INTRODUCTORY LECTURE

TO

A COURSE OF LECTURES

UPON

COMPARATIVE ANATOMY,

AND

THE DISEASES OF DOMESTIC ANIMALS.

DELIVERED NOVEMBER 3, 1813.

BY JAMES MEASE, M. D.

SECRETARY TO THE PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE, MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, AND HONORARY MEMBER OF THE BATH AND WEST OF ENGLAND SOCIETY.

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1814.

TO

ROBERTS VAUX, AND REUBEN HAINES,

AND THE

GENTLEMEN

WHO ATTENDED HIS FIRST COURSE OF LECTURES,

ON

COMPARATIVE ANATOMY,

AND

THE DISEASES OF DOMESTIC ANIMALS,

THIS INTRODUCTORY LECTURE

IS DEDICATED,

BY THE AUTHOR.

Philad. August 10, 1814.

At a stated meeting of the Philadelphia Society for promoting Agriculture, July 12th, 1814, the following resolution was on motion unanimously passed.

The society having been long impressed with the importance of veterinary knowledge, and having offered a premium for the best essay thereon, are with great satisfaction informed of the merit of a course of lectures, delivered last winter, by Dr. Mease, on "comparative anatomy and the diseases of domestic animals;" whereupon resolved,

That Dr. Mease be requested by the president to permit the introductory lecture, on the subject mentioned, to be printed in the third volume of the Memoirs of the Society.

Belmont, July 14, 1814.

Sir,

Permit me to request a compliance with the wishes of the Society, expressed in the enclosed resolution, by your publishing your lecture, and thereby contributing to one of the great objects our society have long had in view;—the encouraging every endeavour to promulgate and promote veterinary knowledge.

I am, very truly, yours,

RICHARD PETERS.

DR. JAMES MEASE.

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GENTLEMEN,

A conviction of the great necessity at present of a course of lectures upon COMPARATIVE ANATOMY, and the DISEASES of DOMESTIC ANIMALS, has induced me to undertake to deliver them. I had indeed contemplated a course on the last subject, several years since, but was prevented from commencing it, by circumstances that no longer exist. The diffusion of knowledge upon the subject of my intended course, although at all times desirable, from mere motives of humanity, as connected with the means of increasing the comfort of a class of animals over which Providence has made us masters, who labour for us, feed, and clothe us; is particularly important, if we reflect upon the value of some of those animals at the present time, when a laudable spirit of improvement induces agricultural gentlemen to stock their farms at a considerable expense, with foreign breeds, or to take great pains in originating new stock at home, for the purpose of increasing the quantity and quality of flesh, milk, or fleece; and when the employment of a large body of ca-

valry is rendered necessary, by the war in which the United States are engaged.—But independently of this latter consideration, which is of a public nature, and certainly of sufficient consequence to claim the notice of government; if the noble animal, the horse, considered in a domestic view, were alone the object of our attention, the importance and high value set upon him, when his powers for either speed or draught, or the beauty of his form have been greatly improved, would be an inducement sufficiently great to authorise a course of instruction upon his structure, diseases, and the means of preserving his health.

As it is very probable that a part of my hearers are entirely unacquainted with the subject upon which I am to lecture, and even with the meaning of the words "*Comparative Anatomy*," it is due to the importance of this branch of knowledge to explain them, to show what attention the study has excited in the old world, to enumerate the names of the distinguished characters who have cultivated it, and to lay before you the very great benefits derived from it, in elucidating the structure and functions of the human body, and explaining the doctrines of its physiology: in aiding the *Painter, Sculptor,* and *Engraver,* and lastly, to point out its intimate connexion with VETERINARY MEDICINE.

By the term "Comparative Anatomy" is understood, the investigation of the structure of brute animals; and its objects are to demonstrate the diversity that exists among similar organs, and analogous parts, and to compare them with one another, and with man.

It is reasonable to suppose that this study must have attracted the attention of mankind in very early times. The slaughter of animals for food, the preparation of the offerings on the altar by the priest, and the custom of deducing auguries from the state of the entrails, would naturally lead to some knowledge of the structure and appearances of the parts: we know likewise, from the book of Exodus, that names were even attached to them, and the parts declar-

ed to be clean, and unclean, are particularly designated. But Greece first distinguished itself among nations, in the study of anatomy, as a science, as it did in the study and practice of the fine arts; and Homer,[1] by the familiar use of several anatomical terms, and the mention of certain parts of the body, and their connexion with each other, shows that some knowledge of the structure of the human frame was then extant. Pythagoras, after an extensive tour to India and Egypt, brought to his native country, the knowledge on all subjects to be acquired at that time, and of anatomy among others, and disseminated it among his countrymen, with great ardour. His pupils, Alcmeon and Empedocles, but more especially Democritus of Abdera, extended the fame of their master, and raised themselves to deserved eminence among the philosophers of that day. Upon the supposition that all the disorders of the human body proceeded from bile, he endeavoured to discover its origin and course, and by the ardour of his pursuits, and consequent frequent seclusion from the public, laboured under the imputation of insanity, until the sage Hippocrates, who was sent to visit him, discovered his retreat, and while he undeceived his fellow citizens, with respect to his mental derangement, did ample justice to his industry and merits.

Aristotle, however, was the first scientific anatomist: he enjoyed particular advantages under the patronage of his pupil, Alexander the Great, who granted him a very large sum of money, to purchase animals for dissection, and to defray the expenses attending his studies. He did honour to the munificence of his royal patron, by his attention to, and improvement of the subject: his regular anatomical works have been lost, but he has given much comparative anatomy in the first part of his treatise on animals, and he has formed an anatomical nomenclature, which is in part still received. Without dwelling on the labours of Diocles of Carystus, and of Praxagoras of Cos, I shall pass on to mention the

successors of Aristotle, viz. Erasistratus his grandson, and Herophilus, who having been protected and employed by the Ptolemies, sustained the character of the school of Alexandria so well, that, during their lives, and for a long time after, it continued the chief place of resort for students, from all nations.

About the year 160 of the Christian account, Galen, a name familiar to the whole world, settled at Rome, and contributed very largely to the advancement of medical science generally, and particularly of anatomy, by his talents, industry in experiments and dissections, and by collecting together all that had been previously written on the subject by the Greek teachers.[2] After his days we have no account of any addition having been made to the previous knowledge, in either human or comparative anatomy, for a very long time. To this suspension of the labours of science, the decay and division of the Roman empire, in the close of the second century, greatly contributed; but the finishing stroke to all liberal studies or mental improvement, in the western parts of Europe, was given by the irruption of the Barbarian tribes of Germany and Scythia, first into Rome, in 410, under Alaric, and finally over the whole of Italy, Gaul, and Spain, at different times afterwards, until the year 476, when the Roman empire was finally extinguished in the West.

A long interval of midnight darkness in science of every kind, succeeded in the western parts of Europe. The Saracens were at length, in their turn, destined to be the rulers of the former seat of learning and of the liberal arts in the East, and for a long time they did little except destroy. The burning of the library of Alexandria will forever remain a splendid monument of their fanatic barbarity.[3] Their successors were fortunately better disposed, and encouraged the arts,[4] and after the subversion of the Visigoths in Spain, Arabian learning was introduced by them into that country, (anno 710,) where it maintained its ground, and spread through

western Europe, until the æra when the genuine spirit for improvement and for science began to appear in the world. A worse enemy to science than even the Saracens originally had been, succeeded in the Turks, who from their first descent on the great theatre of the world, from the mountainous regions of Taurus and Imaus, to the present day, have uniformly evinced a settled hostility to improvement and innovation of any kind. In 1055 they pillaged Bagdad, and the ruin of that seat of splendor and of learning, was completed by the Moguls in 1258. In the progress of their victories, but not until after a long siege, the Turks became masters of Constantinople, (the last remnant of the Roman empire,) in the year 1453, and thus became the unwilling instruments of the diffusion of learning and the arts throughout Europe: for the philosophers who had made that city their place of residence, after having been driven from Rome, fled to the Italian states for protection, bringing with them their own works, and those of the Greek authors in their original dress, and fortunately found the people eager to receive the information they had to communicate; and, what was of most consequence, the different rulers of the country were disposed to afford them all the protection and support they desired. This spirit for the liberal arts had been revived, in part, in consequence of the acquaintance which the crusaders had made with Arabian learning, during their chivalrous expeditions to the holy land; and the means of gratifying it had been already obtained, by the discovery of the mode of making paper, in the eleventh century, and had been powerfully promoted by that of the precious art of printing, in the year 1445, which facilitated the multiplication of copies of books.

Europe thus enriched and roused made some progress in medical literature, and in anatomy, but it was slow; the popular prejudices, nay the abhorrence against touching dead bodies, and much more against their patient examination, long continued in almost all countries except Italy, and the

consequence was, that Italy was the country in which human and comparative anatomy was for a long time chiefly taught.

Upon the general diffusion of the spirit of inquiry in Europe, which continued to take place, the study of human and comparative anatomy kept equal pace; for nearly all those eminent men who attended to one branch, were zealous in the prosecution of the other. But the sixteenth century may be considered as the æra whence we must date the revival of anatomical knowledge in general; during which, we find among others that might be mentioned, the names of Vesalius, Fallopius, Eustachius, and Fabricius,[5] prominent as teachers. The science was prosecuted with additional spirit in the succeeding century, after the doctrine of the circulation of the blood had been taught by Harvey in London; and more especially after his publication of the great discovery in 1628, when a new field was opened, from which both branches of our subject derived important benefits, by the new stimulus to experiment which it excited, and by enabling medical men to illustrate many points, before inexplicable, relative to the animal economy. In the course of the 17th, and the early part of the 18th century, the world was favoured with the labours of Grew,[6] Willis,[7] Tyson,[8] Collins,[9] Lower,[10] Keill, and others in England; Peyer,[11] in Switzerland; De Graaf,[12] Leewenhoek,[13] Blazius,[14] Swammerdam,[15] Ruysch,[16] Steno, and others in Germany and the Netherlands; Rudbeck[17] in Sweden; and Bartholine[18] in Denmark; Bellini, Valisneri, Malphigi,[19] and Redi, in Italy; Casserius,[20] Perrault, G. J. Duverney,[21] and others, in France. The collection of facts made by the foregoing anatomists was great, no complete system however was formed, until about the middle and latter end of the last century, when the observations of preceding authors were arranged, and the science was prosecuted with new ardour. We were then favoured with the discoveries of D'Aubenton,[22] the friend and coadjutor of the Count de Buffon, in his great work on natural history, and Vic D'Azyr,[23] in

France; Camper[24] and Sandifort, in Holland; Pallas, in Russia; the illustrious Haller, professor at Gottingen; Scarpa and Camparetti, in Italy. In England, we are indebted to William and John Hunter, Hewson, Home, M'Cartney, A. Cooper, Townson, Haighton, Cruikshank, and others, and in Scotland, to the two Munros (1st and 2nd,) for the elucidation of the organs of various animals, and for very considerable additions to our stock of knowledge on the subject. Lastly, Cuvier,[25] of Paris, and Blumenbach,[26] of Gottingen, may justly be considered as the most eminent contributors to comparative anatomy, in modern times.

It would be tedious to detail the particular animals and subjects, to the investigation and dissection of which, these illustrious men devoted their attention; it may be therefore only necessary to say, that scarcely any part of the animal creation, from the colossal elephant to the crawling caterpillar, escaped their attention; and that from all of their labours, instruction of the most useful kind, and from some of them, of the most pleasing nature, has been derived.

I shall now proceed to enumerate the advantages that have resulted to mankind from the prosecution of comparative anatomy.

Every well read medical man, who, not content with knowing merely the present state of the science of medicine and the art of surgery, has investigated the progress of their improvement, must be acquainted with the essential services which have been rendered to both professions by comparative anatomy; yet as some of my hearers are not expected to be informed on this subject, it is due to the study, and may not prove uninteresting to them, to give a short account of the benefits which have resulted from it.

1. The study of comparative anatomy opens to the mind a source of the highest satisfaction and interest, and tends most powerfully to give exalted ideas of the wisdom of the Author of all existence. In the words of the eloquent Herder, it "gives man a *clew* to himself, which conducts him

through the great labyrinth of living creation; and if we can say of any method, that through it our understanding ventures to scrutinize the profound and comprehensive mind of God, it must be this."[27] From a very slight knowledge of the structure of the human frame, the royal psalmist was enabled to exclaim, "man is fearfully and wonderfully made," and had he been acquainted with the structure of the inferior order of animals, he would have found in them additional sources of wonder and of praise, from contemplating the infinite variety of modes in which the same functions are performed in different animals, and in tracing the contrivances and structure of the organs and general mechanism of their frames, which are so nicely adapted to their different economies and necessities, whether their residence be in air, in water, or on land.

2. In the early stages of society, this study materially promoted the knowledge of the structure of the human body: for owing to the invincible prejudices against human dissections, and the prevalence of the opinion that the handling of a dead body communicated a degree of moral pollution to the living, it was extremely difficult to procure human bodies for the purpose of examination, and injurious to the reputation of medical men to dissect them even if procured. The ancient physicians therefore were under the necessity of drawing their inferences with respect to the anatomy of the human body, and the uses of its various organs, from brute animals; and apes, probably from their external form more nearly than any other animal, resembling that of man, were the chief subjects of investigation; and we know from the disagreement of Galen's account of the structure of various parts of the body, with what has been ascertained by anatomists in later times, and from recent dissections of those animals, that it was from them his descriptions were chiefly taken.[28]

3. Upon various questions of physiology, which from their nature could not be ascertained in the human subject, this

study has rendered the most essential services. The deer, in the park of king Charles the first, with which he generously furnished Dr. Harvey, served to make some progress in the discovery of the process of the evolution of the fœtus; a subject that has since been greatly elucidated by De Graaf, Spalanzani, Dr. Haighton,[29] and Mr. Cruikshank.[30] By experiments on other animals, Dr. Harvey also ascertained, beyond contradiction, the circulation of the blood through the body, and its rotatory motion by the heart arteries and veins, so as to make many complete circuits round the body in twenty hours.[31]

4. It is to comparative anatomy we owe the discovery of the lymphatic system, and the certainty of the use it was intended to perform in the human body. The office of this admirable and curious system of vessels, is to absorb and convey back to the blood, all the decayed parts of the human body, (even bone itself,) and all those thin, pellucid fluids, that wander from the course of the circulation, that they may undergo new preparations, or be thrown entirely out of the body: and in the intestines, they perform the important office of conveying the nutritious and watery part of the food into the system. Hence they arise from every organ of the body. An opinion may be formed of the active power possessed by those apparently tender, and minute vessels, from considering the rapidity with which they transmit their contents: this has been satisfactorily ascertained by Mr. Cruikshank, to be at the rate of twenty feet in length, in one minute. His experiments were made upon dogs, and the well known facts of a peculiar smell in the urine, being perceived in less than one hour after eating asparagus and certain species of cabbage; and the increase of urine in the same space of time, after drinking certain mineral waters, lead us to suppose that the activity of the lacteals in man, is equally great.[32]

5. It is to this study we owe the discoveries of the celebrated Italian professor Spalanzani, Dr. Stevens, John Hun-

ter, and others, on the digestion of food in the human stomach, and in many other animals, about which process various erroneous theories had been previously entertained. The consideration of this process, as conducted in animals, with an examination of the admirable organs for the purpose, will form a very interesting part of our course.[33]

6. "Comparative anatomy becomes necessary in ascertaining the action of organs. All the functions have ceased long before the human body can be opened, and it is only in the inferior animals that we can presume to make experiments examining the movements of the different organs before the principle of life has escaped." It is chiefly in this field of inquiry, that we have obtained the correct knowledge which we now possess, of many of the animal functions.[34] Nor can the supposition be admitted, that this study savours of cruelty: every humane mind is shocked at the idea of wantonly giving pain to any animal; but when such pain is requisite to illustrate the animal physiology, the sacrifice is indispensable and justifiable. Without it, we might, in all probability, have been ignorant at this day of the sublime discovery of the circulation of the blood, and deprived of the important benefits resulting from it to mankind.

7. By comparing the internal organization of different animals, we are enabled to distinguish those parts which are common in the structure of every animal body, and essentially necessary for the performance of the vital functions; from such as are peculiar to certain animals, and exclusively subservient to their necessities, economy, or enjoyment. Thus when we find particular organs imperfectly developed in certain animals, or extracted[35] in some, and naturally wanting in a third, without any essential injury to life, we are then enabled to judge of the rank which these organs hold even in the human species: and by the circumstance of life being supported, and the functions of the body going on, after a cessation in the performance of certain functions, we are not only taught the propriety of attempting the sav-

ing of life, under circumstances which without such knowledge would have been deemed impossible; but we are induced to admire the wonderful kindness of Providence, in furnishing the system with resources, which enables it to survive after such serious privations, and outrages to the animal economy. We had long known that in the operation for aneurism, where a wounded artery is taken up, and completely divided at the elbow, or in the thigh, the limb below the part is supplied with blood by the inosculating branches given off from the larger artery, above the point of obstruction; but Mr. Astley Cooper, of London, has shown us, that even the carotid, femoral, and brachial arteries of the dog, in which the stoppage of circulation might naturally be supposed would be followed by the death of the animal, may be tied with impunity; nay, that the aorta of the same animal may be tied and divided without injury [redacted];[36] and hence we are taught the propriety of attempting the saving of a human life, by ligature, in case of a wound in the large arteries of the body, instead of amputating the limb. To the military surgeon, who is called upon suddenly to exert his skill, in cases of dreadful wounds, the inferences to be drawn from Mr. Cooper's experiments are invaluable.[37]

8. It was by the study of comparative anatomy that we have ascertained the cause why orans, apes and monkeys cannot speak. J. J. Rousseau, with the strangest inconsistency, while he laboured to perfect his system, by which human reason and the human powers were to attain the highest possible exaltation, absurdly wished to degrade man by assimilating his nature to that of brutes, and asserting that those animals had originally been endowed with the divine faculty of speech, but had lost it from disuse. Although the assertion or opinion was contradicted, by the negative fact, that no savage nation had been discovered without an artificial language, while herds of orans had been found, without any; yet no public refutation had ever been made, of the absurdity of the opinion, until after the year 1779, when

the excellent professor Camper of Holland, by dissecting the organs of voice in orans, apes and monkeys, demonstrated from their situation and structure, that no modulation of the voice, resembling human speech, can be produced in those creatures, because the air passing through the *rima Glottidis*, (or top of the windpipe,) is lost in two ventricles, or hollow bags in the neck, causing it to swell, and out of which the air is forced back, without any voice or melody, into the throat and mouth, through a slit or hole at the root of the epiglottis.[38]

9. It is essential to the study of natural history: for anatomical structure is the only true basis of a natural classification of the animal kingdom. It was owing to his not being conversant with comparative anatomy, that the zoological arrangement of the celebrated Linnæus is so deficient, and to an opposite reason may be ascribed the admirable and comprehensive classification of the French naturalists.

10. An attention to this study has enabled us to explain the facts related by some travellers, the extraordinary nature of which had occasioned an unbelief in them, and the imputation of a disregard to truth.—I allude to the narratives of the surprising power of the camel to take in at one time a sufficient quantity of water to last four or five days, and thereby to become capable of inhabiting the parching deserts of Arabia; and of the practice of the people of a caravan, of opening those animals when they die, in order to obtain the water from their stomachs.—The examination of the stomach of this useful animal, shows how it is enabled to retain the water, and that it is pure enough to be drank when taken from his body, by men whose thirst is great.[39]

11. But while comparative anatomy enables us to do justice to travellers, it also furnishes us with the means of putting to the test the truth of various stories of the vulgar, some of which have been unaccountably admitted by men of science.[40] Such, among others that might be mentioned,

is that of the submersion of swallows in rivers, creeks, or ponds, during the winter, which has long been implicitly believed.[41]

12. A knowledge of the principles of comparative anatomy are as essential to the landscape painter, sculptor and engraver, as the knowledge of the human anatomy is to the painter of mankind. An artist may indeed depict upon canvass an animal, which without an inscription under it, may be known to be of the species intended to be represented; but unless he is acquainted with the relative and natural proportions and forms, which modern improvements have shown are connected with not only beauty of person but profit, he will not reach that perfection in his portraits or delineations, nor produce that effect by his labours, which is at all times desirable. It was this knowledge that has rendered the engraved figures of the horse, by Stubbs, so much and so justly admired, although done so many years since, (1766, London;) and which contributed greatly to the reputation of the painter Adrian Vandervelde,[42] and a few others; and although a minute knowledge of the anatomy of all animals is not expected from an artist, yet an acquaintance with the structure and mechanism, peculiar to each, is essentially necessary to enable him to delineate the muscles, and their action in various positions of the body, and to prevent the commission of those gross absurdities we sometimes see in statues and paintings, such as a walking horse represented with two diametric opposite feet in an elevated position.[43]

13. Comparative anatomy is as essential to the successful practice of veterinary medicine, as a knowledge of the structure of the human body is to the cure of the diseases and accidents incident to mankind. It is owing to a want of this knowledge of their structure, that our useful domestic animals are so mismanaged by farriers, and pretenders to animal medicine; and that diseases, trivial in their nature, or that slight surgical cases often end in death, or lameness,

which might have been easily prevented by a scientific treatment.

The aid which comparative anatomy is capable of affording to veterinary medicine, must be evident to every one who reflects a moment upon the subject.

"The veterinary art is a practical application of scientific principles, to the preservation of the health of domestic animals, and to the cure of their diseases, in the same manner as the art of medicine applies to the health and preservation of man: and the science on which this art is grounded, and which it requires for its perfect exercise, comprises the natural history, anatomy, physiology, and pathology of those animals, together with such portions of the vegetable and mineral kingdoms as are connected with them, either in the way of aliment or remedy.

"To practice this art with certainty, it is necessary to make a special and accurate investigation of the economy of the animal itself, and to observe minutely the different effects that the different subjects of the materia medica might have upon it, and to repeat those inquiries with the same exactness, for every animal that is the subject of the art; and moreover, to superadd such knowledge of the human anatomy, as may be of use in the way of comparison."[44] A plan of study like this, requires a leisure and education, far beyond the capacities and circumstances of those to whom the care of our animals has been hitherto abandoned, and yet such is the importance of the art, that a course of study as long and as circumstantial as that just detailed, is indispensable for those who would fully, fairly, and honourably engage in the exercise of it; nay, from the inability of the sick animal to describe his feelings, and to point out the seat of his pain, his pathology must necessarily be uncertain, and consequently we might suppose, that a greater degree of judgment and penetration are requisite for the physician of animals than of mankind. What then must be the feelings

of any humane mind, to have a favourite horse, which may have greatly contributed to our comfort, health or pleasure, committed to the care of the most ignorant smith or farrier, whose stock of knowledge may consist in knowing how to ruin the poor animal's foot, by bad shoeing, or in giving him when sick, the same drench from a horn, whether the disease be pleurisy or colic? This regret will necessarily continue so long as veterinary medicine is not studied scientifically, or until medical gentlemen cease to think it beneath their notice; and I may add, until the owners of fine horses will by pecuniary rewards, encourage men of respectability and knowledge to engage in its practice. Further, it is a truth, that nature, amidst the infinite variety in structure, seems to have fashioned all the living creatures on our earth after one grand model of organization: this is more especially the case with those composing the extensive class mammalia, of which man is the head.

The bones, the muscles, the vessels, the nerves, the organs that prepare and secrete the various fluids of the body, and those of the different senses, as of seeing, hearing, smelling and tasting, seem to be substantially the same, except as regards some difference in form, size and position, arising from the peculiar wants of each animal.

The diseases of mankind and of some animals, particularly the horse, are moreover very similar. Independently of the various accidents requiring the aid of surgery, such as wounds and fractures of bones; the horse is also subject to fever, pleurisy, dropsy in the brain, severe catarrh, violent colics, dysury or difficulty in staling, diabetes or a preternatural flow of urine, various kinds of worms, epilepsy, asthma, locked jaw, and other complaints: with the locked jaw, many horses are carried off in this city every year.

The Goitre or swelled neck, which is so prevalent a complaint among the inhabitants of Switzerland, of Thibet, and other countries of the old world, and also in the new frontier settlements of the United States, attacks sheep and calves

in this country, and dogs in Switzerland according to Mr. Coxe. From my inquiries into this complaint, as it exists in the United States, I have ascertained that it invariably disappears when the land is well cultivated, and drained. But the fact is far otherwise in the other quarters of the globe; there, it seems to be indissolubly connected with the climate and soil.

Calves are also subject to the croup or hives,[45] and dogs and hogs to inveterate cutaneous eruptions.

Dr. Sims, president of the Medical Society of London, says he knows the mange in dogs and cats will give the itch, and that of two sorts, the one being evidently larger than the other;[46] and a friend of mine was affected with a large pustule, similar to the chicken pock, from touching his face after handling an imported merino sheep, at the time the animal was affected with the disease called by the French, claveau, or sheep-pock. Poultry too have their peculiar diseases, as the gaps in fowls,[47] and dropsy in the craws of turkeys.

If we consider the present state of animal medicine in this country, under its appellation of farriery, we see it in as deplorable a situation, as was the art of medicine, during the barbarous ages, when the gross ignorance of its professors brought disgrace upon the art itself, and when many diseases, which now yield readily to judicious treatment, raged without controul; yet that the veterinary art, like human medicine, in the hands of a judicious person, is raised to respect, we may see by the example of ancient times, and by the present example of several nations of Europe. If we look into ancient history, we find that before the downfall of the Roman empire, which crushed in its ruins all arts and sciences, veterinary medicine was esteemed among the most important objects, and worthy the consideration of an enquiring mind. Connected on the one hand with human medicine, and on the other with agriculture, it both enlarged the stock of human knowledge, and improved an important

branch of rural economy.[48] The venerable Hippocrates wrote a treatise upon the subject.—In Carthage, Mago composed an elaborate work on rural and veterinary medicine. —Columella, who lived about the fiftieth year of the Christian account, devoted four books, out of twelve on husbandry in general, to veterinary medicine. Cato, Varro, Pliny, and Vegetius, (A. C. 300,) also laboured to serve veterinary medicine.—Indeed I find from my researches on this subject, that the course of human and animal medicine proceeded together, until they both fell at the irruption of ignorance and barbarity into Europe, in the third and fourth centuries; but at the revival of knowledge, and of a spirit of inquiry, while the intrinsic value of the life of man animated those labours which have advanced human medicine to its present state of perfection, it was the undeserved lot of veterinary medicine to be excluded from the asylum of the sciences, and to be left to the undisturbed possession of the most illiterate and obstinate of men.—To withdraw it from its obscurity, and to restore it to that rank among the arts and sciences which it was its right to hold, was a merit reserved to France. So long back as the beginning of the sixteenth century, Ruellius compiled by order of Francis the first, a large assemblage of veterinary matter, which he translated into Latin, and published in folio, in the most splendid style, at the expense of his king. Afterwards, the government of the same country, under Lewis the fourteenth, formed the first establishment for studying the diseases of animals; and in the year 1762, a regular school was founded at Lyons, in France, for the study and improvement of veterinary science, with every convenience for that purpose; apartments for dissections, with a botanic garden, and professors in chemistry and materia medica, and others to teach the anatomical structure of animals in general; with the nature and cure of the diseases incidental to them, that thereby the whole nation might be provided with skilful farriers.[49] This shortly after gave rise to a similar one near Paris, and

at present veterinary schools are as regularly organized throughout France, as schools for arts and sciences. The celebrated D'Aubenton, the friend of the count de Buffon, presided over the school at Charenton, and afterwards at Rambouillet, on the removal of the national farm to that place. All these establishments being directed by men of zeal and science, and set on foot and supported by government, gave a degree of respectability unknown before to the study, and so completely removed all former prejudices against it, that it soon afterwards became very generally cultivated by people of education throughout the kingdom.

The example set by France was soon followed in Vienna by Maria Theresa, and her successor Joseph the second; by Denmark, Sweden, and Prussia; and last of all England.—The veterinary college was established in London in the year 1790; and 1500 pounds sterling are annually granted by government for its support. No person is permitted to offer as a candidate for the post of veterinary surgeon in the army, without attending a stated time, the lectures and demonstrations of the professor, and undergoing an examination, conducted by some of the most eminent medical and surgical characters in London, who from patriotic motives take on themselves that trouble. The professor of the college is Edward Coleman, a regular bred surgeon. The Dublin society, which is liberally endowed by the government of that country, and which has done so much for the improvement of Ireland, has also established a veterinary professorship, and a regular bred physician (Dr. Peel) gives lectures on the subject.

It remains for this country, in which the spirit for improvement in stock of every kind is so visibly increasing, and the value of which is enhanced by the high price and the growing demand for some of them; to follow those examples; and by advancing the art to a height as yet unattained, to make it amends for the neglect we have hitherto shown it. Indeed I am persuaded that in a short time the

public attention will be called to the subject, and that men of education will think it no derogation from their medical character, to become acquainted with the diseases of cattle, or to lend their aid in the removal of them when required; and thus rescue our useful animals from the unqualified hands to whose care they must otherwise, as at present, from necessity be committed.

A distinction must be made between veterinary medicine and farriery. The first is founded upon science, whereas farriery disclaiming any connexion with science, proves itself a mere practice, habit or routine, and as it rests on nothing regular or solid, so it must ever be variable. The course of veterinary medicine and farriery are indeed the same, but with this difference, that the former condescends to admit a guide, while the latter prefers to ramble at risk and hazard. Were their objects any way different, farriery would have a plea for rejecting the assistance of veterinary science, founded on the peculiarity of its own object. But they are strictly the same, so that the only alternative might be in the superior excellence of the means by which it endeavours to acquire it. But we know that farriery pretends to no such means, that its practice is a collection of prescriptions and operations, without rule or precision, communicable to any body, in the form of a pamphlet. With this view of the subject, how is it possible that we can sacrifice so much of our common prudence, as to give to it any portion of that confidence which medicine itself is only capable of exacting from us, in proportion as it exhibits a quite opposite character.[50]

Such being the facts with respect to the knowledge required for the veterinary practitioner, and such the distinction between veterinary science and farriery, let us inquire into the inducements and necessity that exist for acquiring the knowledge of this branch of the medical profession.

1. The importance of the subject.

The argument derived from this source rests on the *value*

of cattle, as they are a source of public and private opulence; the means of our subsistence, and the instruments of our convenience and pleasure. This value, I repeat, is daily increasing, owing to the spirit for improvement now spreading through the United States, and to the high price of some stock, particularly fine woolled sheep, the demand for which even in the case of peace, will rapidly increase, from the mere increase of population.

2. The veterinary science offers a new and respectable means of employment to its professors.

It must be obvious, that to the medical practitioner in the country, the knowledge of the diseases of domestic animals will be the means of not only greatly extending the sphere of his utility, but his personal consideration, particularly with respect to the noble animal the horse, which always contributes so largely to our wants, which augments our enjoyments, and preserves our health, and is on many occasions an object of particular interest, from the circumstances of cost and individual merits. Will the young practitioner think that he derogates from his medical dignity by performing an act of humanity, and extending the sphere of his usefulness in any way connected with the exercise of his profession, especially in one that has engaged the attention and labour of some of the most eminent men, both of ancient and modern time, in Europe?—Will he derive no satisfaction—nay more, will he not add to his medical eclat, or obtain pecuniary recompense, from saving the life of a favourite racer of a sportsman, or the hackney of a wealthy invalid? Will he not think himself well employed in setting the leg of a horse of the hunter breed, so valuable for cavalry, and the carriage, and which, although no longer able in consequence of the accident to shine in the field, may still propagate his valuable race?

3. In the United States, an additional necessity for attention to improvement in our knowledge of veterinary medicine arises not only from the fact of our ignorance of the sub-

ject; but of our stock being liable as well to the common diseases to which they are from their nature exposed in all countries, as to peculiarly fatal diseases, the origin of which is involved in great obscurity.

In the states of South Carolina and Georgia, cattle brought from Europe, or from the interior, to the vicinity of the sea, are invariably attacked by a disease which is generally fatal. Cattle from the interior of the state of South Carolina, (but only a particular district,) so certainly disease all others with which they mix in their progress to the north, that I am told they are prohibited by the people of Virginia from passing through the state. The singularity of a fact attending the disease is, that the cattle alluded to have the power of infecting others with which they associate, while they themselves are in perfect health;[51] this I can assert from my own personal observation, in the year 1796. The particulars of this singular but fatal complaint I shall hereafter detail. Pennsylvania has to regret the loss of many thousand horses, by a disease which deserves no other name than yellow fever. I allude to the "*yellow water*," the symptoms and method of cure of which are totally different from the jaundice, yellows, or yellow water of Europe. This disease, I have reason to believe, is peculiar to North America.[52]

Europe furnishes no disease similar to the mortification in the limbs of the New England cattle;[53] nor to that peculiar salivation which has within the last twenty years attacked our horses, from eating second crop grass, particularly red clover,[54] and which from its debilitating effects, amounts to a disease. For the last four or five months, a new and very fatal disease has prevailed among the horses in the vicinity of New Brunswick, New Jersey.

4. It has already been shown, that by means of comparative anatomy we have ascertained the uses of various organs of the human body; and I now can add, that by an attention to the diseases of brute animals, the following advantages have also resulted to mankind.

1. We have been enabled to obtain precise ideas of the nature and seat of some serious diseases of the animal frame. Of the facts illustrative of this position, one of the most important to mankind is the knowledge of the cause of the local and general disease that sometimes succeeds the operation of bleeding in the arm.—For a long time the inflammation and suppuration beginning at the orifice made by the lancet, and the fever that ensued, were ascribed to a puncture of the tendon of the biceps muscle, or of the fascia of the arm, or of a nerve; by others these symptoms were supposed to originate from a bad habit, or from the introduction of some poison adhering to the lancet; but that great benefactor to medical science and to surgery, the late John Hunter, of London, having observed a similar accident to take place after the rough operation of bleeding horses in the neck, was led to ascribe the disease in both cases to the same cause, viz. the inflammation of the internal coat of the vein; and repeated dissections of inflamed veins, in which the operation had been performed, have proved the accuracy of his opinion. By the elucidation of the disease in question, Mr. Hunter has made us acquainted with the true cause and seat of a serious disease, and increased the obligations he has laid the medical world under by his other improvements in surgery and medicine.[55]

2. We have been indebted to the brute creation for one of the greatest temporal blessings, ever conferred upon mankind by Providence, in the discovery, that by conveying from a small pustule on the teats of the udder of a cow, a particle of matter, under the cuticle of a human subject, he was forever secured against that scourge of his existence, the small pox. If before this new source of happiness to mankind had been drawn from this useful animal, such an event as that just now mentioned, had been declared within the compass of possibility, the supposition would have been thought as improbable as that which I now venture to make, viz. that there is just reason to believe, as in the instance

here exhibited, the possibility that an incapacity of being acted upon by the canine virus in both man and animals, may be produced by exciting in them a previous disease.

In alluding to the disease sometimes produced by the bite of a rabid animal, I am sorry, very sorry to be obliged to declare, that it still continues to humble the pride of the medical profession. We know indeed its peculiarities and symptoms, and I myself have contributed to elucidate its pathology; but we also know its extreme fatality; and with regard to the means of cure, the learned and experienced physician is brought *at once* to the level of the most uninformed among the multitude; for, gentlemen, the disease has *never* been cured, and to this day, we are obliged to remain the helpless spectators of our patient's sufferings.[56]

But we must not despair; for I cannot think that Providence has determined to permit this disease to be *forever* incurable, and can any more powerful argument be adduced for investigating the diseases of domestic animals, than the knowledge of this fact, that all of us are every day of our lives liable to the attack of an awful and incurable malady from one of them, and who is the grateful companion, and faithful midnight defender of our houses and property? On this disease I shall deliver a particular lecture; and although I will not assert that I can point out a mode of cure, yet it will still be useful to investigate its pathology, for truth is always elicited by discussion.

3. An attention to the diseases of domestic animals is moreover of infinite importance to the practitioner of medicine in another point of view: for by them we are led sometimes to anticipate fatal epidemics, and of course are provided with the means of guarding against them. Homer tells us, that the plague that spread among the troops at the siege of Troy with great fury, first made its appearance among dogs and cats. In the plague that ravaged the island of Egina, to the south of Athens, about sixty years before the Trojan war, and of which Ovid has given an affecting account,[57] the

disease also first invaded dogs, then sheep and oxen, and lastly mankind. The pestilence epidemic among the cattle, in the year 576, at Rome, was succeeded the next year by a mortal plague.[58]

Dr. Sims of London, informs us, that the scarlet fever which prevailed with very great mortality in the city of London, in the year 1798, was preceded by a remarkable epidemic among cats, which is said to have killed myriads of them. In the following year an epidemic prevailed among the horses, which appeared to be a peripneumony, attended with a discharge from the nostrils like glanders. A similar mortality among cats prevailed in the months of May and June, in 1797, in Philadelphia, and destroyed thousands of them: and we all remember the pestilential fever that prevailed during the following autumn. Fish too, often experience the effects of a pestilential atmosphere, of which the history of the epidemics in 1793, 1794, and 1797, in our own country, afforded strong proofs.[59]

In other cases, epidemic diseases, or a general unhealthiness of the air, have been preceded or accompanied by a vast increase of insects and small animals. Of this, a number of instances might be mentioned, from Lord Bacon respecting the plague in London in 1666; from Diemerbroek on the same disease in Holland in 1635 and 1636; from Baddam, on the plague of Dantzick in 1709; and from the account of the epidemic at Bengal in 1771.

During the fever at Plymouth, Massachusetts, in 1633, the woods were filled with innumerable large flies, of the size of bees,[60] and during the pestilential time in the United States, between 1792 and 1801, various other insects abounded in different parts.[61] In particular, during the year 1798, grasshoppers overspread the country; and we know that that year was very unhealthy. In the year 1805 also, the grass was destroyed by them in the low counties of New Jersey; and the same year, such was the mortality in Salem county, that I was informed the courts could not proceed in

their business, owing to the death of many jurymen by malignant fevers. The same year the yellow fever prevailed in Philadelphia. Many more facts of a similar nature might be mentioned, were it necessary.

In the prosecution of my course, it is my intention to adopt the following plan:

1. I shall demonstrate the structure of different animals.
2. Explain the use and functions of the several parts, and compare them with those of the human body.
3. Point out the causes, nature and symptoms of diseases in our domestic animals, with the method of cure.
4. Give the natural history, operations and doses of medicines.

From this plan it will be seen, that farriery, strictly so called, or what relates to the fashionable operations on a horse, makes no part of the course. By thus separating the scientific from the merely mechanical part, the veterinarian science will be at once put in a condition to go hand in hand with human medicine; but it is proper to remark, that in respect to the noble animal just mentioned, the preservation of whose health is so essentially important to us, the proper method of shoeing shall be taught, and directions given for restoring to a natural state those hoofs which have been injured by a bad system having been previously followed; with ample instructions how to preserve his health in all situations in which he may be placed.

NOTES

TO THE

INTRODUCTORY LECTURE.

Note 1.

See the Iliad, book 5, verses 65 and 304. Book 11, verse 574: other passages might be referred to.

Note 2.

Galen was a native of Pergamus in Lesser Asia; and after travelling wherever instruction was to be obtained, settled at Rome. Although a pupil of the Alexandria school, he did not blindly adopt its dogmas. On the contrary, he thought and acted for himself; as a proof of which it may be mentioned, that he disproved by a simple and obvious experiment, the opinion it had long entertained and taught, (viz. that the arteries carried air,) by laying bare a branch of one of them, in a living animal, and dividing it between two ligatures.

Note 3.

This event, it is said, took place in the year 640 of Christ, and that for six months the Turks heated their numerous baths by the MSS collections of one thousand years. The fact is not credited by M. Renaudot or Gibbon. The writer upon whose authority it is given, is Abul Pharagius, "and the solitary report of a stranger, who wrote at the end of 600 years, on the confines of Media, is overbalanced by the silence of two annalists of a more early date, both christians, both natives of Egypt, and the most ancient of whom, Eutychius, has amply described the conquest of Alexandria." Gibbon's Decline, &c. chap. 51. Eutychius lived between

the years 876 and 950. Abul Pharagius was a native of Malatia, and died in 1286, at Aleppo, primate of the East. His work (Historia Dynast.) was translated from the Arabic, by the learned Pococke, into Latin, 1659.

Note 4.

Under the auspices of Almanzur, the second caliph, and his son Abdallah, Bagdad arose and flourished in the East, (762) and at once became the residence of the successors of Mahomet, and for a long time the seat of all the learning in that quarter of the world. The exertions of the learned men of that day, however, were confined to translating ancient Greek manuscripts: they made no dissections. Nevertheless the spirit of inquiry was thus kept up, and to their translations did the western part of Europe owe their acquaintance with the learning of the ancients.

Note 5.

Andrew Vesalius was born at Brussels about the year 1512 or 1514. He was educated at Louvain, and studied anatomy at Paris, under Sylvius. In 1537 he was appointed professor at Padua, by the republic of Venice. Charles the fifth called him to be his physician, and he was also physician to Philip the second. He published his celebrated work, *de Humani Corporis fabrica*, in 1543, when only about 30 years of age: in this he detected the anatomical errors of Galen, and proved that he had taken his descriptions from brutes. This service to truth raised him numerous enemies. He is said to have been forced to fly, or to banish himself, in consequence of having opened the body of a Spanish nobleman, supposed to be dead, but whose heart he found beating. Other causes are ascribed for the act, but whatever was the motive, he set out to visit Jerusalem with Rimini, general of the Venetian army, and returning at the invitation of the senate of Venice, to fill the chair at Padua, he was shipwrecked, and died on the island of Zante, in 1564.

Fallopius was born in 1490, and was a pupil of Vesalius, and afterwards professor at Pisa, and at Padua, where he

died in 1563. His works are contained in three volumes folio. He was deemed among the first physicians and anatomists of the age, and cultivated medicine and anatomy with great zeal.

Eustachius was contemporary with the two former, and taught at Rome. He was a zealous anatomist, and the passage from the ear to the mouth is called after him, the *Eustachian tube.*

Fabricius Ab Aquapendente, (the preceptor of Dr. Harvey,) was professor at Padua, which for nearly 200 years was the most respectable medical school on the continent of Europe. His works were collected and published in Latin, at Leipsic, by professor Bohn, in one volume folio, 1687, with numerous plates. Besides much human anatomy, he has treated largely of the organs of animals.

Note 6.

Nehemiah Grew, an ingenious and learned physician, was the son of Mr. Obadiah Grew, minister in Coventry. Having been sent to a foreign university for some years, he returned, after taking the degree of doctor of physic, to London, and was admitted to fellowship in the college of physicians in 1680. He obtained extensive practice; was elected a fellow of the royal society; and on the death of Mr. Oldenburg, succeeded to the office of secretary; in consequence of which he carried on the publication of the Philosophical Transactions for a considerable time. He also drew up a catalogue of the articles in the museum of the society, which he finished in folio, under the title of Museum Regalis Societatis. To this is generally appended a work entitled the "comparative anatomy of stomachs and guts," being several lectures read before the royal society in 1676. The work however by which Grew is most deservedly celebrated, is his anatomy of plants, in which he has shown a wonderful degree of ingenuity. This work is accompanied by very numerous and well executed engravings, and may be considered as one of the most curious performances of the seven-

teenth century. Another very celebrated publication of this author, is the *Cosmologia Sacra*, or "a discourse of the universe, as it is the creature and kingdom of God."—This was chiefly composed to demonstrate the truth and excellence of the sacred writings. Dr. Grew died in 1711. *Trans. Royal Soc. Lond. New Abrid. vol. 1. page 660.*

Note 7.

Thomas Willis was born in Wiltshire, in 1621, and died in 1675. He was an excellent anatomist, as he has proved in his *Anatome Cerebri.* He also wrote *Pathologia Cerebri*, and *De Anima Brutorum.* His works were published in London, 1679, in Latin, and 1681, in English.

Note 8.

Edward Tyson was a celebrated physician and anatomist of the seventeenth century, and a great contributor to the Philosophical Transactions, especially on subjects relative to natural history and comparative anatomy. He read lectures at Gresham college. Besides his numerous communications to the royal society, he published the following works: Phocæna, or an anatomy of a porpus, 1680. Carigueya seu Marsupiale Americanum, or the anatomy of an opossum, dissected at Gresham college, 1698, (of which an account is also inserted in the Philosophical Transactions.) The anatomy of a pigmy compared with a monkey, an ape, and man, 1699. *Trans. Royal Soc. Lond. New Abrid. vol. 2. page 448.*

Note 9.

Samuel Collins published "a system of anatomy of the body of man, beasts, birds, insects and plants," 2 volumes folio, 1685, with numerous plates, accurately representing the parts described: there is as much comparative as human anatomy in the work.

Note 10.

Richard Lower was one of the best anatomists of the seventeenth century. He was educated at Oxford, took his degree of M. D. in that University, and exercised his pro-

fession there for some years; but at length removed to London, where he got into extensive practice. He and Dr. King appear to have been the first who performed the experiment of the transfusion of blood. Besides several papers inserted in the Philosophical Transactions, he wrote a treatise, which procured him a great and deserved renown, *de corde, item de motu et colore sanguinis et chyli in eum transitu*, 1669. Among other things in this treatise, he pointed out the difference between arterial and venous blood, proving that the florid colour of the arterial blood is derived from the air. *Trans. Royal Soc. Lond. New Abrid. vol.* 1. *p.* 197.

Note 11.

John Conrad Peyer, M. D. rendered important services to the anatomists of his day, by his work entitled "Merycologia, sive de ruminantibus et ruminatione commentarius." Bazil, 1685.

Note 12.

Regner de Graaf was born at Shoonhoven, in 1641; he studied at Leyden under de le Boe Sylvius and Van Horne; but took his doctor's degree at Angers, and practiced at Delft. He was the author of the following anatomical treatises: *De succi pancreatici natura*, 1664, and 1666; *De virorum organis generationi inservientibus*, 1668; *De mulierum organis generationi inservientibus*, 1672; *Defensio partium genitalium*, 1673. These were collected into one 8vo volume, and reprinted after his death, under the title of *Opera Omnia*, Leyden, 1677. He died prematurely when only 32 years of age, in consequence, as is supposed, of great uneasiness of mind, brought on by the warm disputes in which he was involved with Swammerdam. In his tract on the pancreatic juice, he gives an account of a very difficult anatomical experiment which he performed on a living dog, opening the abdomen, and inserting a tube into the pancreatic duct, for the purpose of collecting the juice thereof; to which he, like Sylvius, ascribed acid properties. By his other writings he threw considerable light on the structure

and uses of the different parts belonging to the organs of generation in both sexes. *Trans. Royal Soc. New Abrid. vol. 1, page 241.*

De Graaf also rendered essential services to anatomy, by contriving convenient instruments for injecting vessels, the idea of which had however occurred before to others, and had even been carried into effect.

Note 13.

Anthony Van Leewenhoek, so highly celebrated for his curious microscopical observations, was a Dutch gentleman, of Delft in Holland. He was born in the year 1632, and died in 1723, aged 91 years. Leewenhoek was not, properly speaking, a man of letters, but from the extraordinary assiduity with which he pursued his researches into the minuter parts of nature, and the striking novelty of the curious observations which he published, his name is perhaps more frequently quoted by philosophers and naturalists, than that of any other writer of his time. This celebrated observer had the good fortune to live at a period, when the instrument by which he obtained his fame, was yet in some degree in its infancy. He applied himself with unremitted care to the grinding and polishing into a state of perfection, the simple lens, as being the best calculated for accurate investigation; and less liable to those deceptions which a composition of glasses sometimes occasions. So many, and so extraordinary were the discoveries of Leewenhoek, that he may be said to have brought into view a new world in science; and such was the general truth and fidelity of his observations and descriptions, and the respect paid to his communications, that he has been not unaptly complimented with the title of the Delphic Oracle, and yet he was not free from errors. *Trans. Royal Soc. Lond. New Abrid. vol. 2, page 66.*

His works were printed in Latin at Leyden, in 1722, and afterwards in Low Dutch; and have been translated into English by Samuel Hoole, London, 1800.

Note 14.

Blazius published in 1681, a volume in quarto, on the anatomy of various animals, with plates, entitled *Anatomia Animalium figuris variis illustrata.* He had previously published a smaller one in 1673, entitled *Anatome Hominis, Brutorumque variorum,* and other works.

Note 15.

John Swammerdam. This celebrated anatomist and natural historian was born at Amsterdam in 1637. His father was an apothecary in that city, and possessed a small cabinet of natural curiosities, by the frequent survey of which his son acquired a taste for those pursuits, by which he afterwards rendered himself so conspicuous. He studied at Leyden, where he took the degree of doctor in medicine, in 1667, but never engaged in the practice of physic, devoting himself wholly to anatomical and physiological inquiries, and to collecting and examining insects. Of this class of animated beings he investigated the generation, structure, and metamorphoses, with astonishing patience and assiduity, and described and elucidated the same in his admirable work entitled, "A general history of insects," first published in the Dutch language, in 1669, and afterwards translated into English. His Historia Ephemeræ appeared in 1675. These and other observations, relative to the natural history of insects were collected into a folio volume, (Dutch and Latin,) printed at Leyden in 1737, under the title of *Biblia Naturæ, sive historia insectorum.* This edition was superintended by Boerhave, who wrote the biographical memoirs which are prefixed to it; but the Latin translation was by Gaubius, professor of pathology at Leyden. Besides a tract on respiration, Swammerdam wrote another anatomical work, entitled, *Miraculum Naturæ seu uteri mulieris fabrica,* published in 1672. He appears to have been the first who practiced the art of injecting the blood vessels with wax; for his countryman and contemporary Ruysch learned this method of him.

His collection of insects and other objects belonging to

natural history, for which the Grand Duke of Florence once offered him 12000 florins, was sold for a very inconsiderable sum. *Trans. Royal Soc. Lond. New Abrid. vol.* 1. *p.* 190.

Swammerdam first employed hot wax to inject into the blood vessels.

Note 16.

Frederick Ruysch was born at theHague in 1638, studied at Leyden, and settled at Amsterdam, on being appointed professor of anatomy there. He formed a fine collection of anatomical preparations, and curiosities in natural history, which was purchased by Peter the Great, and sent to Petersburgh. He died in 1731, aged 91 years. Ruysch excelled in the art of injecting the blood vessels, and in filling the capillary vessels. He also employed maceration and erosion. He first discovered valves in the lymphatics, and contributed largely to the progress of anatomical knowledge by his labours. His works make four volumes quarto, enriched with a great number of plates.

Note 17.

Rudbeck was born in Sweden in 1630, was professor of physic in the university of Upsal, and founder of the botanic garden there.

Note 18.

Thomas Bartholine was the son of Caspar Bartholine, (a man of universal erudition,) he was at first made professor of mathematics, at Copenhagen, but afterwards filled the anatomical and medical chair in that university. In this situation he discovered the lymphatic vessels. He also traced the course of the thoracic duct in the human subject, confirming and elucidating Pecquet's description thereof. His anatomical and medical writings are very numerous. This celebrated man died in 1680, aged 64 years. *Philos. Trans. abridged, vol.* 1, *p.* 247.

Note 19.

Marcellus Malphigi was born in the year 1628, near Bologna, where he studied and graduated, M. D. in 1653. He

was elected to the professorship of the theory of medicine in that university, in 1656, but soon afterwards accepted of a similar appointment at Pisa, which situation he resigned at the end of three years, as the air of that place was prejudicial to his health. In 1662, he succeeded Castelli in the professorship of physic at Messina, where he remained four years, and then returned again to Bologna. Here he continued as a teacher of medicine in the highest repute, from 1666 to 1691, when he was invited to Rome, and appointed chief physician to Pope Innocent XII. He died at Rome of an apoplexy, in 1694. Malphigi's labours have thrown great light upon the structure and physiology of the human, brute, and vegetable creation; as may be seen by consulting his *Anatome Plantarum, Epistolæ Anatomicæ, Exercitationes Anatomicæ, Dissertationes de Utero, de Formatione pulli in ovo, de bombyce, &c.* These tracts were collected into two folio volumes, printed in London in 1686, under the title of *Malphigii opera Physica et Medica.* And in 1697 a third folio volume appeared, containing his *Opera Posthuma.* In his anatomical investigations he resorted to what in those days were new methods; viz. to maceration of the parts, injection of the vessels with coloured liquors, and the employment of magnifying glasses. By such means he was very successful in developing the intricate structure of some of the viscera in man and quadrupeds, as well as the minute fabric of insects and vegetables. He appears to have been the first who used the microscope for examining the circulation of the blood. *Trans. Royal Soc. Lond. New Ab. vol. 1, p. 190.*

Francis Redi was born at Arezzo, in 1626; studied physic at Pisa; was appointed physician to Ferdinand II, and afterwards to Cosmo III, for with the family of the Medici, literary and scientific merit led to preferment, and was sure of receiving its due tribute and reward. After his death, in 1698, Cosmo caused a medal to be struck to perpetuate his name. His letters (2 vols. 8vo) contain a variety of medi-

eal cases and remarks, with observations on anatomy, natural history, and experimental philosophy. His style is regarded by his countrymen as highly classical. His works amount to 7 volumes 4to. Hutchinson, vol. 1, p. 429.

Note 20.

Casserius wrote *De voce auditusque organis historia anatomica.* Paris, 1600, folio, with plates and cuts.

Note 21.

The title of one of Perrault's works is *OEuvres diverses de Phisique et de Mechanique, par Mess. C. & P. Perrault,* (a work of the latter, on fountains, having been published with those of his brother Claude,) Leyden, 1622, 2 vols. 4to.

Claude Perrault also wrote *Mémoires pour servir à l'histoire naturelle des animaux,* 1676, folio. He was an excellent architect, and designed the superb entrance of the Louvre. He died in 1687, aged 75. His life may be seen in Hutchinson's *Biographia Medica,* London, 1799.

G. J. Duverney, professor of anatomy, Paris. Haller says of him, "per sexaginta annos innumerabilia corpora incidit, et a praxi etiam medica abstinuit, ut inter mortuos viveret: multorum certe inventorum auctor, que aliis nominibus tribuuntur." Bibl. Anat. tom. 1, p. 626. Duverney was the human and comparative anatomical pioneer of the latter part of the 17th, and beginning of the 18th centuries.

Note 22.

D'Aubenton gave the anatomy of most of the animals, whose natural history was described by Buffon. Two editions were originally published of Buffon's work; one in 4to. and another in 12mo.—But later French and English editions have omitted the anatomical parts.

Note 23.

Vic D'Azyr, the son-in-law of D'Aubenton, was a very able human and comparative anatomist; he compiled the excellent system of comparative anatomy inserted in the *Nouvelle Encyclopedie Methodique* in which the anatomy of each animal is given separately; and published many papers

on the subject in the Memoirs of the French Academy. The anatomy of each animal is given separately, whereas Cuvier and Blumenbach treat the subject according to the organs and functions of the body.

Note 24.

An excellent account of Camper may be found in the New Edinburgh Encyclopædia, published by Edward Parker, Philadelphia.

Note 25.

Cuvier's work is entitled Leçons D'Anatomie Comparée; in 5 vols. 8vo. and a 6th of plates, Paris, 1805. The two first vols. have been translated in London by Mr. Ross under the direction of Mr. M'Cartney, lecturer on comparative anatomy. A larger work by Cuvier is shortly expected on the same subject.

Note 26.

Blumenbach's work is in one vol. 8vo. and forms an excellent compend of the science. It is well translated by Mr. Lawrence of London. The transactions of the royal society of London contain a great number of papers on comparative anatomy by various persons: a list of which is given in Dr. Thompson's excellent and entertaining "*History of the Royal Society from its institution to the end of the 18th century, London,* 1812," p. 112. The subjects being scientifically classed, by Dr. Thompson, a reference to it will save much unnecessary labour in searching the voluminous work of the society for a paper on comparative anatomy, or any other subject that he may wish to investigate. See also the article "Comparative Anatomy" in the Philadelphia edition of the New Edinburgh Encyclopædia for a list of authors and papers on our subject.

Note 27.

The title of Herder's profound work is "Outlines of the philosophy of the history of man, by John Godfrey Herder." An English translation was published by T. Churchill, London, 1800, 4to.

Note 28.

Anatomists might have reasonably concluded that Galen's anatomical descriptions had been taken from brutes; because, although he says, he had dissected many of the latter, yet he makes no mention of having examined human bodies: we know also that he expressly advises physicians to practice the dissections of apes and monkeys, and not to lose the opportunity of dissecting human subjects if by chance, the German war, or any other accident, they should find one; and had Galen ever dissected a human body, his vanity which is so conspicuous in his writings would not have permitted him to conceal the fact. Vesalius first discovered that Galen's description of the human body was formed from the dissection of brutes, by comparing his descriptions with the actual structure of the parts as laid open by the knife, and for this service to medicine and to truth he excited the enmity of all the medical professors, who had been promulgating Galen's mistatements, as truths.

Notes 29, 30.

Trans. Royal Soc. London, 1797.

Note 31.

Harvey's account of his discovery is entitled "*Exercitatio Anatomica de Cordis et sanguinis motu.*" It is an extraordinary circumstance that the circulation of the blood through the body, should not have been discovered before the time of Harvey, considering that the fact (although not founded on experiment) is plainly asserted by Plato, whose writings had been so long familiar to the learned world. "The heart, says he, is the centre or knot of the blood vessels: the spring or fountain of the blood which is carried impetuously round: the blood is the pabulum, or food of the flesh: and for the purpose of nourishment, the body is laid out into canals, like those which are drawn through gardens, that the blood may be conveyed, as from a fountain to every part of the pervious body."

Hippocrates also speaks of the "vessels communicating with each other, and of the blood undergoing a kind of flux and reflux from and to the heart like the ebbing and flowing of the sea," and even mentions the throbbing of the temporal arteries, as an evidence of the fact. Galen also had (as I have before said,) showed that the arteries contained blood as well as the veins, by the simple experiment of dividing a branch between two ligatures in a living subject, and thus disproved the opinion of the Alexandria school, that they merely contained air. The lesser circulation, or that through the lungs, had been ascertained by Servetus a Spanish physician, and by Columbus the pupil of Vesalius, and was known to other eminent men; and Cœsalpinus an Italian even mentions the communication between the arteries and veins at their extremities, and speaks of the valves of the arteries and auricles as capable of preventing the return of the blood, but still it is apparent from other parts of his writings that he had no consistent idea of their use or of the circulation. Further, the early discovery of the valves of the heart, and those placed at the mouths of the large arteries which had been made by Erasistratus; of those in the veins of the extremities by Sylvius, as mentioned by Stephanus, and the discovery of similar valves in the veins of the arm by Fabricius of Padua, the preceptor of Harvey, it would seem might at once have led to the belief of the existence of a similar organization in the veins of other parts of the body, and to a knowledge of their use in preventing the return of the blood, to the extremities, and to the deduction of its having been previously carried from the heart by the arteries. It was this organization of the veins that furnished Harvey with one of the strongest arguments in favour of his sublime discovery. Finally, says Dr. Hunter, "the obvious phænomena in bleeding animals to death, the different effects of ligatures on different vessels, the practice of surgery with regard to bleeding and blood vessels, the action of the heart when exposed to view in living bodies, all these so evidently proclaim

the circulation, that there seems to have been nothing more required for making the discovery than laying aside gross prejudices, and considering fairly some obvious truths."* Yet anatomists continued until the time of Harvey to assert that the liver was the source of blood, and that from it, the vital fluid was distributed to other parts of the body.

For an account of the opposition made to Dr. Harvey by the envious part of his contemporaries, and of the injurious effects which this sublime discovery had upon the temporal prosperity of its author, the reader is referred to Dr. Rush's volume of Introductory Lectures, a work which ought to be in the possession of every gentleman, and of every professor of divinity, medicine or law.—The life of Harvey may be found in Hutchinson's Biographia Medica.

Note 32.

See Cruikshank's anatomy of the absorbent vessels, p. 30, London, 1790. The history of the absorbents is curious and extremely interesting.—Erasistratus the grand son of Aristotle had certainly discovered these vessels in the intestines of a kid, but he thought they were arteries and agreeably to the opinion of the Alexandrian school of which he was a pupil, he supposed they contained air like other vessels of the same nature. These vessels are also hinted at by Hippocrates, and Galen, but their real use was ascertained by Azellius of Cremona in 1622, who in dissecting first a dog, and afterwards other quadrupeds, observed vessels containing a milky fluid to commence from the intestines; but though he traced them to a cluster of glands which he called pancreas, yet because he also found a few similar vessels on the liver he supposed that viscus to be their final place of termination. The result of the labour of Azellius was published with coloured plates in 1627, after the death of the author, and the year before Harvey's work on the circulation came

* Introductory Lecture, p. 43.

out: for many years both these works excited great interest and the anatomists of all Europe were zealous in verifying their discoveries, and in testing their remarks by the dissection of living animals. At length Pecquet of Paris saw the chyle actually flowing into the heart of a living dog in a regular stream, and traced the source of this fluid to the common receptacle of the thoracic duct. He published his account in 1651: Eustachius before had seen this duct, but did not know the real use of it: he called it *vena sine pari*. Van Horne a Dutch professor laid claim to the merit of the same discovery the following year. Eustachius had a century before discovered the same vessels in a horse, but he was ignorant of their use in the economy of the animal, or of their origin. The honour of ascertaining both points was reserved for Pecquet. The discovery of another set of absorbents, which arise from all the cavities of animal bodies soon followed by the dissection of dogs, viz. in 1651 or 1652. These were called lymphatics from the pellucid nature of their contents, and were found to end with the lacteals in the thoracic trunk. In later times, the same system of vessels was found by various anatomists in all other animals that were examined, of both land and water, and in the human brain by Mascagni of Italy, from whose dissections a series of the most elegant plates have been published. The merit of discovery of the lymphatics in other parts of the body, besides the intestines, was due to Bartholine and Rudbeck, who were contemporaries in the 17th century. The priority of time however by a few months seems to belong to Rudbeck, although Bartholine first published his account of the lymphatics.

Note 33.

Dr. Edward Stevens of St. Croix: his experiments are contained in his inaugural dissertation on digestion, Edinburgh, 1777: a very good abstract of them may be found in Smellie's philosophy of natural history. Dr. Stevens made some of his experiments upon an Hungarian.

Note 34.

New Edinburgh Encyclopædia, article comparative anatomy. In this way the vermicular and peristaltic motion of the bowels—the respiration of birds, and the action of their gizzards, &c. &c. were ascertained.

Note 35.

The spleen has been extracted from dogs and other animals without any injury, and even from man: as Haller shows by numerous authorities: Phys. tom. 6, p. 421, 4to, Lugdun. Batav. 1764. Mr. Shipton cut out two fingers length of the ilium of a dog, without injury to him. Phil. Trans. No. 283. Dr. Musgrave cut out the cæcum of a bitch, without any injury. Phil. Trans. No. 151. The late Dr. Jones of Philadelphia cut off a portion of the pancreas of a man, that protruded from a wound, and he did well.

Note 36.

One dog lived "for more than twelve months, with the two carotids, the two femorals, and one brachial artery obliterated." The vessels were tied in succession, after the wounds of a previous operation had healed. The dog whose aorta was tied, lived two years, and was then killed; and the body being injected, the anastomosing vessels were beautifully seen. Med. and Chirurg. Trans. London, vol. 2.

Note 37.

The saving of life by taking up the vessels of the neck, or the large vessels of the extremities, when they are diseased or wounded, is a modern improvement in surgery. In former times, death in the one case, and the loss of the limb in the other, was the fate of the sufferer.

Mr. John Bell of Edinburgh, took up the posterior iliac artery, in consequence of its division, by the points of a long pair of scissars, "at the place over the sciatic notch, where it comes out from the pelvis;" it was tied exactly where it turns over the bone, and the man was cured, "and walked stoutly." Surgery, 4to, vol. 1, p. 423.

Mr. Abernethy of London, first tied the external iliac artery above Poupart's ligament, which operation he performed in a case of femoral aneurism. His first and second attempts were unsuccessful, owing to the desperate nature of one case, and an unusual occurrence in the other. Mr. A. afterwards was happy in saving two lives by it.* Mr. Freer and Mr. Tomlinson of Birmingham, performed the same operation with success, each once.† Dr. Dorsey also performed it in the Pennsylvania Hospital, in 1811, successfully.‡ The patient walked on the twentieth day. Mr. Astley Cooper of London, has also tied the carotid artery for aneurism, in two cases, the first, in 1805, was in the right carotid; death took place from "an inflammation of the aneurismal sac and parts adjacent, by which the size of the tumour became increased so as to press on the pharynx, and prevent deglutition, and upon the larynx, so as to excite violent fits of coughing, and ultimately impede respiration." In the second case, in 1808, the disease was in the internal carotid, and was cured. See Medico-Chirurgical Trans. vol. 1, pages 1 and 222. London, 1809. Dr. Post of New York, has also within the last year successfully operated in New York for aneurism in the carotid artery.‡ See also Mr. Cooper's account of the dissection of a limb, in which the operation for poplitial aneurism had been performed, in the Medico-Chirurgical Transactions, vol. 2, London, 1812.

Note 38.

Professor Camper rendered most important services both to human and comparative anatomy. His account of the dissection of apes, monkeys and ourans outang is inserted in the Trans. Royal Soc. London, for 1779—vol. 69, and is entitled

* Surgical observations on the constitutional origin and treatment of local diseases, and on Aneurisms. London, 1809.

† Freer on Aneurism. Birmingham, 1807, 4to.

‡ Dorsey's Surgery, vol. 2.

"*On the organs of speech of the ouran outang.*" But as these animals cannot speak, the expression should have been *voice* and not "speech."—Dr. Tyson of London who was himself an accurate dissector, had published in 1699 "ourang outang, or the anatomy of a pigmy compared with a monkey, an ape and man," 4to. without discovering the difference between their organs of speech and voice. Albinus, Martini and even D'Aubenton are also silent on the striking construction of this organ in apes. The merit of professor Camper was therefore the greater, for it unravelled the mystery of their incapacity of speaking, although possessed of organs, (as was supposed) equally well adapted to the end, as those of man. Mr. White confirms professor Camper's statement, and exhibited a preparation of the membranous bag of the monkey to the Manchester Society. Account of the regular gradation of man, by C. White, p. 27—London 1799. There can be no doubt of the confirmation, nor any difficulty in accounting from it, for the want of speech in ourans, apes, &c. Lord Montboddo labours hard to prove, with Rousseau, the humanity of the ouran outang, and accounts for the difference between the result of Tyson's and Camper's dissections of ourans, by the circumstance of the first having examined one from Angola, and the other those from Borneo. See Origin and Progress of Language, vol. 1. p. 344: and Ancient Metaphysics, vol. 3. p. 44. No anatomist or natural historian who grounds his distinctions of animals upon anatomy will attend to this argument.

Note 39.

D'Aubenton, by the dissection of a camel for Buffon's natural history, had many years since actually found a considerable quantity of water in the cells of the stomach, though the animal had been dead ten days. The water was clear, almost insipid, and drinkable. He therefore assents to the assertion of travellers, that camels are killed for the water in their stomachs. Perrault, who dissected a camel in 1676, Mem. de l'Acad. de Scien. tom. 3, was of the same opinion,

but Mr. Home has put the question beyond all doubt, by the dissection of a camel in London, in the year 1806; an account of which may be found in the Trans. of the royal society Lond. for that year. He fully and very clearly explains, from the structure of the camel's stomach, how that animal is enabled to take in a supply of water for future use, thus fitting him to live in sandy deserts, where supplies of water are precarious or scanty.

Dr. Russel says he knew an instance of a camel in a Bassora caravan, remaining fifteen days without water; but none of the natives recollected a similar instance. Leo Africanus however mentions one. Descript. Africæ, lib 9, p. 281. Dr. Russel says that camels sometimes show a preference for salt water. Nat. History of Aleppo, vol 2, p. 167, 168, London, 1794, 4to.

Note 40.

Chemistry also has recently lent its aid to disprove a popular error, which has long prevailed respecting the origin of the salt familiar to most persons by the name of sal ammoniac, which was first brought to Europe from Egypt, and was said in early times to be formed by the action of the camel's urine upon the sands of the desert, near the temple of Jupiter Ammon. Lemery and Pomet both give assent to this notion, and the latter, in his history of drugs, gives a plate of a camel in the act of discharging his urine, and the mass of salt forming in consequence of it under his body !* But the recent analysis of the urine of the camel, shows that ammonia exists in it in so small a proportion, as to render it impossible to suppose it could have the least agency in the formation of the salt in question.

The analysis of the urine of camels referred to, was made by two good chemists, in different countries, viz. Messrs.

* Pomet on Drugs, page 250. London, 1737. The work was originally published in French, in 1694. Lemery derives ammonia from αμμος, (ammos) arena, sand.

Rouelle in France and Mr. Brande in London, and their agreement in the general result, leaves no doubt as to the accuracy of it.

Analysis of the camel's urine, as given by Mr. Home.

BRANDE.		ROUELLE.*
Water,	75	Carbonat of Potash,
Phosphat of Lime, Muriat of Ammonia, Sulphat of Potash, Urat of Potash, Carbonat of Potash,	6	Sulphat of Potash, Muriat of Potash, Urea.
Muriat of Potash,	8	
Urea,	6	
	95	

* Thompson's Chemistry, second Edition, vol. 4, page 655.

The urine of cows was also analyzed by both Mess. Brande and Rouelle, both of whom agree in stating that potash is the only fixed alkali in them.

We now know that the salt which the ancients called *sal ammoniac*, was common salt: and that the true sal ammoniac is not found native. The Egyptians are stated to have procured it by sublimation from soot of cow's or camel's manure, urine and common salt: but from accounts transmitted to the royal society at Paris, it appears certainly that this salt is procured by sublimation from the soot taken alone without any addition. Nicholson's Chemical Dictionary, vol. 1, p. 116; and Magellan's edition of Cronstadt's Mineralogy, p. 458. The soot taken from the chimneys in which cow dung only, as fuel, is burnt, is said to furnish the best sal ammoniac. This salt is however commonly prepared from burnt bones, in the United States, and in Europe.

From Vauquelin's analysis of the urine of various animals, (Annales de Chimie, tom. 82, p. 197,) it appears that the urines of the lion and the tiger are perfectly similar, and differ from the human in some essential points.

1. It is alkaline, even at the instant of being voided, and hence its bad odour; while the urine of a healthy man is always acid.

2. They do not contain any uric acid, nor any combination of this acid with the alkalis. The defect of uric acid in those urines, struck Mr. Vauquelin more forcibly, as he used to ascribe its formation to animal food.

3. They contain only a very small quantity of muriate of soda, (sea salt,) whereas that of man contains a great deal. We find in these urines, much urea, phosphates of soda and of ammonia, sulphate of potash, mucous matter, and a trace of iron. The urine of the beaver has a great resemblance to the urine of herbiverous animals; that of a rabbit, contains lime, magnesia, and carbonate of potash, sulphates of potash and of lime, muriate of potash, urea, gelatine, and sulphur. He did not find any soda in the urines of the camel, cow, Guinea pig, or rabbit. The urine of the horse, according to Fourcroy and Vauquelin, (Thompson's Chemistry, vol. 4,) contains carbonates of lime and of soda, much benzoat of soda, muriate of potash, and urea. Mr. Brande's analysis of the horse's urine, agrees with that of Messrs. Fourcroy and Vauquelin, but he also found in it sulphate of soda, muriate of soda, but no urea, potash or ammonia. Mr. Brande found that the urine of the ass contains a much greater relative proportion of the phosphat of lime and urea, also carbonate, sulphate, and muriate of soda, and a small quantity of potash. The urine of both the horse and ass is destitute of ammonia.

The foregoing details of the urine of various animals are given, as being connected with the interests of agriculture; urine having been found to be highly stimulant to vegetables: and from the abundance of certain ingredients in that of a particular animal, and their deficiency in others, we may ascertain why certain urines are prejudicial, or useful to particular plants.

Note 41.

The notion of the submersion of swallows during winter is of Swedish origin. Olaus, the bishop of Upsal first promulgated it, and naturalists more worthy of attention assented

to it. Linnæus confined submersion to chimney swallows and martins. Kalm his pupil believes the story, and begins the discussion of the subject by saying that "natural history like all other histories depends not always upon the intrinsic degree of probability, but upon facts founded on the testimony of people of noted veracity."* But this testimony must not violate probability, nor be inconsistent with one of the first rules of philosophising, viz. that "like causes produce like effects;" now, if we find that the lungs of two animals are constructed precisely alike, and that one of them cannot live under water, we must conclude that the other is also deficient in that same power. This is the case with man and swallows: both are formed alike, and hence they must be subject to the same laws. Those who wish to see more on this question are referred to a paper I published (anonymously) in the Med. Repository of N. York, vol. 3, p. 241.—1800. Barton's Fragments, Philad. 1799, Caldwell's Memoirs, 1801, and to "Observations on the brumal retreat of the swallows," by Thomas Foster, F. Lin. Soc. London, 1813. The arguments of this author in favour of the swallow being a bird of passage are indisputable: he has also annexed an index to passages relating to the swallow in the works of the antients, and in modern European authors, which is curious and highly interesting.

Note 42.

Adrian Vandervelde was born in 1639 at Amsterdam, and was a pupil of John Wynants. He died at the age of 33. See further, Pilkington's dictionary of painters, p. 686, 4to. London, 1798, and Camper on the connexion between anatomy and drawing, &c. translated from the Dutch by Dr. Cogan, London, 1794.

Note 43.

Aristotle long since remarked that the motion or steps of animals in general are made in the line of their diagonal:

* Travels, vol. 2, p. 140.

that is, in the direction of their two opposite quarters. The absurdity of the error noticed is evident. But the camel forms a striking exception to the rule: he walks by raising the two legs of the same side, the one immediately after the other. Aristotel. de hist. animal. lib. 11, cap. 1. Dr. Russel confirms Aristotle's statement. Nat. Hist. of Aleppo, vol. 2, p. 169, & p. 423. The engravings of the skeletons of some of the animals in Buffon's natural history, particularly of the horse, are very inaccurate.

Artists should read the following works besides Camper's.

1. Reflections on the painting and sculpture of the Greeks, with instructions for the connoiseur, and an essay on grace in works of art, translated from the German original of the Abbe Winkleman, by Henry Fusseli, London, 1765—8vo.

2. Count Algarotti on painting, London, 1763—12mo.

3. Dr. Brisbane on the anatomy of painting, with 6 plates, London, 1769.

4. Essays on the anatomy of expression in painting, with plates, by Charles Bell, 4to, London, 1804. This last is by one of the first anatomists of the present day, and ought to be studied by every painter or engraver, of either man or animals.

Note 44.

Gentleman's Magazine, 1790, p. 299.

Note 45.

See an account of a case of croup in a calf, in memoirs of the Philadelphia society for promoting agriculture, vol. 3, by Mr. Peters, president of the society.

Note 46.

Memoirs medical society, London, vol. 5.

Note 47.

This disease has prevailed with great mortality in Philadelphia county during the last spring. Mr. G. Montague gives some reasons, for believing that by mixing the food of fowls with urine instead of water, and feeding them with it three or four times a day, it may be removed. Memoirs of

Wernerian Nat. Hist. Soc. Edinburgh, vol. 1. 1811. Mr. Peters informs me that he cures it by small pills of camphor, given twice a day.

Notes 48, 49.

Gentleman's Magazine, 1790, page 497.

Note 50.

Mr. Lawrence, "Philosophical and practical treatise on horses," has justly ridiculed, and with much pleasantry, the absurd farrago of nostrums administered by farriers.

Note 51.

I was told by an intelligent drover, that it is the cattle from the district of the long-leaved pine, that possess the power of diseasing other cattle. This species is the *Pinus Australis* of Michaux, *Pinus Palustris* of Linnæus, the pitch pine, yellow pine, red pine, or broom pine. According to Michaux, the country occupied by this pine commences near Norfolk, and continues in a south west direction for 250 leagues in length, and 40 to 50 in breadth. See *Histoire des Arbres Forestiers de L'Amer. Septent. Paris*, 1810. I would be very thankful for any information on the subject of the disease in question. We see something similar to the disease produced among northern cattle, by mixing with those from the south, in the human race. During the revolution war in the United States, the mixture of southern with northern troops, speedily induced disease, if encamped together, although both had been previously healthy. See Rush's Works, vol. 1. In like manner, the mixture of the crews of ships of different nations, at sea, has often produced disease. See Blane's diseases of seamen, page 235; and the arrival of a stranger at St. Kilda, one of the remote and small western islands of Scotland, produces a catarrh among the inhabitants.—Martin's History of the Western Islands, page 284. The case of the South Carolina cattle is however peculiar. We do not find that those from other states produce a similar complaint, or any other, when mixed with the stock of Pennsylvania. The fatal disease alluded to, that

occurred in 1796, in one instance, at Columbia, on the Susquehannah, attacked stock which had merely strolled about, or had lain down in a ploughed field, in which the South Carolina cattle had been previously penned for one night; a full proof of the virulence of the effluvia left by them on the ground. The precaution suggested by the foregoing facts, in grazing, and in armies and navies, is obvious.

Note 52.

See Memoirs of the Philadelphia Society for promoting Agriculture, vol. 1, pages 139, 154.

Note 53.

See account of this disease, by the Rev. Mr. Parsons, in the New York Medical Repository, vol. 1.

Note 54.

See Archives of useful knowledge, vol. 1, page 398, and vol. 2, page 400.

Note 55.

For Mr. Hunter's account of the inflammation of a vein from bleeding, (which is highly interesting,) see Transactions of a society for the improvement of medical and chirurgical knowledge, London, 1793, page 18. Also, Dorsey's Surgery, vol. 1. The late Mr. Wignell, of the Philadelphia Theatre, died of this disease.

Inflammation in the veins of horses or man, after bleeding, according to Hunter, arises from not fully closing the external wound, "and when inflammation takes place beyond the orifice, the surgeon should immediately put a compress upon the vein, at the inflamed part, to make the two sides adhere together: or if they do not adhere, yet simple contact will be sufficient to prevent suppuration in this part: or if inflammation has gone so far as to make the surgeon suspect that suppuration has taken place, then the compress must be put upon that part of the vein just above the suppuration. This I once practiced, and as I suppose, with success." If the disease proceeds, bleeding and other depleting remedies are to be used. Dr. Physick has applied

a blister over the part with success. Dorsey's Surgery vol. 1.

"Upon tracing the vessels, after death, from the inflamed part," Mr. Hunter says, "pus is found mixed with the blood. In some places the sides of the vein were adhering, and in others the inner surface of the vein was furred over with coagulable lymph."

Note 56.

The cases of the cure of the disease produced by the bite of a mad dog, in Calcutta, which have been recently published by Mr. Tymon, Dr. Shoolbred, and Dr. Berry, ought possibly to be adduced as exceptions to the general position; but we must have more cures by the same remedy, before it can be said to be safe. *It never has succeeded before in any country.* See Medical Repository, vol. 2, New Series, and Eclectic Repertory, Philadelphia, vol. 3, for the cases alluded to.

Note 57.

Metam. lib. 7. v. 523.

Note 58.

Livy, lib. 41.

Note 59.

Mem. Med. Soc. London, vol. 5, and Webster's history of epidemic and pestilential diseases, vol. 1, pages 139 and 321. Hartford, 1799.

Notes 60, 61.

Webster, vol. 1, pages 86, 181, and other places. Mr. Webster has rendered an essential benefit to medicine, by his great collection of facts on the subject of epidemic diseases, and by showing their connexion with, and occasional dependence on natural phænomena.