jaw-bone.
back-bone.

An *Indian* Goats horne.
Biſons head and horns.
Bonaſus head and horns.
Antilops horn.
Elkes hooſes.
A Cowes tayle, from *Arabia.*
A Rams head with an upright cloven horn.
Boares tusks, round.
A Sowes head, from *Surat.*
Divers Horns anſwering to thoſe, by Authors attributed to the Ibex, Gazella, Hippelaphus, Tragelaphus, Cervus palmatus, Camelopardalis, &c.

III.

Some Fiſhes and their parts.

Animalia equatilia 1. Sanguinea.

ABacatuaja Braſil: *Margr: p.* 161.
Acajamcu, Braſil: *Margr: p.*163.
Araguaga, gladius Braſilienſis, *Marg: p.* 159.
The Boneeto.
Cunny fiſhes with horns.
The Dolphin.
A Dolphins head.
A Phocæna's head given by *T.W.*
A Dogge Fiſh.
A Grampus.
Guacucuja, Braſil: *Margr: p.* 143.
Guaja apara.
Hogge fiſh.
Sea Horſes { head. teeth. piſſle.
Iperuquiba, Braſil: *Margr: p.* 180.
King Crabbe.
Lump fiſhes.
Parrot fishes.
Poiſon fiſhes.
Paru, Braſil: *Marg*: 144.
Remora.
A Sharke.
Sword fiſhes, with ſeverall ſwords.
Swallow fiſh.
Shovell fiſh.
Sun fiſh.
Starre fiſh.
Sturgion.
Thunny fiſh.
Sea Wolfe.
Toad fiſh, and one with prickles.
The tayle of a { Catt fiſh. Stinge ray.
The caſe of the ſpawn of the Stinge-ray.
A Whales { skin. tayle. jawes. ribs. back-bone. bladder. eare-bone. pupilla, as big as a peaſe.
Roches jaw-bone with flat teeth one inch and halfe long.
Guamajaca guara. Braſ: *Marg*: 159.
Guamajacu *ape*-Braſ: *Marg*: 142.
Guazezua, Braſ: *Margr:* 178. Spec.2.
Unicornu marinum.
Caput *roſmari* cum dentibus cubitum longis.
Reri, Braſil: *Marg*: 188.

IV.

Aquatilia exſanguinea Teſtacea.

APorrhoides parvi, *Ariſtotelis.*
Ballani rubri, *Aldrov:*
Belliculi varii.
Buccinum parvum & ſtriatum, *Rondel:*
Buccina parva varia.
Buccina ſtriata, *Zoographi.*
Cancer Maia plurimis ſpinis horrens.
Cancer Maia. Guaja apara Braſil: *Marg:* 182.
Cancer macrochelis luteſcens fluviatilis, *Matth:*
Chela cancri flavi *undulati.*
Chela aſtaci marini ex *Zoograph. Aldr. p.*115.
Chamæ variæ.
Chama glycymeris, *Rond:*
Chama peloris, *Bellon:*
Chamulæ variæ.
Conchæ veneris variæ.
Conchæ venereæ, *Aldr:* p. 557.
Conchylium, *Rond*: *Aldr:* p. 346.
Concha imbricata, *Rond*: { minor. / lævis. }
Concha anatifera, Barnacles.
Concha margaritifera argentea cum lecto margaritarum.

Conchæ {
candidæ.
corallinæ { læves. / aſperæ. }
clathratæ.
depreſſæ.
echinatæ.
faſciatæ.
longæ niveæ.
miniatæ.
Pictorum.
Rhomboides.
}

Rugatæ.
ſpinoſæ.
ſquamoſæ.
anatifera.

Concha Perſica { major. minor.

Cochleæ {
cælatæ.
cylindroides variæ.
depreſſæ.
echinophoræ, *Rond:*
muricatæ.
perlatæ.
rugoſæ.
umbilicatæ.

Dentalium quinque genera.
Echinometra, *Rond:*
Echinometra maxima pelagica ſpinis denudata.
Echinus ſpatagus.
Echini varii, ſpinis ſpoliati.
Echini minimi varii.
Entalia, vel Antalia.
Favago, *Ariſt: Aldrov*: p.300.
Locuſta maxima.
Lolligo major, *Aldrovan:* 67.
Mentula marina.
Mitulus cum ſtriis.
Mituli fluvii *Thameſis.* myax *Diaſ:*

Murex {
corocoides.
lacteus.
orthocentros purpurea.
triangularis, & marmoreus.

Murices {
marmorei varii, *spec.*12.
appendiculis aſperis, coloribus variis.

Muſculus margaritifer lævis.
Nautilus latinorum alter lævigatus & Ναυπλὸς.
Nautili primum, genus *Ariſt*:

Nautili teſta rudi cortice & variegato.
Nautilus variis imaginibus extimo cortice nitidè inſculptus ex Indiâ.
Nerites Bellonii.
Nerites varia genera.
Ovum marinum.
Oſtreæ oblongæ Virginianæ.
Oſtreæ arborum vamis annexæ.
Pagurus fœmina Venetorum.
Patellæ animalis Lepas, *Rond:*
Patella cypria ſtriata.
Patellæ feræ, aures marinæ vel otia, *Aldr:* 551.
Pinna { aculeata. magna. parva.
Pinnæ byſſus.
Penicillus marinus.
Pectines { eburnei. varii.
Pecten magnus depreſſus corallinus.
Pectunculi.
Pholas.
Polypus.
Purpuræ, *species* 7.
Purpura pentedactylis, *Aldr:* 286.
Rupes elegans artificialis teſtarum.
Solen { mas. fœmina unicolor glabra, onyx *Plin:*
Spondylus.
Stellæ marinæ { arboreſcentes. cartilagineæ. pectinatæ. rubræ. teſtaceæ.
Strombus magnus.
Tellinæ variæ, *Aldr:* 519.

Tridachnes, *Aldr:* 447.

Trochus { magnus. / alter pyramidalis, *Aldrov:* p. 363. }

Trochus Niloticus.

Tubuli marini vel ſiphunculi marini.

Turbines albi oblongi varii, & læves varii.

Turbines tuberoſi parvi varii, *Aldrov:* p. 353.

Turben Anguloſus.

Turben { magnus. / auritus. }

Turben { tuberoſus. / tuberculoſus. }

Turbines { anguloſi. / muricati. / pentedactyli. / teſſerodactyli. / ventricoſi. }

Turbinuli in ſpongiis degentes, *Aldro:* p. 363.

Umbilicus, *Rond:*

Urtica parva cinerea, *Rond:*

V.

Inſecta & Serpentes.

ALæ ſcarlettæ.

Aranea Virginiana.

Araneæ dens.

Buceros.

Bruchus viridis.

Bucroides.

Cicadæ variæ.

Cantharides.

Catena ex muſcis Hiſpanicis.

Cerambyx.

Enena, Braſil: 2d. 3d. *Margr:* 247.

Erioceros hyacynthinus.

Erucæ nodoſæ.

Guaruca cremembi Braſil: ſiſſer, *Mar:* p. 255.

Grillo talpa tardi-gradus.

Grillus ex fuſco nigricans.

Hyppocampus.

Hydrocantharus major Anglicus.

Jatatinga, curuculum, *Scalig: H. A. l 6. Marg:* 255.

Labellæ { albæ. flavæ.
Locuſta.
Locuſtæ Hiſpanicæ.
Locuſtæ perigrinæ.
Mololonthic, viridulus.
Muſcatella armata Virginiana.
Naſicornis Virginianus.
Naſicornium ſpecies variæ pulcherrimæ.
Papiliones variæ.
Oeſtrus.
Phalæna cum pennâ ex capite.
Papilionum plurima genera.
Paipai Guaca, Braſil: *Marg*: 255.
Phalangium.
Phalangii Virginiani caput.
Pediculi cœti.
Platyceros.
Proſcarobæus, cornu reflexo.
Quici miri. Inſectum parallelogramma, *Aldrov*: 254.
Quici, Braſil: cornutus, 20 internodiis, *Marg*: 254.
Scarabæi Virginiani cornua.
Scarabæus naſo inſtar roſtri navalis cornuto.
Scarabæus inſtar bufonis Virginianus.
Scarabæorum varia genera.
Scarabæi varii { domeſtici. Jndici { Orientales. Occidentales.
Scolopendra, Braſil: *Marg*: 255. *Muff*: *l*.2. *c*.8.
Scorpio terreſtris.
Stellæ marinæ variæ.
Tipula.
Tambeiva Braſil: inſectum, avellanæ. mole: *Marg*: 255.
Ammodytes.
Amphisbæna.
Cæcilia.
Cenchris Bellonii.
Dipſas, Grevini.
Dryinus.
Seps.
Serpens marinus. *Aldrov*:
Anguis Æſculapii. Ova, ſceleton.

VI.

Foſsilia.

1 *Metallica.*

FRuſtulum mineræ auri.
Chryſammonites. { Dendrites. Ammonis cornu effigie.
Ramentum mineræ argenti.
Helcyſma.
Argyroctenites varii { majores. minores.

Conchites argentei obſcuri coloris.

Æris { minera. / Pompholyx.

Lepis.

Diphryges.

Viride æris.

Santerna.

Pyrites ærofus globoſus— { teſſellatus. / umbilicatus. / pyriformis. / carycoides.

Pyrites { turbinatus. / anguloſus. / conchytæ.

Cornu Ammonis { helicoides. / hoplites.

Cornu Ammonis ſtriatum armaturâ æneâ lucente.

Belemnites hoplites.

Orichalcum.

Stanni minera.

Stannum Anglicum cum fluoribus variis.

Biacca Alexandrina.

Stelechites cum minerâ ferri.

Fluores varii cum minerâ ferri.

Cochleæ & conchæ ſideroites ex agro Cantabrigienſi.

Chamites & turbinites ſiderites.

Siderocarites.

Sideromycetes.

Lapides ferruginei varii.

Stomoma, ſquama chalybis.

Ferrugo.

Plumbi vena variis mixta.

Glandes plumbariæ diverſiformes.

Chamites molybdoites.

Stibium foſſile.

Ceruſſa cinerea.

Lithargyrii ſpecies { Chryſitis. / Argyritis. / molybditis.

Plumbum nigrum Virginianum.

Biſmuthum.

Cadmia foſſilis, lapis calamnaris.

Galena foſſilis frugifera.

Cadmiæ ſpecies quatuor— { placites. / rhotites. / onychites. / oſtracites.

Metallica factitia.

Pompholyx.
Spodios.
Tutia Alexandrina.

Botrytes.

Alcyonia varia ponderoſa inſtar ſpongiæ concreta.
Adarcion aluminis inſtar.
Porus Roſeus 1. Alcionium primum.

2 Terra.

Marga ſaxatilis.
Marga cum variis ſilicum differentiis.
Stenomarga, Agaricus mineralis, lac lunæ, ex dono *T. W.*

Terræ { Cimolia. / Chia. / Lemnia, ſigillata. / Paraetonii. / Brunnus Anglicus. }

Creta { Syriaca. / Selinuſia. }

Smectis Anglica.

Rubrica { ſinopica. / fabrilis. / Anglica. / laminata. }

Ochra { lutea. / foſſilis. / Anglica. / plumbaria factitia. }

Ruſma Turcarum.
Stalagmata varia ex aquis Eboracenſibus concreta.
Lapis ex earundum aquarum ſtillicidio inſtar racemi uvarum concretus.

3 Succi concreti macri.

Coralium { candidum. / nigrum. / rubrum. }

Coralii frutices, alii inſtar— { Braſſicæ. / craſſulæ. / muſci claviculati, &c. }

Coraliorū differentiæ quatuordecim.
Stelechites coraloides varii.
Coralia hirſuta muſcoſa.

Coralium erythroleucon.
Coraliū rubrum cum antipathe.
Pſeudocoraliū rubrū fungoſum cum aſtris variis.
Pſeudocoralium rubrum calamites.
Millepora Imperati. *Worm:235.*

<table>
<tr><td rowspan="2">Sal foſſilis Anglicus</td><td>albus.</td></tr>
<tr><td>ruber.</td></tr>
</table>

Stelechites ſalis.
Spumæ ſalis variæ.
Lapis ſalinus.
Sal gemma foſſilis.
Sal è ramis arborum ex Indiâ.

<table>
<tr><td rowspan="3">Alumen nativum</td><td>Cantabrigienſe.</td></tr>
<tr><td>Eboracenſe.</td></tr>
<tr><td>Cantianum.</td></tr>
</table>

Aluminis rupei figuræ variæ.

<table>
<tr><td rowspan="5">Chalcanthi ſpecies</td><td>Saxonicum.</td></tr>
<tr><td>Bohemicum.</td></tr>
<tr><td>Bagneum.</td></tr>
<tr><td>Cyprium.</td></tr>
<tr><td>Metallicum.</td></tr>
</table>

Lapis candidus Venetorum ex quo Borax fit.
Auripigmentum.

4 *Succi concreti pingues.*

Sandaracha.
Arſenicum.
Sulphur nativum.
Bitumen Dunelmenſe.
Carbo foſſilis, ex quo varia artificialia.
Carbones ex Ætnâ.
Gagates.
Mummia.
Succinorum copia.

5. Lapides ſelectiores.

Lapides metallicos teſtulatos ex agro Richmondienſi effoſſos, dedit D[9] *Man.*

Aſtragolites.
Buccinites.
Cochlites faſciatus { convexus. / concavus.
Ætitū differentiæ variæ cum callimis.
Gæodites.
Hæmatitum differentiæ variæ.
Cerauniorum varietas.
Chelonites.
Brontiæ, ombriæ, odontites.
Gloſſopetræ magnæ { denticularæ. / non denticulatæ.
Belemnites varii.
Oſteocolli varii.
Umbilicus marinus Eboracenſis.
Selenites, lapis ſpecularis.
Encephalites magnus.
Lithophthalmites.
Muricites.
Chamæpectinites.
Buccinites.
Conchites.
Turbinites.
Rhombites.
Ophytes varii ex *Whitby* in agro Eboracenſi.
Spongites.
Echinitum differentiæ decem.
Marmoris differentiæ variæ.
Marmor Eboracenſe maculoſum.
Magnetes varii.
Lapis minii, vel cinnabaris foſſilis.

<table>
<tr><td rowspan="3">Lapis</td><td>nephriticus.</td></tr>
<tr><td>hyſtericus.</td></tr>
<tr><td>Hybernicus.</td></tr>
</table>

<table>
<tr><td rowspan="4">Lapides</td><td rowspan="2">è Veſicâ</td><td>hominis.</td></tr>
<tr><td>felleâ.</td></tr>
<tr><td rowspan="2">è capite</td><td>aſſellorum.</td></tr>
<tr><td>carpionum.</td></tr>
</table>

Coagulum Ætnæ.
Gypſum.
Pumex.
Talcum.
Smyris.
Ebenum foſſile.
Cryſtallini fluores varii.
Lapilli tranſparentes Virginiani.

6. *Materiæ petrificatæ.*

Cucurbites.
Dactylites.
Pyrites & fructus varii.
Maxillæ cum dentibus.
Dentes varii petrificati.
Ilex petrificata, ex lacu Hybernico *Lough-neath*, ex dono D. *Wybard*.
Quercus cum ejuſdem foliis.
Ulmus.
Sambucus cum ejus medullâ.
Fraxinus.
Muſcus.
Guttulæ Knasburgenſes.
Coſta humana cum carne.
Oſſa varia.
Caput ſimiæ.
Ungula equi.

Ovaria halecis.
Cancer totus.
patella cum piſce.
Cochleæ.
Siderites varii.
Ligna varia in ferrum verſa.
Guttæ fontis vitrificatæ.

7. Gemmæ.

Adamantes Indici ex Decan.
Pſeudoadamas Anglicus.
Carbunculi, pyropi, acriores.
Rubini, ſpinelli ex rupe veteri.
Rubicelli.
Granati { Orientales ex Cambaia. / occidentales. / Bohemici. }
Hyacinthi coccei & crocei ex oriente.
Amethiſtus violaceus orientalis.
Saphirus { albus. / cæruleus. }
Opalorum differentiæ quædam ex Indiâ.
Smaragdi { Scythici. / Britannici. }
Praſii.
Berilli cryſtallini.
Sardii, corneoli varii.
Onychites.
Achates Indici.
Jaſpides virides & purpurei.
Heliotropii varii.
Chryſolithi, topaſii Arabici.
Cryſtalli varii Anglici.
Calcedonius, onyx candida.
Malachites, ſpecies Jaſpidis.
Oculus cati vel Beli.
Turcoſa, Turcois.

Aſtroites, ſtellaris lapis.
Aſteria vera ex agro Staffordienſi.
Alectorius.
Chelidonius.
Garatronius, crapaudina.
Lapis manati vel tuberonum.

Margaritæ { Indicæ. Anglicæ. Scoticæ. Virginianæ.

Lapis { Armenius. Lazuli. limacis.

Lapis Bezoar { orientalis. occidentalis.

VII.

Fructus Exotici.

ACajuiba, acajuti & itimabova, *Marg:* 99.
Ambare, juglandis mole.
Ahovay Thereti, nolæ Cannibalium.
Anacock, phaſeoli genus.
Ananas, malo citrio minor.
Anacardia varia.
Avellanæ Indicæ, juglandis mole.
Apeiba, Braſil: *Marg*: 124.
Avellanæ purgatrices, Ben magnum.

Aratica { Ape. Aponhe, *Margr:* 93. Pana.

Avacari, myrto ſimilis.
Almendras de Peru. *Worm:* 18.
Aurantium nigrum.
Balanus myrepſica.
Banana, muſa Alpini.
Bangue ſemen cannabino minus.

Betele.
Billingbing.
Boramez, agni Scythici pellis portiuncula.
Brindones, intùs rubentes inſtar ſanguinis.
Buna, grana acida continet.
Bon, fructus.
Cachos.
Carambola, ſiliquæ quadrangulares & pentagonæ.
Capſicum.
Cardamoma { majora. / minora.
Cajus, inſtar ovi anſerini.
Cazavi ex herba yuccâ.
Cacâo, potus ejus Chocolate dicitur.
Cevadella, hordeolum.
Cocculæ orientales inſtar racemi corymborum.
Cajete vel Cochine. Braſil. *Marg:* 123.
Caraguata, Braſil: *Piſò.*
Cereiba, Braſil: *Marg:* 128.
Nucum Cocorum varia genera.
Coco nux ex Maldiviâ, *Auger:* Clutius ſpeciatim nominat. pag. 8.
Cocci varia genera.
Copaiba Braſil: *Margr:* 130.
Caſtanea, cornu caprini ſpecie.
Caſtaneæ equinæ teſta.
Cucurbitæ variæ.
Cucurbita, calabaſſæ.
Coni { cedri. / Abietis. / terebinthi.
Cubebæ.
Curcas candidus, avellanæ mole.
Dactylus ebrius.
Daturæ ſemina.
Durionis fructus echinatus.
Duriaon cum Buanâ, *Cluſ:* 65.

Fabæ rubræ, Braſil.
Fabæ purgatrices.
Fauſel, Areca.

Fructus
- ridiculato cono.
- Piceæ.
- Suberis.
- Ilicis triplicis
  - bacciferæ.
  - coccigeræ.
  - glandiferæ. vel gallifere
    - Pummukoner.
    - Maummenark.
- Cedri & Laricis.
- platani Virginianæ.
- gummi-arboris Virginianæ.
- ſquamoſi Indici varii.
- dyſentericus.
- varii, animalium diverſorum ſpeciem ferentes.

Guanabanus.
Guaganas ſemina.
Guiraparibu, Braſil: *Marg:* 119.
Guitiiba. *Marg:* 114.
Ibacurapari.
Jangomus, ſorbo ſimilis.
Jambolones, olivæ ſimilis.
Jaca ex Goâ inſtar cucurbitæ, ex trunco prodit.
Juglans nigra Virginiana.
Icicaribu, Braſil. *Marg*: 98.
Janipaba, Braſ: *Marg:* 92.
Ibati, Braſil. *Marg*: 20.
Jamacuru, Braſil. *Piſo* 100.
Jetica, *Marg*: p. 16.
Jaborandi, *Piſ:* 97.
Lancium racemi.
Lobus niger membranoſus.
Lobus ex *Windondaw* Virginiâ.
Lobus echinoides ex Braſiliâ.
Lobus echinoides. *Bonduch.* mates Indorum.

Malacactos.
Mangoſtans, Jambos, mole aurantii.
Mangas, ovo anſerino major.
Mehen bethene cum capillis.
Mehen bethene ſine capillis.
Mungo nigrum.
Moringa fructus pedalis.
Mandubiguacu, nux purgatrix.
Mucuna, Braſ: *Marg:* 19.
Meyney vel nequamel.
Mecaxuchitl, piperis oblongi inſtar miſcetur cocco.

Myrobalani { citrinæ. / emblicæ. / Indicæ, & chepulæ.

Nux { moſchata cum mace, Indica. / Piſtachia, vomica.

Nimbo inſtar olivæ ſubluter.
Palmeto ſylveſtris fructus.
Phaſeoli varii.
Phaſeolus arboreſcens.
Phaſeolus Indicus.
Pochicria Virginiana.

Radices.

Radices {
Caopeba, Braſil:
Chinæ.
Contrayarvæ.
Dariagen.
Jalapiæ.
Labrundinæ.
Mataliſtæ.
Mechoacan.
Sarſaparill.
Tagion Guineæ.

Miſcelanea.

Folia Thee.
Fungus { ſambucinus. / roſæ. }
Boletus cervi.
Pila ſtagnalis.
Orabanche.
Coni { cupreſſi. / pini. }

Ligna.

Agallochum.
Aſpalathum gummoſum.
Caoba, *i.e.* ſaccharinum.
Cocogola.
Colubrinum.
Cinnamomi lignum.
Bdellium.
Corylinum tortilatam.
Cupreſſinum.
Fætidum.
Guajacum.
Hebenum.
Leviſſimum è Siam:
Nephriticum.
Rhodium.
Santalinum.
Strumoſa ligna varia.

Semina.

Ammeos.
Amomi.
Bombacis.
Cardamomi utriúſque.
Baccæ { hederæ. / juniperi. / lauri. / paridis. / myrti. }
Carthami.
Cataputiæ utriúſque.
Colocynthidos.
Citrulli.
Cucumenis utriúſque.
Cucurbitæ.
Cumini.
Dauci utriúſque
Fœnugræci.
Grana { Gnidia. / Paradyſi. / Kermes. }
Harmel.
Hyoſcyami.
Hyperici.
Laureolæ.
Lentes.
Lithoſpermi.
Lini.
Lolii.
Loti.
Lupini.
Magiſtrantiæ.
Mezerei.
Milii.

Napi.
Panici.
Pæoniæ.
Psyllii.
Rapi.
Santonici.
Sesami.
Seseleos.
Sumach.
Staphydis agriæ.
Thaspios.

Gummata.

Aloes.
Ammoniacum.
Anime.
Arabicum.
Assa fœtida.
Bdellium.
Benzoinum.
Bezetta rubra.
Cancamum.
Caranna.
Cate.
Cerasorum.
Coopal.
Colophonia.
Elemi.
Euphorbium.
Galbanum.
Gamboja.
Guayaceni.
Hederæ.
Juniperi.
Labdanum.
Lacca.
Manna.
Mastiche.
Mastlach Turcarum.
Mummia.
Myrrha.
Olibanum.
Opopanax.
Opium.
Sagapenum.
Sarcocolla.
Scammonium.
Styrax.
Tacamahaca.
Tragacanthum.

Materialls of Dyers and Painters.

1. *For Blacks.*

GAlls.
Copporas.
Black of Seacoale.
Black of Charcoale.
Black of Fuligo.
Allerbarke.
Symach.
Malicorium, &c.

2. *For Yellowes.*

Old Fuſtick.
Weede Woodwaxen, or Greening-weed.
Pinke.
Maſticutt.
Woould.
Orpement.

3. *For Reds.*

Alchanet.
Madder.
Braſil.
Redwood.
Cochinell.
Campeigiana.
Campeichia.
Braſiletto:
Orchall.
Arnotto.
Flores Carthami.
Minium.
Cinnabrium.

4. *For Blewes.*

Lapis Lazuli.
Ultramarin.
Virditer.
Woade.
Nele.
Indico, divers ſorts
Logwood.

5. *For White.*

Ceruſſa.
Album.

VII.

Mechanick artificiall Works in Carvings, Turnings, Sowings and Paintings.

SEverall Heads cut on Agates.
Divers Figures cut on Shells.
Variety of Figures cut in cryſtalls.
Divers ſorts of Doublets.
Divers ſorts of Ambers, with { Flyes / Spiders } naturall.
A Bird ſitting on a pearch naturall.

Comelian-cup. Amber-cup, and Amber-bottle turned. A Crystall bottle.

Severall things rarely cut in Corall.

Divers ſorts of Corall, one with Moſſe in it.

Divers things cut on Plum-ſtones.

Heliotropian ſpoone.

Many cups of Agates.

Cornelian thum-caſes of the Turks.

Several curious paintings in little forms, very antient.

Splene-ſtones, divers ſorts.

The Indian lip-ſtone which they wear in the lip.

A little Box with the 12 Apoſtles in it.

A ſilver Box with 6 diviſions.

Turkiſh Alkaron in a ſilver box.

The Roman measure called *Ligula*.

Divers ſorts of Purſes of Outlandiſh work in gold and ſilver.

Jupiter, *Jo* and *Mercury* wrought in Tent-ſtitch.

Divers ſorts of Straw-worke wrought with a needle.

Cloath ſpun of the downe of yellow feathers.

Chirurgeons Inſtruments framed upon the points of needles.

Halfe a Haſle-nut with 70 pieces of houſholdſtuffe in it.

A Cherry-ſtone holding 10 dozen of Tortois-ſhell combs, made by *Edward Gibbons*.

A neſt of 52 wooden-cups turned within each other as thin as paper.

A Hollow cut in wood, that will fit a round, ſquare and ovall figure.

The ſtory of the Prodigall ſon carved in wood: Antient.

Perſius and *Andromeda* carved in an Ivory table.

Figures and ſtories neatly carved upon Plum-ſtones, Apricock-ſtones, Cherry-ſtones, Peach-ſtones, &c.

A Cherry-ſtone, upon one ſide S. *Geo:* and the Dragon, perfectly cut: and on the other ſide 88 Emperours faces.

The martyrdome of the Biſhop of *Amphipolis* carved in Alabaſter.

Severall Landskips, Beaſts, Cities, Rocks, naturally wrought in ſtones.

Landskips—
Stories— cut in Paper by ſome of
Trees— the Emperours.
Figures—

Divers rare and antient pieces carved in Ivory.

Two figures carved in ſtone by *Hans Holben.*

A large piece of Fortification cut in wood.

A Deske of one entire piece of wood rarely carved.

A modall of the Tower of *Straſburg* carved in wood.

A rare piece of hollow-carved worke in faſhion of a Book.

A Cherry-ſtone with a dozen of wooden-ſpoons in it.

A dozen of ſilver Spoons in a little box.

Flea chains of ſilver and gold with 300 links a piece and yet but an inch long.

A dozen of little Sheers.

Little chains of ſilver, gold, and ſtraws, ſmall as haire.

Divers curioſities of turned work in Amber. / Ivory.

A little wheele and ſpindle turned in Amber.

A cup turned in a pepper-corne and garniſhed with Ivory.

A ſet of Cheſſe-men in a pepper-corn turned in Ivory.

Divers ſorts of Ivory-balls turned one within another, ſome 6, ſome 12 folds; very excellent work.

Rolls of the Barkes of Trees wherein are graved the China, Arabian, and Eaſtern Languages.

Plates engraved in Gold. / Silver. / Copper.

Diuers medalls caſt of in ſeverall metalls.

A Copper-plate enameled with the ſtory of the Salutation.

Divers rich enamell'd plates of —— { Gold. Silver. Copper. Braſſe. }

An ancient annointing Box of guilt-braſſe.

Effigies of divers Perſonages of honor, note and quality.

Severall figures, heads, and effigies caſt of in plaiſter of *Paris.*

Several ſorts of imboſt Wax-works curious.

Phaëton with his Chariot and Horſes, excellent wax-works.

Divers figures moulded aud painted.

A glaſſe-hatt-band ſpun in fine threds.

A glaſſe-basket full of ſeverall fruits.

Back-work wrought upon glaſſe.

Variety of glaſſe in many curious forms.

Backſide work acht upon cryſtall.

Two ſeverall modells of the Sepulcher at *Jeruſalem*; one in wood: the other in plaiſter.

Moſaick work of divers ſorts.

Severall draughts and pieces of painting of ſundry excellent Maſters.

A ſmall Landskip drawn by Sir *Nath: Bacon.*

The figure of a Man ſinging, and a Woman playing on the Lute, in 4° paper; The shadow of the worke being *David*'s Pſalmes in Dutch.

Prince of *Orange*'s picture ſhadowed with writing in afore-recited manner.

Old *Parre's* picture.

A Booke of Mr. TRADESCANT's choiceſt Flowers and Plants, exquiſitely limned in vellum, by Mr. *Alex: Marſhall.*

A book of all the Stories in the glaſſe-windowes of *Sancta Sophia*, lim'd in vellum by a Jew.

Divers ſorts of pictures wrought in feathers.

A little Box made of ſtraw and ſilke.

Indian books made of *Phillyrea.*

Indian paper made of { Graſſes. Straw. Rinds of trees. }

With large margents full of figures and divers colours.

Babylonian combs.

Severall Indian combs, one of reeds.

VIII.

Variety of Rarities.

Indian morris-bells of ſhells and fruits.

Indian muſicall Instruments.

Indian Idol made of Feathers, in ſhape of a Dog.

Indian fiddle.

Spanish Timbrell.

Instrument which the Indians ſound at Sun-riſing.

Portugall muſicall Inſtrument like a hoop, with divers braſſe plates.

A choice piece of perſpective in a black Ivory caſe.

A Canow & Picture of an Indian with his Bow and Dart, taken 10 leagues at Sea. *An°.*—76.

A bundle of Tobacco, *Amazonian.*

Birds-neſts from *China.*

Indian Conjurors rattle, wherewith he calls up Spirits.

Indian *Pa* God.

The Idol *Oſiris. Anubis*, the sheep, the Beetle, the Dog, which the Egyptians worſhipped. Mr. *Sandys.*

A Gamaha with *Jeſus*, *Joſeph* and *Mary*, in Italian capitall letters.

A Gamaha with a Fiſh in it.

A Gamaha of a Deaths-head.

A Circumciſion-Knife of ſtone, and the inſtrument to take up the *præputium* of ſilver.

Jewes Philacteries with the Commandements, writ in Hebrew.

A piece of Stone of Saint *John Baptists* Tombe.

A piece of the Stone of *Sarrigo*-Castle where *Hellen* of *Greece* was born.

A piece of the Stone of the Oracle of *Apollo*.

A piece of the Stone of *Diana's* Tomb.

An Orange gathered from a Tree that grew over *Zebulon's* Tombe.

Severall sorts of Magnifying glasses: Triangular, Prismes, Cylinders.

Antient Iron-Money in crosse-plates, like Anchors, preserved in *Pontefract*-Castle, *Yorke-shire*.

Severall Assayes of Money.

A Brazen-ball to warme the Nunnes hands.

A piece of one of the Logges of *Bagmere* in *Cheshire* neer *Breereton*.

A Trunion of Capt: *Drake*'s Ship.

Divers sorts of Indian Jakes.

Severall sorts of Cymballs.

Cassava Bread 2 sorts.

The Padre Guardians staffe of *Jerusalem* made of a branch of one of the 70 Palme-Trees of Elam, which he gave to Sir *Tho: Roe*.

A glasse-horne for annointing Kings.

2 Roman Urnes.

A Roman sacrificing-earthen-Cup, with the word *CAMPANION* printed in the bottome.

Tarriers of Wood made like our Tyring-Irons.

Tarriers of Wood like Rolles to set Table-dishes on.

Indian Tresles to hang a payr of Skales on, of black varnisht wood.

The plyable Mazer wood, being warmed in water will work to any form.

Blood that rained in the *Isle of Wight*, attested by Sir *Jo:Oglander*.

A Hand of Jet usually given to Children, in *Turky*, to preserve them from Witchcraft.

IX.

Warlike Inſtruments.

POleaxe with a Piſtoll.

Poleaxe and Piſtoll with a Mill and Croſſe-bow in it for either Arrow or Bullet.

German Poleaxes.

Count *Mansfield's* Poleaxe, called *Puſſacon.*

Indian ſquare-pointed Dagger, broad and flat.

Japan Sword and Dagger.

Moores Daggers, 2 ſorts.

Severall ſorts of Daggers.

Javelin *Japan.* / *Turkiſh.*

Indian Lance.

Molocco Sword.

Targets from the *East India* of— Reeds. / Leather. / Skins, and / Crocodill-skin.

Bowes 12. / Arrowes 20. / Quivers 12. / Darts 60. From *India*, *China*, *Canada*, *Virginia*, *Ginny*, *Turkey*, *Perſia.*

Drums two ſorts; 1. from *Ginny* of a whole piece of wood; 2^{d}. from *India* of copper.

Targets ſeveral ſorts, *viz:* Knights Templers. / Britaine, *Iſidore* the Monk. / Roman. / Japan. / Græcian. / *Roguza.*

Indian drumming Target.

Ginny Drum made of one piece.

China Armour.

Knife wherewith *Hudſon* was killed in the *North-West paſſage*, or *Hudſon's* Bay.

Knives from *Ginny*, 3 ſorts.
Knives from *Muſcovy*.
A *Damaſcus* knife perfum'd in the caſting.
Roman Darts headed with copper, taken neer *Pontefract*, *Yorke-ſh.*
Moddels for a Cannon, with the appurtenances.
Tamahack, 6 ſorts.
Poiſoned Creeſes, or Daggers,— 2 waved. 2 plain.
Iron Manacle taken in the Spaniſh-Fleet. —88.
Sithe—
Symiter from *Turkey*.
Steletto
Souldiers Coat of Armour.
Skaling ladders 6 ſorts of wood and ropes, and iron pullies; 2 with joints of wood cloſed in a ſtaffe.
A Sempitan or Trunck wherewith they execute men to death with poyſoned Arrowes.

X.

Garments, *Veſtures*, *Habits*, *Ornaments*.

AN Arabian veſt.
A Ruſſian veſt.
A Portugall habit.
A Turkiſh veſt.
A Brackmans veſt of Leaves of Aloes.
A Virginian habit of Beares-skin.
A Babylonian veſt.
A Greinland-habit.

A Match-coat from—— *Virginia* of Feathers. Deer-skin.
Canada.

Match-coat from *Greenland* of the Intrails of Fiſhes.
Pohatan, King of *Virginia's* habit all embroidered with ſhells, or Roanoke.

A Match-coat of *Virginia* made of Racoune-skins.

Crownes { Indian.
Amazonian.

Swabes ſuit.

Henry the 8 his { Stirrups.
Haukes-hoods.
Gloves.

Barbary Spurres pointed ſharp like a Bodkin.
K. great Porter's Boots.
Little *Ieffreyes* Boots.
Little *Ieffreyes* Masking-ſuit.

Boots from { *Lapland.*
Greenland.
Muſcovy.
Babylonian.
Ruſſian.
Perſian.

Shooes to walk on Snow without ſinking.
Spurres from *Turkey*.
Moores Cap.
Chappenes, 20 ſorts.
Tartarian Whips.
Scourges of Sinewes.
Diſciplines of wire, quilted cotton.
A Fryers Diſcipline with ſilver rowels.
A lacrymaticall Urne for Teares, of glaſſe.
Girdles of the length of the Sepulchre.
Nunnes penitentiall Girdles of Haire.

Cordilier Girdles of { ſilke.
pearle.
ſtraw.
cotton, curious worke.

Jewes girdle and purſe.
Girdle, Indian.
Boràchios for wine.

Hat-bands of Porcupine quills beaten flat and dyde.

A payre of Scotch gloves wrapt up like a ball.

A linnen Shirt woven without either ſeam or ſtitch, 2 yards long.

A veſtall Nunnes head-dreſſe, of tiffany curiouſly criſped.

Duke of *Muſcovy's* veſt wrought with gold upon the breaſt and armes.

Caſe of Indian bands and caps made of the rinds of trees.

Shirts and ſmocks, Indian.

Turkiſh ſhaſh.

Brabant Womans caps and cuffs.

Polander Prieſts cap.

Handkerchiffs of ſeverall ſorts of excellent needle-work.

Edward the Confeſſors knit-gloves.

Anne of *Bullens* Night-vayle embroidered with ſilver.

Anne of *Bullens* ſilke knit-gloves.

Henry 8. hawking-glove, hawks-hood, dogs-coller.

Severall ſorts of girdles from *Ieruſalem* weaved in gold, ſilver, and ſilk.

A Caule of haire, excellent work.

Ruſſia ſtockens without heels.

Hat of very fine ſtraw or bent.

A hat-band made of the ſting-ray.

Bands and cuffs of ſtraw.

Indian monteroes.

Shooes from	*Peru.*	*Rhode.*
	Canada.	*Malta.*
	Mogull.	*Greneland.*
	China.	*Poland.*
	Japan.	*Portugall.*
	Cormandell.	*Spaine.*
	Barbery.	*Ruſſia* ſhod with Iron.
	Turky.	*East India.*
	Venice.	

Sandals of wood, from *China*.
Sandals made of twigs.
Severall ſorts of Sandals.
Choppenes for Ladyes from { *Malta.* / *Venice.* }
Womans breeches from the *Abiſſenes*.
Divers night-caps made of graſſe, from the *Weſt Indies*.
Turkiſh belt wrought with gold.
Rich veſt from the *great Mogull.*
Napkins made of the rinds of trees.
Variety of Indian Crowns made of divers ſorts of feathers.
Severall attires and ornaments made of moſt beautifull feathers.
A Hat-band of glaſſe ſpun into fine threads.
Variety of Chains, made of the teeth of Serpents and wilde beaſts, which the Indians weare.
Bracelets from *Guiny*.
Bracelets of Indian fruits.
Severall ſteel-chains of curious work, from *Spaine*.
Black Indian girdles made of Wampam peek, the beſt ſort.
A Bracelet made of thighes of Indian flyes.
Purſes of the barks and rindes of trees.
A Purſe made of a Toad-skin, a handfull long.
Virginian purſes imbroidered with Roanoake.
A Coat lyned with *Agnus Scythicus*.
West Indian thred.

X.

Utenſils.

A Roman Lamp.
A Lethern Tobacco-pipe.
A *Ginny* Lanthorn.
Indian Ladle.

Diſhes of gourd ſhells, Indian.

Ginny drinking-cups made of birch.

Indian pillow.

Chaffing-diſh, gridiron, ſpits, and to roaſt egges and apples; all to be done with one ſire, and all in a modell of iron.

Desk for a book, Rack to hang a cloak on ——	of carved Whale-bone.

Indian cradle.

An Indian hollow low ſtoole.

An Indian little round table.

China ware, purple and green.

Mazer diſhes.

Indian long pepper-boxes.

Cup of	Rhinoceros Unicorn, & Albado's —	hornes.

Divers diſhes of mother of pearle.

A branched Candleſtick turned in Ivory.

An Indian diſh made of excellent red earth, with a Neſt of Snakes in the bottome.

A caſting bottle of marbled-glaſſe.

Variety of *China* diſhes.

A Table-cloath of graſſe very curiouſly waved.

Divers tranſparent Ivory-cups.

Severall cups of Amber turned.

Cup made of Albado horn,

Skades to ſlide with.

Hamaccoes, five ſeveral ſorts.

A *Portugall*-Whisk of haire to beat away flyes from horſes and camels.

Tobacco-pipes, 30 ſorts from	*Braſil.* *Virginia.* *China.* *India.* *Amazonia.*

Viſnago, a Spaniſh tooth-picker.

Turkiſh tooth-bruſh.

Gurgolets to poure water into their mouthes without touching it.

Baskets to carry those Gurgolets, Indian.

Plates made of Ruſhes, *Ginny*.

Turks budget.

A Turkish Inkhorn.

An Italian lock, *Cuſtos pudicitiae*.

An *Umbrella*.

Ventilo's of— *Palmeta* leafe. / Turkiſh feathers. / Straw. / Leather. / Sedge.

Indian baskets 20 ſorts.

German locks 6 ſorts.

Fannes of skins and ruſhes.

Tartarian ſaddle with ſtirrups of wood with a hollow wherein he keeps his meat alwayes warm.

Divers ſorts of Indian weights and skales.

Beads ſtrung upon ſtiffe wyers, and ſet in four-ſquare frames wherewith the Indians caſt account.

A Turks travelling bucket of leather.

An Indian leather-caſe wrought in gold.

Letter-caſes made of the rindes of trees and graſſes.

A copper Letter-caſe an inch long, taken in the *Iſle of Ree* with a Letter in it, which was ſwallowed by a Woman, and found.

A choice poliſhed ſteel for a looking-glaſſe in an Ivory frame, cut in curious figures.

Divers ſorts of Looking-glaſſes of ſeverall formes.

A ſteel-glaſſe that ſhowes a long face on one ſide, and a broad on the other.

XI.

Nomiſmata. [Omitted.]

XV

CATALOGUS

Plantarum in Horto
Johannis Tredeſcanti,
naſcentium.

[Omitted.]

PLANTARVM
IN HORTO
IOHANNEM TRADE-
SCANTI *naſcentium*
Catalogus.

NOMINA
SOLVMMODO
*Solis vulgata exhi-
bens.*

Anno 1634.

TITLE-PAGE FROM THE CATALOGUE OF THE PLANTS GROWING IN THE ELDER TRADESCANT'S GARDEN

From Gunther *Early British Botanists*, 1922

Principall Benefactors
to the precedent Collection.

King *Charles.*
Queen *Mary.*

George Duke of *Buckingham.*
Lady *Katharine* Dutchefs of *Buck:*
Willian Laud Archbifhop of *Cant:*
Robert Earle of *Salisbury.*
William Earle of *Salisbury.*
Earle of *Carlifle.*
Lord Vifcount *Dorchefter*
Lord Vifcount *Faulkland.*
Lord *Strange.*
Lord *Goring.*
Lord *Cambden.*
Counteffe of *Arundell.*
Lady *Matrevers.*
Lady *Denbeigh.*
Lady *Wootton.*
Lady *Mary Villers.*
Lady *Goring.*
Lady *Killegray.*
Lady *Chriftian Levifton.*
Sir *Thomas Roe.*
Sir *Chriftopher Hatton.*
Sir *Henry VVooton.*
Sir *Kenelme Digby.*
Sir *Nathanael Bacon*
Sir *Butts Bacon.*
Sir *Dudly Diggs.*
Sir *Henry Vane.*
Sir *Henry Palmer.*
Sir *Robert Heath.*
Sir *Peter Manwood.*
Sir *John Trever.*
Sir *William Bofwell.*
Sir *Clipsby Crew.*
Sir *Alexander Gourdon.*
Sir *James Bagg.*
Sir *David Kirke.*
Sir *Richard Wifeman.*
Sir *John Smith.*
Sir *John Wieldes.*
Sir *Henry Meldree.*
Sir *John Aemoote.*
Lady *Roe.*
Lady *Graimes.*
Doctor *Owin.*
Doctor *John Hill.*
Doctor *Thomas Wharton.*
Doctor *William Broad.*

Doctor *Bugg.*
William Murray Esq.
William Curteene Esq.
Elias Ashmole Esq.
Captain *Weddell.*
Captain *Plumbey.*
Captain *Ireland.*
Captain *Cleborne.*
Captain *Prim.*
Captain *Wood.*
Captain *West.*
Captain *Swanley.*
Captain *Adam Denton.*
Captain *Trenchfield.*
Captain *David Atchinson.*
Mr. *Nicolas*, Secretary to the Navy.
Mr. *John Slany* Merchant.
Mr. *Charleton* Merchant.
Mr. *James Boovy* Merchant.
Mr. *John Millen.*
Mr. *Thomas Howard.*
Mr. *White of Burntwood.*
Mr. *Ofield.*
Mr. *Ofley.*
Mr. *Greene.*
Mr. *Munke.*
Mr. *Sadler.*
Mr. *Bushell.*
Mr. *Liggon.*
Mr. *George Tomasin.*
Mr. *Dells.*
Mr. *Gage.*
Mr. *Pergins.*
Mr. *Robert Martyn.*
Mr. *Trion.*
Mr. *Woolfe.*
Mr. *Browne.*
Mr. *Martin Masters.*
Mr. *Butler.*
Mr. *Phillips.*
Mr. *Harison.*
Mr. *Pette.*
Mr. *Short.*
Mr. *Bound.*
Mr. *Stone.*
Mr. *Bartholomew Hagatt.*
Mr. *Reeve.*
Mr. *Francis Cline.*
Mr. *Thomas Herbert.*
Mr. *Rowland Bucket.*
Mr. *Snelling.*
Mr. *Rowe.*
Mr. *Smith.*
Mr. *Butterworth.*
Mr. *le Goulz.*
Mr. *William Martyn.*
Mr. *Lanyon.*
Mr. *Gasper Calthoofe.*
Mr. *William Lambert.*
Mr. *John Benson.*

FINIS.

APPENDIX B.

ASHMOLE'S LIST OF TRADESCANT'S CURIOSITIES

Perhaps a rough draft prepared by Ashmole when he assisted Tradescant with the 1656 Catalogue of his Museum. See pp. 392 and 288 note.

The items marked with asterisks do not appear in the printed Catalogue.

Mostly catalogued on pp. 428 and 429.

A shirt without a seame or stich 2 yds longe. [f. 189
A headres of a vestall of crisped tiffany.
A vest from Duke of Muscovy wrought of gold upon the brest and armes.
Lace of Indian bands and caps made of rinds of trees.
A Turkish shash. Shirts and smock from East India.
A brabant womans cap and cuffe.
A poleander preiste cap.
Several sorts of curious needle worke Handkercheefs.
A Glove of Edward the Confessors.
A a Bullen night vale inbrodred in silver and her gloves silke.
Several sorts of Girdles from Jerusalem wev'd in silke, silver and golde.
Turks travelling buck of lether.
A cal made of hair excellent.
Russia stocking without heeles.
A table cloth of grasse curiously weved.
A fine straw hat. Band and Cuffes of Straw.
Indian Mounteroes.
Shoes from pegu, barbery, turkey, Venice, Canida, Mogull gilt.

Sandals sevrall sorts	China, Russia shod with iron Groneleand Poleand.
[letter cases from India] *erased*	Knights of Malta, queens of Japan, Muscovy, Portugale, Spane.

Sandalls from China of wood.
Sandals made of twiggs.
Chapeenes from Malta, Venice for ladyes.
[A lacrimeticall glasse] *erased.*
*Herba Draconis.
*A claw of Paludanus his silken Crabb.
Weomens breches from the Abissons.
little Jeffries masking suite.

See pp. 427 and 429.

Divers night capps made of a kinde of grasse from the west Indies.
A Turkish Belt wrought with gold.
An Indian letter case wrought in gold.
A rich vest from the Greate Mogull.
A purse made of a Toad's skin a handfull long.
Henry the 8: his hawking glove, hawks hood and dog coller.
letter cases, purses and napkins made of the rindes of tres or gras.
Virginian purses imbroadered with Roanoke.

*A Brane stone a foote $\frac{1}{2}$ diameter. [f. 189v
*Frutex marina.
*Planta retiformis.
*Quercus marina.
*Tamariscus ,,
*Caulis ,,
*Corolina ,,
Muscosa coralina black, white, and red.
a Rock of large Bristol diamonds.
a Rock of petrified shells.
*Coralina magna facie trunci Quercini.
Coralina brassica facie.
Coralina crassili forma.
Coralina musca claviculata similis.
Corall lik a hawthorne thicket.
Corall like a spunge.

See pp. 408-9.

Corolina hirsuta.
Hippuris saxea.
Alcyonium maris rubri sevrall sorts.
Alcyonium maris Album.
Corolina instar algosa.
Corall like a deeres horne.
Corall full of holes on the one side.

The modell of the Towne of Strazburg carv'd in wood.
A litle steele looking glasse sett in an Ivory frame cut in curious figures.
Variety of Mother of perle dishes.
A glasse Basket full of variety of fruites of glasse.
Varitey of Glasse in many curious formes and shapes.
*Shells in which the true perle is lodged.
A branched Chandlestick turn'd in Ivory.
*The martyrdome of the Bp. of Amphipolis carv'd in Alabaster.

See pp. 424 and 431.

An Indian dish made of an exelent red earth with a nest of snakes in the bottom.
A glasse horne for anointing.
A Casting botle of marbled glasse.
Variety of China dishes.
A peece of the stone of the oracle of Appolo. [f. 190
,, ,, Diana's tombe.
An Orange that grew on Zebulon's tombe.
sevrall sortes of Cymbals.
Turkey eggs, Egg at Easter.
*Reedes.
*Drops of mell turn'd to glas (?).

Rarities petrified.

pp. 411-12.

Sevrall sortes of mushroomes, Roe of a red herring, pith of Elder, Olive, Cowcumber, whet stone, peece of a man's rib and flesh, Crab fish and shell of a periwincle, Peare, Date stone, Oaken leafe, clay tobacco pipe, Cocles, Comfits sevrall sorts, pease, Elder stick, Roundle stones, a litle clubbe stick, sevrall bones, Castle sope, Ash, Oake, Hoolley with barke, fishes stone, long and black.
Sevrall woods turnd to Iron.
*A peece of a scull ½ inch thick.
Teeth two inches over and deepe, small teeth above an inch over.

p. 423.

Gamahan with a fish on it. [*Figure of a fish.*]
Gamahan of deaths heads.

Curiosities of carved worke.

Plum stones, Apricock stones, cherry stones, Peach stones, Stories and figures carved in them.
A cheriston carved on one side with St. George killing the draggon, on the other side 88 Emperors faces.
A cheriston with a dozen of wooden spoons in it.
a dozen of silver spoons in a little silver box.
flea chain of silver and gold, y length of an inch 300 linkes a peece.
1 dozen of litle sheeres.
Chains of straw, of silver, steale and gold.

See p. 421.

Divers sortes of fether workes wrought with a needle in figures.
A whele and spindle turnd in amber.
A cup turnd in peper and garnished with ivory.
A sette of chesse men in peper Corne, turn'd in ivory.
a cheri stone with 10 dozen of tortis shell combes.

*Tool of a spider. divers sorts.
Chirurgeons instruments upon pointe of needles.
*A letter case in copper 1 inch long.

CURIOSITYES OF PAINTING THINGS CUT OF IN THE FORMES.

See pp. 421-2.

Perseus and Andromeda cut in an ivory table.
Things moulded of and panted.
Sevrall sorts of inbost wax worke very curious.
Divers curiositys of turnd worke in Ivory.
Sevrall draughts of Masters.
An inameld plate of the Salutacon and sevrall other.
Divers plates ingraved in silver gold and copper.
Divers medalls cast of.
Divers sorts of coynes.
Divers sorts of Indian waights and skales.
Thin beades set on wyres in frames to cast accounts with.
Divers sorts of Indian frutes.
Sevrall sorts of Oares.
Cupps of a Rhenocerus Vnicorne, Albados hornes etc. with spoones and dishes of shells weeds vkomes Indian plyable wood that being warmed in water will worke to any forme.
*Divers members of Mummy.
*Hare of a Mare maide.
A lacrimetticall Urne.
A cup written Campanian in the middle.
An Egiptian Idolls in Earth—vide Lauds { Rams head, long beake, Batt. dogf.
A Gamahaa with Jesus Joseph and Mary in Capitall Italian lettres
Pinna marina ye silke of it.

See pp. 423-4.

*A chalcidan Stone.
*Divers sortes of Indian Inkes.
*Frute of a tree like an apes head, and other representing other s[h]apes of a[n]imals.
Manatee stones.
foote of a Gynnye Dog.
*hollow stones found in Eagles nest
Etites.
*Asbestus stone.
A plug of Capt. Drakes ship.
A Damascus knife, perfumed in ye casting.
Circumscision knife. [*Figure in margin.*]
Cloth made of the downe of fethers, yellow.

See pp. 423-4.

Jewes Philacteries with the Comandmts in Hebrew.
Blood that raind in the Ile of Wight in Hen: 2 tyme.
A Jet hand against witchcraft, given to children in Spaine.
Scotch gloves wrapt up in a ball.
A peece of the stone of St John baptist tombe.
A peece of Sorrigo Castell, where faire Hellen of Greece was borne.

MS. Rawl. D. 864.

APPENDIX C.

THE ASHMOLEAN COLLECTION OF MINERALS

The following Metals, Oars, &c are kept & to be seen in M^{r} Ashmoles Musæum in Oxford. Many more have been added since D^{r} Plots time.

MS. Lat. Misc. e. 29.

Taken from D^{r} Plotts Tables. M.S.

Metals are Perfect, Imperfect. Perfect. Gold: Native, Factitious. Silver: Native, Factitious. Imperfect. Hard: Copper, Iron. Soft: Lead, Tin. These also Native, or Factitious.

Gold Native.

In grains. (place) Hispaniola, Habessia, Scotland: also in y^{e} Sea Sand near Reculver in Kent: but comes from y^{e} falling & afterward washing of y^{e} Cliffs, above wch once stood a Roman Town suppos'd to be burnt. vid Gibsons Engl: Cambden.

Factitious.

Out of a white Stone, in Germany.
Out of a purple Stone. ibid.
Out of Galena, in Hungary.
Out of Chrysocolla (wc^{h} is a natural Borax of a blewish green: at Goltbergen in Silesia.
Out of Lapis Lazuli.
Out of Lead Ore. in Darbyshire.

Metals.

Out of Tin Ore in Cornwall: and frequently out of Silver Ore.

Silver.

Native.

In large lumps in Germany: Norway.
In ye form of Trees or Vines, In Sweden: Habessia.

Factitious.

from an Ash-coloured Stone. Hungary.
from a whitish Spar.
from a flat Smooth Slat.
from a Black Copper Ore. England, viz. Cumberland.
Out of Lead Ore, in Darbyshire.
Out of Tin Ore, in Cornwall.

¶ Metall Imperfect.

Hard requiring ignition before Fusion.

1. Copper.

Native: found in some mines. (found since Dr Plots days in Cornwal, and no small piece given to the Musæum by Mr Joh Sowter.

Metals. Copper.

Factitious.

Out of a Red Ore. Hungary.
from Ore like Dice. Norway, England.
from a Black Ore. England.
from a Red ore. Staffordshire.
from Brass ore. England.

2. Iron.

Native.

Out of Grains or Bullet. at Bad .... .
In a Mass.

Factitious.

Out of a Black } Stone. Staffordshire.
Out of a white } Stone. Staffordshire.
Out of a liver colour'd Stone. Staffordshire.
Out of Pittee, Cavila, & white vein. Sussex.
Out of a foliated Ore. Salop.
Out of ye ye Magnet.

Imperfect Soft.

Admitting Ignition before fusion.*

Native or Soft ore.] *1. Lead.

Factitious.

Potters ore } the best werewith Potters glaze ye Pots.
Steel ore } Cornwal, Darbyshire.

Metals. Lead.

Frim Ore, wch will crumble like Sandstone.
White Ore. Craven in Yorkshire.
Striated ore.
formed ore. Staffordsh: formed in an Octohedron.
Galena, Plumbago. Cardiganshire.
Whitish red ore of Somersetshire, which is fistulous.

2. Tin.

Native.

Zill Tin. Cornwal, Devon; which is a gross gravelly Powder.

Factitious.

Out of Tin Stones, wch are of a dark liver colour.
Out of Corn Tin: ye Stone consists of shining angulous grains.
Out of Slagge; wch is of a pull & shining colour, which some think to be ye ore of Zink.

Metallica.

1. Quicksilver.

Native.

Virgin Mercury. Idria; St Albans.

Artificial.

Out of a fine } Cinnabar.
Out of a course } Cinnabar.
Out of Lapis Hæmatites.

2. Antimony.

Native.

A Terrene sort from Transillvania.
A fine sort from Hungary.
A dark sort not shining, but striated holding Tin.

Artificial.

Italian. German. Bohemian.

English { Darbyshire: more splendid.
English { Cornwal: more striated.

The rest are,

Bismuth or Tin-glass, Latinè Plumbum cinereum.
Zink or Spelter.
Cadmia metallica or Cobalt.
Calaem, a white metalline Cadmia.

Metallicis affinia are,

Either made out of them, as

Cerussa. Minium. Bianca.

Lithargirum aureum, majus } coctum.
argenteum minus

or relating to them,

Pompholix. Lapis calaminaris. Spodium.
Aurum Mosaicum or Musivum.

Other Minerals & Fossils, are

Arsenick.

Natural.

Auripigmentum: Aleppo. Rusma.

Factitious:

Yellow: out of Mineral Sulphur & Salt.
White: made so by Sublimation, call'd Risagallum.
Realgar, i.e. y^e comon Ratsbane.
Red: made so by Coction, as Sandrach.

Fat Inflamable Bodies are

1. Sulphur:

Natural. Sulpur vive,

1. Transparent. Apyron (qud igne inexpertum.
2. Opaque. Italick. Icelandish.
Pure. Sulphur minerale.

Artificial.

Mixt, with Mercury Cinabrium.
wt^h Rosin; Common Brimstone.
Horse Brimstone, w^ch is y^e Dreggs of y^e Common.

Bitumen.

Natural.

Liquid. Petroleũ sive Naphtha. Pitchford in Shropsh:
Asphaltum Iudiacum.
Solid. Terra Ampelitis; i.e. Kannel Coal. Salop: Staff:
Lancash:

Gagates. Kent. Norfolk.
Lithanthrax. Staffordsh: Warw: Caemarth: Penbroksh:
Pix fossilis. Barbados.
Ambaer.
Ambergrise.

Factitious.

Liquid: Tar.
Solid. Camphora Chinensis. The Common is made of y^e wood of y^e Camphire tree. [De varijs Camphoris (etiam de Nativâ) varijsq; præparandi modis vid. P. Herman: Mat. Med. pp. 254. 251.]
Mummie.

Earths.

Are either not usefull in Chymistry, Elementary Sandy: or usefull in Chym. Saline Metaline.

Not usefull in Chym:

1. Elementary, viz. Barren & voyd of al Salts.
2. Sandy. Amblecot Clay. Usefull for making Crucibles. Terra Tripolis, to hinder fusion in Salts. Pulvis Puteolanus, for making Lutes. Rusma, to hinder fusion in y^e Distillation of Salts. Terra argentaria, for polishing Silver.

Vsefull in Chym:

1. Salin. 1. Ductile & capable of figure, and because not Chapping and may be gravelly as Loam.
must not gravelly as figuline or Potters Earth.
must not be gravelly, and must burn white, as Tobacco-pipe Clay.

2. No matter whether so ductile and capable of figure.
1. Fat, & gravelly, as Marles. Not gravelly, as Fullers Earth. 2. Lean, and not scoring, as Terra Nilotica. Scoring best when dry, as White Chalk. Scoring best when wet: Green, Red, and Black Chalks.

2. Metalline. 1. Impregnated but weakly, as

Ocres, Red $\begin{cases}\text{Stone.}\\ \text{Clay.}\end{cases}$ Yellow $\begin{cases}\text{Stone.}\\ \text{Clay.}\end{cases}$

2. Impregnated strongly w^th mineral metalic vapours, and pertain to y^e following Metalls; viz.
to Silver, Lac Lunæ. to Mercury, Topha fistulosa. to Copper, Zaffer. to Iron, Darlaston Clay, Mogra,

Biloon, and most of The Ocres. to Lead, Wadt or Kellow, i.e. Black-lead.

Stones are
Pretious. Vile.
Transparent. Semiopaque. Opaque.
Stones Pretious.

Transparent.
Adamant: Oriental or true. Bastard from Bristol, Cornwal.
Rubie, is Oriental. Bastard: Spinel Balasse, Welch.
Saphire, is male: femal.
Smaragd or Emerald. Oriental, European. Peruvian Occidental.
Chrysolite.
Hyacinth } Oriental. Occidental.
Granet
Topaz. Opal. Beryl.
Cornelian. Male, Femal.
Lapis nephriticus; sc: Indicus, Hispanicus, Bohemicus.

Semiopaque.
Chalcedony.
Pearls. Oriental. Occidental, Norway, Denmark, British.
Coral. Red Mediterranean: White, y^e Red Sea. Black, Atlantick.

Opaque.
Turcois. Persia, Bohemia.
Oculus mundi. Oculus Beli.
Oculus cati. In Provincia Indiæ Occidentalis Tolotopic dicta.

Stones Vile.

Transparent.
Crystall: formed, unformed.
Lapis specularis.

Semiopaque.
Lapis Lyncurius. Talcum venitum.

Opaque.
Alabastrum. Amianthus. Lapis Armenus, w^ch is y^e same with Lapis Lazuli, but without gold spots, and of this is made y^e blew cald—Vltramarine. Lapis calcarius. Cal-

culus humanus, dictus Ludus. Hæmatites. Lapis Iudaicus: male or y^{e} long, female. Osteacolla. Marmor Peloponesiacũ, Morea Marble. The Wolf Stone. Magnes. Magnesia, from Piedmont. Pumex, from Coblens. Flint. Iasper & Agat may be termed Flints. Lapis Spongia. Lapis Scissilis Hibernicus, Irish Slat.

Salts are,
Acid, or Alkalizate.

Acid are, Common, Nitrous, Vitriolick. Aluminous: w^{ch} are Natural, or Factititious.

Alkaline are Natural or Artificial: these Volitile, or Fixt.

1. Common Salt, Natural. 1. Concreted, and therefore Fossile, as Sal Gemmæ: Cappadocia, Hungary. Block Salt. Hungary, Poland. 2. Dissolved. Marin. Fountain. Factitious. Fountain. Hall in Saxony: Isle of Majo, Ierbo, &c.

2. Nitrous. 1. Natural. Aereal. Aqueous, Natron of Egypt. Mural (wall) Aphonitrũ, idem quod Nitrũ Calcarium. Fossile Tin-car. Egypt, Asia.

2. Factitious. Common mural Saltpeter. Vrinous, w^{ch} is either Bestial, as Halonitrũ or human, as Borace. Venice.

3. Vitriolick.

1. Natural. Gren, Chalcitis. Hergrund in in Hungary. Yellow, Melanteria, which is y^{e} Melanteria of Wormius's Musæum; but Melanteria known to others is Black, as is also Sory. Misy is of a goulden colour. White. Herngrund in Hungary. Red, out of Germany. Vitriolum Neophytum, idem quod Trachitis.

2. Artificial. Blew Cyprian, w^{ch} is y^{e} Roman of y^{e} Shops. Green English. Greenish blew, Danzick, Hungary, Rome. White Goslarian. Red, Germany. Yellow, made so by age.

4. Aluminous.

1. Natural. Alumen Scissile: from Nples. Alum: plumeum: from Cyprus, Anglisey.

2. Artificial. Rock Alum, Alumen Rupeũ Whitby Alum. Scajolum, ex Schisto lapide combusto. Saccharinun: ex Alumine Rochæ, ovorũ albumine, & aqua Rosaceo. Worm: pp. 23. 24.

¶ Alkalizate (salts) are Natural, or Artificial. w^ch^ are volatile, or Fixt.

1. Natural: volatile: Mercury. 2. Fixt. Earths, Tartar with its Vini Calculus.
2. Artificial: volatile Salt of Harts horn, Mans blod, vrine, and all other salts (which are urinous) from animals.
2. Fixt (Artificial.) Lime. Potashes, cald Cineres clavellati or Gravelled Ashes. Wood Ashes, and all yᵉ other fixt Ashes of Plants.

¶ Salts are distinguished not only by their different shootings, but also by their solobility in cold water; from whence you may gather a special distinction.

In yᵉ quantity of ℥ij of water you may dissolve	℥iij of loaf Sugar	and no more.
	℥ij. ʒi of Green vitriol.	
	ʒvi. ℈i. of common Salt.	
	ʒv. ℈ij. x. gr. of Nitre	
	ʒv. ℈ij of Sal Ammoniacũ	
	ʒij. ℈ of Alum.	
	ʒj ℈h. of Borax.	

APPENDIX D

LIST OF BENEFACTORS TO THE ASHMOLEAN MUSEUM

1683-1766

Abstracted from the Benefactors Book, with notes on those who presented notable objects of Natural History. When names only are mentioned the benefaction usually took the form of coins or other antiquities.

The introductory note dated 1683 refers to Robert Plot as 'Musaei Custos primarius ac primus . . . Hoc Volumen Benefactorum tum nominibus tum donationibus inserendis accomodum, suae memoriae, virtutisque causa D.D.D.'

The benefactors in the first year, 1683, were:

Elias Ashmole.

Aaron Goodyear.

Robert Huntingdon. Merton.

J. Eliot, M.D., Exeter, gave 'calculum eximiae quidem magnitudinis e vesica puellae octennis sua manu excisum, una cum duobus lapidibus ad Ammonis cornu similitudinem naturaliter formatus quorum alter armatura aenea obductus'.

Dorothy Long.

John Colvil of Kelling, co. Norfolk. 'Calculum adeo magnum e vesica cujusdam Beatricis Shrewe de Tunsted in eodem Comitatu sine ulla aut sectione aut dilaceratione extractum, admirando sane artificio Joh. Hubberti civitatis Norwicensis Chirurgi peritissimi.' Clearly an advertisement of a successful surgeon.

Gervase Wilcox, civis et piscarius Londinensis.

John Heysig.

Martin Lister.

1684. JOHN YEOMANS, 'civis et Navarchus Bristolliensis' trading 'in partibus Americae Boreazephyris', gave a Cymba peculiar to those regions, commonly called a *Canoe*, propelled by a single rower, clad in a skin coat.

WILLIAM GIBBONS, M.D., St. John's.

Pisciculus cornutus, known to the Indians as *Ican Setang* (as large a pledge as possible).

EDWARD ENT, Balliol.

Twenty-four Birds.

THOMAS BRATHWAIT.

1685. JOHN BISHOP OF OXFORD, Dean of Christ Church.

Old Maps of Oxford and Cambridge.

1686. WILLIAM KINGSLEY, Antiquities.

WILLIAM CHARLETON. His real name appears to have been COURTEN, cf. *D.N.B.* He lived 1642–1702.

Zygaena. Corals. Shells.

1687. WILLIAM DUGDALE.

Forty-eight Manuscripts.

1688. SAM. BUTLER.

A shaving of the true Cross. It was kept as piously in the Museum as if it were 'in Hierophylacio'.

1688. THEOPHILUS LEIGH.

1689. NICHOLAS ROBERTS.

Sea-birds indigenous in Northern Regions. The Arctic Duck of Clusius; Lomwia et Alca Norvegiensium of Hoier; and some migratory birds 'in Dimetiam' besides.

EDWARD MORGAN. A horticulturist of renown.

Hortus siccus in three volumes.[1]

JOHN AUBREY, Trinity.

80 MSS. and a mosaic pavement.

JOHN ROBINSON. An antiquarian, who collected 'summo sudore'.

[1] Now in the Bodleian Library.

1690. WILLIAM HEDGES. Indian Merchant of the City of London.

Gonga, an idol from the Pagoda on Sagur island at the mouth of the Ganges.

1691. ROBERT PLOT. Keeper of the Museum 1683-90.

'Is postquam Gazophylaceum hocce Ashmoleanum per septem annos summa fide, ac diligentia procurasset. Fossilia quae in agro Oxoniensi et Staffordiensi nata ipse primus feliciter detexerat ... multa mineralia ... exotica non pauca Conchylia, Mineralia Metalla Terras, Salia, Lapides, Alcyonia, Poros, corallia aliaque id genus multa.'

1692. EDWARD POCOCK.

Jewish Trumpet made of a ram's horn, which they blow morning and evening every day from the 1st to the 28th of August.

THOMAS HUES.

Tangerine Antiquities.

1693. — HARRIES.

JOHN AUBREY of Lhan-Trydhyd.

Books.

MATTHIAS BIRD.

Antiquities.

JAMES IVIE.

Coins.

1694. JOHN SOWTER. London Merchant.

Various Ores of Tin and Copper from mines in Cornwall and Devon. Native copper from Polgouth and Trevascus.

1694. BENJAMIN BROWN, B.N.C.

Silver ring.

1695. CHARLES KING.

Gems.

1696. CHARLES HOPKINS.

1697. GEORGE WALKER.

1698. IUSTIN SHEPHERD.

1699. THOMAS CREECH, All Souls.
A coin from a Spanish ship sunk in the time of Elizabeth and encrusted with 'pseudocorailio'.

1700. RICHARD DYER, Oriel.
Coins.

1701. JOHN GOSCH.

1702. ROGER BURROUGH.

WILLIAM BROMLEY.

1706. JAMES POUND.
Plants and Animals from the East Indies enclosed in cylindrical glass jars and placed in small cases in the windows.

1707. CHARLES HARRIS.
A certain African Ass called *Zebra*.

1708. TIMOTHY LANNOY.
Skin of Angora Goat.

EDWARD LHWYD. Keeper of the Museum, succeeded by David Parry in 1714.
Naturalia.

1715. JOHN WILKES.
Natural history specimens.

1716. JOHN WOODWARD, Professor at Gresham College.
Relics of the Great Flood and Fossils.

THOMAS SHAW, Queen's.
Collection of Insects caught near Oxford and most elegantly arranged in their proper classes and families.

1717. HENRY JOHNSON, Christ Church.
A huge scaly lizard, commonly called an *Asraw*.

JOSEPH DISNEY, Christ Church.

1718. T. PALMER.

1719. GEORGE CLARKE, All Souls.

Ship model made by W^m Lee, with figure.

SMARTIUS LETHIEULLIER, armiger of Aldersbrook, Essex.

Various species of Animals which he purchased 'e supellectili Woodwardiano', put up in 16 cylindrical glass jars.

'Let not my name appear as ye Benefactor of them.' S. L. in a letter to Huddesford dated May 1756. MS. Ashmole 1822, f. 25.

1743. ANNA MARIA WOODFORD, da. of Regius Professor of Medicine.

Lace collar.

1745. THOMAS NELSON, University.

NATHANIEL CRYNES, Bedell in Arts.

A picture made of the feathers of Mexican birds.

1756. EDWARD SEYMOUR, pharmacopola of Wantage.

Walnut wood, dyed.

COUNTESS OF WESTMORLAND.

Magnet.

According to letters from the Earl of Westmorland to W. Huddesford, the Countess desired that her name might not be brought forward as a benefactor. MS. Ashmole 1822.

1757. RICHARD RAWLINSON, bequeathed Venetian *Paeota* and *Gondola*; a white fox from Muscovy and a Palanquin.

JARED LEIGH.

1758. WILLIAM BORLASE.

Crystals, Minerals, and Metallic bodies, including the type specimens described in his History of Cornwall.

THOMAS PENNANT.

Specimens of Metals, Minerals, Crystals, and Naturalia.

1761. William Perrot.

Flying Fox. Cf. Edwards, *Hist. avium*, tab. 180.

1766. Isaac Hughes.

Body of an Infant preserved in Balsam 'variisque Aegyptiaco more'.

List of Keepers of the Ashmolean Museum.

1683. Robert Plot, Magd. Hall.
1690. Edward Lhwyd, Jesus.
1709. David Parry, Jesus.
1714. John Whiteside, B.N.C.
1729. George Shepheard, Trinity.
1730. George Huddesford, Trinity.
1755. William Huddesford, Trinity.
1772. William Sheffield, Worcester.
1796. William Lloyd, Wadham.
1815. Thomas Dunbar, B.N.C.
1822. William T. Philipps, Magdalen.
1823. John Shute Duncan, New Coll.
1826. Philip Bury Duncan, New Coll.
1854. John Phillips, Magdalen.

Professor Phillips was the last Keeper of the Ashmolean Museum in the original sense of the office as defined by the Founder. As first Keeper of the New University Museum, he should still have controlled the Ashmolean scientific collections in their new home. But the many losses incline us to think that he did not exercise that supervision which is generally expected of a Keeper. At the Ashmolean the charge of the antiquities devolved upon John Henry Parker in 1870 and on Arthur Evans in 1884, while at the University Museum Phillips's responsibilities were shared between the Keepers of that Museum, Henry Smith in 1874 and Edward Tylor after 1883, and various Professors.

The result, as far as the older Collections go, has been deplorable! See page 375 to 378.

APPENDIX E

MUSÆUM POINTERIANUM

Being

An Explanatory Catalogue of several sorts of Rarities, both Natural and Artificial:

bequeathed to St. John's College.

Collected by M^r IOHN POINTER, M.A.

[Chaplain of Merton College in Oxford *erased*] and Rector of Slapton in the County of Northampton and Diocese of Peterborough.

[c. 1740].

The Rarities included in the Catalogue were both Natural and Artificial, viz. 500 Coins and Medals, both Ancient and Modern, as Hebrew, Greek, Roman, Chinese, Arabian, Russian, Persian, German, Turkey, Spanish, Portuguese, Swedish, Polish, Danish, French, Dutch, Saxon, and British Coins and Medals.

Also the Skeleton of several Sorts of Birds, Beasts, Fishes, Embryo's, Insects, and Eggs.

Also a great variety of curious Sea and Land Shells, Crustaceous and Testaceous, Bivalvular and Turbinated.

Several Sorts of Fossils, as Earths, Salts, Sulphurs, and Specimens of Ores, Minerals, and Metals.

Specimens of Physical Drugs.

With variety of other Rarities in Mathematicks, Mechanicks, and curious Works of Art.

To which is added *Hortus Siccus*, being a Collection of 500 Physical Plants, all gumm'd down in a large Paper Book, plac'd according to their several Classes, with their proper Names to them, together with their Virtues.

All these Curiosities in two large Chests of Drawers.

The Præface

However inconsiderable these Things may appear in the Eyes of some of the Ignorant & Illiterate Part of Mankind (*that only look upon the Out-sides of Things without examining their real & intrinsic Value*), *yet by the more Judicious Part of the World, by Men of more refin'd & enlarg'd Understandings, they have always, in all Ages, especially in these latter & more knowing Ages of the World, been esteem'd as Things of great Use & peculiar Advantage. Hence it is that the Greatest Princes, the most Celebrated Universities, & Royal Societies, have with great Care & Pain, great Cost & Trouble, ransact'd both Sea & Land to collect them, & as carefully treasur'd them up in their several Musæum's & Repositories.*

'Tis well known that ancient Coins & Medals have their singular use & advantage in History. Plants, Seeds, Roots, Gums, & other Physical Druggs, are of great Use in Physic & Surgery: Earths, Sulphurs, Salts, Minerals, & Metals, are likewise of great use, not only in Physic, but Mechanics. And as for those curious & fine-wrought Shells, & formed Stones, & other Un-common & Stupendous Works of Nature & Art (*that seem to be more for Show than Use*), *they have notwithstanding this peculiar Advantage, that they lead us to the Great Author of Nature, & not only serve to puzzle the Philosopher, but also to*

admonish (if not convince) the Atheist, & even astonish & delight the Ignorant Vulgar, by whom they are in some sort admir'd (at least) for their Rarity, as they are esteem'd by the most Learned for their Use; Insomuch that they both Profit & Please,

Et Prodesse possunt et Delectare.

However some men (that have had but a little insight into Nature) may look upon Plants & Insects, &c. as inconsiderable things, yet 'tis well known that the wise Solomon was of another opinion, for he thought it not beneath him to take notice as well of abject Reptiles, as of Lions, Eagles, Elephants & other noble Animals; nor did he only write of the tall Cedars of Libanon, but also of that Little despicable Plant that grows out of the Wall. Pliny in his Treatise of Insects, seems to be transported with an un-usual Admiration of the Workmanship of Nature in them; Nusquam alibi spectatiore Naturæ rerum Artificio &c. In Nothing (says he) is the Workmanship of Nature more remarkable, than in the Contexture of these Little Creatures. Formica Cælos dignitate superat. Inest sua gratia Parvis. The Deeper insight any man has into the Affairs of Nature, the more he discovers of the Accurateness & Art that is in the contexture of things; & the more he knows, the more he Admires. As the Author of the Dedicatory Epistle to M. Mouffet De Insectis, rightly observes—Hæc Summi rerum omnium CONDITORIS *infinitam testantur Potentiam, Mentemq; Hominum ad* CAUSAM CAUSARUM *origunt, ut* NUMINIS *Præsentiam ubiq; agnoscant, & beneficam Manum in singulari erga ipsos Directione, & elective Agente influentiâ, non minus submisso quàm grato animo venerentur.*

But I need say no more concerning these Wonderfull Works of Nature & Art, chusing rather to leave 'em to speak for themselves (the Invisible Things of the Great CREATOR *being clearly seen & understood by these Things* *that are made) : I only beg leave to add a word concerning a Particular Medal amongst my Collection of Medals, & 'tis that of Otho. This Medal is suppos'd, by several Good Judges that have seen it, to be Genuine, & what makes me inclin'd to think so, is because it was a Medal belonging to the late R^{t}. Rev^{d}. & Learned D^{r}. Huntington, L^{d}. Bishop of Rapho in Ireland, who was a Curious man & a great traveller, & had brought this amongst a great many other Greek & Roman Coins from Italy & those Parts, & had given a large Collection of 'em to y^{e} University of Oxford but did not care to part with this Valuable Medal as long as he liv'd ; after his Death one of his Nephews (the Rev^{d}. M^{r}. W^{m}. Huntington) gave it to me. The excellent Author of y^{e} Book call'd the Knowlege of Medals (written by a Nobleman of France & esteem'd the Best of this sort that is extant) Pag. 11 says, that the Latin Otho of the Large Size in Copper (as this is) is Inestimable. And pag. 132 he tells us, when a Medal exceeds 10 or 12 Pistoles, 'tis worth whatsoever you please: by this means the Otho's of Large Copper are raisd to an Extravagant rate. M. Vaillant calls an Otho of Large Copper, A Single Medal.*

But if it shou'd be objected that there is no such thing as an Ancient Otho, I answer in the words of that excellent Antiquary, Spon,—they are only Ignorant Persons who pretend that there are no Ancient Otho's. Vid. Missons Voyages to Italy Vol. 2. p. 197.

In Mottes Abridgment of the Philos. Trans. Vol. V. Part 4th. Page 27. amongst other Curious Coins, we have the following of an Otho,

IMP. OTHO. CAES. AUG. TR. POT.

Reverse

SECURITAS. P. R.

The Priest giving the Sacramentum to the Officers.

I. COINS AND MEDALS

(67 pages of MS. omitted).

A COLLECTION OF NATURAL CURIOSITIES, such as Birds, Quadrupeds, Fishes, Insects, Shells, & Fossils.

II. BIRDS

1. A White CROW. Given me by my very good Friend & Countryman George Chamberlain Esq. Member of Parliament for Buckingham.
2. A HUMMING-BIRD (the Skeleton) brought me from the East-Indies by Capt. Hawkins. The least of all Birds, & call'd Humming-bird from the noise it makes, by the hovering motion of its Wings, when it hovers over Flowers to suck the Honey out of 'em as Bees do, which it does by thrusting its Tongue into the Blossoms of Trees wch is twice as long as his Bill. Its Body was curiously covered with Feathers of changeable Colours. Its Bill 3 quarters of an Inch long, Tail an Inch. From the point of the Bill to ye end of the Tail 4 Inches.
3. SEA-CURLEW, call'd ARQUATA coccinea or the Whistling-Curlew from the great noise it makes, (the Head of one). The Brasilians call it Guara. Its Bill is very long, in some 5 inches ½, in some above 6; the Legs long too. In the Stomach are sometimes found small Stones & shells, & sometimes Frogs, &c. Its Colours so alter that they are first Black, then Ash-colour, next White, after that Scarlet, & at last Crimson; which Colours grow the richer the longer he lives. In Suffolk they have this Proverb

   A CURLEW, be she White, be she Black,
   She carries twelve-pence on her Back.

   Vid. Willughby's Ornithology, p. 294.
4. A Brasilian MACCAW (the Head of one) with curious fine Feathers, & a Bill like an Eagle's; They are call'd also COCKATOON, & is the largest sort of Parrot. Their Bills are the most remarkable, by which they catch hold of Boughs, & help to raise themselves up in climbing of Trees. They are call'd Ανθρωπόγλωττοι from their thick

muscular Tongues, by which they are the better enabled to Speak.

5. The IYNX or WRYNECK, altho' a Bird of very beautiful Feathers, & consequently far enough off from being any way Terrible: yet being in danger, has such odd Contortions of its Neck, & Motions of its Head, that I remember (says Mr. Derham) has scar'd me when I was a Boy, from taking their Nests, or touching the Bird; daring no more to venture my Hand into their Holes, than if a Serpent had lodg'd in it.
6. A KING-FISHER call'd the HALCYON (dried), Hence comes the Term Halcyon, i.e. Happy or Quiet Days. This Bird when it makes its Nest on the Sea-shore, it is a Sign of Fair Weather.
7. A NIGHTINGALE, dried.
8. A CANARY BIRD, dried.
9. A CUCKOO, dried.
10. A FRENCH PYE, dried.
11. A BUSTARD'S Head.
12. A HERN'S Head & Leg.
13. A CHICKEN with 4 Legs (dried). Form'd from a Double Egg. Vid. Handleys Mechanical Essays on the Animal Œconomy, pag. 49.
14. A STINT. Head & claw.
15. A MOOR-HEN. Head & claw.
16. A PARTRIDGE'S Head, wing, & Leg.
17. A COOT'S Head & Leg.
18. BAT (skeleton). Vid. 52d in pag. 74th. [*See* p. 462.]
19. CROW (skeleton).
20. OWL'S Head & Head-feathers.
21. SNIPE, Head, wing & leg.
22. MARTIN, Head, wing & leg.
23. SPARROW, dried.
24. A White LARK.
25. Chickens Foot with 5 Claws.
26. Quail's Leg.
27. Pheasants Head.

III. BIRDS EGGS

1. An Ostrich's egg, smooth & of a straw colour, full of large Pores, & of an Oval figure, measuring a Foot ½ from one End to the other, & a Foot & quarter round the middle. They are sometimes so Big as to Weigh 15 Pounds.
2. Another carv'd in Figures.
3. A Swan's egg, smooth, white, & oval, measuring near a Foot from one end to ye other, & 9 inches ½ round the middle.
4. A Hen's Egg of an ordinary size, inclos'd in another of an Extraordinary size being bigger than a Turkey's Egg; the production of which was the Destruction of the Hen This Double Egg was given me by Mr Eedes of Littlemore near Oxford.
5. Other Hens Eggs of divers Shapes & Sizes: one Oblong & slender, another very small & spherical. Another is an Egg within an Egg, & the outer Egg no bigger than an ordinary Nutmeg.
6. A Duck's Egg about the same size.
7. Pheasant's Egg, smooth & shining, & of a Mouse-colour, without spots.
8. Crow's Egg, blewish & full of Dark-brown Blots, obtusely conical.
9. Iack-daw, whitish & inclin'd to Blew, sprinkled with dark spots.
10. Pidgeon, clean milk-white, without spots.
11. Kite, whitish sprinkled with yellow.
12. Mag-py, whitish inclin'd to Blew, full of very small Brown-colour'd specks.
13. Black-bird, faint-blew, full of very small but faint Brown specks.
14. Thresh, Blew-colour'd with here & there a Reddish speck especially about the Head.
15. Lapwing, citrine-colour, stain'd with large Black spots.
16. Nightingale, whitish & full of small Brown specks.
17. Hedge-sparrow, clear Blew with⟨out⟩ any Specks.
18. House-sparrow, white colour full of Brown spots.
19. Brown-linnet, all over full of Brown streaks & spots.

20. Yellow-hammer, whitish-Colour with black stratches here & there.
21. Black-cap, Ash-colour with a few Black scratches.
22. Pied-finch, Ash-colour with a few yellow spots like Iron-moulds.
23. Cookoe, Reddish shell full of small specks.
24. Hawk, Pale-colour'd, & generally dawbd with a great dirty Blot.
25. Wind-weaver, Blewish & full of small specks.
26. Heron, sky-colour'd, without spots.
27. Bustard, Dun-colour'd, with dirty spots & stains.
28. Moor-hen, yellowish, & full of small dirty specks.
29. Partridge, shining Ash-colour.
30. Owl, whitish but a little dirty withall.
31. Turkey, straw-colour'd, full of Brown specks.
32. Sea-pye, Ash-colour'd & full of small but faint specks.
33. Merrop (a Sea Bird) Ash-colour'd & full of Specks & Stains.
34. Chaffinch, white with a ring of specks round y^e Head.
35. Green-finch, whitish w^th a few Red specks on y^e Head.
36. Water-wagtale, whitish & full of little Brown specks.
37. Starling, of a clear shining Ash-colour without spots.
38. Robin, whitish & full of Reddish Freckles.
39. Hoarse-chat, of a dirty colour w^th a few Black streaks.
40. Twit-lark, Ash-colour, & all over full of Brown specks.
41. Canary-bird, Oval, & white, the Head speckled & stain'd.
42. Martin's Egg, smooth, white, & oval.
43. King-fisher's Egg, milk-white, smooth, & a little Oval.
44. Tom-tit's Egg, small, white with yellow specks.
45. Ground-builder's Egg, smooth & Dun-colour.
46. Fly-catcher's or Swift's Egg, white, smooth & spherical.
47. Ring-taild-hawk, white with a little cast of Blew.
48. Wind-hover, smeard over with a Blood-colour.
49. Turkey-hen's Egg, whitish & spherical.
50. Guinea-hen's Egg, smooth & Ash-colour.

To these Birds Eggs, give me leave to add

51. A Snake's Egg, white, & about the bigness of the Top of ones Thumb. The Shell is no hard Shell like other

Eggs, but only a tough Skin. They are generally found 20 or 30 of 'em in a cluster conglutinated together, so that it is very difficult to separate 'em without breaking 'em. Given by Mr Hawkins Surgeon in Oxford.

52. Bat or Flitter-mouse. Half Bird & Half Beast. Vespertilio. The Shape & number of his Teeth show him to be a Voracious Animal. The Claws of his Thumb & Feet that he is Rapacious. His Wings being made to Open & Shut are very admirable, in having ye Bones of such a length as might serve for all, the Positions betwixt being quite Open & quite Shut. Tail he has none. The Chinese esteem 'em as a delicate sort of Meat.

IV. QUADRUPEDS.

1. A Lizard call'd the Guiana, 2 foot & 2 inches long. A very Tame & Innocent Creature. He changes from Green to Hairy-Colour or Russet when angry. His Eggs are very pleasant. In Brasile are a sort of Lizards 5 foot long, which being flaid & sodden exceed all other Meat in Whiteness, Sweetness, & Tenderness.

2. A Green Lizard, 6 inches long, in Spirits of wine.

*3. The Head of a Green Turtle, given me by the Ingenious & Skillfull Surgeon Mr John Hawkins[1] of Oxford Brother to Serjeant Hawkins. These Turtles are generally found between ye 2 Tropicks. The Flesh of 'em eats so exactly like Veal that it is hard to distinguish the one from the other.

4. The Fœtus of a Cow, less than ones little Finger, with all its parts entire (in Spirits of Wine) taken out of the Belly of a Cow by ye same Ingenious Surgeon.

5. The Fœtus of a Mouse, that was just ready to kindle. (In Spts. of Wine.) taken out of the Belly of a Mouse by my self.

6. The Skink, a 4 footed Serpent, a kind of Land Crocodile, found in the River Nile in Ægypt. Like a Lizard, only

[1] John Hawkins, *chyrurgius privilegiatus* 1713–14, was younger brother to William Hawkins, the lawyer, fellow of Oriel. John had been an Army surgeon who had seen service in Portugal. On his return he settled in Oxford, where he died aged 47 on Jan. 15, 1734–5, when the bells went for him. He left a widow and ten children. Hearne, *Collections*, cxliv.

* Extant 1925.

he has shorter Neck & Tail, short Legs, a flat & broad Foot like a mans Hand, with very short Toes, & without any Claws. The Powder of it is said, Potenter Venerem stimulare.

7. The WATER LIZARD, call'd Newt or Eft, a small sort of Lizard.

8. A CAT dried, in very good Shape & Posture.

9. A RAT dried.

10. A WEASEL, Mustela, dried, with his 2 hinder Legs cut off, & his tail turn'd up to make him look like a Dragon.

11. A STOAT (white skin & tip of the Tail black). In the Winter time they turn White. They are reckon'd Prudent, courageous, & fierce Animals, they commonly livd in the caverns of the Earth. The Flesh of 'em was forbidden by the ancient Jews.

12. Foetus of a DEER; in Spirits of Wine.

13. RAIN-DEER'S Leg.

14. A young TORTLE.

15. ANTILOPE'S Leg.

16. GUINEA DEER'S Leg very small, not much above 3 inches long.

17. SEA-COW'S Tooth.

18. BOAR'S Tusk.

*19. ELEPHANTIS Nervi pars.

20. ELEPHANT'S Grinder, (one of 'em, for he has 2 in each Jaw, 2 large ones prominent. They have Teeth as soon as they are born. This Tooth is a Foot long wanting an inch. The Tongue of an Elephant is but small. The Æthiopians eat their Flesh.

21. A PORCUPINE'S Quill, which he darts out as weapons in in his own defence.

22. An ENGLISH MASTIFF'S claw.

23. SCALY-LIZARD (one Scale).

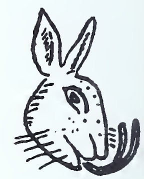
24. STURGEON (one of his Scales).

25. A RABBIT'S Tooth, which is an Annular Tooth & a perfect Ring. It goes in & out of the Jaw twice. And had another Tooth about 2 inches long & perfectly strait. Given me by one Mr Knight of Bazing-stoke in Hampshire, who kill'd the Rabbit.

Dr Plot tell us (in his Nat. Hist. of Staffordsh: p. 252.) of a Rabbit taken in Salt-Warren in ye sd County, that

* Extant 1925.

had 2 Teeth growing out of y^e^ lower Jaw, that turn'd round over y^e^ Nose above the Upper Jaw, with that length & compass, that they almost touch'd y^e^ Forehead in y^e^ return, thus which surely must so incommode y^e^ Animal in feeding, that I see not w^ch^ way it cou'd perform to itself that necessary office, unless by licking-in its Food on each side the Mouth. But this Inconvenience was not so great as what it met with at last upon y^e^ account of these Teeth, by w^ch^ it was taken & kill'd, being hang'd by them in a Hedge.



But to return to our Hampshire Rabbit. Tho' this Rabbit had but 2 Teeth, & those very incommodious for Feeding, yet it was a very large full-grown Rabbit, for it was given me with y^e^ Skin stuff'd out. 'Tis difficult to account for its Way of Feeding. To be sure those Teeth cou'd be of no service in that matter. The staitness & length of the Lower Tooth must hinder its Grazing. It might lick-in its Food (as D^r^ Plot's Rabbit did) on each side y^e^ Mouth. And Mastication was surely perform'd by the Gums only. The common Position of the Mouth was (I guess) Open, because so found when Dead: & indeed the Ring-tooth hinder'd y^e^ easy compression of y^e^ Jaws, tho' I believe it cou'd & did with some difficulty make a shift to bring y^e^ Jaws together in order to grind its Food, between its Gums, which might be grown callous by frequent use, (as Old People commonly do that have lost their Teeth) & at last Use & Custom made it tolerably easy so to do, as it plainly appears by the unnatural Position of the 2 Jaws, for they don't exactly tally & answer one another, the Lower Jaw being a little distorted & turn'd aside.

But how to account for y^e^ Shape of these Irregular Teeth, will be still a greater Difficulty. What if we shou'd imagine that when y^e^ Rabbit was very young, & the Teeth small, tender, & pliable, the Rabbit shou'd in y^e^ time of Eating its Food (or afterwards) be continually rubbing & grinding one Tooth against y^e^ other (having but those two) & so cause y^e^ Upper Tooth to curl & twist by degrees into an Annular Shape (as Horns on y^e^ Heads of Cattle grow curled & sometimes Annular). For doubtless these Teeth at the first, during y^e^ time of its Infancy, were of use ⟨to⟩ our Rabbit, tho' afterwards they became Incommodious.

26. STAG. A Bone out of a Stags Heart. My Lord Bacon in his Nat. Hist. pag. 157. says, that most of the Hard Substances fly to y^e Extremities of the Body, as Skull, Horns, Teeth, Nails & Beaks, only the Bones are more Inward & clad with Flesh. As for the Entrails, they are all without Bones, save that a Bone is sometimes found in y^e Heart of a *Stag*, & it may be in some other Creature. Give me leave to add, that they seem to be a Help for y^e stronger & more steady motion of the Muscles of the Heart.

27. MOLE dried.

MOLE. What is more obvious & ordinary than a *Mole?* (says the Learned D^r *Moor*, who cites it from *Cardigan*) & yet what more palpable Argument of Providence than she? The Members of her Body are so exactly fitted to her Nature & Manner of Life: for her Dwelling being under Ground where nothing is to be seen, Nature has so obscurely fitted her with Eyes, that Naturalists can scarce agree whether she have any sight at all or no. But for amends, what is she capable of for her Defence & Warning of Danger, she has very eminently confer'd upon her; for she is exceeding quick of Hearing. And when her short Tail & short Legs, but broad fore-feet arm'd with sharp Claws, we see by the Event to what purpose they are, she so swiftly working herself under Ground, & making her way so fast in the Earth, as they that behold it cannot but admire it. Her Legs therefore are short, that she need dig no more than will serve the meer thickness of her Body; & her fore-feet are broad that she may scoup away much Earth at a time; & little or no Tail she has, because she courses it on the Ground, like the *Rat* or *Mouse*, of whose kindred she is, but lives under the Earth, & is fain to dig her self a Dwelling there. And the making her way thro' so thick an Element, which will not yield easily, as the Air or Water, it had been dangerous to have drawn so long a Train behind her; for her Enemy might fall upon her Rear, & fetch her out before she had compleated or got full Possession of her Works.

M^r *Boyle* remarks that tho' the *Mole* be not totally Blind (as 'tis commonly thought) she has not sight enuff to distinguish particular Objects. Her Eye is said to have but one Humour in it, which is suppos'd to give her the Idea of Light, but of nothing else, & is so form'd that this Idea is probably painfull to y^e Animal. Whenever she comes up into broad Day Light she might be in danger of being taken, unless she were thus affected by a Light striking upon her Eye, & immediately warning her to bury her self in her proper Element. More sight wou'd be useless to her, as none at all might be fatal.

28. Part of an Unicorns Horn.[1]

V. FISHES

1. The FLYING-FISH, call'd HIRUNDO-PISCIS, 15 inches long in the Body, & the Wings 10 inches long & 7 wide, spotted with Black. Given me by M^r Hawkins the Surgeon.[2] These Flying Fishes often rise in great Shoals above the Water & fly about 100 yards till their wings begin to be dried in y^e Air & then they plunge themselves into the Water again to wet their wings, & often tumble in great quantities into the Ships. The Birds of Prey are very expert at catching 'em when they mount up into the Air, which affords diversion, for if they attempt to dive beneath the Water, they are persu'd by other Fish that swimming near the Surface easily devour 'em, so that they know not which Element to make choice of to save themselves in.

2. The little GLOBE-FISH, ORBIS MINOR, so call'd from its Orbicular figure. This is about the bigness of a mans fist. He is arm'd with long, round, hard, & sharp spikes or needles all round about, & may be call'd a SEA-HEDGHOG, or SEA-PORCUPINE. He swims with these Needles close to his Body, & exerts 'em upon occasion. It has a very small Mouth, small Fins & Tail.

3. STAR-FISH, STELLA-MARINA, consisting of 5 Feet or Rays, each Ray 3 inches ½ long, thick-set with curious Warts, w^ch Rays are fill'd up with a sort of Pulpy matter when its alive. The Mouth is in y^e middle. He is a great swimmer. Their motion is perform'd by bending their jointed Rays backwards & forwards.

4. HIPPOCAMPA or HORSE-FISH (ab ἵππος equus, & κάμπτη flexura). So call'd because his Head resembles that of a Horse's, the Body Septangular, & the Tail square & sharp at the end, his Body & Tail divided by several

[1] Unicorn's Horn was given as a medicine to produce perspiration in fevers as late as the time of Grew (1683).

[2] See p. 462, note.

Incisures; no Fins nor Legs. Head & Neck cover'd with fine Hair, which is only to be seen when he is alive. Under the Belly of the Female Fish are 2 Passages, out of one of which the Excrements are voided, out of the other the Eggs which are red. The Body of this Fish is about the thickness of ones Finger, & from the Nose to Tail ½ foot long.

5. Young Sea-urchins.

6. The Snipe-fish or Needle-fish, a small Fish with a long sharp Bill & large Eye-Orbits, calld Scolōpax.

7. The Gournet, small fish like a Ruff.

8. The Coney-fish, or Triangular-fish, calld so from its Snout something resembling that of a Coney or Rabbit. It has 3 Fins, one just above the Tail.

9. A New-england Crab.

10. The Sea-scorpion, or (as some wou'd have it) Scorpæna.

*11. The Saw-fish's Saw or Spiked Snout, being a thin flat Bone about a yard long, & a Hands breadth, armed on each side with several Spikes, growing strait from the end of the Snout. The Fish is sometimes 10 foot long, & extraordinary thick, call'd in Latin Pristis.

12. A young Dolphin's Tail, expanded Horizontally, by the help of which he plays above Water, & swims faster than other fishes.

13. Iack's Jaw-bone, 7 inches ½ long, taken out of Sr John D'oily's Ponds at Chisleton near Oxford. The Jack weigh'd 22 Pounds, & was a yard & 7 inches long. Given by ye Rev. Mr D'oly his son, M.A. Fellow of Mert. Coll. Oxon.[1]

14. Cod-fish Jaws & Head-Bone.

15. Shark's Jaws, with double Rows of Teeth, so terrible that they prick with their Points & cut with their Edges at the same stroke. His Throat is as wide as his Body, able to swallow a man whole, or bite off his Limbs. A Shark is sometimes 7 or 8 yards long.

16. Cuttle-fish Bone, or Lolliginis vel Sepiæ Os. Drank in milk is an effectual Remedy against the Diarrhœa & Dysenteria.

[1] Sir John D'Oyley, matric. Merton 1720, † 1773.
* Extant 1925.

VI. INSECTS W^TH WINGS

1. BEES. Their Colours vary according to their Ages, In their Middle Age they are Brown, whereas before they were more Pale, in their Old age they are very Hairy, full of wrincles, & venerably Grey. They are most Industrious Animals, & subject to Government. They have all the 5 Senses. Their Smelling is so quick that they will scent Honey or any flowry meadow a mile off. They live but a Year & Quarter at most. Their Combs are built according to the exact rules of Mathematics. In the Hexagonal Figure of their Cells there is no space unimploy'd. Their Wax is composd of the Farina fæcundans or small Seeds of Flowers, w^ch they carefully carry home to their Hives, where they are very readily assisted & eas'd of their Burdens by others of the same Colony.
2. WASPS, are likewise Industrious Animals, & subject to Government, but soon Angry, whence comes y^e word Waspish or Peevish. The Female Wasps less so, being destitute of Stings, & of a smaller make. 2 years is the most that they live.
3. HORNET, or Great Wasp. Their Tails are arm'd with such a Venemous Sting that they will kill a Horse, Ut ter novenis ictibus Hominem, imò Equum interficiant, says Moufet. Spicula Crabronum asperrima, says Virgil.
4. HUMBLE-BEES, call'd by the Germans HUMMEL, from the Humming noise they make, and Bees of little use, therefore the old Grecians usd to call a useless Fellow Βομβύλιον Ἄνθρωπον.
5. The MUSK-FLY, a diminutive Bee yielding a strong Perfume like that of Musk; found in Buckingham-shire. Another sort like a large Cantharides with long Horns.
6. FLESH-FLY, Musca carnivora, with a Reddish Head, grey spots on his Body, thick Belly, Blew, transparent, Hairy.
7. HORSE-FLY, Musca Equina, that annoy Horses, with a flat, hard, smooth Body, blacker than the Common sorts of Flies.
8. OX-FLY, call'd Oestrum, Ang. BREES, of a yellowish colour, which entring into the ears of an Ox makes him run mad.
9. GREAT-DRAGON-FLIES, or Water-Butter Flies, call'd Libellæ maximæ, with fine colour'd Bodies 3 inches

long, & Wings 2 inches long, expanded, & fine net-work, large goggle Eyes, looking every way for its Prey, feeds upon Flies like the Swallows, have little forked Tails. 3 sorts, Greater, Lesser, & Least of all. Chiefly found about Rivers & Ponds. The Middle sort of these LIBELLÆ are of a curious Colour, Bodies Sky-colour, Wings of bright Violet colour. The least of these LIBELLÆ with their Bodies all over of a bright Blew colour, & y^e^ wings of a silver colour, tho' some have Red & others Yellow Bodies.

10. WATER-FLIES call'd Phryganides coming from y^e^ little worm Phryganium Angl: CADOS-WORM, w^ch^ has 4 brown wings, 2 short Horns, forked Tail, Body somewhat Long, they live upon y^e^ surface of the Water, bred in bits of Straw &c. & therf: calld Straw-worms. Another Water-fly calld y^e^ CRANE-FLY from y^e^ length of its feet. Of these there are 4 Sorts, one is so greedy after y^e^ Light y^t^ we see it often burnt in the Candle, it has long shanks, body almost Oval of an Ash colour, silver wings, black eys, 2 short horns, & a Pointed Tail. Seen in meadows in August. This is of y^e^ Male kind. The females are calld OPILIONES, because often found amongst Sheep. Vid. Derhams Physico-Theol: pag. 235.

11. The GNAT, Culex. A very mischievous little Animal, that annoys men both Day & Night, both with its shril noise & sharp Sting, especially those y^t^ live near Fens & Rivers. He has 2 Wings, great for y^e^ bigness of his Body, 6 crooked scambling Legs, with w^ch^ he lifts up his Body w^th^ more ease. He has a long Body, & a Proboscis 3 times longer than those of Common Flies, with a Sharp Point to break thro' the Skin, & fistulous to suck y^e^ Blood. There are 3 Sorts, bigger, lesser, middlemost, & least. The Least Sort are the most stinging, here in England ; but in the America they are very Large & so Stinging that they will pierce thro' very thick cloathing. This little Insect has vast Spawn, sometimes above an inch long & $\frac{1}{2}$ a Quarter Diameter, in w^ch^ the Eggs are neatly laid.

12. BUTTERFLIES, Papiliones. The Butterfly is a volative Insect, having 4 wings, 6 feet, 2 eyes prominent, & 2 little Cornicles, a forked Beak or Bill, & another within that with which they suck in the sweet juice of Flowers. They lay their little Eggs upon & under Leaves, some of one Colour, & some of another ; out of w^ch^ are hatch'd Caterpillars, (some at 4 days end, some

not till 14, some are preserv'd all the Winter) & vice versâ, out of the Aureliæ of Caterpillars are produced Butterflies. There are divers sorts of Butterflies, some calld Day-flies, others Night-flies, some larger, some smaller, some one Colour, some another, & some variegated. Some have their wings speck'd with Silver, others are oculated, like Peacocks Tails.

The Day-Butterflies are to be describ'd so as all men may see the Fruitfullness & Elegancy of Nature herein & Admire. The largest of these Day-Butterflies, is for ye most part all Yellow, except ye extremities of ye wings wch are Black. The roundles of ye inner wings are Azure as tho set wth Saphire stones; the Eyes like Chrysolite. Says The Theatre of Insects. It wou'd ⟨be⟩ endless to describe all ye various sorts of these Insects (if I had them), I shall only observe ye Sagacity of the White-Butterfly-Caterpillar, wch having fed it self its due time, then retires to Places of Security. I have seen great trains of 'em creeping up the Walls & Posts of ye next Houses, where with the help of Cobweb-like Filaments, they hang themselves to the Cieling & other commodious Places, & then become Aureliæ; in which State & Places they hang secure from Wet & Cold, till ye Spring, when they are transmuted into Butter-flies.

13. Glow-worm, Cicindela, call'd λαμπȣρὶς from its shining Tail. The Glow-worm is sometimes a flying Insect having 4 wings, the outermost like Leather, ye inmost membranous of a silver colour & transparent. The Body oblong having 5 incisures, whereby it is extended or contracted as occasion serves; the Head broad, dunnish & flat with 2 cornicles, 6 feet in ye fore part of ye Body. 2 Spots on each side the Tail which shine. The Glow-worm is a slow-pac'd Animal, the Body about an inch long. The shining quality of his tail expires with his Life. By which Light you may read a large Print.

14. Gras-hopper, Cicada. M. Moufet says (but he is mistaken) that this is ye only Insect that has no mouth, instead of wch he has sort of *Proboscis* having 10 streaks running athwart it, by ye help of wch Tube he Sucks the Dew wch is its only Nutriment, *Pascuntur dum rore Cicadæ*, says Virgil. The Stridulous noise yt ye Grass hoppers make, is perform'd by their Wings (says *Verdue*) Under the end of the first Wing, on that side where they are articulated, there is a small blackish, hard, & transparent eminence, or Rising over against a very fine

Drumb, which is on the under Wings; when this small knob comes to strike on the Edge of this Drumb, the Air suffers a Collision, which makes the Noise. The Grasshoppers have strong brawny Thighs, with long, slender & strong Legs, which enable 'em to leap with great Agility & Strength.

15. CRICKET, Gryllus, much like the Grasshopper, y^e^ wings only excepted. They are of 2 Sorts, the Field or Fenn Cricket, & the House-cricket. The House or Domestick Cricket is all over of a dunnish colour, the Body long & much less than ye Field-cricket, ye Head almost Round, eys black, ye Cornicles moveable, ye Back cross'd with 2 white lines. The Female is bigger, & has 3 bristles at ye end of ye Tail. Both Sexes fly, leap, & run. In Africa they are comonly kept in Cages to promote Sleep, which they do by their shrill noise. The Singing of the *Crickets,* is a Sound that is occasion'd by a very dry Membrane, which is folded up like a Fan, & fasten'd under the Wing to a pretty Long Tendon. Altho' the Muscle cannot be contracted but ye Fan must be folded wch produces ye Sound.

16. The CRICKET, calld the MOLE-CRICKET, because it commonly lives under ground like the Mole & is calld in Lat: GRYLLO-TALPA, & has therefore his fore-Legs very brawny & strong; & his Feet arm'd with 4 flat strong Claws, together with a small Lamina with 2 larger Claws, & a 3d with two little claws: which Lamina is jointed to the bottom of the Foot, to be extended to make ye Foot wider, or withdrawn within ye Foot. These Feet are plac'd to scratch somewhat sideways, as well as downward, after ye manner of Moles Feet, & they are very like them also in figure. Verdue says it has 3 Stomachs & chews the Cud. His hinder Feet are very long by which he leaps. His Hood or Mantle is about ½ an inch long, extended forward, over part of his Head; behind, over part of his Wings; before Concave, behind, Convex. His Eyes protuberant, yet very small. Has 4 Wings, whereof ye uppermost pair are not above ¾ of an Inch long, the other are prolong'd above ¾ of an Inch beyond the Tail. Each of these apart is most curiously folded up inwards with a double Roll to secure 'em from being torn as he creeps to & fro under Ground. Given by Dr Marten Fellow of Mert. Coll.[1]

[1] EDMUND MARTEN, Fellow of Merton College 1680; M.D. 1689; Warden of Merton 1704–† 1709.

17. Moth's call'd Blattæ, eating Cloaths or Books, according to Horace—Blattarum & Tinearum epulæ—tho' Martial reckon'd 'em different. 3 sorts of Blattæ, the Soft, Mill, & ye Stinking. All of 'em shift their Skins when old. The Males have wings, females none. The Male is Soft, ye Female blacker, has a small Head, 2 long Cornicles, the Body has 7 incisures. The Stinking-Moth has thighs sharp wth Prickles, & are as Black as a coal, often found in Wine Cellars. The Tinea or Garment-eating Moth, with a little Black Head, Body yellowish, in a case somewhat long, & at each end something Hairy, has 6 feet.

The best Preservative against Moths is ye Juice of Cedar. for ye Books preserv'd in Numa's Tomb were anointed with this Juice, & so free from Moths (as Pliny says) 530 years.

18. Cantharides or Spanish Flies. Some greater, some less. Some of a glittering Green, some of a sad Red. usd in Physic. The Lesser Cantharides has a long forked Head, eyes black & prominent, & long black Cornicles.

19. Beetles, call'd by Latins Scarabæi, by ye Germans Kaefers. All Beetles cast their skins, & have no Sting. Some are Greater, some less. Some Horns, some none. The Biggest are the Stag-flies, wch are blackish, of a dark Red, wth 2 whole Horns without joints, with branches like a Stags, as long as ones little Finger, wth wch they pinch as Lobsters do. Has 6 feet, the fore feet longer & bigger than the rest.

20. The Bright-Blew-colour'd Beetle; this Beetle in August is troubled with Lice hanging between its Legs, & at last kill'd by them. This may be call'd the Louzy-Beetle.

21. The Tree-chafer, Scarabæus Arboreus, commonly found upon Trees especially Sycomore-Trees. His Head small, His Shoulder-piece or Mantle & the middle of his Belly black, but just under the wing-shells spotted wth white. His wing-shells, & the end of his Tail (which is long & flat-pointed) of a light Chesnut colour. His Breast cover'd with downy Hair.

22. The Long-smooth-scarabæus, all over of a shining-black, & very smooth.

23. The little Green-scarabæus, about ½ an inch long. His Head small, his snout oblong. All over of a curious

Shining Green: the wing-shells mark'd with 4 or 5 white specks on the margins; his Belly of a Golden Red.

24. SMALL-CHAFERS, of a dun colour, that fly against people in an Evening, making a Humming noise as they fly, & buzzing about their Ears.

25. The OYL-BEETLE or WATER-BEETLE, Proscarabæus. The Female has a forked mouth & is bigger that y^e^ Male. They have both tender Bodies, betwixt Black & Dark-blew shining, 2 short wings upon their Shoulders, to help not so much their Flying as Going. Seldom seen but in May. They feed chiefly on Violet leaves & yield a pleasant smell when bruis'd. They have 6 feet. Upon y^e^ least touch there is a sort of an Oil or Honey comes from 'em.

26. EARWIG, Auricularia or Fullo. When it is provok'd & put to 't, it will shew you a pair of Wings, otherwise invisible. They are commonly of a dark Red colour, only Head, feet, & forked Tail yellow, silver Ring about y^e^ neck, & a forked Mouth as well as Tail.

27. CHINESE-FLIES, a little larger than our Millipedes, and very curious & uncommon Flies, having a thin, bright-shining & Gold-colour'd Tegument upon their Backs, which bears a small resemblance to the Tortoise-Shell, only there is no Defence for their Bellies, tho' they seem to serve instead of Wings by y^e^ Apertures in the middle. Under this thin Covering (or Wings) which is Orbicular & larger than their Bodies, seem to be protracted 4 black Legs but are not so, for their 6 legs belonging to their Bodies are plainly visible.

28. The STAG-FLY, of the Beetle-kind very large, with large Horns branch'd out like a *Stags* or Harts, call'd in *New-England* a *Flying-Hart.* It flies High & swift & com̄only rests on branches of Trees, where it begins w^th^ a shrill chirping voice, w^ch^ it raises by little & little, till it makes y^e^ whole Woods ring again, & then lessens gradually till it ceases w^th^ a kind of silent Murmur; & so flies from Tree to Tree making y^e^ same Music.

VII. INSECTS WITHOUT WINGS.

1. SILK-WORMS, Bombyces. Bred of the Eggs of Butterflies & chang'd into Aurelia's. The most Smooth sort of Caterpillars, with white Bodies, black Eyes, & forked mouths. For the Butterfly is almost always of the same

Colour w^th^ its Caterpillar. Silk-worms were first brought into England in K. Jam. 1^s^. time. From y^e^ Eggs of one single Silk-worm I have hatchd near 300 in one Summer. And if y^e^ Produce of one single Silk-worm was so great, what must have been y^e^ Produce of each of those 300 another year (had I preserv'd em), & so on still to another year, &c.?

One Ounce of Eggs will in some Places make 6 Pounds of Silk, in others 12. There has been 900 Bononian feet of Silk wound off from one Bottom. The Eggs of Silk-worms kept in a warm Place all winter, will produce little Grubs next Summer, w^ch^ are to be fed with Mulberry leaves, after they have done feeding & got into their Aurelia state, they will ly in their cases for about a fortnight till they begin to spin. After they have done spinning you must make haste to wind off y^e^ Silk, otherwise they will eat their way thro' their Cases & so spoil the Silk.

2. Other Smooth CATERPILLARS. Of various Colours according to the Leaves they feed on. Some spotted & streak'd on the Back with lively colours. Some with Horns on their Tails, some without. Some 4 inches long, & as thick as ones Finger. Some no thicker than an ordinary Packthread.

3. HAIRY-CATERPILLARS. The most mischievous of all. Some ~~thick-set~~ with Hair, some thinner. Some of one colour, some of another, & some variegated, call'd Palmer-~~worms~~, Bear-worms, Urchin-worms, &c. What I beg leave to observe on Caterpillars in general, is (besides their several Metamorphoses, w^ch^ I observ'd before in y^e^ Silk-worm) their extraordinary Motive Faculty, by which they not only Convey themselves more Easily from Place to Place, but likewise more commodiously gather their Food. For having Feet both Before & Behind, their fore-feet are sharp & hooked to climb up & draw Leaves & other things to 'em, & to hold by their Fore-feet. And their Hind-feet have broad Palms beset w^th^ sharp nails to crasp anything. And besides, this Motive Faculty is only adapted to their Nympha-State: In their Aurelia-State they have no motion: & in their Mature-State they have y^e^ Parts & Motion of a Flying Insect.

4. STAPHYLINUS is another Insect w^ch^ *Moufet* reckons among the Caterpillars, tho' I am rather inclin'd to think it a Beetle, both from its shape & colour, being of a

shining Black, only y^e Body is slender & longer, & it commonly walks with his Tail cock'd up, especially when provok'd, & then it emits some excrement out of its Tail. Aristotle says it will poison a Horse if eaten by him: but how so small an Insect that is not so thick as ones Little Finger shou'd poison so large a Beast, I cannot tell.

5. The Scolopendræ, call'd Multipedes from its many Feet. 'Tis also all over Hairy. 'Tis reckon'd Venemous, as some people reckon all Hairy Caterpillars. 'Tis pretty to observe the Progressive Motion of these Insects, how on each Side of the Body every Leg has its Motion & knows its own Office, one very regularly following the other from Head to Tail: As the Head directs, so they all frame their Motion.

6. Millepedes, Aselli, Ang. Sows or Hog-lice. It is a small Insect, & has 14 feet, & every Foot 1 joint. Has a thin testaceous covering. The Sides about y^e feet are dented like a Saw. When touch'd it rolls it self up within its Covering for protection like a Hedg-hog, & is about y^e bigness of a large Pea. Of great use in Physic & is an excellent Purifier of the Blood. Good for y^e disorders of y^e Reins & obstructions of the Viscera, keeps the Nerves clean from Viscosities, &c. They are best taken in substance, or bruisd & mixt w^th white-wine. Dose 20 or 30 at a time.

7. Spiders, Araneæ. Of various Colours, Shapes, & Names. I have some sent me from *Guinea* by Capt. *Hawkins*, whose Bodies are as thick as the Top of ones Thumb, & Legs 2 inches long. The Eyes of *Spiders* (in some 4, some 6, some 8) are plac'd all in y^e Forehead (w^ch is round & without any Neck) all Diaphanous & transparent, plac'd so for y^e greater conveniency of catching their Prey w^ch is Flies. *Scaliger* tells us that in *Gascony* there are *Spiders* of that virulency, that if a man treads upon 'em so as to crush them, their Poison will pass thro' the very soles of his Shoe. In y^e Summer time there are Spiders call'd Lupi that dart out their Webs & by the help of those Webs sail up into the Air much higher than the Highest Steeples. M^r *Leewenhock* put a *Frog* & *Spider* together into a Glass, & observ'd the Frog, after it had been stung by y^e Spider several times, to dy in about an Hours time. And yet *Moufet* tell us of Cures that have been perform'd by eating of Spiders. *Mouf.* Insect. l. 2. c. 15.

8. ANTS OR PISMIRES, Formicæ; wonderfully industrious, provident little Creatures; that will carry a weight thrice as great & heavy as themselves; make themselves little Cells under Ground, with many Labyrinths & mazes, & with little Rooms on purpose to lay their Eggs being mindfull of Posterity, Raising Towers that are seen a far off, call'd Ant-Hills, & making Castles underneath, one to meet in, others to lay-up their Stores in, & to shelter themselves from y^e inclemency of the Winter season. The outmost skirts of their Castle is for burying their Dead. They have Officers among them of all sorts, & every-one knows his own Business, & all unanimously agreed to promote y^e Public Good of their Society. They all go out a forraging together, the Older leading the younger, & bring in y^e Grain & Seed of almost all sorts of Plants, first biting-off y^e Ears of Corn least it shou'd grow again, & then stow it up, & if they perceive it to mould, they bring it out again & dry it in the Sun & then treasure it up in their Grainaries. *Virgil* (Æneid. 4.) speaking of y^e *Ants* says,

—— Parcum genus est patiensq; Laboris
Quæsitiq; tenax, & quod quæsita reservet.

Go to the ANT, thou Sluggard (says Solomon), *consider her ways, & be wise.* Vid. Moufet. p. 238.

9. A WATER-WORM, Lumbricus aquaticus, that lives in the Water, about ½ a foot long, his Body not so thick as a Packthread, all of an equal bigness from Head to Tail, insomuch that 'tis hard to know the Head from y^e Tail, only when alive it wou'd often curl its tail very briskly, & when Dead shrunk to y^e smallness of a common Needle-thread. Another I have very small, not above a quarter of an Inch long, & has legs.

10. An EARTH-WORM, Lumbricus terrestris. What is most admirable in these Creatures is their Tegument, w^ch is most compleatly adapted to their way of Life & Motion, both for Creeping & terebrating y^e Earth. For their Body is made throughout of small Rings, which have a curious Apparatus of Muscles, enabling 'em with great strength to dilate, or contract those Rings; These Muscles are Spiral, by y^e help of w^ch they can (like y^e Worm of an Augre) y^e better bore their passage into y^e Earth. Their reptile Motion also may be explain'd by a Wire wound on a Cylinder, w^ch when slipt off, & one end extended & held fast, will bring y^e other near it. So the Earth-worm having extended its Body, it takes

hold by y^e Roughness y^t is upon y^e edges of its Rings (w^{ch} are instead of small Feet), & so contracts its hinder Parts. These Worms have a sort of Proboscis above their Mouth, by the help of w^{ch} they can turn-up & bore thro' the Earth. Vid. D^r Tyson Phil. Trans. No. 147.

11. SNAILS, Cochlææ. They are Androginous, i. e. each respectively possess the Male & Female Parts of Generation, so as to be capable of impregnating it self without the help of another of the same kind. Their Eyes are at a distance from their Heads being at the ends of their Horns, or (to speak more properly) at the ends of y^e Optick Nerves that are sheath'd in their Horns. The Broad Skin along each side of their Bellies, & the undulating Motion there, serves 'em instead of Feet & Claws, to Creep & Climb. The glutinous Slime, emitted from their Bodies, together with the Pressure of y^e Atmosphere, enables 'em to stick fast to any-thing.

VIII. SHELLS

Nature has sufficiently guarded some Animals against all Common Dangers by that Natural Cloathing she has given 'em, their Armature of Shells, & such-like hard & impregnable Coverings of their Bodies, some of which are such curious Pieces of Mechanism, so compleatly form'd & fashion'd as to exceed any Human Composures.

1. The TORTOISE-SHELL. Some of these Shells are exact Pannel-work, very Mathematically compos'd; others have such lively & beautifull Colours that they command our Admiration. This (to which the Back of the Tortoise grows) is a safe Defence to his Body, & affords a secure Retreat to his Head, Legs, & Tail, which he withdraws within the Shell upon the least appearance of any Danger. Some of the largest Tortoise-Shells are so hard that a Cart Wheel may draw over 'em & not hurt 'em.

2. VENUS-SHELL, call'd so from its beautifull Colours. I have 'em of several Sorts & Sizes. One near as large as an Ostriche's Egg, commonly calld the *High-back'd Navled Venus-Shell*: It has each Lip furrow'd, & on y^e thicker End it has resemblance of a little Turban or Navle. I have several Lesser *Venus-Shells* of several sorts, & stain'd with several Colours, & some very small. *Venus-Shells* are usd by y^e Italians for polishing Paper, & by y^e Ægyptians for smoothing Linnen.

3. The Frog-wilk, 8 inches long, wth 3 Appendices like Feet on each side, only 1 is broke off. The Tail a little whirl'd.

4. The Broad-lip'd-wilk. 10 inches long, with wrinkled Lips, & dyed with a deep Purple; usd by the Indians as a Trumpet, both in their Wars, & in Hunting. This Shell has 3 rows of Knobbs on the Back. Another Shell 7 inches long, with higher Knobs or Spikes on the Back, & y^e Lip broke off. Another with less Knobs.

5. Thick-lip'd-wilk, 8 inches long, with a fine Conic Turban at the Tail-end, with a row of Knobbs on the Back.

6. The Long-mouth'd-wilk, 7 inches long, of an Ash-colour, Murex Labris parallelis. Both the Lips of this Shell are plain & even on the surface, only the Left Lip has furrows a little oblique. The Back knobbed, & middlemost knobb pretty tall.

7. The Spiked-wilk, Murex aculeatus, Half a foot Long, with large Spikes round the Back, & a curious Conic Turban at the Tail-end.

8. Large-escallop, Pecten vulgaris, the large Furbelow'd Escallop, 7 inches broad.

9. Pectunculi, sev: little 'scallops, some 1 inch, some ½ inch long.

10. Pectunculus-parvus Ex Parte Internâ Rubens 4 inches long, & 4½ broad. The Outward Parts of the Shell most exactly fluted & furrow'd. A very beautifull Scallop.

11. Another small Scallop, 3½ long, & 3 broad, taken out of the Belly of a Cod-fish in New-found-Land 1713.

12. The Spiked-lip'd Wilk, Ash-colour'd, & 7 inches long, wth the Lip edg'd with several gutterd Spikes, & y^e Tail turbinated.

13. The Round-bellyd Whirle-snail, Turbo-cochlea. 3 inches from Head to Tail, & 2 inches cross y^e Belly. Thin like a common Snail-shell. The Rounds wind from the Mouth to the Right-hand, & that very Obliquely. Speckled with Chestnut spots in rows. The Mouth very long, & y^e Belly wide. Several sorts.

14. The High-crownd Snail, 4 inches high, & 3 inches ½ in y^e circumference of the thickest part. Several.

15. The Spiked-wilk, 4 inches long, round mouth, with gutterd Spikes on each side the Mouth, & a list of

gutterd spikes cross the Back from Head to Tail. An Ash-colour'd Shell.

16. A Knobbed-wilk, 3 inches long.

17. The Round-mouth'd Snail, with a Pearl-colour, Cochlea cælata. 2 inches ½ long. Their natural Colour without is sometimes Green, with White & Bay spots. One way whereby it receives a bright Pearl-colour, is by being steep'd in Vinegar, wch eats off ye rough & duller surface.

18. The Cylindrical-snail, Cochlea cylindrica, with a small whirl at the end; the shell near 2 inches long.

19. Cockle-shell, entire, i. e. Bi-valvular. The Valves are seldom or never close shut. Of a clean white colour, & finely striated from the Head to the Circumference. 1 inch ½ long.

20. Chequer-grain'd Cockle, Chama granosa. A single Valve, something above 2 inches long, milk-white. Very beautifully striated.

21. The Sea-ear, Auris marina. It has its Name from its fig: like a Mans Ear. The inside is of a Pearl-colour, the Out-side brown & rugged with many small radiated & spiral Wrinkles running across. There are several Holes on one side, thro' which ye Animal admits & expells the Water at Pleasure. The Shell is near 4 inches long, & of a fine shining Purple Pearly colour in the Inside. There are plenty of 'em in Gernsey Island.

22. Mother-of-pearl, Mater Perlarum sive Concha Margaritifera. The inside of ye Colour of Pearl, but the Pearls themselves grow within the Animal. Found near the Island Borneo, so big sometimes as to weigh 47lb.

23. The Sea-urchin Shell, Echinometra, Oval, & 2 inches long. Given by Dr Bouchier Regius-Professor of Laws.[1] The Sea-Urchin makes its progressive Motion by ye help of its Prickles, as Aristotle tells us, & moves in a Spiral Line as Moufet informs us.

24. Small White Venus-shells, call'd by the Indians Wampum-pegs. The 4 Indian Kings of the Continent of America, between New-England & Canada, that had their Public Audience of Her late Majesty Queen Ann, made a Present to her of some Belts adorn'd with these Shells. These Shells pass for Money in some parts of the Indies.

[1] Thomas Bouchier (alias Butcher, Wood *Athenae*) of Magdalen Hall and All Souls. Regius Prof. of Civil Law 1672–1712; Principal of St. Alban Hall 1679–1723.

25. The RAZOR-MUSCLE, Solen fæmina. The Italians & Venetians call 'em Cappæ, i. e. Conchæ Congæ. Hence y^e^ common people in Devonshire (where there is plenty of 'em) call 'em CAPPER-LONGO's. This Shell y^t^ I have is Bivalvular, & Cylindrical, near ½ foot long, & but 1 foot wide. These Muscles ly in deep Holes by y^e^ Sea Side, & y^e^ way of taking 'em is by pouring water (I think Hot water) down into their Holes, & then they will immediately jump up, & you must be very nimble to snap 'em as soon as they appear above Ground, otherwise they will presently sink down again.

26. The SEMICIRCULAR-MOUTH'D SNAIL, Tooth'd on both sides; the Teeth of the Outer Lip are y^e^ lesser; they stand not on y^e^ Edge of the Lip, but deep in y^e^ Mouth, just over against the inner Lip. The White parts of the Shell on both sides of the Mouth are circumscrib'd by a Circle, whose Centre is at the Edge of the inner Lip. The Outward part of the Shell is speckled with White, Red, & Black Spots, & a little rugged with spiral wrinkles. The toothed Lips serve as Joints to hold their Lids more steady.

27. The FLAT-WHIRL SNAIL, or Serpentine-Snail, wreathed round like a Snake wrapt up.

28. COCKLES, Chamæ & Conchylia, of various Colours, & sorts.

29. PERIWINCLES, Cochleæ aquaticæ, Water-Snail-Shells.

30. COMMON COURY, or Blackmore's Teeth (commonly so calld) Thoracium vulgare, sive Cauricium.

31. STAR-COURY, Thoracium Stellatum.

32. WHITE-THICK-OISTER-SHELL, Concha crassa Undelitii.

33. TWISTED-LIGHTER-MUSCLE, Ostreum tortuosum.

34. CANCER-MARINUS, An Indian Crabb-Shell.

35. SPIKE-KNOBBED-CASKET; Cassis tuberosa cornuta.

36. FAIR-WING, Harpa nobilis: it seems to have Musick-lines drawn upon the Shell.

37. WORM-SHELLS, like little Earth-worms.

38. DENTICULI-ELEPHANTIS, small Shells resembling Elephants Tuskes.

39. STROMBI-FLUVIATILES-LÆVES, slender River-Pegs, Little Shells curiously wreath'd.

40. VALVATÆ-UNDATÆ, waved Nerits.

41. BUCCINÆ-PARVÆ, small Trumpet-Shells.

Cum multis aliis quæ nunc Describere longum est.

FOSSILS.

I understand by the word Fossil, every thing that is found in the Bowels of the Earth; as Metals, Half-metals, Minerals, Bitumens, Salts, Stones, & Earths.

IX. METALS.

1. Gold, Aurum. A Metal soft & malleable, & y^e most solid. It is generated in many Mines in different Parts of the World, but the greatest Quantity is brought in Bars from Peru. There is Gold likewise found in Asia, Africa, & Europe, sometimes in a Mass w^ch is calld Virgins Gold, sometimes in Grains, sometimes in Oar, sometimes in Dust or Spangles. The Golden Oar is so calld from the Pyrites aureus or Marchasite (a Metallic Mineral loaded with Sulphur & Earth) mixt with it, which gives it that Colour. The first Preparation y^t is made of Gold, is the Refining of it, which is done after 4 manners, but Antimony is the best. Each Metal has its proper Marcasite, which is as it were its Seed, & y^e nearer it approaches to a Metallic Perfection, the farther it goes from y^e nature of a Marcasite. That of Gold is usually a little round Ball, very weighty & hard to break. That of Silver is almost of the same make, but not of so clear a Colour. That of Copper is either round or long, & of y^e largeness of a Tennis-Ball, moisture will turn it into Vitriol, when broke to pieces 'tis of a Gold-colour, bright & sparkling. These are y^e chief Marcasites. 'Tis surprizing to think that a Gold-beater can reduce an Ounce of Gold into 1600 Leaves, each of which shall contain 37 Lines square.
Vide Pomets History of Druggs.
2. Silver, Argentum. Is a Metal very compact, white, smooth, shining, very extensible by y^e Hammer. Taken from several Mines in Europe, but chiefly from America, especially from Peru, often found intermixt with small white chrystalline stones, & with Gold, Copper, or Lead. 'Tis refin'd with Quicksilver. Silver thrown into melted Lead runs sooner into a Fusion than if it were put alone to melt in a Crucible, because the Sulphureous Parts of Lead contribute to the speedy Fusion of Metals. Silver may be precipitated by mixing Salt water in the Dissolution, & so precipitated is y^e finest of all, & of 12^d

weight, if it has so much; but there is always some little Allay of Copper to be found in Silver, let it be never so well refin'd.

Plate Silver contains one Part Copper, to 24 Parts Silver; & Silver of the Cupell has but 1 quarter Part Copper to 24 Parts of Silver.

3. Iron, Ferrum nativum. Is the hardest, driest, & most difficult to melt of all other Metals. It is compos'd of an Earth, a vitriolic Salt, & a Sulphur, ill digested, & ill united, & so subject to Rust. There are Iron mines in Spain, Germany, Sweden, & England, & France. An Iron mine is sometimes found within an Inch of the Surface, sometimes 1, 2, 3, 4, 5, 6, Foot deep. The Oar is found sometimes in Pieces, sometimes in Sand. In Lancashire there are 4 sorts of Iron Oar, Raddle-oar, Clay-oar, Blew-oar, & y^e^ Button-oar.

The manner of Making Iron from the Oar, is thus. They wash the Oar in a running Water to separate the Earth from it, & then carry it into large Furnaces, where covering it with Coals, Flint-stones, & Potters-clay, by the means of a large Pair of Bellows wrought by a Water-mill, it melts like Lead; & after scumming from it a Dross (which when cold becomes like Glass) they stay the Bellows & with an Iron bar open a Hole w^ch^ is in the bottom of the Furnace, & immediately comes out as it were a Stream of Fire, which runs into Holes, made like Moulds, of 6, 7, to 10 foot long, & 1 foot broad. The Iron thus thrown into these Moulds is what they call Sow-metal. The finer y^e^ Work is to be, the longer is the Metal to remain in Fusion; for y^e^ matter continues but 12 Hours for y^e^ coarser Works, & 15 or 18 for the finer.

The Rust of Iron is Iron penetrated & rarify'd by the Moisture of the Air.

Steel is Iron render'd more hard, more compact, more fine, & polishd, by Calcination & Dipping it in Water. To do this, they lay Iron, & the Hoofs of Animals, Stratum super Stratum, in a Furnace made on purpose, near the Mines; they put Fire to it, & when y^e^ Metal is softned & almost melted, they dip it in Cold Water, that so y^e^ Pores which were open'd by y^e^ force of the Fire may immediately be shut up; & they oftentimes repeat the Calcination & the Dipping. The Hoofs of Animals burnt in the Fire produce 2 Effects; the first is that they dissipate the most volatile, saline, & rarify'd Particles of the Metal: the 2^d^ is that a Portion of the volatile Salts (which these Hoofs do naturally contain) is introduc'd into the Pores of the Metal. Iron is preferable to Steel for all Medicinal Purposes.

4. Tin, Stannum, is a Metal, soft, malleable, Sulphurous, white, shining, & a little harder than Lead, very easy to be melted. Taken out of the Mines of England, & other Places. They say likewise 'tis composd of Earth & an impure Sulphur, a Metallic Salt, & a Mercury a little finer & better digested than that of Lead, & that it is an enemy to Gold & Silver, & when they are once mix'd 'tis difficult to part 'em. The Common Tin in France, is English Tin & Lead, with Brass that is incorporated with it. To know the Degrees of Goodness in Tin, they take a white Chalk & make a sort of Mould of it into which they pour y^e Tin when melted, & by means of this Chalk the Artists know what Standard it is of, by the little Lines or Furrows found in it. The Tin in France is purer & brighter than that we use in England. The best we have in Engl. comes from Cornwall.

5. Copper, Cuprum. It is beautifull, shining, of a Reddish colour, easy to rust, abounding in Vitriol. It is made or generated of a Purple Sulphur, a Red Salt, & a Citrine Mercury. It is found in several Parts of Europe, but principally in Sweden & Denmark. It is taken from the Mine in lumps, which are washd to cleanse it from the Earth that is mix'd with it, & afterwards melted with vehement Fires. It is taken out of the Mine in Sand, & in a Stone almost like that of Iron. 'Tis a Metal very difficult to be melted, & when it has been often melted it becomes ductile, & almost as malleable as Gold or Silver, after it has been thrice melted. After they have washt it they cast it into Moulds of different Figures: To make it true Red Copper, they melt it a 2^d time, & when 'tis well refin'd they cast it into Moulds of Sand, where it falls into Cakes or Places that are not smooth as we see them. To make this Copper malleable they melt it a 3^d time, & then form it into Cakes 3 inches thick & 15 inches Diameter. Of these Cakes put whole or in quarters into the Fire, they make Plates, & of these Plates they make Cauldrons by use of Hammers that work by a Water-Mill, & the Plates are form'd into the Vessels by one y^t turns these Plates & puts 'em into what Shapes he pleases.

Yellow-Copper or Brass, or Letton, calld Aurichalcum, is a mixture of Copper & Calaminaris-Stone melted together by a vehement Fire in Furnaces made on purpose. The greatest part comes from Flanders & Germany. The Lapis Calaminaris embarrasses & extends y^e^ Acrid Salts of the Metal to that degree, that Brass does not make the same impression on Liquors as the Red Copper. The best Brass is that w^ch^ gives the clearest Sound when you strike it.

That we call Tinsel is Yellow Copper beat as thin as Paper, & is usd by Lace-men.

German Gold is Tinsel beat very thin & kept in little Paper books for y^e^ use of Painters.

The Painters Brass is the German Gold groun'd to Powder, w^ch^ is put into little Shells & calld Shell-Gold.

There are 4 Sorts of Copper-Oars, the Azure, Green, Golden, & Cinereous.

6. Lead, Plumbum. It is a Metal fill'd w^th^ Sulphur, or a Bituminous Earth, that renders it very supple & pliant. 'Tis probable it contains some Mercury. It has Pores like those of Tin. This Metal is found in many Countries fixt to divers sorts of Stones & Earths, some of which contain Silver, & some both Gold & Silver. In Lancashire there are 4 sorts of Lead-Oar, viz: the Spar-oar, Coke-oar, Potters-oar, & White-oar. Lead-oar is melted in a proper Furnace, & as it melts the Lead runs out by a Pipe, & y^e^ Earth remains, & so does y^e^ Gold & Silver, but sometimes 'tis very little: if there be any considerable Quantity, 'tis to be separated by y^e^ Coppel. Your Lead-workers often become Paralytic, for Lead is extremely Cold. Lead serves to purify Gold & Silver.

X. THE FACTITIOUS RECREMENTS OF METALS

1. Red-lead, call'd Minium, is Lead-oar pulveriz'd, & calcind, in a Reverberatory Fire for 3 or 4 Hours. Minium ought to be chose for its high Colour, the finest Powder, & cleanest, & care must be taken that it has not been wash'd, which will be known by its Whitish Colour, & little Lumps. It is of use in Medicine, because it is drying, & gives a Body to some Oilments & Plaisters.

2. White-lead, or Ceruse, Cerussa nativa. It is a Lead that is penetrated, rarify'd, & half dissolv'd by y^e^ Vapour of Vinegar, & reduc'd into a very White Substance that

is heavy & friable. The way of making this Ceruse, is to beat the Lead into fine thin Plates, which are hung over Earthern Pots or laid upon small Sticks in the Pots, the Bottom of which is cover'd with Vinegar. The Pots being fill'd with Lead must be stop'd so as to exclude Air, & plac'd in a proper Heat, so that y^e Fumes of y^e Vinegar may penetrate & attenuate y^e Lead: After a Months time, they open y^e Pot & find all y^e Plates of Lead reduc'd into a white brittle substance which they call White-Lead, then they break these Plates of Lead into pieces & dry 'em in y^e Air for y^e use of Painters.

3. LITHARGE, Lithargyrus or -gyrium, is a Lead ting'd with y^e Impurities of Copper, & reduc'd into the form of Dross or Metallic Scum, by Calcination: this is made upon y^e Purification of Copper in Poland, Sweden & Denmark. There are 2 Sorts, one call'd Lithargyrium Auri, seu Chrysitis, or LITHARGE of GOLD; the other Lithargyrium Argenti or LITHARGE of SILVER. The Difference of Colours makes no Difference in the Virtue of 'em. Both Sorts are desiccative, cooling, detersive, & give a consistence to several Plaisters, for they dissolve in boiling with Oil & fat Bodies.

4. TUTTY, or the Spodium of the Greeks, call'd Tutia factitia, is a Metallic Species in Scales or Drops of different size & thickness, solid within, & rough without, with a sort of Excrescences like Pins Heads. 'Tis found sticking to Rolls of Earth, which are hung up & plac'd on purpose on the Top of the Furnaces where the Founders cast their mix'd- & Bell-Metal to retain y^e Fume or Vapour, like the Smoke in Chimnies; And therefore it is not made by sticking to y^e Bottom or Sides of the Furnace. Tutty ought to be in bright Scales, thick, granulated, of a fine Mouse-colour Without, & a pale-yellow Within, hard to break, & clean. Tutty is usd in Medicine, when well beaten. Tutty well prepar'd & incorporated with fresh Butter, is a sure Remedy for the Piles.

XI. MINERALS

By Minerals I mean every thing that is of a Metallic Nature, & which differs only from Metals in not being malleable, or that is not capable of Fusion. *Lemery* calls a Mineral a Petrification made by a coagulation of Acid or Salt Waters found in the Pores of the Earth.

1. The Load-stone, Magnes, Lapis Heraclius, Lapis Syderitis, Lapis Nauticus. Is a compact, hard Mineral Stone, pretty Heavy, & of a Black or rather Brown Colour, or obscure Blew, found in Iron or Copper Mines. The best is found in India & Ethiopia, also brought from Italy, Sweden & Germany. It is endu'd with unaccountable Qualities, such as directing its Poles towards the North & South, its attracting Iron or Steel (when cas'd) & communicated its Virtue by the Touch. The Virtue it communicates to Steel is lost when the Figure of it is alterd, either by bending or hammering it. If it chance to fall, it loses something of its strength for a while. It will make y^e filings of Iron move upon a Plate, by only passing y^e Load-Stone along underneath, without touching it. M. *Lemery* tells us he has seen a Magnet no bigger that a common Apple, attract & suspend a Bar of Iron of 22^lb weight.

These Stones are astringent & stop Blood outwardly apply'd.

Those that travel thro' the vast Desarts of Arabia, have a Needle & Compass to direct 'em in their way, as Mariners at Sea.

The Power of y^e Magnet depends not on its Bulk, the Smaller being usually the Stronger.

M^r *Theodore Haac, F.R.S.* some years ago made an Experiment for preserving & encreasing y^e Strength of the Load-stone. He considerd that Animal Motions by use became more vigorous, & that so it might possibly prove as to some Properties of Inanimate Bodies; thereupon he hung up as much weight at his Loadstone as it wou'd bear, & so left it for some Weeks. After that he applyd more weight to the former, & it very easily held the same. And repeating y^e Addition of more Weight at several times in y^e space of 2 years, he at last found, that his Stone had not only recover'd its Strength it had formerly lost, but encreasd it; for whereas before he had never known it to take up more than 16, it wou'd now take up 30 times its own Weight.

2. Antimony, Stibium, is a Mineral y^t comes very near to the nature of Metals. 'Tis supposd to contain a double Mineral Sulphur. It is heavy, shining, & in Chrystals shooting like Needles, of a blackish-colour, found near the Mines of Metals in Hungary, Transilvania, Britany, Poitou, & Auvergne. The clearest is best. Crude Antimony is w^t has never sustain'd the Fire. 'Tis of little use in Medicine before it purify'd by melting. The way

to melt it is thus, they take 2 Earthen Pots, one of w^ch they fill with the Mineral in Powder, the other they place empty in the midst of a strong Fire, laying an Iron Skimmer upon it, upon w^ch they put the Pot of Powder turn'd upside-down; then encompassing both the Pots with Fire, the Antimony will melt & pass thro' the Holes of the Iron-Plate, & fall into the empty Pot underneath, & form it self into a Cake. The Iron-Plate with Holes put between y^e 2 Pots, serves to keep-back the Stone or Spar y^t is commonly found with the Mineral Antimony. When y^e Antimony is melted, take the Pot off y^e Fire, & when Cold, break it & take out the Antimony for use.

The Letter-Founders for Printing, use Antimony to make their Lead y^e more durable & hard.

Antimony melted & boild in a *Ptisan w^th Sarsaparilla, Guaiacum, &c. is a certain cure for y^e Secret Disease. The Glass of Antimony is separated from its Sulphurs, melted in a Crucible, & cast upon a hot Marble.

3. Calamine-stone, Lapis Calaminaris, vel Cadmia. A Mineral Substance, whereof there are 2 General Kinds, One Natural, & the other Artificial; The Natural is Metallic as Cobalt, or not-Metallic as Lapis Calaminaris: The Artificial is a kind of †*Scoria*, which is separated from the Metals in y^e Founders Works, when they make Leton, Pompholyx, or Tutty. Its chiefest use is to turn Red Copper into Yellow, which is call'd Leton or Yellow Brass. This Mineral is found in England, & Germany, & near Leige in Flanders.

4. Blood-stone, Hæmatites, ab *αἷμα*, because being Powderd it is of the Colour of Blood, & stops Bleeding. It is a Mineral of a reddish brown colour, hard, ponderous, participating of Iron dispos'd like Needles, taken from y^e Iron Mines. The best is that from Spain, w^ch has streaks that are Blackish without, & like Cinnabar within. 'Tis very Astringent & drying, & stops Blood, given inwardly as well as outwardly in fine Powder, the Dose is from 15 Grains to a Dram. There is another sort of Blood-stone found in England calld the Bastard-Hæmatites, it differs from y^e former in that it neither shoots into Needles, nor is so hard. Choose such as is of a Brownish-Red, weighty, solid, & smooth. It is a Stone altogether insensible of Acids.

* A decoction of Barley (husk'd), Liquorice, & Raisins.
† Metallic Recrement.

5. Emery, Smyris Lapis, vel Lapis ferrugineus. It is a kind of Marcasite or Stony-Mineral, very Hard, whereof there are 3 sorts; the 1st & most esteem'd is Spanish Emery, because it is found in the Góld & Silver Mines of Peru & other parts of New-Spain. It is Reddish, mix'd with streaks of Gold & Silver. The King of Spain has forbid ye Exportation of it, because of ye Gold contain'd in it. The 2d is found in Copper Mines & has no Gold in it. The 3d is Common Emery, of a blackish Colour & found in Iron Mines. We powder & grind it in England by certain Mills made for ye purpose. The Powder is us'd in polishing Arms, &c. & polishing & cutting all Gems excepting Diamonds. Of no use in Physic, only by way of Dentifrices.

6. Quicksilver, Crude or running Mercury, Liquid Silver, a Mineral Liquor, of a Volatile nature, found in ye Mines, & composd (as is thought) of a white Sulphurous Earth & of its own proper internal Mercury, which tho' it be a Heavy Body, yet it easily flies away wn set over the Fire. It easily unites itself to any Metal especially Gold, to wch it often serves as an Intermediate to join it to other Metals. 'Tis found in the Mines after different manners, sometimes enclosd in its own Mineral, & very often embodied in a Natural Cinnabar. After they have found it in its Mines, they make use of great Iron Retorts to separate it from ye hard Bodies wth wch it is join'd, & by ye means of Fire & fresh Water into wch it falls, they render it fluid, & sometimes run it thro' Leather to cleanse it from its impurities. Hungary & Spain are ye only Places in Europe from whence they take Quicksilver. The white & clean Quicksilver is ye best. The way to prove it is by putting a little in a Spoon & letting it evaporate over ye Fire, if there remains a Yellow Spot, 'tis a sign 'tis Natural, but if it leaves a Black one, 'tis a sign 'tis mixt with Lead or Tin. 'Tis so Weighty yt a solid Foot of Mercury weighs 947lb. And so Strong that a 50lb weight of Iron being put upon a Bouillon of Quicksilver (wch generally weighs 80lb) it shall no more sink in it than if it were an Ounce. Quicksilver is also so Cold, externally, that it is impossible to hold ones Hand in a quantity of it for ye space of a Quarter of an Hour.

The Parts of Quicksilver are supposd to be of a Round Figure, wch is a Reason why it is Fluid, & why it volatilizes so easily by Fire, tho' it be so Heavy, for ye Round Figure being improper for Union of Parts, these little Bodies cannot adhere together but must roll upon one another.

7. Cinnabar, is both Natural & Artificial. *Natural Cinnabar* call'd Mineral, is a mixture of Mercury & Sulphur that sublime together by y^e^ means of a Subterraneous Heat, & this is done near after the same manner as Artificial Cinnabar is made. For *Artificial Cinnabar* is a mixture of Sulphur & Quicksilver sublim'd together. Take a quantity of Sulphur & melt it in a great Earthern Pan, then mix by little & little thrice as much Quicksilver; you must stir about & preserve the matter in Fusion till all the Mercury disappears: then powder y^r^ mixture, & sublime it in Pots in an open Fire well govern'd, & you'll have a hard Mass, & of a very Red Colour. By this means y^r^ Mercury is made fit for Transportation, & for Painting.

The Mineral Cinnabar (which we call Natural) is a Red Stone, heavy, & shining, the best comes from Spain. The best is of a high Colour, the most shining, & with as little Stone as possible. The higher its Colour is, the most Quicksilver it contains. It is an excellent Anti-venereal, & good for all Diseases of the Head & Brain. Of Cinnabar in Stone, ground with Urine or Aquavitæ, is made Vermillion.

XII. MEDICINAL SALTS

1. Sea-salt, Sal marinum, Sal commune, is a Salt made from the Sea Water by Evaporation & Crystallization. To purify Salt, it ought to be dissolv'd in Water, & the Dissolution filtrated thro' brown Paper, & then y^e^ Humidity to be evaporated in an Earthen Pan, & so there will remain a very white Salt: but it will be purer & better, if instead of Evaporating all y^e^ Humidity, Part is left to Crystallize in a cool Place.

Sea Salt contains a great deal of Acid, a small quantity of Sulphur & Earth; it is incisive, penetrating, deciccative, aperitive, & resolutive; it is usd in Apoplexies & Convulsions.

Spirit of Salt, is an Amber-colour'd Liquor drawn from dry Sea Salt, by the assistance of dry'd Potters Earth, & Retort, & Fire. The best is made here in England.

2. Nitre or Salt-petre, Sal Nitrum, is a Mineral Salt, partly Volatile & partly Fix'd, w^ch^ is made from old

Stones, Ashes, Earth, Pigeons Dung, & y^e Urine of several Animals, which has lain a long time on Cellar Floors, or on y^e Stones: This Salt being form'd by the Acid of the Air, which after it has penetrated & rarify'd the Stones or Earth, is thus fix'd & embodied.

Common Salt-Petre is purify'd by dissolving it in Water, filtring the dissolution, & evaporating y^e Water over a Fire, till there appear a small Scum upon it; then leaving it to cool, without stirring, there will shoot fine, long, white, clear, & transparent Crystals; Pour off, by Inclination, the Water y^t swims upon it, & take out the Crystals to dry, evaporating again Part of the remaining Water, & leave it to cool; new Crystals will be form'd, which dry as before: And so y^e oftener you Purify y^r Salt, the finer it will be.

The use of Saltpetre is very considerable in making Gun-powder, & divers Chymical Preparations, &c.

That is best that shoots out in long Crystals, is cooling upon the Tongue, & that casts out a great Flame when thrown upon hot Coals. It abates Thirst, provokes Urine, & allays the Heat of the Blood.

3. Natural-Salt, Sal Nativum, from a Rock of it found in Cheshire in y^e year 1670, from w^ch issues a vigorous sharp Brine, beyond any of the Springs made use of in our Salt-works. There runs near it (at least in the Winter season) a small Gutter, but it is wholly free from all Danger of Overflowing, which threatens all other Salt-Pits in this Country every great Shower, thro' the vicinity of Rivers. This Rock of Salt, by y^e relation of the Workmen, is between 33 & 34 yards distant from the Surface of the Earth. That parcel of it w^ch the Augur brought was as hard as Alum, & as pure, & when pulveriz'd became an excellent, fine, & sharp Salt.

4. Alum, Alumen, rupeum sive Commune. Our English Alum is accounted y^e best, call'd Roch or Rock-Alum, clear & transparent as Crystal. A clear & acid Water is distill'd from it w^ch we call Alum-water, good ag^st small Ulcers or Excoriations in the Mouth, from 4 to 8 Drops. True Burnt-Alum is a good Escarotic to eat away proud luxuriant Flesh.

Roman-Alum, is a Stone Alum of a middle size, of a disagreeable Styptic Taste; the best is that which is Reddish throughout, inside as well as outside. Much in use with Dyers & Tanners, &c.

5. Vitriol, is a Mineral compounded of a Acid Salt & Sulphureous Earth. There are 4 sorts, the Blew, the White, the Green, & the Red.

The Blew is found near y^{e} Mines of Copper in Hungary & Cyprus, & is a little caustic, & is never usd but in Outward Applications.

Green Vitriol is of 3 sorts, English, German, & Roman. The Roman & English are much alike, only y^{e} first is not so easy to dissolve. The German is better than y^{e} rest for y^{e} preparation of Aqua-fortis.

White Vitriol is the most of all depurated from Metallic mixtures.

Red Vitriol is y^{e} least common of 'em all, it stops Blood being apply'd to Hæmorrhages.

Vitriol in general, is one of y^{e} most usefull Druggs in Physic, found near Mines of Metal, & sometimes naturally chrystallized, but frequently mixt with Earths & Marcasites, out of which it is to be extracted by means of a Lye, as we do Salt-petre.

If you dissolve a little White or Green Vitriol in water, & write with the dissolution, y^{e} Writing will not be seen; but if rub the Paper with a little Cotton dip'd in the decoction of Galls, it will appear legible.

The White & Green Vitriol are found in the Mines in Lancashire & Derbyshire: & out of y^{e} same Oar both Green & White Vitriol make their Efflorescences.

6. Tartar. Any gross or terrestrious matter, that sticks to the Sides of the Vessel, when separated from its Liquor by Fermentation, is calld Tartar; but y^{e} most Medicinal is that of Wine, which is found sticking to Casks like a hard Stone, sometimes White, sometimes Red, according to y^{e} Colour of the Wine it comes from. White Tartar is to be prefer'd before Red, as being purer, & containing less Earth. There are Both sorts in great Abundance in Hot Countries; but the best White Tartar of all, is brought out of Germany. It must be Heavy, White, & Chrystalline.

The Lees of Wine are likewise a liquify'd Tartar. The Ashes that are made of 'em when burnt, are call'd Gravelled-Ashes.

The Lees of Wine being incomparably more fermented than the Tartar which is found on y^{e} Sides of Vessels, yeilds a Salt more volatile.

7. Arsenick, Arsenicum. A ponderous Mineral consisting of a Sulphur loaded wth corrosive Salts. 3 sorts, the

Yellow calld Auripigmentum or Orpiment: the Red calld Sandaracha: and the White, calld Ratsbane y^e strongest of all. None of these Arsenicks shou'd be given inwardly.

XIII. BITUMENS

Bitumen signifies a fat, sulphureous, inflammable Matter, which is found of different Colours & Consistence, either within the Earth, or upon it, or swimming upon the Face of the Waters, some of w^ch are Hard, some Soft, & some Liquid like Oil.

1. Amber, Succinum, Electrum, Ambra citrina, Karabe. 'Tis call'd Karabe (w^ch in y^e Persian Lang: sign: Draw-straw) because this Bitumen being viscous several little Animals, as Flies &c. do stick to it & are enclosd. Most of y^e Yellow Amber is found upon y^e Banks & Sands of small Rivers running into the Baltic Sea in y^e Dutchy of Prussia: For on those Coasts there grows abundance of Poplars, Pines, & Firs, from w^ch there flows in Summer a great quantity of Gum & Resin, which is partly blown into the Sea by Winds: this Gum hardens into Amber.

   The best Amber is that w^ch is fine, large, hard, & transparent, & attractive of Straws.

   Amber is of different Colours, White, Yellow, & Black. The White is held in greatest esteem in Physic, tho' it be opacous; when it is rubd it is Odoriferous, & it yields more volatile Salts than any of y^e rest. Amber stops spitting of Blood, the Bloody-flux, the immoderate flux of the Hæmorrhoids & Gonorrhea's. The Dose is from 10 Grains to ½ a Dram.

2. Iet, Gagates lapis. A Sulphureous Fossil, found in the bowels of the Earth, hard, smooth, & of a shining Black, found in several Parts of Europe. It yields a good deal of Oil, & a little volatile penetrating Salt. It discusses, is emollient, expells Wind, & allays Vapours. The Dose from a Scruple to a Dram. It has an attractive Power when heated by rubbing.

3. Iews-pitch, Bitumen Judaicum, Asphaltus. Is a solid, brittle, black Bitumen like Black Pitch, that is sulphureous & inflammable, & in burning sends forth a strong disagreeable Smell. It is found swimming on y^e surface of the Asphaltite Sea calld the Dead-Sea; a sort of Gum that drops from Pines & other Trees about y^e Lake of

Sodom. The Arabs usd this to pitch their Ships, & was usd in embalming of y^{e} Ancients. It yields a good deal of Sulphur, partly exalted, with Volatile Salt & a little Earth. It fortifies & resists Putrifaction, resolves, attenuates, & cleanses cicatrizes Wounds, & is usd Externally & Internally.

4. COAL, Carbo fossilis. Distinguishd into Sea-coal & Pit-coal, only on account of that w^{ch} is generally carried by Sea, All Coal being properly speaking Pit-coal, w^{ch} is chiefly found in Engl. Scot. Irel. Germ. &c. & is an impure Sulphur, mixt with many gross & Earthy Parts, & a Volatile Salt. In distillation it yields an Acid Spirit, reddish Oil, black Balsam, & Volatile Salt like Amber.

5. CANNAL-COAL, Terra Ampelites, sive Lapis Obsidianus. A very Bituminous Stone, black as Jet, splitting into Scales, & easily reduc'd to Powder found in many Quarries in France. There are 2 sorts, one Soft, the other Hard. It affords abundance of Sulphur & Salt. Proper to kill Worms & Vermine.

6. NATIVE-SULPHUR, Sulphur vivum, is an Earth or Clay easy inflammable, but in burning emits a bituminous Smell; brought from Cicily & other Places. Let it be soft, friable, smooth, & shining within & without, of a Mouse-colour, & free from Dust & Gravel.

7. MINERAL-SULPHUR, a hard, earthy Bitumen, yellow, & bright enough, of a fetid, sulphureous smell, easy to be melted or burnt: comes from Mount Vesuvius.

8. COMMON-BRIMSTONE, Sulphur caballinum. The common factitious Sulphur is made of yellow Mineral Sulphur melted, & by assistance of right Train Oil & Moulds cast into Rolls. Choose such as comes from Holland, in large rolls, of a Golden-Yellow, light & easy to break into Crystalls. It is one of the chief Ingredients of Gun-powder. The Flower of Brimstone is an excellent cleaner of the Blood.

9. CHINA or INDIAN INK, is a hard Solid Paste, which the Chinese make of black Bituminous Earth, w^{ch} they powder & with Gum-dragon form into a Paste, & lay upon little sticks & then mark it with some China characters, & make little square Cakes of y^{e} Thickness & Length of ones Finger.

10. GUN-POWDER, Sal Pyrium, is a Composition of Salt-petre, Sulphur, & Wood-coal, which by means of Vinegar & a Sieve full of Holes is made into corns. The way of

making it is thus; All ye Ingredients must be pure, & finely powder'd, moisten'd with Vinegar or Spts of Wine, or Urine, well beaten together for 24 Hours, & then granulated thro' a Sieve with a bottom of thick Parchment made full of round Holes, & ye former beaten mass must beforehand be moistend with Brandy & Champhire, being made up into Balls like Eggs, wch put into ye Sieve wth a wooden Ball that moving up & down about ye Sieve may break the Balls of Powder, & make it pass thro' the little Holes into Corns.

XIV. EARTHS

1. Terra-sigillata, Alba Constantinopolitana. Seal'd Earth from Constantinople. A kind of Bole or fat clayey Earth, that is dry, soft & friable; sometimes whitish, yellowish, or Reddish, insipid, & astringent to ye Taste. form'd into Cakes abt the bigness of ones Thumb, stampt with the Grand Signior's Signet to make it pay Duty. This Earth is a good Antidote agst Poisons, proper for Fluxes, Hæmorrhages, Gonorrhea. Dose from ½ a Scruple to 2 Scruples. It is outwardly usd to stop Blood, & dry up Wounds. Also Terra-lemnia comes now from Constantinople.
2. Terra sigillata rubra.
3. Terra sigillata Japoniæ seu Japonica; Cashew or Japan Earth. A dried Paste, hard, gummy, reddish: Tho' this appears to be rather a thick Juice, than an Earth. 'Tis good to strengthen ye Brain, Lungs, & Stomach.
4. Terra Tripolitana from Tripoli. Taken from a Mountain 20 or 30 feet deep, & in veins a foot thick. Outwardly apply'd is drying, but of no use in Medicine.
5. Creta, chalk. From Crete. 'Tis very Astringent, & coṁended for removing that uneasiness of ye Stomach calld the Heart-burn.
6. Bole-armoniack, Bolus Armena, sive Bolus Orientalis. The best is the cleanest, smoothest, of a bright Yellowish Red, yt melts like Butter in ye mouth, its Thickness is known by sticking to ye Tongue. The Counterfeit Bole is of a sad deep Red, & gritty. The finest comes from ye Levant & Armenia, tho' that we have is from France. 'Tis very Drying & Astringent, Good agst Fluxes & Gleets, thickens thin Humours, usd in spitting of Blood, bleeding Wounds, also to consolidate broken Bones.

7. FULLERS-EARTH, Smegma Fullonium. Besides y^e use made of it by Fullers, 'tis good against Burns & Scalds, Swellings, & the Gout. Vid. Salmons Dispens. p. 434.

8. TALCUM-AUREUM.

9. ARGILLA alba, Common Clay, or Potters-earth, or Tobacco-Pipe Clay, Cimolia alba. Very Astringent & cleansing.

10. OCHRA, OKER. The Yellow & Red Oker is one & the same thing, for y^e natural Colour is Yellow, & it gains its Red colour by Calcination in the Fire. 'Tis a vein of Earth that is Dry, fat, & will crumble, & is soft to y^e Touch, of Yellow or Gold Colour. All the best Mines of Oker in France are in Berry, & ly 150 or 200 foot deep, & of 4 or 8 inches thick; above it they find a yellow Clay, & under it a white Sand. Oker is much usd by Painters, & is drying & Astringent, being externally apply'd.

We have an excellent Oker-Pit here in England, on Shotover-Hill near Oxford, the present Proprietor of which is Brigadier Tyrril; D^r Plot says 'tis accounted the best of its kind in the World, 'tis of a Yellow Colour & very weighty; I heard Painters commend it for best Gold Paint that they have. The Stone-Oker (or Ochre) is prefer'd to the Clay. The Stone-Oker we may call Native, because ready for use as soon as dug. The Clay-Oker, because of y^e Natural Inequality in its goodness, they wash & steep 2 or 3 days in Water, & then beat it with Clubs on a Plank into thin broad Cakes, of an equal mixture both of good & bad: then they cut it into Squares, & put it on Hurdles laid on Trestles to dry, & afterwards 'tis fit for y^e Merchant.

This Oker-vein lies from 7 to 30 feet in Depth, & between 2 & 7 Inches thick.

D^r Plot says there are but 10 folds of Earth to be passd thro' before you come to this Oker: But I find there are 21 Stratum of Layers of Earth, Sand, & Shells, to be passd thro' before you come to the Oker:

1. A Reddish Earth under the Turf, & under it a Reddish Maum.
2. A Pale-blew Clay or Maum.
3. Dark-yellow Sand, a yard thick sometimes.
4. A fine White Clay 1½ inch generally.
5. Dark-white & sometimes Reddish Maum or Sand 1 foot thick.

6. A Green fat Oily Pipe-clay, from ½ an Inch to 2 foot.
7. Fine White Sand, a yard thick generally.
8. A hard Red compacted Sand.
9. Pale-Blewish Sand, from 1 inch to 10.
10. Sand of 2 or 3 colours, or rather Maum.
11. A Brown Vein of Maum, an inch thick.
12. A Striped-Vein of White & Yellow Maum, 1 foot or better.
13. An Iron Shell, ½ inch.
14. Another Brown hard Vein, 2 inches.
15. Another strip'd Vein of White & Yellow Maum.
16. Another Iron-Shell, or Brown Vein mixt w^th^ Yellow, ½ inch.
17. Compound Sand of White, Black & Yellow.
18. Black Sand, 1 inch.
19. Thin Iron-Shell under y^e^ Black Sand.
20. Umber-Stone, Dark-yellow, & Gritty, 1 inch.
21. Fine Green Pot-clay, 10 inches thick.
22. The pure Yellow Oker, of 2 Sorts, Stone-Oker & Clay Oker, running from 4 to 8 inches.
23. Another hard Shelly Iron Vein or Iron Crust, under the Yellow Oker.
24. A White or Pale-Blewish Sand, as fine & soft as Meal lying under the Oker.

XV. COLOURS USD BY PAINTERS & DYERS.

White

Cerusse. . . .

Black

Galls & Copperas or Green Vitriol.

Yellow

Masticot (the Calx of Tin): Spruce: Pink: Yellow Orpiment: Yellow Oker: Gambuja: Turmeric.

Red

Red-Lead calld Minium: Cochineel: Sanders: Purple: Indian-Lake: Sandaric or Red-Orpiment: Rosat.

Blew

Lapis-Lazuli: Logwood: Stone-Blew: Indico: Smalt made of Zaffer & Pot-ashes, calcin'd.

Green

Bise: Sap-green: Cedar-green.

Brown

Umber: Cologn-earth: Spanish-brown.

To w[ch] add

Several Sorts of Frosts & Speckles us'd in Japanning.

XVI. OARS, OR ORES.

A Collection of Oars or Metals unrefin'd, from Cornwall, Darbyshire, Devonshire, & Cheshire in England, Cardiganshire in Wales, & from Sweden: Given me by M[r] Dyer late Fellow of Oriel College, Oxon.[1]

1. A specimen of Oar from Blewes, a Mine in S[t] Justs, not far from y[e] Lands End. 4 of which will make 1 of Copper.
2. Oar from Cubbart Mine in Guinnop Parish, Cornwall. The same with Darbyshire Oar to the sight.
3. Oar from Tolgus-Downs near Redruth, a Town in Cornwall.
4. Oar from Polwheel near Trevascus, supposd to be same with that of Trevascus.
5. Oar from Zetnoth, a Mine joining to the Metal-work, Cornwall.
6. Oar from Trevascus in the Parish of Guinnier, Cornwall This Mine is y[e] greatest, having y[e] Floor 30 feet broad, & from 10 to 12 thick.
7. Oar from North-Moulton in Devonshire, mix'd with Iron & Quicksilver.
8. Oar from Relistian Mine in Guinnier Parish, Cornwall.
9. Oar from Boscriggans in S[t] Justs, Cornwall.
10. Oar from Mashwork Mine near Ashburton, Devonshire.
11. Oar from Derbyshire in y[e] Duke of Shrewsburys Land near Asbourn. It seems to be y[e] same w[th] Cubbart Work in Cornwall.

[1] RICHARD DYER matric. Oriel 1669; Fellow 1673. 'A learned man and excellent botanist.' See p. 520.

12. Oar from Poldice, a famous Tin-Mine in Guinnop, Cornwall.
13. Oar from Franchus-Mine in Guendron Parish, Cornwall.
14. Oar from Wheale-Noweth in Heyle, a Mine near Helston in Cornwall.
15. Oar from Tregajoran Mine in Luggan Parish, Cornwall.
16. Oar from Penhallock-Vein Mine in Luggan Parish, Cornwall.
17. Best Swedish Oar, which is not better than our best Mundick (i. e. Copper) Oar.
18. Oar from Alderley Edge Mine in Cheshire, which is Oar without mixture, & runs Copper ye first melting.
19. Oar from Biscondle Mine in St Austells, Cornwall.
20. Oar from Rosselin Mine, Cornwall.
21. Oar from Metal-work, which is a Mine in Kenwren Parish in Cornwall: The greatest next to Trevascus, but not so good.
22. Oar from Tolkern Mine in Cambrey Parish, Cornwall.
23. Oar from Pitz-Kessow in Kenwren Parish, Cornwall. This Oar contains Tin & Quicksilver mixt together.
24. Oar with Tin, Yellow Mundick & White Mundick & Spar, a Rarity at Traskus in Cornwall where found.
25. Oar from St Anne's in Cornwall in the Tin Mine there. A small bit from a great Stone.
26. Oar from Cleders-work or Mine in or near St Agnes Parish in Cornwall.
27. Native Quicksilver of Trevascus. A Bushel of it was found where the Water had a Passage 20 fathom deep.
28. Cornish Copper Oar.
29. Cornish Copper Oar.
30. Cornish Copper Oar.
31. Lead Oar from Cornwall.
32. Mundick Oar, a yellow Copper Oar from Cornwall. A Metal not to be made malleable by any Art or management as yet known. 'Tis found in ye Copper & Tin Mines, sometimes in very Large quantities.
33. Cornish Tin, stamp'd to powder by what they call the Stamp-House, & made ready for ye Melting-House.
34. Soapy Rock, from a Cliff in Cornwall.
35. . . .

36. Lead Oar from Mehuntlett in Cardigan-shire in Wales. From a Tun of this Oar they have Half a Tun of Lead: And if they have no Lead, they extract as much Silver as will answer.

[*End of Vol. i.*]

Vol. ii contains a Catalogue and Description of several Precious Stones that are Medicinal, Stones less Precious, and formed Stones: Also Gums, Juices, Chymical Preparations, Things taken from Animals, Exotic Fruits, Physical Plants, Roots, Seeds, Barks, etc., with an account of their several Virtues and Uses.

Precious Stones (12).
Stones Less Precious (8).
Formed Stones (36).
Gums (24).
Juices (12).
Chymical Preparations (13).
Things taken from Animals (5).
Fruits exotic (29).

'Coffee moderately drank, especially in Cold Weather, agrees with Old people, & such as are Phlegmatic, & those that are Fat & Corpulent; but it is not so proper for Bilious & Melancholly Persons (says Lemery) or those who have thick & hot blood. And Pomet says, 'tis bad for Girls subject to ye Green-sickness.'

An Account of Physical Plants, Leaves, Roots, Seeds, Gums, Woods, Barks, & Flowers now most in use, rank'd according to their Virtues, in a new method prescrib'd by the learned and ingenious Dr. Blair & Dr. Quincy.

'No Plant can be rais'd without Seed. . . . That famous Experiment of Malpighi, who a long time enclos'd a quantity of Earth in a vessel, secur'd by a fine cloth from the small imperceptible seeds of plants that are blown about by ye winds, had this success of his curiosity, to be the first happy discoverer of this important truth, that no Species of Plants can be produc'd out of the Earth *de novo* without a preexistent seed, and consequently that they were all rais'd & created at the beginning of things by the Almighty Gardener, God blessed for ever.'

OF WATERS.

Water (says D^r *Mead*) is of so constant a Service, not only for our Drinks, but also in preparing our Flesh & Bread, that it may justly be said to be the Vehicle of all our Nourishment: so that whenever this happens to put on other Properties than are necessary to fit it for this Purpose, 'tis no wonder if in its passage thro' the Body, these do make suitable Impressions there. Thus at *Paris*, where y^e Water of y^e River *Seine* is so full of *Stoney* Corpuscles, that even the Pipes thro' w^ch it is carried, in time are incrustated & stopt up by them; the Inhabitants are more subject to the Stone in the Bladder, than in most other Cities.

The Purity of *Water* (says M^r Handley) is best found by its Transparency, Flexility, Insipidness, & the less it is mixt with Vegetable, Mineral, or Terrene Particles, the Clearer. But there is none but what has some. From hence it is, that it decays & stinks upon its Stagnation: for it being fill'd with Particles of different Gravities, some will subside, whilst others emerge, & divide themselves that some of 'em will become lighter than the Air, & strike the Nose with an unpleasant Odour, which when spent, & the rest subsided, the *Water* again becomes Sweet.

Rain Water the soonest Stinks, because the freest from Mineral Particles, yet is well loaded with Vegetable ones; & if it was not for this, it wou'd be the wholsomest to drink of any other: But *Spring-Water* being less apt to corrupt than *Rain-water*, altho' Heavier (provided it run with a strong Current, & will bear Soap) is fitter for common use.

Of whatever Nature the gross Particles (with which the Water is saturated) is, these according to their several Gravities, the Capacity of the Canals, & such-like circumstances, will, when they come to circulate in the Animal Body, be by the Laws of Motion, deposited in one Part or other: & because impure stagnating *Well-water* has a greater aptness to extract the Tincture out of Malts, then Smooth *River-water* has; because such *Well-water* abounds with Mineral Particles & *Aluminous Salts*; therefore many Ignorant People chuse it for Brewing of Beer, which is certainly a great Error: for *Clay* being a *Mineral Glebe*, the Metallic Salts & gross Particles with which Waters passing thro' such a Bottom do abound, are indigestable in a Human Body; by which are produc'd Concretions in the *Kidnies* & *Bladder*, & Joints, & Scurvies, hard Swellings in the Spleen, & by their Corrosive Quality twitch & irritate the Membranes of the Stomach

& Bowels, & hinder Digestion, & when it comes into the Blood it obstructs the small Canals of Insensible Transpiration, & so causes Cachexies, Pains in the Limbs, livid Spots in the Skin, Ulcers, &c. especially in Weak Constitutions & those of a Sedentary Life.

And *Pliny* tells us, that those Waters are condemn'd in the first place, which when Boild do incrustate the sides of the Vessels; & that our *Well-waters* do this is plain from the Tea-Ketle.

If we design to *relax* by drinking Water, we shou'd take it warm with the Infusion of Sarsa, China, Liquerish, Althea, or the like. Or if we wou'd lessen its Relaxing Quality, we may mix it with Green-Tea, Coffee, or Bitters; for as all Bitters contract the Fibres of the Stomach, they are call'd *Stomachic's.*

Now as those of a *Lax* Constitution cannot bear much Water-drinking, so those of a *Robust* Habit cannot bear Bitters; whence it is that Coffee, Tea, & Bitters, are so usefull to some, & pernicious to others.

Sanctorius informs us, that Drinking of Water hinders *Insensible,* & helps *Sensible* Perspiration; Now since an increas'd Perspiration, is the effect of an increas'd Celerity of ye motion of the Blood, or an inlargement of the Pores, so a diminish'd Perspiration must be ye effect of a Slower motion in the Blood, or of straiter Pores: from whence we may learn, that Drinking of Waters is proper in Fevers & all Chronical Diseases, attended wth an Effervescence of the Humours, as Gout, Head-ach, Melancholly, & Bilious Hæmorrhages, &c.

Nothing is less Flatulant than *Water*; No Liquour we drink having less Air contain'd in its Pores; as all Fermented Liquours & made-wines have; which being Heated in the Stomach, the Air contain'd in them expands & exerts its Elasticity, & so forces its way upwards in *Ructus's* & Belchings: they also convey great quantities of Air into the Blood.

Yet if *Water* is taken in too Great Quantity, it too much Relaxes & spoils both Appetite & Digestion: And *Mineral Waters* wou'd do the same were it not for their Stiptic Quality, & their Salts, which carry them into the Habit of the Body & enables 'em to open Obstructions, which they wou'd not do were they divested of their Mineral Qualities.

All *Spring-waters,* as they travel thro' the Earth, wash off & carry with them some Particles of the Soil they pass thro': so that they become Wholesome or Mischievous according to the Nature of the *Mineral* Matter they are charg'd with: So that those are certainly the Best to drink, which are the clearest from any Mineral Particles & the Lightest: And it may be determin'd which are so, by weighing other convenient Bodies in them, which we are taught by the common *Hydrostatic Scales*: & the way by *Soap* is also very instructive, for the more ready they are to Lather, the more fit they are for Drinking. Those *Springs* that arise out of *Chalk* are accounted the best, because in Chalk we find no Unwholsom Mineral; & they are apt to absorb any Poisonous Particles from the Water, as it passes thro' its Bowels.

Those *Spring-waters* that are impregnated with *Aluminous* or *Nitrous* Particles (being abstersive & restringent), if drank in a Morning, help those Stomachs that are Relax'd by Intemperance, by washing off their Filth & Slime, & by astringing their Fibres, & drawing up the Membranes to a due Tensity. Those of the *Aluminous* kind, not far from London, are to be found at Epsom, Dulwich, Acton, & North-Hall, &c.

River-water partakes of the Soil it runs throw, tho' less than that of Springs; & may be accounted as a Compound of *Spring & Rain-Waters* together. And as *Spring*-waters in their subterraneous Travels, take up many Mineral Particles, so *River-waters* take up much Filth from their Ouzy Bottoms; & in their long Passages, both the Mineral Particles that are comunicated to them from the Springs, & the Ouzy ones, that they gather'd up in their Journey, will by degrees fall & sink, or be so intangled in more wholesom Clay, & Ouze, that they will in time be almost quite lost.

Rain-water comes nearest to an Homogeneous Fluid, & is therefore to be prefer'd as a Diluter before any other Sort.

Well-water is subject to the same Inconveniences as Spring-water, & which is a greater Mischief by its Stagnation, it may take up, from the Bed it lies upon, such Particles (besides what it brought thither) as will render it more Unwholsom. Therefore of all Waters, that from a Well (especially if it be a Deep one) is the most to be suspected.

Pond-water, as it consists mostly of Rain-water, so it cannot be distinguishd from it, if it comes from a clean Bottom. But then, what by the motion of the Wind, or the treading of Cattle, or some other Cause, it is generally so disturb'd as to force up its Filth, w^ch^ corrupts & ferments & makes it the most Un-cleanly (at least) of all the rest.

Snow-water brings so much *Nitre* with it as renders it both Detersive & Diuretic; but is not us'd Internally, unless upon necessity.

OF MEDICINAL WATERS.

Those that abound with an *Aluminous* & *Nitrous* Salt, are those about London, chiefly those of Epsom, Dulwich, Acton, & North-Hall. These do great service where the First Passages want cleansing; if not too often repeated, otherwise their Salts will get into the Blood too much, & so in time, by their Grossness, obstruct the Glands, & occasion Fevers of an ill kind. Those that please to make a Whey of 'em, may boil them up with Milk, a Quart of Water to Half a Pint of Milk, is the Rule. These Waters are of great use in those Cholic's where Peristaltic Motion of the Guts is inverted: But the Patient must walk-about, or be kept erect; For the Moisture softning & relaxing the Fibres, & y^e Weight pressing downwards at the same time, are of Use to force their Passage quite thro', in w^ch consists y^e Cure.

These *Waters* are all best at the Well-Head, & much of the same Strength: If any can be said to be Strongest, 'tis that of *Dulwich*.

Those that partake of Iron or *Steel*, are those of *Tunbridge*, *Scarborough*, *Hampstead*, & *Islington*. There is hardly any Alterative of greater Efficacy, than those of *Iron*, & therefore ought to be usd with Caution: for if they are taken in too great Plenty, & in Sanguine Habits, they will raise the Blood too High, disturb the Nervous Fluid, & put the whole Man into Disorder, causing Vertigo's, Epileptics, Apoplexics, & the like.

In Young Persons, due Evacuations ought to be made whilst they drink these Waters, especially if they make the Patient Costive.

In the Green-sickness, in all Obstructions of the Viscera, especially of the Uterus & Kidnies, in a relax'd Tone of the Stomach, & in Crapula's, they do great service; & in Such as by Long Illness, or from any other Cause, have their Blood poor, thin, cold, & Watery, these Waters give great Assistance.

Those call'd *Epsom-Salts*, & sold for such, are all a Cheat; *Common Salt* dissolv'd in the same Quantity of Liquor, wou'd Operate as well.

OF HOT BATHS.

The chief of this kind that we have, is at *Wells* in *Somersetshire*: it abounds with a *Mineral Sulphur*, as appears by its turning Silver or Copper Blackish. The Bath Mud rub'd upon Silver makes it of a Gold Colour: And some that have boil'd it in Oil, say that it makes a good *Balsam of Sulphur.*

The Distempers it helps, are Languors, Debilities, Wastes of the Constitution, Old Pains, & Aches that are the Remains of Nervous Distempers, & where some particular Part continues contracted, or has any Humours fixt upon it which it cannot dislodge, the *Waters* pump'd upon it Hot from the Spring do very great service: Also in Gouts, Rheumatisms, contracted & Paralitic Limbs, Aches, & Lameness, &c.

Likewise *Inwardly* usd, they strengthen a decay'd Stomach worn out by Debauches, & help Nausea's & Vomitings; & in Abscesses & Ulcers of the Kidnies or Urinary Passages they do very great service, as is evident by daily Experience.

A *general Bathing* in these Springs, effectually opens the vast number of Secretory Orifices upon the surface of the Skin, & clears the Cutaneous Ducts of all offending Matter; so that all the Fluids have more room to flow in, & liberty to reek-out what is not of service to the Human Body, in a very Pleasing manner without Pain or trouble.

In *Warm Bathing*, the Pores being open, the Water insinuates itself into the Body, & mixing with the Blood dilutes it, & dissolves the Acrid Salts in its Serum.

Warm Bathing likewise helps Perspiration, & refrigerates the Internal Bowels, & gives ease in Nephritic Pains, sooner than anything.

Sanctorius tells, that a Flux is cur'd by promoting Perspiration in Warm Bathing; & that Hypocondriac's are reliev'd by Frequent Bathing.

EFFECTS OF COLD BATHS.

There is hardly any Chronic Distemper, but the Use of the *Cold Bath* will be advantageous to it, unless the Body be very *Corpulent*, or the *Viscera unsound.* But in very Fat corpulent Persons, the Fibres are so stuff'd that they had ⟨no⟩ room to vibrate or contract with the sudden squeeze of the *Bath*, & so will only be weaken'd in their springs to no purpose: & in Unsound Viscera, or where any Part is weaker than the rest, such a Sudden Contraction & additional Force, as the *Bath* gives to the Solids, will press the Fluids on such Part too much, & endanger the rupture of the Vessels, & promote the discharge of Humours upon that Part, which otherwise might drain off another way.

But if nothing of this lies in the way, whatsoever is to be effected by bracing the Solids, invigorating the Vibrations,

& accelerating the Bloods Motion, is with Certainty to be had from the *Cold Bath.*

All Diseases from sizey Blood, & a Lentor from the Animal Juices, if the Elasticity of the Vessels is not worn out, will find relief from the *Cold Bath,* as Rheumatisms, Hypocondriac Affections, & Debility from too tender, indulgent & inactive ways of Life.

Likewise Diseases proceeding from Bad Transpiration &c. may find Relief: for from Immersion, the whole Nervous System is so shook that the very Capillaries feel the Influence of it (says Dr *Quincy*) & are forc'd open by an increas'd Velocity of the circulating Fluids.

The *Cold Bath* is a Specific in the Rickets, & Hæmorrhages whether of the Intestines, Nose, or Uterus; which are not only cur'd by it, but their Return prevented.

Cold Bathing acts the Part of a Diuretic: & plunging over Head does more in the Cure of the Bite of a Mad Dog, & of Melancholly Madness, than almost anything whatever: & nothing more effectual in the Cure of Impotency, when owing to a former Excess of Venery, than the *Cold Bath*: Also in a **Fluor albus,* in the too great Abundance of the †*Catamenia,* Weakness of the Limbs, Sciatica, ‡*Valgous Pains,* Wind, Convulsions, Rickets, in all Inflammatory Pains that depend upon ye sizeyness of the Blood, such as Rheumatisms, Pains of the Ears, Limbs, Teeth, & Head: & all Pains depending on Salt or Corrosive Humours, such as Stone, & Strangury: All Bilious Distempers that depend on an Over-Rarefaction of the Blood & Animal Spirits; Nervous Pains, Windy Constitutions: And all Diseases depending on the Saltness of the Blood: Also in Stranguries; & Nephritic Pains: And it prevents the Gout. It condenses the Skin & makes it insensible of Cold. In Healthy People it increases the Appetite, quenches Thirst, strengthens Digestion, makes the Limbs strong & vigorous & fitter for Exercise; & preserves the Crasis & Motion of the Fluids.

But to prevent Gout, Asthma, & all Chronic Diseases, there must be due Evacuations, both by Bleeding, Purging or Vomiting, not only *before,* but *in* the use of the Cold Bath, or else the Disease will return, upon any new Effervescence of Humours.

And now we must consider in what Cases it is injurious, & they are in Fits of the Gout; in thin or Consumptive

* A continual evacuation of corrupt Humors from the Uterus.
† Womens Courses.
‡ When the Feet & Legs turn outwards.

Habits, in Cold Constitutions, & Old Persons: for those that live Intemperately & use no Exercise, in Plethory's, Cholic's, Phtisic's, Surfeits, Vomitings, Gripes, Loosness, Inflammations of the Lungs, Iliac Passion, & during any Defluctions; And if tarried-in too long time, produce Cramps, Fevers, & Deafness, which last may be prevented by stopping the Ears with Wool. &c.

The Time for the use of Cold Baths, is from June to September: But we must not go in too Hot or too Often, nor tarry in above 1, 2, or 3 minutes.

CAUTIONS BEFORE BATHING.

1. Bleed & Purge, & use a proper Regimen.
2. Do not Bathe, if you are Hot, above y^{e} comon standard, & at the first Immersion, go out imediatly as soon as it is perform'd.
3. Use it Fasting, or a while before Dinner, or about 4 in the Afternoon. And let y^{r} Suppers be more plentifull than y^{r} Dinners.
4. Bath at least 9 or 10 times, by 2 or 3 times a Week.
5. If it be for the Rickets, Palsies, & several Nervous Distempers with Obstructions, the Patient ought to Sweat with Cold Bathing. But if it be usd for Preservation of Health, or for invigorating the Animal Spirits, or in Windiness, or Sizeness of the Humours, Sweating is not necessary.
6. Plung in all over your Body at once, or you run the risk of a Head-ach, because there being the least Resistance to the circulating Blood in the Head, which is (in this Case) pressd upon only by the weight of the Air, it will run so plentifully thither as to distend the Vessels beyond their usual Tone, & thereby cause a Painfull Sensation.
7. If we consider the Nature of Perspiration, we must believe the *Morning* to be the most proper time for *Cold Bathing*; for then y^{e} Perspiration of the Body is finish'd, & the Body emptied of all Hot particles produc'd by the Fermentation of the Chyle & Effervescence of the Blood, & then (if ever) the Head is serene & clear, & the Spirits have room to exert themselves; which upon going out of the Bath, the Pressure & Coldness being taken off, by their Elastic Power they force their way thro' the obstructed Nerves; but Long tarrying in weakens their Force, & the Benefit of the Immersion is lost.

Where the Offending Matter has been made too Fluid either by the Warm Bath, or by Medicines in Chronical Rheumatisms, Sciatica's, &c. the violent Contracting Power of the Cold Bath will sometimes perfect the Cure.

The most obvious Consequence of Bathing, is by a greater Pressure upon our Bodies to straiten the Vessels, & so dissolve the Humours & make 'em fitter to pass the Glands, & to squeeze out any Viscid Matter adhering to the side of the Vessels, & rendring y^e Matter of the Fluids more free; it also generates greater Quantities of Spirits & causes 'em to move more swiftly thro' the Nerves.

When the *Mercury* stands highest in the Barometer, our Bodies are pressd-upon by a Weight of Air (according to D^r *Wainwright*) equal to Thirty-nine Thousand, Nine Hundred Pounds Troy: Now when this Weight is either increas'd or diminish'd (as 'tis often by Change of Weather) it must certainly make a great Alteration in our Fluids. But this Pressure is never so Great as when we Bath our selves, because Water being above 800 times heavier than Air, must needs greatly increase the Pressure & occasion many Inconveniencies; for the tender *Fibrillæ* of the Skin being of unequal Strength & Tensity upon this Extraordinary Pressure, some Weak Part must suffer.

Insensible Transpiration is double to all the *Sensible* ones put together (according to the Opinion of *Sanctorius*), & is 10 times greater than that by Stool only; so that a Person will be as weak by Perspiring Double the Quantity he us'd to do, as in having 10 Stools where he us'd to have but 1: And if we consider that the greatest part of our Stools is the Remains of our Food which cou'd not enter the *Lacteals*, we shall find the Difference yet greater; for we can't believe that above one 10^th of our Stools is evacuated from y^e Mass of Blood by the Liver, Pancreas, & Intestine Glands: So that upon this account, there is as much deriv'd from the Blood in 1 day by Perspiration, as by Stool in 100: therefore if Perspiration be doubled in 24 Hours, it will make a man as faint as if he had in that time 100 Stools more than usual.

Men of a Robust Constitution, & that live Plentifully, & use but little Exercise or not enough to throw off the Dregs of a very full Diet, & who are Subject to Catarrhs, Pains in the Joints, &c. may receive Benefit by Wearing of *Flannel*; tho' too long a use of it may so relax the Tone of the Fibres of the Skin, as to hinder that Perspiration which before it help'd: But when it is left off, it ought to be in a Warm Season, & at the same time either go into a *Cold Bath*, or use a Flesh Brush. As the Consequence of one Evacuation is the lessning of another, therefore, when too much is thrown off by Stool, Urine, or Spittle, the wearing of *Flannel* may be of use.

In many Cases the *Cold Baths* have y^e greatest Effects after the use of the *Hot*. Because where there is a cold, clammy, Phlegmatic, tenaceous Humour, the *Cold* Bath only stiffens & makes it worse, but when relax'd & loosned by the Heat of a *Hot* Bath, these Viscous Humours are wash'd away by Sweat, & then the *Cold* Bath is very seasonable to corroborate & confirm the Muscles, to brace the Nerves & relaxed Membranes. Sometimes neither *Hot* nor *Cold* Baths will do any good Singly, yet in Conjunction will do great Cures. At other times the Hot alone, or Cold alone are most proper: And the *Hot* more particularly in the West-India Gripes & Cholics, where a *Paralysis has been general, with a total loss of Limbs, or y^e Members of the Body much contracted; the *Hot* Baths have cur'd Both the Solutions & Contractions; which are such Contrary Operations that y^e most Ingenious D^r *Baynard* says, 'tis past his Philosophy to find out how such Cures are wrought, unless it be by Comforting the †*Archeus* with mild & gentle Warmth; the *Bath* being a Friendly Fomentation, a Natural *Sal Volatile Oleosum*, & a Cordial to the languid Spirits, that put's 'em in a capacity to act with more vigour.

But they are mischievous in Plethoric Habits, sanguine Constitutions, full Stomachs, or with Medicinal Prepartions: or to such as over-heat their Blood by tarrying in too long at a time; or by exercising their Bodies over-much, whilst in them, by swimming, &c.

The Chief Ingredients that impregnate the Bath Waters, are Sulphur, Iron & Nitre mixt with *Sal sui generis* in a small Quantity, the Sulphur bearing more than a double proportion to all the rest. D^r *Lister* says they are a Compound of a Calcareous Salt, Common Salt, Ochre, & Lime-stone.

Instead of Wine at Meals, to be us'd by *Bath*-Water-Drinkers, a Well-brew'd middling Beer, made bitter with Hops, Sage, & white Hore-hound, is far more preferable, as agreeing better with the Stomach, & will cause y^e Waters to pass better, says M^r *Handley*.

D^r *Radcliff* doubted whether *Cold Bathing* might not in some measure contribute to make the *Smallpox* more Mortal (since it has been Epidemical for some years past & more Mortal than formerly); for as the Water constringes &

* An Abolition of voluntary Motion or Sense, in all y^e Body or one Part.

† Hidden Virtue of Nature common to all things—most exalted invisible Sp^t.

indurates the Fibres, it may easily endanger such as have accustom'd themselves to it.

[*End of vol. ii.*]

Vol. iii contains a Catalogue of Physical Plants, methodically digested into Classes.

[*Omitted.*]

An Additional Catalogue of both Natural & Artificial RARITIES, consisting of Anatomical things, Petrify'd things, Curious Works of Art, Antiquities, Indian things, & Miscellaneous Curiosities.

ANATOMICAL RARITIES.

1. A bit of an Indian Prince's *Painted Skin*, & the Picture of him. See a large Account of him in the 4th Vol. of my MUSÆUM, pag. 20th.
2. A *Stone* taken out of a Mans Stomach, an Inch & 3 quarters in Diameter.
3. A *Stone* taken out of a Man's Bladder.
4. Another out of one of the Kidnies.
5. A Mans *Skull* entire, found in digging a Gravel Pit in St Giles's Field by Oxford.
6. A Mans *Stomach*, given by ye Rev. Mr Betty of Exeter Coll.
7. Chalky sort of Stone taken out of a Branch of ye Aorta leading into the Heart, by that Accurate & Ingenious Anatomist Mr Chiselden.
8. Small Stones voided by Urine.
9. Stones out of the Heads of Toads.
10. Stones out of the Heads of Craw-fish.
11. Stones out of ye heads of Cod-fish.
12. Stones out of the heads of Ruffs.
13. Pearls out of Oisters.

14. The Tuskes of Sea Cows, Woolfs, & Boars.

15. A Stone out of a Pigs Sheath.

16. The Bones of Mice excern'd again indigested in Owls Dung.

17. A round Ball of Pilchard's Bones, closely compacted together, & suppos'd to be excern'd by larger Fish who devour'd the said Pilchards. For when Pilchards come up to fresh Water, these Balls are always observ'd to be left behind. The Balls are near as big as Hen's Eggs.

18. Hair-Balls out of Cow's & Calves Stomachs; 2 or 3 of 'em cover'd with a Smooth Crust, $7\frac{1}{4}$ inches in circumference. These Balls are Round & compacted-together like ye Wool of a Hat. They are often found in the 1st or 2d Ventricle, & occasion'd by the Cows licking their Calves or themselves, & swallowing ye Hair they lick off. After ye Hair has been a considerable time in ye Cows Stomach, 'tis by the Motion of ye Stomach compacted & work'd into a Ball, & by the viscous Juices of ye Stomach cover'd over with a thin Coat, & harden'd by ye Hair of ye Stomach & pollish'd by its continual Motion. These Hair-Balls are sometimes found in ye Stomachs of young Calves without any Covering. If these Balls ly long in ye Stomachs of either Cows or Calves, their Shells contract a Chesnut-colour, if a lesser time, an Ash-colour.

19. A Worm or Maggot out of a Sheep's Head: (Given me by my very Worthy, Learned, & Ingenious Quondam-Tutor, the Revd. Mr Edw. Welchman, Archdeacon of St Davids, & Rector of Lapworth in Warwickshire). This Worm is about the bigness of a large Millipedes, & in the shape of one contracting its Body now it is dead, & of a Black Colour, roundly turgid on the Back, & flat underneath, divided with several *Annuli* or Rings (as these Animals generally are), the Extremities of which Protuberances, serve instead of Feet. I believe it may be compar'd with the Worm describ'd by Dr Thorpe, in the 5th Vol. of Mr Motte's Continuation of the Philos: Trans. pag. 343.

In Vervecis capite, & eâ potissimum Parte unde erumpunt Cornua, sæpissime Vermes nasci testatior Vir clariss: D. Redi.

20. The Cast Skin of a Snake, 3 Foot & 9 Inches long, & so entire that there is not the least Breach to be seen in it throughout the whole Skin, & in the Head-Part you may

see the very *Tunica adnata*, or Outward Skin of the Eye it self.

21. The Larynx of a Deer.
22. The Cornua & Os Hyoides of ye Larynx of a Dog.
23. Eagles Claws.
24. Porcupine's Quill.
25. Monstrous Birth of a Cat.
26. A worm 3 inches long, taken out of a Mouse's Liver. Given by Miss Charlotte Twisleton.

PETRIFY'D THINGS.

1. A bit of the *Scala Gestatoria* or Wooden Ladder, wch had been buried under Ground, & afterwards dug-up a perfect Stone (that Ground being famous for turning Wood into Stone); to be seen, as *Camden* tells us, in the Monastery near *Aspely-Gowiz* in *Bedfordshire*. This was given me by Dr Marten of Mert. Coll:
2. *Petrify'd Wood* from a Well near *Bedford*, which Petrifications may be thus accounted for: The Wood is first crusted over with a Stony Concretion, & afterwards, as it rots away inwardly, the Lapidescent Juice insinuates it self by degrees into its room, & so makes at last a firm Stone.
3. *Water & Sand congeal'd*, taken out of a very Cold Spring in *Pool's-hole* at the *Peak* in *Derby-shire*.
4. A Piece of the *Crust* that covers the *Lime-stone Rock* in *Pools-hole*, being also Water congeald as it trickles down from the Rock, like our Iceycles hanging down from the Eaves of Houses in ye Winter-time; These Iceycles are generally $1\frac{1}{2}$ foot long.
5. A Piece of the *Queen of Scots Pillar*, which is $1\frac{1}{2}$ foot in Diameter. This is the Pillar which that Unfortunate Princess grac'd with the Title of Her *Non Ultra*.

   These several Pieces of Petrification were sent me by my very good Friend the Revd. & Ingenious Mr John Egerton formerly M.A. of Queens Coll: Oxon, & Rector North-Allington in Devonshire, who visited ye sd Peak in Derbyshire.
6. A Piece of *Petrification* from *Buxton-Bath* or St Ann's Well in Somersetshire. Given me by my good Friend the Revd. Dr Crosse, late Archdeacon of Salop & Rector of Broughton in Oxfordshire.

7. *Petrify'd Water & Sand* from a Spring near Hopcraft's-Holt, not far from Heyford-Bridge in Oxfordshire.

8. *Petrify'd Snail-Shells* & Twiggs (by Incrustation) from a Spring running down Heddington Hill towards Marston-Lane, near Oxford.

9. A turf of *common Moss*, growing upon y^e Rocks in y^e *Peak* in *Derbyshire*, Part of which is petrify'd, & Part not: That which the Water wetted in running off y^e Rocks is petrify'd. Given by M^r Hickman formerly Gentleman-Commoner of Queens Coll.

10. Sea *Coral* (call'd *Lithodendron*, i.e. a Petrify'd Plant) growing in the Sea. There are several sorts, White, Red, & Black, & some of 2 Colours Red & Black. Besides which there is white *Coral* stellify'd call'd *Coraloides*. 'Tis Green under Water.

    Some say that *Coral* whilst under Water is very Soft, but when expos'd for some time in Air, becomes very Hard. But D^r Lemery & others contradict this.

    Coral (when prepar'd by beating it on a Marble into a most fine Powder that it may be y^e more easily dissolv'd) is given to stop Dysenteries, Diarrhea's, Flux of the Hæmorrhagies, & all other Distempers that are caus'd by an Acrimony of Humours; this being an Alkali that destroys them: The Dose is from 10 Grains to a Dram in Knot-grass Water, or some other appropriate Liquor.

11. A large Turf of *Corallina reticulata*, which is Sea-Moss petrify'd by Incrustation. The inward Part is fibrous.

Now to account for the business of Petrification: 'Tis well known, that besides Sea-water there is Spring-water in several Places, which tho' clear, will yet petrify those things that ly in it for some time, as Wood, Fruits, & Parts of Animals, according to *Pythagoras* in Ovids 5^th Book of his Metamorph:

> Flumen habent Cicones, quod potum Saxea reddit
> Viscera—

And besides Spring-Water that petrifies things thrown into it, there are others, that, without y^e help of any other Matter, petrify of themselves. There are Waters, in y^e Grotto of *Arsi* in *Burgundy* in France, that turn into Stone as soon as they fall upon the Stones where they stand still. Near *Clermont* in the Province of *Auvergne* in *France*, they say there is a little Brook running out of a Rock, the Water of which in 24 hours, is turn'd into Stone: This Water kills those that drink of it, & if you put it into a Vessel, it assumes the Form thereof in Petrifying. Nay they say that in some parts of *Peru*, they build their Houses with a Water of this kind, after it is petrify'd in Molds prepar'd for that purpose. 'Tis strange, that all these Waters, while they run, are very clear & limpid, but as soon as they stand still, they become hard & darkish.

If I may be allowed the liberty (says Mons: *Lemery*) to guess at the Reason of these things, there is in these Waters a very considerable quantity of Coagulating Acids, united with the Earthy & Stony parts they had dissolv'd by the way: Now these Acids being drag'd along by y^e^ motion of the Liquid parts that continually run, they cou'd not get any ascendency over the Water, because y^e^ progressive Motion of the Torrent opposes the same: But as soon as the Water comes to stand still; these same Acids opperating then upon each Part thereof, closely stop up the Pores, & withstand the free Introduction of subtil matter of that of y^e^ 2^d^ Element, & of Air; from whence it follows, that the slippery & flexible Parts of the Water being no longer agitated by a more subtil matter, by reason of their too strict Union with the gross Parts, they must Condense & at last become Dark, because the Rays of Light can no longer pass there in a direct Line as before.

ARTIFICIAL RARITIES

1. Two curious Medals of the 2 Vespasians, in fine turn'd Wood-work (Turkey Box), done by a new-invented Turning Machine in 1723. Given me by Richard Dashwood Esq. of the Inner Temple. This curious Engine, by turning a Winch or Winder with the hand, turns many curious Pictures in Bass Relief in Ivory or Wood of several kinds, as Heads, Medals, Landskips, Birds, Beasts, Insects, &c. The Tool begins to cut in the Middle, & so works on till y^e^ Figure is made, & the Piece of Wood or Ivory that you work upon, continues all the time in a regular Circular motion, & is finish'd in about an Hours time. See the Picture of it in the 4^th^ Vol. of my MUSÆUM.
2. A pretty Devise to make one Bit of Wood to tally to 3 different Mathematical Figures.

3. A brass Ring artificially put into a Piece of Wood, as tho' it had been Originally in the Wood. Done & given me by M^r Tubb the Joyner in Oxford.

4. A Chain of 6 Links, made all of one entire Piece of Box, with a Tobacco Stople at one end, & a Hand at the other. Given me by the Rev. M^r Bearcroft, Fellow of Mert. C.

5. A Flea chain'd to a Silver Chain of 30 Links & but one inch long. Given me by M^rs Betty Layfield.

One Mark Scaliot a Black-smith & Citizen of London, for proof of his Skill & Workmanship, made a Chain of Gold of 43 Links, to which Chain the Lock & Key being fastn'd & put about a Flea's Neck, she drew the same w^th ease: All which Lock & Key, Chain & Flea weigh'd but one Grain & a half: A thing most incredible to believe, but I my self have seen it, says M^r John Stow in the Annals of Queen Eliz.

6. A Tea-Pot made of Staffordshire Pit-coal or Culm. Given me by M^r Charles Bertie.

7. A Box of very fine Straw-work. Given me by y^e Rev^d. M^r Meadowcourt Fellow of Merton College.

8. Several Pieces of fine old Painted Glass.

9. A curious Polish'd Cup or Tumbler, made of a Coco-Nut Shell.

10. A Pair of Womens Gloves, made of the Skin of a Hen, & inclos'd in a Walnut-Shell.

11. A Chicken & Piece of Bacon in Wax-work.

12. A Dish of Fruit in Wax-work.

13. Fruit in Bead-work.

14. A little Brass Jack, scarce so big as a mans Fist, that will help to roast a large Joint of Meat. Given by M^r Tho: Knight of Slapton in Northamptonshire.

15. A Skain of Silk woon'd upon a Reel, & put into a Glass Viol with a narrow Neck to it by fine Instruments, & the Stople fasten'd in the inside.

16. Burmicham nails, made at 3 strokes of y^e Hammer, extremely small.

17. A Chair made of Feathers & Pins.

18. A round Ball or Box of Wood, 8 inches in Circumference, curiously wrought on the out-side into pretty Works & Mottoes in 7 Pair of Verses. 'Tis to be open'd by turning one Section of it till it stands to such a Point. Given by M^r Talbot of Mert. Coll. Oxon.

19. A curious Piece of Bacchanalia in fine carv'd Work upon Ivory. Given by M^{r} Wells Bookseller in Oxford.

20. A Battle-Piece, upon the Shell of an old Sword, Given me by M^{r} Carter Cutler in Oxford.

21. A Brass Ephemeris, showing all the Days in the Year in the outmost Rim, New-Moons, fix'd Holy-days, Degrees of the Sun, its Place in the Zodiac, its Rising & Setting, also the course of the Moon, Epact, &c.
   On the Back-side of it are 4 Quadrants.

22. Another Brass Plate, showing the Revolutions of the Planets. On the Back-side of w^{ch} is a fine & usefull Altimetric Quadrant, that shews by Inspection.

23. A Geometrical Sun-dial, for the Pocket, made upon Box, & to be directed by the Degrees of the Sun's Declination, mark'd on the Back-side of the Quadrant.

24. A curious & valuable Piece of Microscoptic Paint, upon a little round Board, on which is depicted y^{e} Inside of a Popish Chappel, where is to be seen a Priest baptizing a Child, but to be seen best by a Magnifying-Glass.

25. M^{r} Smart's Tables of Time, calculated for 200 years.

26. M^{r} Carte's Frontispiece of a Clock, serving instead of a Perpetual Almanac. See the 4th Vol. of my MUSÆUM.

27. A Perpetual Almanac, in 12 Parts for the 12 Months of the Year, curiously Pictur'd & Painted out, wherein the Several Seasons of the year are most exactly represented. Given by M^{rs} Mary Crosse.

28. A Perpetual Ephemeris, or Table shewing the Day of the Month for Ever. See the 4th Vol. of my MUSÆUM.

29. The New-Testament, & Psalms, wrot in Short-hand writing, in a very small Book, by Ebenezer Phillips a Jew; & given me by the Rev^{d}. M^{r} Russel late Fellow of Merton College.

30. Fine Glass-Work, as Pipes, Swords, Images, Cups, Pens, & a Brush of fine-spun Glass, of a Golden colour, & as fine as Hair, every Thred of which is a Tube. Done by y^{e} famous Dutch man M. Nicolaes de Geu's.

31. Curious Pen-writing. Some as fine as any Printing; done by M^{r} Parry of Jesus College, Oxon. Also by M^{r} Thomason a School-master in Cheshire. See y^{e} 4th Vol. of my MUSÆUM.

32. The Writing of Matthew Buchinger, who was born without Hands or Feet, & wrot the Lords Prayer in y^{e} com-

pass of a Silver 2d. & may be very easily read without the help of a Glass.

33. Toe-writing, by Joannes Valerius.

34. Mouth-writing.

35. A fine old carv'd, or rather Cast, Piece of Oriental Alabaster or factitious Marble: being a Representation of ye ancient Druids in their Oaks, who (as Diodorus Siculus tells us) were Divines. This was brought out of the Indies, but said to be made in China.

36. A neat Pocket-Piece or Medal, struck upon a new & fine Metal as beautifull as Gold, no broader than a Crown-piece; wherein are describ'd Tables & Lines whereby to find the Day of the Week, & Day of the Month for Ever; the Rising & Setting of the Sun; the Southing & Age of the Moon; the Beginning & Ending of the Terms; the fixt & moveable Feasts, &c. for Ever.

See the Explanation of it in the 4th Vol. of my MUSÆUM, p. 22.

37. A very nice Sett of Ivory Skittles & Bowl, put into an Ivory round Box not much bigger than a Pins head, & to be sett up by ye help of a small pair of Forceps. Given by Tho. Bedford Esq.

ANTIQUITIES.

1. A Piece of an old *Tessellated Roman Pavement*, found in the Field near Stunsfield in Oxfordshire in 1711, 35 foot in length & 20 in Breadth, compos'd of little square Pieces of Brick & Stone about the bigness of Dice, of 6 different Colours, orderly dispos'd into Works & strongly cemented together on a thick Bed of Mortar. The Animal Figures on this Pavement were Bacchus & his Panther. Supposd to have been a Pavement of a Subaltern Officers Tent belonging to the Roman General or rather Usurper Allectus in the time of ye Emperor Dioclesian. See my Account of this Pavement, printed in 1713.

2. A Piece of a *Roman Patera* or Sacrificing Dish.

3. A Piece of a *Sepulchral Urn*, with some of the Bones buried in it. Given by my Good Friend & Countryman Richard Wykham Esq.

4. An old *Roman Key*, found at the Devises in Wiltshire, in a Sepulchral Urn, which Urn was 5½ Foot in Compass,

an Ell in height, & containing 10 Gallons, & full of Ashes. See y^{e} 4th Vol. of my Musæum.

5. A Picture of the PENATES, (little Brass Statues of the Heathen Gods, that they usd to carry about 'em for Protection). Found at the Devises in Wilts, in 1715. Also an Explanation of 'em.
6. Romish Beads & Crucifixes.
7. A bit of *Stone-henge* in Wiltshire near Salisbury, which seems to be plain Natural (& not Artificial) Stone.
8. The Head of an old *British Pole-Ax*, given by D^{r} Williams of Exeter College, Oxon, & found at an Old Fort near Manchester in Warwickshire, call'd *Old-Bury* (i. e. an Old Burrough) of a Quadrangular Form, & containing 7 Acres of Ground, with an Entrenchment a Lands-length distant from it. In the North of it there have been found several *Flint-Stones* about 4 inches long, curiously wrought by grinding, or by some such way. One end is shap'd like the Edge of a Pole-ax; & they are thought by S^{r} W^{m}. Dugdale, to have been Weapons us'd by the *Britains* before the Art of making Arms of Brass & Iron. They must have been brought hither for some Extraordinary Use, because there are no *Flints* to be found within 40 miles of the Place. Another of 'em is now to be seen in M^{r} *Ashmole's Musæum* in Oxford. Vid. Camden p. 613. 1st Vol.
9. Some Bricks with Foliage, taken from some Pavements belonging to Osney Abbey, which Abbey was built in 1129 in the Island Meadows near Oxford Castle, the Ruins of whose Walls still shew to have been very large.
10. An ancient *Spur*, found in one of the Burroughs of the famous *Stone-henge* on Salisbury-Plain, Wilts, in 1719.

    At the same time, very deep within y^{e} said Burrough or Burying-Place, being then levell'd, was found an entire Human Skeleton of an unusual size, the length of it measuring full 9 foot, 4 inches. Given by M^{r} Edmonds of Mert. Coll.
11. An Explanation of an *Ancient Almanac*; call'd by the Danes, the Rimstock, by the Swedes & Norwegians the Primstaff, & by the Britains, the Clogg or Staffordshire Perpetual Almanac. The Figure of which is to be seen in D^{r} Plot's Nat. of Staffordshire.
12. The Copy of a *Hebrew Conveyance* of some Lands bought of a Jew by the Founder of Merton College, Oxon. where the Originals are to be seen.

13. An old Lease bearing Date the 9th Year of K. Hen. 3rd Ano. Dom: 1224. containing but a few Lines. Given by Mr Parrot late Steward of Mert. Coll.

14. A *Popes Bull*, granted (by Pope Leo ye 10th for the building of St Peters Church at Rome, & ye Conventual Churches of Augustin Friars in Oxford & others within the Realm of England) in ye year 1516.

15. *A Pope's Pardon* of Sins, granted by Pope Clement 7th to Mrs Margaret Brooks of Knaresburgh in Yorkshire & her Heirs, for 500 years, granted A. D. 1526. Concluding In quantum Claves Ecclesiæ se extendunt. Given by Dr Brooks of Allsouls Coll: Oxon. See ye 4th Vol. of my Musæum.

16. Polydore Virgil's. Latin Epitaph on the Founder of Merton College. See ye 4th Vol. of my Musæum.

17. The Copy of an old *Pater-Noster*, or rather *Papa-noster*, being directed to the Pope & not to our Savior, & is the Reverse of the Lords-Prayer, & more properly a Curse than a Prayer. It was found in ye Wall of a dissolv'd Priory in Warwickshire, made by Wm. Townsend the Prior.

18. A Piece of *Skin*, taken off one of the Doors of Copford Church (near Colchester) in Essex, which Doors were all lined with such Skin & secur'd with Iron-work, & the Skins (by Tradition there) suppos'd to be Danes Skins. Given me by the Rev. Mr Parsons once Curate there.

19. The Figure of *Alexander the Great's Horn*, by the help of which he us'd to call his Army together 100 Stadium's off; the Diameter of this Stentorophonic Horn, Kircher tells us, was 5 Cubits, & that it was suspended on a Supporter. There is a Figure of it preserv'd in ye Vatican. See the 4th Vol. of my Musæum.

20. The Figure of an *ancient Shield*, that was lately in the possession of Dr Woodward. See ye 4th Vol. of my Musæum in my Chest of Rarities.

21. A Fragment of the Walls of Troy. Given me by the Rev. Mr Jō. Martin Rector of Sandwich in Kent, my good old Friend, who in a Letter to me tells me, that the Person, from whom he had it, assur'd him that he took it from thence himself, & (says he) I can give ye more Credit to him, because he seems not to have capacity, & I am sure, has no Interest to impose upon me. He was 14 years in the Mediterranean & the Levant, & I enquiring of him abt his Voyages ask'd him

whether he had seen y^e Ruins of TROY, he told me he had & that he had taken a little stone from thence to whet his Knife. This being spoken of incidentally & without Design, I suppose you will think there is less Reason to question its being what he assures me it is. Now tho' TROY was destroy'd by the Greeks 1300 years before our SAVIOUR's time, yet why may there not be some small Remains of this City, as there are of a ROMAN City call'd ALCHESTER still to be seen in the Plow'd Lands in Chesterton Field in Oxfordshire?

INDIAN THINGS.

1. An Indian Pagod.
2. The Head of a West-India Spear, jagged, & poison'd.
3. A pair of Indian Shoes with soles, made of Fish-Skins & stitch'd with Porcupines Quills; made to go on Shipboard.
4. An Indian Manatee, to whip the Negroes when tardy, made of the Skin of a Sea-cow, & twisted.
5. An Indian Bottle, earthen & painted, 14 inches high, & 7 in circumference.
6. A large Indian Bag, made of nothing but Straw, of several Colours.
7. A Piece of the Sugar-Cane.
8. The Sea Hand-weed, whose chequer'd Fibres look like the threds of Linnen held up against the Light.
9. The Indian Fann-weed, broad & flat, & spread out like Net-work. Given by M^r Hackett. A large Reticular Plant from Barbadoes.
10. Ears of Indian Wheat, & Turkey-wheat, with their Corns of various colours, some all of Cornelian-colour, others all White, others with a mixture of White, Yellow, Purple, & Ash-colour, all upon the same Ear.
11. A spire of Indian Grass.
12. An Indian Tobacco-pipe.
13. Cashew Bread made of Indian Roots.
14. A Virginian Candle, made of wax & myrtle-berries. Given me by the Rev^d. D^r Holland the late very worthy Warden of Merton Coll:
15. Part of the Tail of a Rattle-snake.

17. The inner Bark of the Legeta Tree, like Net-work or fine Lace. This Tree is 30 foot high.
18. Corallina geniculata mollis Americana.
19. Corallina latifolia & Opuntia marina Cortusi.
20. The Apostles Creed in the Malabar Language.
21. Indian Kings Speech to Queen Ann.
22. An Indian Prince's Cane. Given me by Richard Dashwood Esq. of the Inner Temple, who beg'd it of y[e] Prince for me.
23. The Shell of a very large Indian Calabash, a yard & 5 inches in Circumference, us'd as a Box or Bag to put things into. Given by Capt. Metcalfe.
24. Indian Bowes & Arrows, 2 yards in length, given by the same Hand.
25. Sheggapapoon damoon, or Berries us'd by the Indians for Braceletts—Given by D[r] Coleby of Stamford.
26. A nice pair of Scales, much in use in the East-Indies, call'd *Doeings*. Given by Capt. Metcalfe. The Balance of these Stilliards is 7 inches long. Two-penny-weight & 21 Grains, is the weight of the Ball. 9 Grains each Section.

A Catalogue of some *Indian Seeds* from Barbadoes given me by M[r] Dyer of Oriel College, Oxon.[1]

1. Seed, of the Cedar Tree ; so call'd in Barbadoes.
2. Horse Nickar.
3. Indian-wood, or Ink-berry.
4. Prickly Yellow-wood.
5. Jack-in-a-Box.
6. Indian River wood.
7. Sweet Mastic.
8. Sweet Timber wood.
9. Poison Olive.
10. Tamarinds.
11. Black Nickar.
12. Lignum vitæ.
13. Indian wood.
14. Pea tree.

[1] R. Dyer. See p. 497. Herne.

15. Sowr Cherry.
16. Clammy Cherry.
17. Sea-side Grape.
18. Maccaw tree.
19. Fat Pork.
20. White wood.
21. Shot-seed, i. e. Canna Indica.
22. Everlasting Bean.
23. Everlasting Pea.
24. A sort of Barbadoes Senna.
25. Palmetto.
26. The Thorn-Apple.

True Scarlet *Oak Acorns* from the North of America. The Leaf of this Tree is near 9 inches in depth, & above 5 inches wide, the Tree rises above 200 foot in Height, & the Timber is equally valuable with ours, & is very swift in Growth tho' it comes from so Cold a Climate, & is allow'd by all Judges to be y^e^ greatest Improvement ever yet planted.

MISCELLANEOUS CURIOSITIES.

1. The Hand-Writings of several Kings & Queens, & Princes, States-men, & other Great Men.
   See the 4th Vol. of my Musæum.
2. The Patriarch of Alexandria's Petition to the Arch-Bishop of Canterbury, in 1710. Written in Modern Greek, & Translated. Given by Mr Herne late Fellow of Merton Coll: whom the Archbishop (his Kinsman) employ'd to translate it, but his Grace dying before ye Translation was finish'd, the said Mr Herne gave it to me. See ye 4th Vol. of my Musæū.
3. A Letter from the Sophi of Persia to K. Ch. 1st written on Paper made of the Bark of Trees. Given by Dr Tovey of Mert. Coll. since Principal of New Inn Hall.
4. Another Letter from the late Czar of Muscovy, to King James 2d written in the Slavonian Language. Given by the same Hand. See 4th Vol. of my Musæum.
5. A Chinese MS. with a Map of the South Part of China. Given me by the Rev. Mr Shute Fellow of Mert. Coll.
6. A Programma against Riotous Disputations, publish'd by the Rev. Dr Mew when Vice-chancellor of the Uni-

versity in y^e year 1672. Given me by the R^t Rev. D^r Potter Lord Bishop of Oxford. See 4^th Vol. of my Musæum.

7. Archbishop Laud's Lattin Letter to the University of Oxford, in 1640. in which he complains of the Iniquity of the then Present Times, & offers a Present of some Curious MSS. of Ancient Times. See 4^th Vol. of my Musæum.
8. A copy of S^r Tho: Fairfax's Letter to Prince Rupert, showing the Origin of the late Civil Wars.
9. Oliver Cromwells Dying Prayer.
10. Oliver's Order sign'd by his own Hand, & directed to the Spanish Ambassador, concerning some Prize Ships.
11. Devises & Motto's on the Standards & Colours, us'd in the time of the late Civil Wars.
12. Effigies of the Loyalists in K. Ch. I. time.
13. Orbis eruditi Literaturam à charactere Samaritico deduxit D^r Edv. Bernardus 1689.
14. The Picture & Acc^t. of 2 Hungarian Children that grew together.

    For all which see the 4^th Vol. of my Musæum.
15. A License to eat Flesh in Lent, granted to a certain Person by Archbishop Juxon.
16. Very thin & small Trenchers in use in Q. Eliz: time. 5 inches long & 4 broad. not y^e 10^th part of an Inch thick.
17. One of the first Tobacco-Pipes that were made in England, found in digging up some of the Old Foundations of K. Hen. 1^st Palace in Woodstock-Park, which stood near the Bridge & was the Place where Q. Eliz: was kept Prisoner (during her Sister Mary's reign) in whose time Tobacco was first brought into England by the Mariners of S^r Francis Drake. A. D. 1585.
18. Jewish Passover-Cakes.
19. A Book of Poems, call'd *Lachrymæ Oxonienses*, made upon the Death of Prince Henry, K. James 1^st Eldest Son, in 1612—By several famous Hands, viz: D^r Abbot Professor of Divinity—Isaac Casaubon—Archbishop Bancroft—Archbishop Laud—Edm: Gunter mathematician—Dean Fell—Melancholly Burton—D^r John Harris Historian—D^r John King—Bp. Sanderson—S^r W^m. Waller—D^r Wilkinson—cum multis aliis.
20. A branch of a Tree resembling a Mans Hand.

21. A common Pebble with Silver in y^e middle of it.

22. A Kid of Silk Cotton.

24. Part of the Body of the Glassonbury Thorn-tree, that blossoms every Christmas-day in y^e morn: & continues so till Evening. Given me by M^r Paget of Chipping-norton, Oxfordshire.

25. A Virginian Thorn, some of whose Prickles are $9\frac{1}{2}$ inches long.

26. Sand from the Island of Ormos in y^e Persian Gulph.

27. Salts sweated out of a Stone-wall, being a White Excrescence in thin & light Flakes like Nitre, very nauseous to the Taste.

28. A Pear with large Leaves growing out of y^e end of it, call'd the Musk-Pear.

29. Large entire Oister shells dug out of a Hill call'd OISTER-HILL (where they are commonly found) in Hedley-Parish near Epsom-Wells in Surrey: suppos'd to have lain there ever since the Deluge. Vid. Nicholls's Conference w^{th} a Theist. Part I, p. 56 & D^r Woodward's Hist. of Fossils.

30. Flies enclos'd in Amber, & Spiders in Gum.

31. A lump of the Vitrify'd Salts of calcin'd Hay, taken out of the Ashes of a Hay-Rick burnt to the Ground. Given me by the Rev^d. D^r. Martin late Fellow of New College[1]—Also other Lumps that I took my self out of the Ashes of a Hay-rick burnt near Kidney-Hall by Oxford in 1718.

32. Lapis Lydius, Basanus or Touch-Stone—So much celebrated of old, for showing the various Impressions different Metals make upon it when rub'd or drawn along its Surface.

33. Popish Wafers, such as are us'd at the Eucharist; the larger for the Priest, the smaller for the People; the Larger bearing the image of our SAVIOR upon the Cross, the Smaller, the Agnus-DEI, both Un-consecrated.

34. A Map of England upon Silk, such as was presented to the Morocco Ambassador, as a Direction to him in his Travels into England in the year 1708. Given me by the Rev^d. M^r Meadowcourt Fellow of Merton College, Oxon.[2]

35. The Earl of Essex's Sword, who was beheaded in Q. Eliz:

[1] Edmund Marten 1688–1751, New College. D.C.L. 1718. Dean of Worcester 1746–51.

[2] Meadowcourt. See No. 36, p. 528.

time—Given by S^r John D'oiley,[1] who had it from my Lord Abingdon.

36. A Sicilian Cap, made at Messina. Given by M^r John Ward, Rhetoric Professor at Gresham College, London, & F.R.S.

37. A curious Pair of embroiderd Gloves from Jerusalem. Given by Richard Wykham Esq. of Swacliff, Oxfordshire.

38. A Tobacco-Stople, made of a piece of the Royal Oak. Given by the Rev^d. M^r Kennet, Son to y^e late Bishop Kennet.

39. A Determining-Batchelor's Scheme for y^e year 1670.

40. A Book call'd *Vox-Piscis*, or the *Fish-Book*, found in the Belly of a Cod-fish, in Cambridge Market in 1626 taken upon the Coasts of Lin; whereof this is a Copy. Given me by M^r Herne late Fellow of Merton College. The Book is 5½ inches long, & 3½ wide, & 1½ thick. The Cambridge Punns made on this Book, were by a young Scholar (I suppose a Civilian) that viewing this Unconcoded Book in the Cod-fish, said it might be found in the *Code*, but cou'd never be enter'd into the *Digest*. Another said, he shou'd never for y^e future reckon it any disgrace to be call'd *Cods-head*, seeing that Fish is now become so learned an *Heluo-Librorum*, Anglicè, a Devourer (as it were) of Books.

41. A luxuriant Branch of y^e Sycomore tree, Given by Miss Sally Witts.

41. *Earth* (or Dust) that was rain'd upon the Archipelago upon the Eruption of Mount *Vesuvius*, Dec. 6. 1631. mention'd in the *Philosophical Transactions* Numb. 21. It rain'd from 10 at night till 2 next morning, so that it lay 2 inches thick on the Deck of Cap^t. *Badily's* Ship, who sent this following Relation,

... *Sand* (as he calls it) of *Monte Græco*, that was taken-up in the *Archipèlago*, in Dec. 1631. within less than 30 Leagues of *Sestos & Abydos*, about 14 days after *Monte Græco*, or *Monte Santo*, near *Naples* in Italy, blew up, which is accounted 150 Leagues distant from the Place where it fell: And when it fell, the Mountains & Country in the *Archipelago* were cover'd with Snow & Frost upon it, but the *Sand* was so thick that it cover'd the Snow, & alter'd the colour of the Country, & caus'd such a Darkness that it put one W^m. *Ditchley* (a Quarter-Master then

[1] Sir J. D'Oyley. See note on p. 467.

upon the Watch, in the Ship Dragon, with Capt. *Harding*) into such a Fright, that he said the Day of Doom was come, the Darkness was so Dismal, & the Wind was quite calm. Water, Fire, & Earth came out of the Mountain, & the Gallies in the Mole of *Naples* were on float. Near Shoar the Water fell so much that the Fore foots or Prowes were 4 foot in length on ground. Many Houses fell in *Naples*, & the People went in Procession all Day & all Night, till ye Mountain blew up, wch was before this time as picked as ye former. Given me by Dr *Astrey*.

42. A written Picture of the King of Poland. Given by Madam Lacy of Pudlicot in Oxfordshire.

43. Pocco Sinipoi, or Tartarian Lamb; which taken inwardly does certainly stop Bleeding—Given by Dr Coleby.

44. Moxa; which cures the Gout by burning the Part affected. Given by Dr Coleby.

45. A flower'd Piece of Cornu-Ammonis—Given by Mr Crosse.

46. A Pin that had work'd it self out of the Stomach of a young Turkey, turn'd Yellow by the Juices in the Stomach, & which I saw taken out of a callous Excrescence on one side of its belly.

47. The Figure of an Irish Knife or short Dagger that was us'd at the Massacre in Ireland in ye year 1642, with these Motto's on it

Pro Christo & Patriâ.
Fide, sed cui vide.
Soli Ensi & Loricæ.
Mar. 8. 1642.

Mr Harris of Brackley in Northamptonsh: has one of these Knives.

48. A piece of Brown Paper & a Stick sing'd in a Burning-Spring or boiling Well at Broseley near Wenlock in Shropshire. This Well was discover'd about Jun. 1711. by a terrible noise it made. Some People out of curiosity, after they have set this Water on fire, have put a Kettle of Water over the Cistern, & in it Green Peas or a joint of Meat, & boild it much sooner than over any artificial Fire. The Water it self is as Cold as any Water I ever felt; & what is remarkable, as soon as ever the Fire is out, if you put yr hands into it, it feels as Cold as if there had been no such thing as Fire near it. See Mottes Abridgment of the Philos. Trans. Vol. 5. pag. 216. Part. 3d.

ANATOMICAL RARITIES.

49. *A Tape-worm*, call'd *Lumbricus latus*, about a Foot long, a Quarter of an Inch Broad, Milk-white, of a flat & thin Substance like fine Tape, divided into infinite Rings & Incisures, taken out of y^e Belly of a Hare by M^r W^m. Haynes of Chipping-norton in Oxfordshire Feb. 14. 1736–7. I suppose a mouth on each side of every Ring, & that they suck in the Chyle & cause an Emaciation in the Body by depriving it of its Nutritious Aliment, & occasion a Canine Appetite as well as Atrophy. These worms D^r Lister tells us have been often found in the *Duodenum* & Kidneys of Dogs & are also call'd *Lumbrici Cucurbitini*, from the likeness each Annulus or Link has to a Cucumber-Seed. Great quantities of these Worms have been found likewise in the Guts of Horses, & have eat Holes thro' 'em & so kill'd the Horses.

100 Worms have been taken out of a mans Tongue, & 30 out of the Gums.

These Worms are Male & Female, & one Single Worm has produc'd 100, nay 1000 Eggs.

50. A Stone as big as a large Pea, taken out of a Neats-Tongue, 2 inches deep, by y^e Ingenious M^r Mackarnist Apothecary in Chipping-Norton, Oxfordshire.

51. A large yolk of an Egg, 9 inches in circumference, cut out of a Hen's Belly, & given me by the Rev^d. & Ingenious M^r W^m. Dowdswell of Kencom, Oxfordshire,[1] the Hen suppos'd to be trod by a Swan.

52. Part of the Body of the famous Glastonbury Thorn-tree that is said to Blossom on Christmas day; Given me by M^r Paget of Chipping-norton, Oxfordshire.

52. The undermost Skin of a Goose's Web-foot—(Given by M^rs Haynes Mistress of the White-hart Tavern in Chipping norton, Oxfordsh.) being a Web of Nervous Fibres & other Vessels differently interwoven together like Nets, which make its Thickness. Under these Nets are thousands of small Glands, into every one of w^ch there comes a small Branch of an Artery, & a small Vein also comes out of 'em, & a Lymphatic Vessel going from y^e Gland, passes thro' these Nets & terminates at the Superficies of the Skin.

[1] William Dowdeswell matric. Christ Church 1674. Rector of Kingham †1711.

MISCELLANEOUS CURIOSITIES.

A Piece of a Coat of Mail, made of little Brass Rings let one into another, & chain'd & interlac'd together, *Lorica hamis conserta vel hamata.* us'd by y^e Old Romans.

A LIST OF BENEFACTORS TO THIS COLLECTION.

1. The Rev. D^r Holland, late Warden of Merton College, Oxon.
2. D^r Astrey, D.D.
3. The Rev. M^r W^m. Marten, Rector of Cuxham Oxfordsh:
4. D^r John Marten, M.D. Fellow of Mert. Coll. Oxon.
5. D^r Wyntle, M.D. Warden of Mert. Coll.
6. D^r Trowe, M.D. Fellow of Mert. Coll.
7. D^r Tho: Cox, M.D. Fellow of Mert. Coll.
8. D^r Ben: Purshall, M.D. of Evesham, Worcestersh:
9. D^r King, M.D. late Fellow of Mert. Coll.
10. D^r James Bouchier, LL.D. Regius-Professor of Law.
11. D^r The: Metcalfe, M.D.
12. D^r Williams, M.D. of Exeter Coll.
13. D^r Carleton, M.D.
14. D^r Edw: Marten, D.D. late Fellow of New Coll.
15. D^r John Lydal, M.D. late Fellow of Mert. Coll.
16. D^r Clark, Chancellor of Chichester.
17. D^r . . . Bearcroft, D.D. Fellow of Mert. Coll.
18. D^r John Gilbert, D.D. Canon of Christchurch, Oxon & Chancell^r of Exeter (afterwards Bp.)
19. S^r William Can, late of Oriel Coll.
20. The Hon^ble Charles Bertie Esq.
21. The Hon^ble Richard Dashwood Esq. of y^e Middle Temple, London, Counseller at Law.
22. Richard Wykham Esq. Justice of Peace.
23. Cap^t. (Richard) Hawkins.
24. M^r Hickman, Gentleman-Commoner of Queens Coll.
25. M^r Rawlinson, Gentleman-Commoner of Corpus-Christi Coll. afterwards LL.D^r.
26. M^r John Hawkins, Surgeon in Oxford.
27. M^r W^m. Cheselden, Surgeon in London.
28. M^r . . . Lasher, Apothecary in Oxon.
29. M^r Tho. Lever, Apothecary in Oxon.

30. Mr Wm. Sanderson, Surgeon in Oxon.
31. The Rev. Mr Morton, late Rector of Oxendon, Northamptsh. & F.R.S.
32. Mr Wm. Leigh, Gent. Comoner, of Mert. Coll.
33. Mr . . . Finch, Gent-Com: of Mert. Coll.
34. Mr John Smith, Gent. Com. of Mert. C.
35. The Rev. Mr Wm. Huntington, M.A. late of Mert. Coll.
36. The Rev. Mr Ric: Meadowcourt, M.A. Fellow of Mert. C. now Prebendary of Worcester.
37. The Rev. Mr Jō. Russel, M.A. Prebendary of Peterborough.
38. The Rev. Mr Matthias Mayo, Rector of Cublington, Bucks.
39. The Rev. Mr Wm. Mayo, M.A. late of Trin: Coll.
40. Mr Oglethorp, late Gentleman-Comr of Corpus-Christi Coll.
41. The Rev. Mr Haynes, Rector of Catstock in Dorset:
42. The Rev. Mr Jō. Welch, M.A. formerly of Linc. Coll.
43. Mr Jacob Bobart, late Mr of the Physic Garden, Oxon.
44. The Rev. Mr . . . Nevill.
45. The Rev. Mr John Turner, LL.B.
46. Mr Geo: Cooper, Public Register of the Univ: of Oxon.
47. The Rev. Mr Betty, M.A. Fellow of Exeter Coll.
48. The Rt. Rev. Dr Potter, Bishop of Oxon. afterwards A.Bp. of Cant.
49. Mr John Potter, Student of C.C. Oxon. &
50. Mr Tho: Potter, both Sons to the sd A.Bp.
51. Samuel Dale, Esq. F.R.S.
52. The Rev. Mr Shute, Fellow of Mert. Coll. M.A.
53. The Rev. Mr Kennet, Son to ye late Bp. of that Name. M.A.
54. The Honble. the Lady Cullen.
55. The Honble. the Lady Dutton.
56. Mrs Mary Crosse.
57. Mrs Eliz. Layfield.
58. The Rev. Mr John Egerton, M.A. late of Queens Coll. Oxon.
59. The Rev. Mr Byne, late Proctor of the Univ. of Oxford.
60. The Rev. Mr Breton, M.A. late Fellow of Mert. Coll.
61. Mr Simpson, M.A. late of Mert. Coll. Oxon.
62. Mr Sayer, M.A. of Mert. Coll.
63. The Rev. Mr Pettiward, M.A.
64. The Rev. Mr James Cox, M.A. late of Mert. Coll.
65. Mr Charles Guyon.

66. The Rev. Mr Gardiner, M.A. late Fellow of Mert. Coll.
67. The Rev. Mr Denham, M.A.
68. Mr Ben Cole, Surveyor.
69. Mr Anth: Peisley, Booksellr in Oxford.
70. Mr Townsend, Mason of Oxon.
71. Mr Roe, Painter in Oxon.
72. Wm. Hackett, Gent.
73. Mr Sherlock, late Butler of Queens Coll.
74. The Rev. Mr Lydal, Fellow of Magd. Coll.
75. Mrs Rebecca Willoughby.
76. Madam Wright Judge Wrights Lady.
77. The Rev. Mr Hen. Jackson, M.A. late Petty-Canon of St Pauls.
78. The Rev. Mr Roger Brent, M.A. Fellow of Pembr. Coll.
79. Mr Jos: Meddoms, Gent.
80. Mr Jō. Norgrove, Gent.
81. Mr Tickell, M.A. late of Queens Coll.
82. The Rev. Mr Welchman, Archdeacon of St Davids & Rector of Solihull Warwicksh:
83. The Rev. Mr Burroughs, M.A. of Queens Coll.
84. Mr Gregson of Hart-Hall, Oxon.
85. The Rev. Dr Edw. Gardiner, late of Braz: Coll. Oxon.
86. The Rev. Mr Furney, M.A. of Oriel Coll.
87. The Rev. Mr Lancaster, M.A. Vicar of Dorchester, Oxfordsh.
88. The Rev. Mr Herne, M.A. late Fellow of Mert. Coll.
89. Mr . . . Knight of Basingstoke, Hants.
90. Mr . . . Combes, Commr, of Mert. Coll.
91. Mr John Smith of Witney, Oxfordsh.
92. Mr Tho: Edwards, Mason, of Shennington, Gloucestersh.
92. Mr Love, B.A. of Mert. C.
93. Mr Wenman, B.A. of Mert. C.
94. The Rev. Mr D'oiley, M.A. Fellow of Mert. Coll, Son to Sr John D'oiley.
95. Mr Char. Moseley, M.A. Fellow of Mert. Coll.
96. The Rev. Dr Robinson, D.D. late Fellow of Mert. C. & late Proctor of ye Univ.
97. The Rev. Mr Woolley, M.A. Fellow of Mert. Coll.
98. Brown Willis Esq. a great Antiquary.
99. Mr Bernard, Gentleman-Commoner of Mert. Coll.
100. Mr Joel Travise of Dorchester, Oxfordsh:
101. Dr Coleby of Stamford. M.D.
102. Tho: Bedford Esq.
103. Sr Martin Wright one of the Judges of the Kings-Bench.

104. The Rev. M^{r} W^{m}. Dowdswell Rector of Kingham, Oxfordshire.

105. M^{r} Mackarnist Apothecary in Chipping-norton, Oxfordshire.

M^{r} W^{m}. Haynes Vintner at Chipping-Norton.

M^{r} Tho. Venables Attorney at Law.

The Rev^{d}. M^{r} Eaton Vicar of Chipping-Norton.

Capt. Signreap.

M^{r} Brome Witts Mercer.

Lady Clark.

M^{rs} Baynton.

Bp. Tanner.

Bp. Bradshaw.

M^{r} Jō. Ward of Gresham College, Rhetoric Professor & F.R.S.

John Streachy Esq. F.R.S.

M^{r} Bowles Librarian.

M^{r} James West Counsellor at Law.

M^{rs} Haynes of Chipping-norton, Oxfordsh: Vintner.

APPENDIX F

TABLE OF THE SUCCESSION OF THE SCIENTIFIC PROFESSORS 1500–1920

	Medicine.					**Astronomy.**	**Geometry.**	**Natural Philosophy.**
500								
10								
		(Linacre) (Sh.)						
20		**Wolsey Lecturer.** 1. Musgrave				**Wolsey Lecturer.** 1. Kratcher		
30								
		Warner Crispyne	(Sh.)					
40								
50		**Henry VIII Professors.** 1. Warner						**Shagglyng Lecturer.** Ward
		✲			**Superior Linacre Lecturers.**[1] ✲			
60		2. Francis ✲			Barnes			
70		3. Bailey						
80		✲ (Niphus) (Sh.) ✲ 4. Aylworth						
90								
		✲						

[1] The duty of the Linacre Lecturer was to explain Hippocrates and Galen to the younger students.

	Medicine.		Linacre Lecturers.	Astronomy
1600				
	5. Warner		Dochen Bust	
10				Savile Professors.
	✲			
			Warner	
20			Lapworth	✲
				1. Bainbridge
30	6. Th. Clayton (father)			✲
			Bainbridge	
40				
	✲		Greaves	2. Greaves
50			Whistler	✲
	7. Th. Clayton (son)		Lydall	3. Ward
			Dickenson	
60				✲
	✲			
70				4. Wren
	8. Hyde			✲
80				
	✲	6. ✲ Luffe ✲		5. Bernard
90	9. Luffe	7. Robert		
		8. Fry		✲
	✲			
1700				6. Gregory
		9. Keil		

Geometry.	Natural Philosophy.				
					1600
Savile Professors.	Sedley Professors.				10
✲					
					20
	✲				
1. Briggs					
✲	1. Lapworth				30
	✲				
2. Turner					40
	2. Edwards				
✲					50
	3. Crosse				
					60
	4. Willis	Chemistry.	Museum Ashmole Keepers.	Botany Sherard.	
	✲			✲	
					70
			✲		
	✲				
		Ashmole Professor.			80
3. Wallis	5. Millington	1. Plot	1. Plot	1. Morison	
			✲		90
				✲	
		✲ Readers.	2. Llwyd		
					1700
✲	✲				
			✲	2. Bobart	

Year		Medicine.						Radcliffe Librarian.	Radcliffe Observer.	Astronomy.
1710		10. Hoy								7. ✲ Caswell ✲
		✲	10. Tadlow 11. Code							
20		11. Lasher 12. ✲ Beauvoix	✲							8. Keill
30		✲	12. Nichols							
40		13. Woodford	13. ✲ Lawrence							✲
50			✲ 14. Alcock					✲ 1. Wise		
		✲ [Pitt]	✲							9. Bradley
60		✲ 14. Kelly	15. Smith ✲		Practice of Medicine.			✲		
70	Lichfield Profs.	✲	16. Parsons					2. Kennicott	✲	✲
80	✲ 1. Parsons ✲	15. Vivian	17. ✲ Thompson					✲		
90			✲ Tomlins & Aldridge		Aldridge.			3. Hornsby	1. Hornsby	10. Hornsby
1800	2. Wall	✲	✲		✲					
10		16. Pegge	1. Pegge		1. Bourne			✲	✲	✲

Crewe Exp. Phil. (1749)	**Geometry.**	**Natural Philosophy.**	**Chemistry.**	**Ashmole Keepers.**	**Botany.**	**Sibthorp Rural Economy.**	**Prince Regent Mineralogy.**	**Prince Regent Geology.**	
									1710
		6. Fayrer		3. Parry					
				✲					
		✲		4. Whiteside	✲				20
	4. Halley			✲	3. Sandys				
				5. Shepheard	✲				
		7. Bertie		✲					30
					4. Trowe				
					✲				
					5. Dillenius				40
	✲			6. Geo. Huddesford					
		✲			✲				
✲									50
	5. Bliss	8. Browne		✲					
1. Bradley									60
	✲ Betts ✲	✲		7. Wm. Huddesford	6. Humphrey Sibthorp				
									70
				✲					
✲									
		9. Wheeler							
	✲								80
	7. Smith	✲		8. Sheffield	✲				
			Beddoes						90
			✲	✲	7. John Sibthorp				
2. Hornsby	✲				✲				
		10. Hornsby	**Aldridge.**						1800
	8. Robertson		✲						
				9. Lloyd					
✲	✲	✲							10
			1. Kidd				✲		
				10. ✲ Dunbar	8. Williams			✲	

Year	Medicine.	Medicine.	Anatomy.	Anatomy. Lee's Anatomy.	Anatomy.	Zoology. Hope Zoology.	Physiology.	Librarians.	Observers.	Astronomy.
1820	3. ✲ Bourne	✲	✲		✲			4. Williams	2. Robertson ✲ ✲	11. Robertson ✲ ✲
30	✲						Linacre Physiology.	✲	3. Rigaud	12. Rigaud
40	4. Ogle	17. Kidd	2. Kidd ✲		2. Ogle			5. Kidd	✲	✲ G. Johnson ✲
50	✲	18. ✲ Ogle ✲	3. Acland ✲ 4. Rolleston		✲		✲ 1. Rolleston	✲	4. M. Johnson	
60			✲			✲ 1. Westwood		6. Acland	✲	14. Donkin
70	5. Acland	19. Acland			Linacre Human & Comp. Anatomy. 1. Rolleston		Waynflete.		5. Maine	✲
80	✲				✲ 2. Moseley		✲ 1. Sanderson		✲ 6. Stone	15. Pritchard
90		✲ Burdon Sanderson		✲ 1. Thomson	3. Lankester	✲ 2. Poulton			✲	✲
1900		✲ 21. Osler			4. Weldon ✲ 5. Bourne		2. Gotch	✲ 7. Jackson	7. Rambaut	16. Turner
10							✲ 3. Sherrington			
20		22. ✲ Garrod			✲ 6. Goodrich				✲	
	Medicine.		Anatomy.			Zoology.	Physiology.	Librarians.	Observers.	Astronomy.

Exp. Phil.	Wykeham Physics.	Geometry.	Natural Philosophy.	Chemistry. / Waynflete.	Ashmole Keepers.	Botany.	Rur. Econ.	Mineral. / Waynflete.	Geology.	
		9. Rigaud								1820
3. Rigaud		✱		✱	11. Philipps; 12. ✱ Duncan					
					✱			1. Buckland	1. Buckland	30
			11. Cooke	2. Daubeny		✱	✱			
✱							✱		[Strickland]	40
		10. Baden Powell			13. Philip Duncan		2. Daubeny			
										50
4. Walker			✱	✱; 3. Brodie	✱	9. Daubeny		✱	✱	
								2. Storey Maskelyne	2. Phillips	60
		✱	12. Price	**Waynflete.** 1. Brodie	14. Phillips	✱	✱; 3. Lawson			
				✱	✱					70
✱		11. Henry Smith			Ashmolean Scientific Collections transferred to University Museum about 1860.	10. Lawson			✱	
							4. Gilbert		3. Prestwich	80
				2. Odling		✱; 11. Balfour				
						✱	✱	**Waynflete.**	✱	90
5. Clifton		12. ✱ Sylvester ✱				12. Vines	(Suspended)		4. Green	
	✱		✱							1900
	1. Townsend	13. Esson	13. Love				✱	1. Miers	5. Sollas	
								✱		10
				✱			1. Somerville	2. Bowman		
6. ✱ Lindemann		14. ✱ Hardy		3. Perkin		✱; 13. Keeble				20

Exp. Phil. Geometry. Nat. Phil. Chemistry. Ashmole Keepers. Botany. Rur. Econ. Mineral. Geology.

APPENDIX G.

LIST OF OXFORD MEN WHOSE NAMES ARE ASSOCIATED WITH THE STUDY OF MEDICAL OR BIOLOGICAL SCIENCES.

The names of those who are especially distinguished by their scientific work are printed in clarendon type.

UNIVERSITY COLLEGE, 1249

Leonard Digges, d. 1571.
Lord Herbert of Cherbury, 1583–1648.
William Jackson, M.D. 1661.
John Radcliffe, M.B. 1675.
Edmund Cartwright, Fellow of Magdalen.
J. Frederick, matric. 1722.

BALLIOL COLLEGE, *c.* 1265

Nicholas Tingewick, M.D., d. 1324.
John Free, d. 1465.
John Evelyn, 1620–1706. F.R.S.
Sir John Finch, *c.* 1660.
Timothy Clarke, F.R.C.P. 1664.
Robert Fielding, M.D. 1653.
Thomas Waldron, M.D. 1653.
John Atfield, M.D. 1661.
Thomas Andrew Knight, 1759–1838. F.R.S. First President of the Horticultural Society.
Michael Geddes, 1647–1713.
Matthew Baillie, 1761–1823. Pathologist.

MERTON COLLEGE, 1264

John of Gaddesden, M.D. *c.* 1309.
John Kyllingworth, fl. *c.* 1360.
John Chylmark, *c.* 1386.
Nicholas Colnet, 1398.
John Somerset, 1424.

John Kyllingworth, 1441.
Walter Hart, of All Souls.
John Curteis, Fellow 1442.
Thomas Bloxam, M.B. 1455.
Henry Sutton, 1458.
John Stacy, 1462.
John Chamber, Fellow 1492.
Philip Dense, 1500.
John Blysse, M.D. 1509.
William Lorymer, 1509.
George Owen, M.D. 1527.
Robert Huicke, M.D. 1538.
Thomas Huys, 1548.
Roger Giffard, M.D. 1566.
Thomas Jeesop, M.D. 1569.
Theodore Goulston, M.D. 1610.
John Bainbridge, M.D. 1620.
Richard Hawley, M.D. from Leyden, 1627. Fellow.
William Harvey, of Caius. Warden, 1645.
Sir Charles Scarburgh, also of Caius College. M.D. 1646.
John Wilby, M.D. 1646.
Daniel Whistler, M.D. 1647.
Richard Trevor, M.D. 1661.
Charles Willughby, M.D. of Padua, 1663.
Thomas Laurence, M.D. 1664.
Henry Hawley, M.B. 1668. Also of Oriel.
Thomas Alvey, M.D. 1671.
Edmund Dickinson, *c.* 1640—*c.* 1705. M.D. 1656.
John Bateman, M.D. 1682.
Richard Smith, M.D. 1678.
Humphrey Ridley, M.D. Leyden, 1688.
Anatomy of the Brain.
Observationes Medici.
William Coward, M.D. 1687. Author.
Robert Huntingdon. Fellow, 1680.
John Pointer, 1668-1754. Benefactor to St. John's.
Robert Whitehall, *c.* 1700.
George Aldrich, M.D. 1755.

ST. EDMUND HALL, 1269

Sir Richard Blackmore, M.D. Padua, *c.* 1680. Author.
Thomas Hearne, 1678-1735.

GLOUCESTER HALL, 1283

Thomas Allen, 1542–1632.
Sir Kenelm Digby, 1603–1665.
Christopher Merrett, M.D. 1642–3.
Edward Duke, M.D. 1660.
William Cole, M.D. 1666. Author.

HART HALL, 1282–1740

Gilbert Kymer, Chancellor 1431-3.
William Worcester, 1415-82?
Edward Jordan, M.D. 1591.
Philip Stevens, M.D. 1655.
Catalogus Horti Botanici Oxoniensis, 1658.
William Coward, M.D. 1687.
Oliver le Neve, matric. 1679-80.
John Lamphire, M.D. 1660. Principal 1663–†88.

EXETER COLLEGE, 1314

William Dunne, M.D. 1582.
William Palmer. Physician to the Queen of Henry VI.
Nathaniel Carpenter, *c.* 1600.
Sir Simon Baskerville, M.D. 1611.
Richard Spicer, M.D. 1622.
John Wallis, of Emmanuel College, 1616–1703.
George Beare, M.D. 1655.
Richard Inglet, E–L.R.C.P. 1660-1.
John Bidgood, M.D. 1660.
Narcissus Marsh, *c.* 1670.
Simon Wellman, also of Magdalen, M.D. 1686.
George Woodward, L.R.C.P. 1691.
Christopher Furneaux, 1693–1729-30. M.B. 1719.
Francis Nicholls, 1698–1778. M.D. 1730.
Charles Lyell, 1797–1875.

ORIEL COLLEGE, 1326

Roger Marbeck of Ch. Ch., M.D. 1573.
Thomas Cogan, M.D. 1574.
Sir Matthew Lister, *c.* 1605.
Sir Maurice Williams, M.D. 1628.
Daubigny Turberville, M.D. 1660.
Nicholas Fortescue, E–L.R.C.P. 1665.
Richard Dyer, Fellow 1673. Botanist.
Anthony Lawrence, E–L.R.C.P. 1677.
Ralph Stubbs, E–L.R.C.P. 1700. In practice in Reading.
— Ibbetson, *c.* 1700.
Henry Hawley. See Merton.
Gilbert White, 1720-93.
Christopher Pegge, 1765-1822.
William John Broderip, 1789-1859.

ST. MARY HALL, 1326–1902

Humphry Whitmore, M.D. 1648.
Aylmer Bourke Lambert, 1761-1842.

ST. ALBAN HALL

Edward Lapworth, M.D. Also of Magdalen.
John Bulkeley, E-L.R.C.P. 1683.
Philip Stephens, 1620-79. M.D. 1655. Fellow of New College and Princ. Hart Hall.

QUEEN'S COLLEGE, 1340

George Bate, New College, M.D. 1637.
George Smith, M.D. 1661.
Richard Francklin, M.D. 1660.
Richard Brown, M.D. 1675.
Medica Musica; or, a Mechanical Essay on the Effects of Singing, Music and Dancing on Human Bodies: with an Essay on the Nature and Cure of the Spleen and Vapours. 8vo. Lond. 1674.
Prosodia Pharmacopaeorum. 12mo. Lond. 1685.
The General History of Earthquakes. 8vo. Lond. 1694.
Sir Robert Southwell, 1653-1702. President of the Royal Society (5 times).
Philip Coode, matric. 1690. See All Souls.
George Waldron, matric. 1706.
William G. Maton, 1774-1825.
John Wallis, 1733.
Thomas Shaw, 1694-1751. Traveller. Princ. of St. E. Hall.
Thomas Pennant, 1728-98.
Daines Barrington, 1728-1800.
Edward Rudge, matric. 1781-†1846. F.R.S.

NEW COLLEGE, 1379

Thomas Bentley, M.D. 1518.
Edward Atslowe, M.D. 1554.
Walter Bayley, 1561.
Christopher Johnson. Physician 1571.
Walter Bayley, 1561.
John Giffard, M.D. 1598.
Thomas Hopper, lic. to practise, 1602.
Richard Haydock, 1605.
Thomas Grent, *c.* 1620.
George Bate, M.D. 1637.
Henry Stanley, M.D. 1641.
John Windebanke, M.D. 1654.
Nicholas Stanley, M.D. 1660.
Ralph Austen.
Robert Sharrock, *c.* 1664.
John Lamphire. See Hart Hall.
Richard Morton, M.D. 1670.
Walter Harris, M.D. Bourges 1675. Author.
William Musgrave, M.D. 1689. Sec. Royal Society, 1684. Author.
William Cole, 1642. Also of Merton.

William Woodford, M.D. 1724. Regius Professor.
James Woodforde, 1758-81, p. 145.
John Oglander. Warden 1768-†1794.
John Shute Duncan, 1769-1844.
Philip Bury Duncan, 1772-1863.

LINCOLN COLLEGE, 1427

Thomas Nurse, M.D. 1641.
John Thorpe, L.R.C.P. 1646.
Christopher Bennet, M.D. Cantab. 1646. Corrector and enlarger of Muffet's *Health's Improvement*. 4to. London 1655.
George Rogers, M.D. 1648.
John Triste, L.R.C.P. 1650.
Robert Pierce, M.D. 1661.
Francis Willis. See B.N.C.
John Manship, E-L.R.C.P. 1663.
Charles Panton, E-L.R.C.P. 1685-6.
Charles Harris, steward, *c.* 1690.
John Sibthorp, 1758-95.
John Radcliffe, M.B. 1675.

ALL SOULS COLLEGE, 1437

Walter Hart of Merton.
Nicholas Halsewell, Fellow 1468.
Thomas Linacre, 1460-1524.
Richard Bartlot, M.B. 1503.
Thomas Gwyn, M.D. 1528.
Robert Recorde, 1510?-1558.
John Warner, M.D. 1535.
Richard Master, M.D. 1554.
John Howell, M.D. 1555.
Richard Forster, M.D. 1573.
Sir Edward Greaves, Bart., M.D. 1641.
Morbus epidemicus. An. 1643. 4to. Oxon. 1643.
Sir Richard Napier, also of Wadham. M.D. 1642. Astrologer.
Christopher Wren, 1632-1723.
Thomas Millington, M.D. 1659.
Thomas Sydenham. See Magdalen Hall.
John Hill, M.D. 1659.
John Mayow, 1643-1679. Also of Wadham.
Richard Adams, M.D. 1684. Principal of Magdalen Hall.
Philip Coode. Anatomy Lecturer. M.D. 1707. Fellow.
John Berkenhead, M.A. 1643. Fellow. Prof. of Moral Phil.

MAGDALEN COLLEGE, 1458

John Perch, M.B. Fellow † 1480.
William Hasard. Fellow 1488-1509.
John Claymond. Fellow 1488. President 1506, of Corpus 1517.

Edward Wotton, 1492–1555.
Nicholas Gibbarde, *c.* 1541–1608.
Thomas D'Oylie, M.D. 1571.
Simon Forman, 1552–1611.
Percivall Willughby, 1596–1685.
Thomas Fox. Demy 1608. M.D. 1623.
Henry Sayer, M.B. 1642.
William Browne. Fellow 1657–78. Botanist.
Henry Yerbury, M.D. Fellow 1647–8, d. 1686.
William Hooper, 1622–95. Fellow.
Francis Barksdale, M.D. 1649.
Timothy Woodroffe, E–L.R.C.P. 1653.
Samuel Thorner, E–L.R.C.P. 1658.
Robert Dale, E–L.R.C.P. 1663.
Henry Clerke, M.D. 1652.
Edward Hawtaine, M.D. 1660. Fellow, 1638–59.
Thomas Trapham, M.D. 1664.
Robert Conny, M.D. 1685. Naval doctor at Deal.
Simon Wellman, M.D. 1686.
Richard Short, M.D. 1694.
Abel Clark, chorister, E–L.R.C.P. 1698. In practice in Witney.
Daniel Lysons, 1744.
Charles Daubeny, 1795–1867.

BRASENOSE COLLEGE, 1509

Humphrey Lloyd, 1527–68. Author.
Richard Caldwell, M.D. 1554.
Thomas Hearne, *c.* 1600.
Sir William Petty, 1623–1687.
Elias Ashmole, 1617–1692.
William Quartermaine, M.D. 1657.
Thomas King, M.B. 1650.
Thomas Arris, M.D. 1651.
John Smith, M.D. 1659.
Thomas Frankland. Forged F.R.C.P. certificate, 1675.
Francis Willis, 1718–1807. Also of Lincoln.

CORPUS CHRISTI COLLEGE, 1517

Ludovicus Vives, 1492–1540.
John Claymond, of Magdalen.
Thomas Twine, M.B. 1598. Author.
William Clayton, M.B. 1642.
Peter Bourne, M.D. 1614.
Pseudo-Medicorum Anatomia. 4to. London, 1624.
James Hyde, 1650. Anatomy Lecturer.
John Parys, 1661. Anatomy Lecturer.
John Betts, M.D. 1654.
De Ortu et Naturâ Sanguinis 12mo. Lond. 1669.
Josiah Lane, M.D. Leyden, 1664.
William Creede, M.D. 1694. Bur. in Coll. Chapel, 1711.

Thomas Sutton, M.D. 1692.
Arthur Parsons, M.D. 1693.
Richard Newlyn, *c.* 1700.
Sir Ashton Lever, 1729–88.
John White, matric. 1745–6.

CHRIST CHURCH, 1546

H. Hare, *c.* 1500.
Thomas Francis, M.D. 1554.
Henry Wotton, M.D. 1567.
Roger Marbeck, M.D. 1573.
Richard Hakluyt, 1553–1616.
Hon. Robert Dudley, 1573–1649.
Robert Fludd,, M.D. 1605. Also of St. Johns.
Thomas Clayton. Regius Prof. of Medicine, 1611.
" " " " 1647.
Daniel Oxenbridge, M.D. 1620.
Charles Bostock, M.D. 1640.
Sir John Baber, M.D. 1650.
Martin Llewellyn, M.D. 1653.
Stephen Skinner, M.D. 1654.
Nathaniel Hodges. Trinity Coll., Camb. M.D. 1659.
Vindiciae Medicinae et Medicorum, 1660.
Λοιμολογια, *sive Pestis nuperae apud Populum Londinensium grassantis Narratio Historica*. 8. Lond. 1672.
A Collection of . . . Pieces relating to the last Plague in 1665.
An Account of the first rise, progress, symptoms, and cure of the Plague.
Edward Harding, E-L.R.C.P. 1661.
Charles Vermuyden, L.R.C.P. 1662.
John Locke, 1632–1704.
Robert Hooke, 1635–1703.
Thomas Willis, M.D. 1660. See p. 59.
Richard Lower, M.D. 1665. See p. 66.
Francis Eedes, M.D. 1674.
John Master, M.D. 1672.
Andrew Griffiths, M.D. Cantab. 1686.
John Ward, M.A. 1629–1681. Vicar of Stratford-on-Avon.
John Freind, 1675–1728.
Robert Lovell, 1650. Author, †1690.
Samuel Crop, M.B. 1703.
John Urry, *c.* 1710.
John Parsons, 1742–85.
Sir Joseph Banks, 1743–1820.
Matthew Lee, 1695–1755.
Sir Christopher Pegge, 1765–1822.
Sir H. Halford, 1766–1844.
John Kidd, 1775–1851.
William Herbert, 1778–1847. Botanist.
William Buckland, 1784–1856.
Richard Simmons, 1782–1846. M.D. 1809. Collector of Minerals.
Sir Henry W. Acland, 1815–1900.

TRINITY COLLEGE, 1555

Thomas Allen, 1542–1632.
Thomas Lodge, M.D. 1602. Sa yrist.
Thomas Wharton, M.D. 1647.
Francis Potter, 1594–1678.
Nathanael Highmore, 1613–84–5.
George Bathurst, 1620–44. Fellow.
Ralph Bathurst, 1630–1704. M.D. 1654. President.
John Aubrey, 1626–97.
John Evelyn, 1698.
John Clark, Hon. F.R.C.P. 1664.
John Deighton, E-L.R.C.P. 1665.
John Wills, 1669.
John Luff, 1674. Anat. Lecturer.
Stephen Fry, 1686. Anat. Lecturer.
John Etwall, E–L.R.C.P. 1688.
Salisbury Cade, M.D. 1691.
Denton Nicholas, M.D. 1694.
James Adey Ogle, M.D. 1792–1857.

ST. JOHN'S COLLEGE, 1555

William Clarkson, M.D. 1590.
Matthew Gwinne, M.D. 1593.
Sir William Paddy, 1501. Court physician to K. James, whose views as to tobacco he shared. Gave a Medical library to St. John's.
Robert Fludd, 1591. M.D. from Ch. Ch. 1605.
Richard Andrews, M.D. 1608.
John Speed, physician. Hero of a drinking contest with Admiral Van Tromp, which left the latter no better than 'a drunkeing greazy Dutchman' to be carried away unconscious to his rooms (Mallet).
Edmund Gayton, 1608–1666.
Author of *Pleasant Notes upon Don Quixote*, 1654, his best work: *Hymnus de febribus* 1655; *Art of Longevity* 1659, based on diet of Avicenna and Razes; *Religion of a Physician* 1663, 'very rare and very poor' (Osler); a Broadside by him in the Bodleian; two *Ballads upon Mr. J. Bobart's Yew-men of the Guards to the Physick Garden* 1662.
William How, 1619–1656. Botanist.
William Conyers, M.D. 1653.
Humphrey Brooke, M.D. 1659.
A Conservatory of Health. 12mo. London 1650.
John Case. Physician. M.D. 1589–†1600.
Richard Torlesse, M.D. 1666.
William Leving, M.D. President, 1673.
William Warner, M.D. 1676.
William Sherard, 1658–1728. Botanist.
William Gibbons, M.D. 1683. 'Mirmillo' in Garth's *Dispensary*.

Richard Adams, M.D. 1684. Principal of Magdalen Hall.
Robert James, M.D. 1705–76. Originator of James's Powder.
A Medical Dictionary with a history of Drugs, 1743.
Dissertation on Fevers, 1748.
Charles Tadlow. Anatomy Lecturer, 1716.

JESUS COLLEGE, 1571

John Powell, E–L.R.C.P. 1690.
John Jones, licenced *ad practicandum*, 1678.
The Mysteries of Opium revealed, 1700.
Nathan Alcock, M.D. Leyden 1741, Oxon. 1749. Anat. Lecturer.

MAGDALEN HALL, 1602–1874

Jonathan Goddard, *c.* 1612–1675. M.D. 1643.
Observations concerning the nature and similar parts of a Tree. Fol. Lond. 1664.
The Fruit Tree's Secrets. 4to. Lond. 1664.
A Discourse concerning Physick and the many Abuses thereof by Apothecaries. 8vo. Lond. 1668.
Discourse setting forth the unhappy condition of the Practice of Physic in London. 4to. Lond. 1669.
Walter Charleton, M.D. 1642-3. See p. 165.
William Denton, M.D. 1634.
John Skinner, M.D. 1647.
Samuel Thomson, M.D. 1648.
Robert Plot, 1640–1696. See p. 321.
Edward Tyson, 1650–1708. M.D. 1680. 'Carus' in Garth's *Dispensary*. See p. 170.
Thomas Sydenham, matric. 1643, M.D. Cantab. 1676. Also of All Souls.
Samuel Morris, M.D. 1670.
Richard Morton, M.D. 1670.
Geo. Shaw, 1751–1813.

NEW INN HALL

John Pechey, L.R.C.P. 1684.
Claver Morris, M.D. 1691.

WADHAM COLLEGE, 1612

John Wilkins, 1614–1672. Warden.
Seth Ward, 1617–1689. From Sidney Sussex College.
Christopher Wren, 1632–1723.
John Mayow, 1643–1679.
Walter Stonehouse, 1597–1655. Fellow of Magdalen.

Thomas Sydenham, joined the College in 1643. Also of Magd. Hall.
George Joyliffe, M.A. 1643.
Sir Richard Napier, M.D. 1642. Astrologer.
Thomas Jameson, M.D. 1668.
Artificial Embellishments; or Art's best Directions how to preserve Beauty or procure it. Oxford, 1665.
Robert Pitt, M.D. 1681.
William Gould, M.D. 1687. 'Umbra' in Garth's *Dispensary.*
Humphrey Hody, 1660–1706.
W. Austin, M.D. 1783. Physician to Radcliffe Infirmary.

PEMBROKE COLLEGE, 1624

(BROADGATES HALL, Before 1382–1624)

Thomas Hall, M.D. 1581.
William Clarkson, M.D. 1590.
Edward Dawson, M.D. 1633.
Sir Thomas Browne, M.D. 1637.
Sir Thomas Clayton, M.D. 1611. Master of Pembroke.
Sir Thomas Clayton, M.D. 1639. Principal. Regius Prof.
Elisha Coysh, M.D. 1657.
William Quartermaine, B.N.C., M.D. 1657.
Nicholas Lamy, M.D. *c.* 1631.
Robert Stapley, *c.* 1690.
George Joyliffe, *c.* 1639.
John Wyberd, M.D. 1654.
John Martyn, L.R.C.P. 1683.
Francis Upton, L.R.C.P. 1689.
Robert Hooper, 1773–1835. Pathologist.
George Poulett Thomson afterwards **Scrope**, 1797–1876.

WORCESTER COLLEGE, 1714

Robert Bourne, *c.* 1770–1829. See p. 192.

HERTFORD COLLEGE, 1740

Grant D. Yeats, 1773–1836.

MISCELLANEOUS AND UNATTACHED

John Goodyer, 1597–1664. Botanist.
William Flud, M.D. of Oxford.
Alexander Rhead, M.D. 1620.

John Hody, M.D. Montpelier, incorp. 1634.
Henry Hawley, M.D. Oxon, father of R. H. of Merton.
Percival Willoughby. In practice in Derby, 1640.
Adrian Metcalfe, M.D. 1645.
Hon. Robert Boyle, M.D. 1665.
Thomas Browne, E–L.R.C.P. 1662.
Edward Deantry, Hon. F.R.C.P. 1664.
Edward Hulse, M.D. Leyden 1668–70, incorp. 1670. F.R.C.P.
Sir Theodore Colladon, M.D. 1670.
John Castle, native of Oxfordshire, E–L.R.C.P. 1678–9.
Walter Needham, Trin. Coll., Camb. See p. 134.
William Smith. Born at Churchill, co. Oxon.

INDEX

The index does not include the names in the Appendices to this volume.

"*Nunc scripsi totum: sic est: et sit tibi notum*"
E thes. Madan.